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D1.2 - City Diagnosis: analysis of existing city plans

WP1; Task 1.2

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Table of content

Executive Summary.....	19
1 Introduction.....	20
1.1 Purpose and target group	20
1.2 Contribution partners.....	21
1.3 Relation to other activities in the project.....	22
2 City Diagnosis Approach	23
2.1 Analysis of the main city characteristics and city level indicators.....	25
2.2 Analysis of the existing city plans	27
2.3 Modelling the energy demand side.....	27
2.4 City needs and priorities identification	28
3 City Diagnosis: analysis of the City Level Indicators.....	29
3.1 Classification and description of the indicators.....	30
3.1.1 Energy & Environment.....	31
3.1.2 Mobility.....	32
3.1.3 Governance	32
3.1.4 Society & Citizens	33
3.2 Methodology for the calculation of the city indexes.....	35
3.2.1 Step I: Indicators Calculation	37
3.2.2 Step II: Indicators Normalisation.....	41
3.2.3 Step III: Prioritisation of categories, application fields and indicators.....	46
3.2.4 Step IV: Aggregation to calculate the city indexes.....	53
4 City Diagnosis: analysis of the existing city plans	55
4.1 Analysis of city plans towards the development of a City Vision 2050	56
4.1.1 Short Term Plans	62
4.1.2 Medium Term Plans	63
4.1.3 Long Term Plans.....	66
4.1.4 European targets.....	67
4.2 Methodology for the analysis of the existing city plans	71
4.2.1 Template for collecting information.....	71
4.2.2 Targets Defined.....	73
4.2.3 Identification of Actions	74
4.2.4 Actuation Areas identified and Financial schemes.....	74
4.2.5 Main needs and priorities identified from the analysis of the existing city plans...	74
5 City Diagnosis: Groningen.....	75
5.1 General overview of the city.....	75

5.2	City characterisation.....	77
5.2.1	Energy & Environment characterization.....	77
5.2.2	Mobility characterization.....	77
5.2.3	Governance characterization	78
5.2.4	Society & Citizens characterization.....	78
5.3	City indexes calculation.....	79
5.3.1	Indicators Normalised	79
5.3.2	Categories, application fields and indicators prioritised.....	80
5.3.3	Aggregation and calculation of the city indexes.....	80
5.4	Analysis of the existing city plans	84
5.4.1	Main City Plans identified	84
5.4.2	Main targets defined in the city plans	85
5.4.3	Main actions identified to achieve the defined goals	87
5.4.4	Actuation areas identified and financial schemes	89
5.4.5	Main needs and priorities identified from the analysis of the existing city plans...	91
6	City Diagnosis: Oulu	92
6.1	General overview of the city.....	92
6.2	City characterisation.....	94
6.2.1	Energy & Environment characterization.....	94
6.2.2	Mobility characterization.....	95
6.2.3	Governance characterization	96
6.2.4	Society & Citizens characterization.....	98
6.3	City indexes calculation.....	99
6.3.1	Indicators Normalised	99
6.3.2	Categories, application fields and indicators prioritised.....	100
6.3.3	Aggregation and calculation of the city indexes.....	101
6.4	Analysis of the existing city plans	104
6.4.1	Main City plans identified	104
6.4.2	Main targets defined in the city plans	105
6.4.3	Main actions identified to achieve the defined goals	106
6.4.4	Actuation areas identified and financial schemes	110
6.4.5	Main needs and priorities identified from the analysis of the existing city plans...	112
7	City Diagnosis: Bassano del Grappa	114
7.1	General overview of the city.....	114
7.2	City characterisation.....	116
7.2.1	Energy & Environment characterization.....	116
7.2.2	Mobility characterization.....	117
7.2.3	Governance characterization	117
7.2.4	Society & Citizens characterization.....	118

7.3	City indexes calculation.....	119
7.3.1	Indicators Normalised	119
7.3.2	Categories, application fields and indicators prioritised.....	120
7.3.3	Aggregation and calculation of the city indexes.....	121
7.4	Analysis of the existing city plans	124
7.4.1	Main City plans identified	124
7.4.2	Main targets defined in the city plans	125
7.4.3	Main actions identified to achieve the defined goals	126
7.4.4	Actuation areas identified and financial schemes	128
7.4.5	Main needs and priorities identified from the analysis of the existing city plans	129
8	City Diagnosis: León	130
8.1	General overview of the city.....	130
8.2	City characterisation.....	133
8.2.1	Energy & Environment characterization.....	133
8.2.2	Mobility characterization.....	135
8.2.3	Governance characterization	136
8.2.4	Society & Citizens characterization.....	137
8.3	City indexes calculation.....	140
8.3.1	Indicators Normalised	140
8.3.2	Categories, application fields and indicators prioritised.....	141
8.3.3	Aggregation and calculation of the city indexes.....	142
8.4	Analysis of the existing city plans	145
8.4.1	Main City plans identified	145
8.4.2	Main targets defined in the city plans	147
8.4.3	Main actions identified to achieve the defined goals	150
8.4.4	Actuation areas identified and financial schemes	150
8.4.5	Main needs and priorities identified from the analysis of the existing city plans...	152
9	City Diagnosis: Kadıköy.....	153
9.1	General overview of the city.....	153
9.2	City characterisation.....	155
9.2.1	Energy & Environment characterization.....	155
9.2.2	Mobility characterization.....	158
9.2.3	Governance characterization	160
9.2.4	Society & Citizens characterization.....	161
9.3	City indexes calculation.....	162
9.3.1	Indicators Normalised	162
9.3.2	Categories, application fields and indicators prioritised.....	163
9.3.3	Aggregation and calculation of the city indexes.....	164
9.4	Analysis of the existing city plans	167

9.4.1	Main City plans identified	167
9.4.2	Main targets defined in the city plans	169
9.4.3	Main actions identified to achieve the defined goals	172
9.4.4	Actuation areas identified and financial schemes	173
9.4.5	Main needs and priorities identified from the analysis of the existing city plans...	175
10	City Diagnosis: Trenčín.....	176
10.1	General overview of the city.....	176
10.2	City characterisation.....	178
10.2.1	Energy & Environment characterization.....	178
10.2.2	Mobility characterization.....	179
10.2.3	Governance characterization	180
10.2.4	Society & Citizens characterization.....	181
10.3	City indexes calculation.....	183
10.3.1	Indicators Normalised	183
10.3.2	Categories, application fields and indicators prioritised.....	184
10.3.3	Aggregation and calculation of the city indexes.....	185
10.4	Analysis of the existing city plans	188
10.4.1	Main City plans identified	188
10.4.2	Main targets defined in the city plans	189
10.4.3	Main actions identified to achieve the defined goals	190
10.4.4	Actuation areas identified and financial schemes	192
10.4.5	Main needs and priorities identified from the analysis of the existing city plans...	193
11	City Diagnosis: Vidin	194
11.1	General overview of the city.....	194
11.2	City characterisation.....	197
11.2.1	Energy & Environment characterization.....	197
11.2.2	Mobility characterization.....	200
11.2.3	Governance characterization	201
11.2.4	Society & Citizens characterization.....	201
11.3	City indexes calculation.....	203
11.3.1	Indicators Normalised	203
11.3.2	Categories, application fields and indicators prioritised.....	204
11.3.3	Aggregation and calculation of the city indexes.....	205
11.4	Analysis of the existing city plans	208
11.4.1	Main City plans identified	208
11.4.2	Main targets defined in the city plans	210
11.4.3	Main actions identified to achieve the defined goals	212
11.4.4	Actuation areas identified and financial schemes	214

11.4.5	Main needs and priorities identified from the analysis of the existing city plans...	217
12	City Diagnosis: Lublin	219
12.1	General overview of the city	219
12.2	City characterisation	221
12.2.1	Energy & Environment characterization	221
12.2.2	Mobility characterization	222
12.2.3	Governance characterization	223
12.2.4	Society & Citizens characterization	223
12.3	City indexes calculation	225
12.3.1	Indicators Normalised	225
12.3.2	Categories, application fields and indicators prioritised	226
12.3.3	Aggregation and calculation of the city indexes	227
12.4	Analysis of the existing city plans	230
12.4.1	Main City plans identified	230
12.4.2	Main targets defined in the city plans	231
12.4.3	Main actions identified to achieve the defined goals	233
12.4.4	Actuation areas identified and financial schemes	235
12.4.5	Main needs and priorities identified from the analysis of the existing city plans...	238
13	Conclusions	239
	Bibliography	241
	Annex A: Groningen	243
A.1	City Level Indicators	243
A.2	Existing City Plans	245
	Annex B: Oulu	258
B.1	City Level Indicators	258
B.2	Existing City Plans	260
	Annex C: Bassano del Grappa	275
C.1	City Level Indicators	275
C.2	Existing City Plans	277
	Annex D: León	289
D.1	City Level Indicators	289
D.2	Existing City Plans	291
	Annex E: Kadıköy	316
E.1	City Level Indicators	316
E.2	Existing City Plans	318
	Annex F: Trenčín	346
F.1	City Level Indicators	346

F.2	Existing City Plans	348
Annex G: Vidin		357
G.1	City Level Indicators	357
G.2	Existing City Plans	359
Annex H: Lublin		374
H.1	City Level Indicators	374
H.2	Existing City Plans	376

List of figures

Figure 1: MAKING-CITY City Diagnosis Approach	24
Figure 2: Steps for the City Diagnosis characterisation.....	26
Figure 3: Classification of the City Level Indicators	29
Figure 4: Application fields within the categories of the City Level Indicators	29
Figure 5: City characterisation indexes approach.....	35
Figure 6: Levels of indicator groupings.....	37
Figure 7: Template for City Level Indicators data gathering	39
Figure 8: Proportion of method used for indicator weighting	46
Figure 9: Analytic Hierarchy Process (AHP) approach	47
Figure 10: Top down structure for MAKING-CITY indicators.....	47
Figure 11: Energy & Environment structure	49
Figure 12: Proportion of method used for indicator aggregation.....	53
Figure 13: Radar view of an example Indexes per Category	54
Figure 14: Radar view of an example Indexes per Application Field.....	54
Figure 15: Layers Planning process.....	55
Figure 16: Topics covered by the plans.....	61
Figure 17: Long, medium and short term planning concepts	62
Figure 18: Covenant of Mayors' requirements	64
Figure 19: Methodology for the long term planning.....	66
Figure 20: European Energy Targets	67
Figure 21: What Groningen is	75
Figure 22: Groningen's highlights	75
Figure 23: Radar view of Groningen Indexes per Category.....	81
Figure 24: Radar view of Groningen Indexes per Application Field	83
Figure 25: Actuation areas in Groningen.....	89
Figure 26: What Oulu is.....	92
Figure 27: Oulu's highlights.....	93
Figure 28: Oulu Administrative Organisation.....	96
Figure 29: Radar view of Oulu Indexes per Category	101
Figure 30: Radar view of Oulu Indexes per Application Field	103

Figure 31: Some climate actions in Oulu related to those realized by city or its companies.	109
Figure 32: Climate actions in Oulu towards carbon neutrality	110
Figure 33: Kaujovainio area and the places of old (3) and new (2) combined heat and power plants.....	111
Figure 34: What Bassano del Grappa is.....	114
Figure 35: Bassano del Grappa's highlights.....	115
Figure 36: Bassano del Grappa total energy consumption.....	116
Figure 37: Radar view of Bassano del Grappa Indexes per Category	121
Figure 38: Radar view of Bassano del Grappa Indexes per Application Field.....	122
Figure 39: Main actuation areas in Bassano del Grappa.....	128
Figure 40: What León is.....	130
Figure 41: León's highlights.....	131
Figure 42: Percentage of housing per construction year in León	133
Figure 43: Population density in León	138
Figure 44: Housing density in León	138
Figure 45: Distribution of the number of companies in the Municipality by sector	139
Figure 46: Radar view of León Indexes per Category	142
Figure 47: Radar view of León Indexes per Application Field	143
Figure 48: Main actuation area in León.....	151
Figure 49: What Kadıköy is.....	153
Figure 50: Kadıköy's highlights.....	154
Figure 51: Kadıköy final energy consumptions /m ² by fuel types.....	156
Figure 52: Residential energy consumption (data derived from a user in Kadıköy)	157
Figure 53: Kadıköy residential sector final consumption (in GWh) by fuel types and by activities	157
Figure 54: Tertiary energy consumption (data derived from a user in Kadıköy).....	157
Figure 55: Kadıköy tertiary sector final energy consumption (in GWh) by fuel types and by activities	158
Figure 56: Energy consumption of public transportation by means of vehicle type.....	159
Figure 57: Energy consumption per passenger [KWh/passenger].....	159
Figure 58: Total energy consumption of vehicle type [GWh]	160
Figure 59: Radar view of Kadıköy Indexes per Category	164

Figure 60: Radar view of Kadıköy Indexes per Application Field.....	165
Figure 61: Dedicated Urban Transformation Areas in Kadıköy	173
Figure 62: What Trenčín is.....	176
Figure 63: Trenčín Castle.....	177
Figure 64: Trenčín's highlights.....	177
Figure 65: Trenčín sources division on energy consumption	178
Figure 66: Trenčín shares of the different transport modes.....	180
Figure 67: Radar view of Trenčín Indexes per Category	185
Figure 68: Radar view of Trenčín Indexes per Application Field	186
Figure 69: Actuation areas of Trenčín planning	192
Figure 70: What Vidin is	194
Figure 71: Climate data for Vidin.....	194
Figure 72: Baba Vida, the only fully preserved fortress in Vidin area	196
Figure 73: Vidin's highlights	196
Figure 74: Inability to keep home adequately warm, 2018 (source: Energy Poverty Observatory).....	198
Figure 75: Dwelling comfortably warm during winter time, 2012 (source: Energy Poverty Observatory ⁶⁵).....	198
Figure 76: Dwelling comfortably cool during summer time, 2012 (source: Energy Poverty Observatory ⁶⁵).....	198
Figure 77: Radar view of Vidin Indexes per Category	205
Figure 78: Radar view of Vidin Indexes per Application Field	206
Figure 79: PED zones identified in Vidin	214
Figure 80: PED zone identified in Vidin: GK Saedinenie and GK Himik.....	215
Figure 81: PED zone identified in Vidin: Vida 2	215
Figure 82: What Lublin is	219
Figure 83: Lublin's highlights	220
Figure 84: Radar view of Lublin Indexes per Category	227
Figure 85: Radar view of Lublin Indexes per Application Field	228
Figure 86: Actuation areas of Lublin planning.....	237

List of tables

Table 1: Contribution of partners	21
Table 2: Relation to other activities in the project	22
Table 3: City Energy Profile indicators	31
Table 4: GHG Emissions indicators.....	31
Table 5: Waste Management indicators	31
Table 6: City Mobility Profile indicators	32
Table 7: Economy indicators.....	32
Table 8: Initiatives and Strategies of the Public Administration indicators	33
Table 9: Public ICT / Data indicators	33
Table 10: Affordable Housing indicators	33
Table 11: Citizen Engagement and Empowerment indicators.....	33
Table 12: Urban Structure indicators.....	34
Table 13: Description of the different Likert scales used by quality indicators.....	39
Table 14: Energy & Environment indicators normalisation methodology.....	42
Table 15: Mobility indicators normalisation methodology.....	43
Table 16: Governance indicators normalisation methodology	44
Table 17: Society & Citizens indicators normalisation methodology	44
Table 18: Heating degree-days classification and target values regarding DH-network	45
Table 19: Cities clustering according to their heating degree-days.....	45
Table 20: Scale of relative importance of the AHP method	48
Table 21: Example of the pair-wise comparison among Energy & Environment application fields	49
Table 22: Example of the pair-wise comparison among City Energy Profile indicators	49
Table 23: Example of the Energy & Environment application fields comparison MATRIX.....	50
Table 24: Example of the City Energy Profile indicators comparison MATRIX.....	50
Table 25: Example of the categories normalised matrix and obtaining relative weights.....	51
Table 26: Example of the categories normalised matrix and obtaining relative weights.....	51
Table 27: Random Index (RI) for the different n matrix	51
Table 28: Energy & Environment Indicators Weighting per Category and per Application field	52

Table 29: Plans identified by the MAKING-CITY cities classified by their scope	56
Table 30: Plans identified by the MAKING-CITY cities classified by period of implementation.....	58
Table 31: Topics covered by the different plans identified by the MAKING-CITY cities.....	62
Table 32: Global Covenant of Mayors initiatives	63
Table 33: MAKING-CITY cities status related to the signature of Covenant of Mayors.....	64
Table 34: SEAP, SECAP and SUMP approaches	65
Table 35: European 2020 targets	68
Table 36: European 2030 targets	69
Table 37: European 2050 targets	69
Table 38: Information to be extracted from the Local plans.....	71
Table 39: Information to be extracted from the Regional and National plans	72
Table 40: Template for City targets aligned with the European ones	73
Table 41: Groningen climate characterisation	76
Table 42: Groningen Indicators Normalised.....	79
Table 43: Groningen Indicators Weighting per Category and per Application field	80
Table 44: Groningen Indexes per Category	81
Table 45: Groningen Indexes per Application Field.....	82
Table 46: Groningen Short Term plans.....	84
Table 47: Groningen Medium Term plans.....	84
Table 48: Groningen targets aligned with the European ones.....	85
Table 49: Main financial instruments in Groningen.....	90
Table 50: Oulu climate characterisation.....	93
Table 51: Oulu Indicators Normalised	99
Table 52: Oulu Indicators Weighting per Category and per Application field	100
Table 53: Oulu Indexes per Category.....	101
Table 54: Oulu Indexes per Application Field	102
Table 55: Oulu Short Term plans	104
Table 56: Oulu Medium Term plans	104
Table 57: Oulu targets aligned with the European ones	106
Table 58: Bassano del Grappa climate characterisation.....	114
Table 59: Bassano del Grappa Indicators Normalised	119

Table 60: Bassano del Grappa Indicators Weighting per Category and per Application field	120
Table 61: Bassano del Grappa Indexes per Category.....	121
Table 62: Bassano del Grappa Indexes per Application Field	122
Table 63: Bassano del Grappa Short Term plans.....	124
Table 64: Bassano del Grappa Medium Term plans.....	124
Table 65: Bassano del Grappa targets aligned with the European ones.....	125
Table 66: León climate characterisation.....	132
Table 67: León emissions inventory. Calculation of the carbon footprint 2018	134
Table 68: Consumption and emissions in León 2018	134
Table 69: León Indicators Normalised	140
Table 70: León Indicators Weighting per Category and per Application field.....	141
Table 71: León Indexes per Category.....	142
Table 72: León Indexes per Application Field	143
Table 73: León Short Term plans	145
Table 74: León Medium Term plans.....	146
Table 75: León targets aligned with the European ones	148
Table 76: Kadıköy climate characterisation.....	153
Table 77: Total energy consumptions of Kadıköy	156
Table 78: Kadıköy public transportation modes and energy consumption	158
Table 79: Number of public transport means, fuel type and travelled distance of Kadıköy...	159
Table 80: Kadıköy Indicators Normalised.....	162
Table 81: Kadıköy Indicators Weighting per Category and per Application field.....	163
Table 82: Kadıköy Indexes per Category.....	164
Table 83: Kadıköy Indexes per Application Field	165
Table 84: Kadıköy Short Term plans.....	167
Table 85: Kadıköy Medium Term plans.....	168
Table 86: Kadıköy targets aligned with the European ones.....	169
Table 87: Trenčín climate characterisation.....	177
Table 88: Trenčín Indicators Normalised	183
Table 89: Trenčín Indicators Weighting per Category and per Application field.....	184
Table 90: Trenčín Indexes per Category.....	185

Table 91: Trenčín Indexes per Application Field	186
Table 92: Trenčín Short Term plans	188
Table 93: Trenčín Medium Term plans	189
Table 94: Trenčín targets aligned with the European ones	189
Table 95: Vidin climate characterisation	195
Table 96: Vidin transport energy consumption by type of transport	200
Table 97: Vidin Indicators Normalised	203
Table 98: Vidin Indicators Weighting per Category and per Application field	204
Table 99: Vidin Indexes per Category	205
Table 100: Vidin Indexes per Application Field	206
Table 101: Vidin Short Term plans	208
Table 102: Vidin targets aligned with the European ones	210
Table 103: Lublin climate characterisation	220
Table 104: Lublin Indicators Normalised	225
Table 105: Lublin Indicators Weighting per Category and per Application field	226
Table 106: Lublin Indexes per Category	227
Table 107: Lublin Indexes per Application Field	228
Table 108: Lublin Short Term plans	230
Table 109: Lublin Medium Term plans	231
Table 110: Lublin targets aligned with the European ones	232
Table 111: Groningen City Level Indicators calculation	243
Table 112: Oulu City Level Indicators calculation	258
Table 113: Bassano del Grappa City Level Indicators calculation	275
Table 114: León City Level Indicators calculation	289
Table 115: Kadıköy City Level Indicators calculation	316
Table 116: Trenčín City Level Indicators calculation	346
Table 117: Vidin City Level Indicators calculation	357
Table 118: Lublin City Level Indicators calculation	374

Abbreviations and Acronyms

Acronym	Description
AHP	Analytic Hierarchy Process
BaU	Business as Usual
CITYkeys	Smart city performance measurement framework (EU project defining a common indicator framework to assess the performance of smart city projects and smart cities in Europe).
CoM	Covenant of Mayors
DH	District Heating
EE	Energy Efficiency
EEV	Energy Efficient Vehicles
EPBD	Energy Performance of Building Directive
ESCO	Energy Services Company
ESPRESSO	systEmic Standardisation aPRroach to Empower Smart cities and cOmmunities (EU project to harmonise standardisation approaches for smart city lighthouse projects).
ETS	Emissions Trading Regime
EV	Electrical vehicle
FP7	EU Seventh Framework Programme
FWC	Follower City
GCoM	Global Covenant of Mayors
GDP	Gross Domestic Product
GHG	Greenhouse Gases
ICT	Information and Communication Technology
ISO	International Standards Organization
IT	Information Technology
JRC	Joint Research Centre (the European Commission's science and knowledge service)
KPI	Key Performance Indicator
LH	Lighthouse
LHC	Lighthouse City

Acronym	Description
LMS	Learning Management System
LT	Long Term
MCDM	Multi-criteria Decision Making
MT	Medium Term
OECD	Organisation for Economic Co-operation and Development
PED	Positive Energy District
PV	Photovoltaic
RES	Renewable Energy Sources
R&D	Research & Development
SCIS	Smart Cities Information System
SEAP	Sustainable Energy Action Plan
SECAP	Sustainable Energy and Climate Action Plan
SME	Small and Medium Enterprise
ST	Short Term
SUMP	Sustainable Urban Mobility Plan
WP	Work Package

Executive Summary

The present deliverable includes a deeply analysis of the city plans and characteristics of the project cities within the WP1 “New long-term urban planning towards 2050” of MAKING-CITY project, in order to make a good city diagnosis and be able to develop the advanced long term planning on the basis of each city. WP1 aims at the development of methodologies, procedures and integrated tools to support advanced long term planning for reaching a new 2050 city vision approach. The objective of the whole WP is guiding the urban energy transition according to a long term approach properly combined with the already existing medium term plans and short term roadmaps, formulated as implementation project to reach an effective and viable set of actions, fostering a consolidated and impact-based energy transition.

The city diagnosis is a key phase for the deployment of an urban energy transition methodology because by an accurate diagnosis it can be identified the priority action lines.

Task 1.2 whose result is this deliverable, is focused in the diagnosis of the lighthouse and follower cities. All cities involved in MAKING-CITY have carried out a city audit, analysing the existing city plans and their most relevant characteristics from a city level point of view. The cities have analysed their defined targets and goals achieved as the first step to baseline the real cities situation and to prioritise their needs mainly in the energy field.

In this deliverable, a process to analyse the information included in the city plans has been established and aligned with the WP5 developments. All cities have calculated the city level indicators defined in the D5.1 “City Level Indicators” as part of this city diagnosis and characterization.

The diagnosis of the cities is carried out in a twofold scope. First, cities are characterised according to some areas through the city level indicators defined in D5.1, through a methodology that normalises and prioritises the indicators to achieve city indexes that characterise it and reflect its strengths and weaknesses. Second, another methodology is developed to analyse the existing city plans, through the main points and going deeply into the targets.

The work carried out by the cities in this task and reported in the present deliverable is the basis of the demand-side characterization of the cities at medium term that will be included as input in deliverables D1.13 to D1.20 “New/Updated SECAP” of each city; and so as well an input for the development of the City Vision 2050 through the definition of Long-Term Vision that will be carried out in deliverables D1.5 to D1.13 “Long-term city plan” of each city.

1 Introduction

1.1 Purpose and target group

This report constitutes Deliverable “D1.2. *City Diagnosis: analysis of existing city plans*” which is the main outcome of “Task 1.2. *Analysis of the existing city plans: targets defined and goals achieved*”.

The main objective of the deliverable is the diagnosis of the lighthouse and follower cities involved in the project. This document includes the analysis of the main characteristics of the cities, their existing city plans, targets defined and goals achieved by the eight cities of the project. The evaluation of the existing city plans is considered as input to the diagnosis towards the definition of the Long Term vision.

In this deliverable, a process to analyse the information included in the city plans has been established and aligned with the WP5 developments. In Task 5.1 the evaluation framework at city level has been defined and the eight cities of MAKING-CITY have calculated the baseline for this set of indicators and it has been included in this deliverable.

The present deliverable is structured as follows:

The chapter 2 describes the MAKING-CITY City Diagnosis Approach.

Chapter 3 aims at describing the methodology and analysis carried out to calculate the city characterisation indexes, taking the city level indicators defined in WP5 and taking into account the city needs and priorities.

Chapter 4 describes the objective of analysing the existing city plans and the methodology used to analyse the existing city plans.

Chapters 5 to 12 are eight sections dedicated to each of the cities of the project, which include a general overview of the city, more specific descriptions of the characteristics of the city in the different categories, the calculation of the city indexes as a result of processing the city level indicators and city needs and priorities, and the analysis of the existing city plans, taking into account their main targets, actions, actuation areas and financial schemes. As a final part in each of the chapters of the cities, a section has been included on the main needs and priorities identified in the previous analyses of the city level indicators and existing city plans performed, by way of conclusions.

Chapter 13 includes the main conclusions of the deliverable on the methodologies carried out and the set of results obtained as a diagnosis of the project cities.

After all these chapters, [Bibliography](#) chapter is included.

Finally, there is an annex for each city ([Annex A](#): Groningen to [Annex H](#): Lublin), with two sections each, where in the first one (from [A.1](#) to [H.1](#)) the result of the calculation of the city level indicators is gathered; and in the second one (from [A.2](#) to [H.2](#)), the complete analysis of the existing city plans is included in its corresponding template.

1.2 Contribution partners

The following Table 1 depicts the main contributions from participant partners in the development of this deliverable.

Table 1: Contribution of partners

Partner nº and short name	Contribution
01 - CAR	Task and deliverable responsible. General structure and content of all chapters of the deliverable.
02 - TEC	Content in chapters 2.3 and 2.4.
03 - GRO	Content in chapter 5 and Annex A
11 - RUG	Content in chapter 5 and Annex A
13 - OUK	Content in chapter 6 and Annex B
20 - VTT	Content in chapters 2.1 and 3.1. Contribution in chapter 6 and Annex B
21 - BAS	Content in chapter 7 and Annex C
22 - UNI	Content in chapter 7 and Annex C
23 - LEO	Content in chapter 8 and Annex D
24 - KM	Content in chapter 9 and Annex E
25 - DEM	Content in chapter 9 and Annex E
35 - TN	Content in chapter 10 and Annex F
27 - STU	Content in chapter 10 and Annex F
28 - VID	Content in chapter 11 and Annex G
29 - GSC	Content in chapter 11 and Annex G
30 - LUB	Content in chapter 12 and Annex H
30a - LPEC	Content in chapter 12 and Annex H

1.3 Relation to other activities in the project

The following Table 2 depicts the main relationship of this deliverable to other activities (or deliverables) developed within the MAKING-CITY Project and that should be considered along with this document for further understanding of its contents.

Table 2: Relation to other activities in the project

Deliverable nº	Relation
D1.3 (D1.22 Initial Version)	The results of the analysis of the present deliverable will serve as input for the D1.3 <i>Tools for modelling energy demand, supply side, simulation of scenarios and estimation of impacts</i> .
D1.4 (D1.23 and D1.24, Initial and Updated Version)	The results of the present deliverable D1.2 will serve as input for the D1.4 <i>Capacity building, coaching and mentoring</i> .
D1.5 – D1.12 (D1.25 – D1.32, Initial Versions)	The present deliverable provides the City Diagnosis for each city for the deliverables D1.5-D1.12 <i>Long-term city plan (City Vision 2050)</i> .
D1.13 – D1.20	The present deliverable will provide the City Diagnosis for each city for the deliverables D1.13-D1.20 <i>New/Updated SECAP of the cities</i> .
D4.1 (D4.20 Initial Version)	The City Diagnosis will serve as input in the D4.1 <i>Methodology and Guidelines for PED design</i> .
D4.3 (D4.16 Initial Version)	The City Diagnosis and analysis of existing city plans within the present deliverable will serve as input in the selection of candidate areas to become a PED in the follower cities within the D4.3 <i>Analysis of FWC candidate areas to become a PED</i> .
D5.1 (D5.13 initial version)	Definition of the city level indicators within D5.1 that have been calculated in the present deliverable D1.2 as part of the city characterization.

2 City Diagnosis Approach

Exploring new plans and strategies for cities requires, among other things, high-quality data, thorough analysis of the local context and truly collaboration and clear communication. Visualising information plays a key role in creating and sharing knowledge. MAKING-CITY presents data on 2 Lighthouse and 6 Follower cities and the urban dimension of a set of key performance indicators featuring energy and environment, mobility, governance and society. Well-established methodologies, new findings and recommendations are presented in a visually attractive way, in a series of diagrams. Bringing statistics and data to life is crucial for effective policy-making in cities and involving stakeholders and the public at large.

The methodological approach gives continuity to previous developments within the scope of FP7¹ Smart City projects, i.e. R2CITIES² and CItYFiED³, and H2020⁴ Lighthouse projects i.e. REMOURBAN⁵, MAtchUP⁶, mySMARTLife⁷. The initial developments from the FP7 projects were focused at district level, with some minor interactions at city level. In particular, the R2CITIES project delivered a holistic design methodology⁸ based on the application of a Multi-Criteria Decision Making approach that would allow designing optimised solutions for district retrofitting [1]. This methodology was based on the evaluation of a set of District Sustainability Indicators while proposing an Integrated Project Delivery method improving the communications among stakeholders and, therefore, the decision-making process. The CItYFiED project developed a procedure composed of several phases and a decision-making process that would aim to understand the city (objectives and needs) in order to deliver a set of customized Strategies for the Sustainable Urban Renovation at district level with the energy efficiency as the main pillar and local authorities as clients. The objective of the CItYFiED Methodology⁹ [2] was to enable the replicability and mass market deployment of energy efficient retrofitting of districts.

The FP7 projects experiences were pushed one step further by the H2020 Lighthouse projects, widening the scope to the city level. The REMOURBAN project presented a methodology for the design of a sustainable urban development strategy for cities. The Urban Regeneration Model (URM)¹⁰ developed within REMOURBAN provides solutions in both technical and non-technical fields addressing the city diagnosis, the temporal goals, the main Smart City enablers within the transformation process and innovations in the key priority areas of energy, mobility and ICTs. Three key frameworks were defined within the overall model, which established the main enablers for the city transformation: Management, Evaluation and Finance. The MatchUP⁶ and mySMARTLife⁷ projects included in the city diagnosis the analysis of their urban plans and city agendas in the short/mid-term

¹ EU Seventh Framework Programme, website: https://ec.europa.eu/research/fp7/index_en.cfm

² R2CITIES project website: <http://r2cities.eu/>

³ CItYFiED project website: <http://es.cityfied.eu/>

⁴ Horizon 2020 EU Programme website: <https://ec.europa.eu/programmes/horizon2020/>

⁵ REMOURBAN project website: <http://www.remourban.eu/>

⁶ MAtchUP project website: <https://www.matchup-project.eu/>

⁷ mySMARTLife project website: <https://www.mysmartlife.eu/mysmartlife/>

⁸ R2CITIES holistic design methodology: <https://www.mdpi.com/1996-1073/11/9/2368/htm>

⁹ CItYFiED Methodology for city renovation at district level:
http://polired.upm.es/index.php/building_management/article/view/3920

¹⁰ REMOURBAN Urban Regeneration Model: <http://www.remourban.eu/technical-insights/infopacks/urban-regeneration-model.kl>

in order to strengthen the planning processes for urban transformation, considering, among others, the concepts of Smart People and Smart economy.

Leveraging on the experience gained on those projects, a sound methodology for city diagnosis has been developed by MAKING-CITY (Figure 1), where several steps are included, and the involvement of various stakeholders at each step is also needed. MAKING-CITY takes a step in the methodological approach bringing the City Vision 2050 and the Positive Energy District (PED) concept to the analysis. Currently, city energy plans for energy transition are designed within a 2030 horizon, which can be considered as a mid-term strategy (part of the 2030 Climate & Energy Framework in Europe). Nevertheless, learning from the past to plan the future of cities for more than the next few years is a real need. In MAKING-CITY, the City Vision 2050 is used as a longer timescale to address the urban energy system transformation towards low-carbon cities.

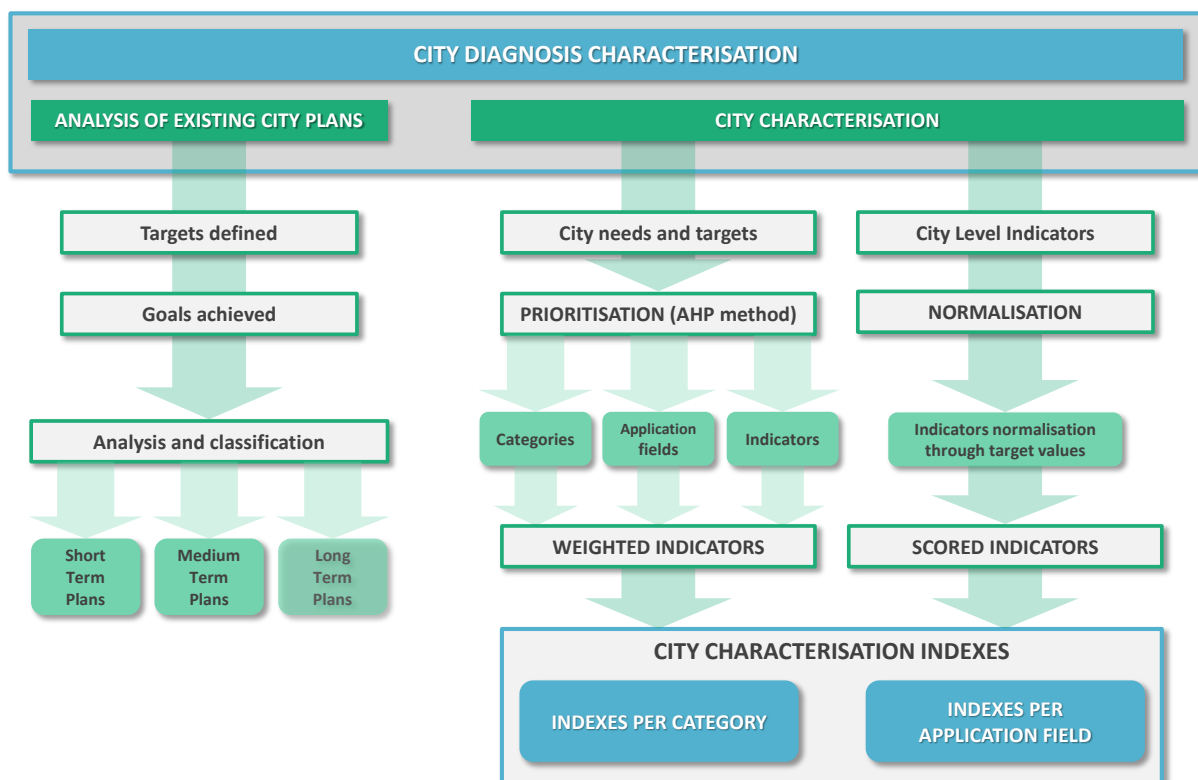


Figure 1: MAKING-CITY City Diagnosis Approach

The MAKING-CITY city diagnosis approach links the analysis of the exiting city plans in the short, medium and long term to the city characterisation in a systematic way, but considering the local context and circumstances of each city. The analysis of existing city plans is focused on gather the most relevant information of the city plans, in order to put in context the city diagnosis carried out through the calculation of the City Level Indicators and the developed methodology to reach the city characterisation indexes.

The cities characterisation will be completed with the demand side characterisation described within deliverable D1.3 (and its initial version D1.22) and carried out for each city within Task 1.6, where the energy demand side and the supply-side will be modelled, and the scenario to a 30 years vision will be analysed, as well as the estimate of the impacts.

2.1 Analysis of the main city characteristics and city level indicators

As first step for the city diagnosis, MAKING-CITY project has defined some key categories whose performance and current conditions have to be quantified and described. For each of these categories, a set of indicators result as a summary of this evaluation. These indicators have been defined and described in the deliverable 5.1. For the calculation and measurement of these indicators, a combination of tools and procedures need to be use (e.g. energy performance simulation engines, non-destructive testing, etc.).

The City Level Indicators are defined and classified in D5.1 and used within this deliverable for the city diagnosis framework.

Indicators have been selected for tracking the overall progress of the sustainability targets (related to energy and environment, mobility) and other smart functions (related to governance, society and citizens, ICT) in the project cities. Indicators are an essential part of the evaluation framework, which provides guidelines for monitoring the evolution of a city towards a smarter city. In MAKING-CITY, the City Level Indicators will be used to show to what extent overall policy goals have been reached in mid or long term energy planning considering all project cities in the pursuit of emission neutral cities with intelligent energy systems.

The process for the indicators selection and definition for city level has been an iterative working process between the contributors of Task 5.1. The process started by analysing the main reference indicator systems developed by CITYkeys¹¹, SCIS¹² and ESPRESSO¹³. In addition, selected on-going smart city projects were investigated for comparison, including MATCHUP, Stardust and mySMARTLife. From the long list of possible indicators at starting point, a robust set of 20 indicators in four different categories were selected to represent the targets of the project. The detailed definitions and calculation methods were finally processed between the key contributors.

The definition of the city level evaluation framework (including the contribution of lighthouse city partners to identifying indicators) can be summarized into the following steps:

1. Structuring the evaluation framework: VTT prepared the draft list of city level (both technical and non-technical) indicators. At this time *Energy & Environment*, *Mobility*, *Governance* and *Society & Citizens* categories were established in order to discuss more in detail about the indicator selection, applicability and data availability.
2. Defining the evaluation procedure and indicators: This step included the matching of indicator framework with city level actions in relation with project level interventions, and the definition of practical steps to collect the data, calculate the indicator values and report the development. Methodological guidelines on evaluation procedures (baseline definition, impact assessment methods) must still be further discussed in collaboration between technical partners.

¹¹ CITYkeys website: <http://www.citykeys-project.eu/>

CITYkeys Key Performance Indicators: http://www.citykeys-project.eu/citykeys/cities_and_regions

CITYkeys Indicators for smart city projects and smart cities: <http://citykeys-project.eu/citykeys/resources/general/download/CITYkeys-D1-4-Indicators-for-smart-city-projects-and-smart-cities-WSWE-AJENUD>

¹² SCIS website: <https://smartcities-infosystem.eu/>

¹³ ESPRESSO website: <http://espresso-project.eu/>

3. Validation of indicators with partners involved in demonstrations: The refined indicator proposal included a list of indicators in association with city level actions / interventions as well as methodological definitions. It was placed under general review for all interested partners in terms of feasibility, relevance, evaluation boundaries, data sources and methodological approaches for baseline calculations and definitions. Final validation and fine-tuning of definitions & calculation methods were processed within the first “test calculations” performed by the city of Oulu.

In general, city level indicators (and even more so KPIs) should express as precisely as possible to what extent an aim, a goal or a standard has been reached or even surpassed. Data that are not linked to standards or specific goals of projects can be used as quantitative background information, but are not suited for evaluative purposes. Often, however, various indicators are available to assess the progression towards a certain goal. A set of criteria (based on the combination of CIVITAS¹⁴ framework and the RACER-principle) has been used in the MAKING-CITY project. All selected indicators should follow the validation criteria. This means that all indicators should be:

Relevant, Acceptable, Credible, Available, Measurable, Reliable, Familiar, Robust and Independent.

Ideally the indicators or KPIs are defined so that they are able to show a direct relationship of the energy related interventions with other relevant interventions in MAKING-CITY, energy sustainability being the main issue of the project.

With the calculated indicators, a methodology is carried out to obtain city indexes with respect to each one of the four categories. This methodology is explained in the Section 3.2 of the present document, and is carried out in three steps to achieve the city diagnosis characterisation.



Figure 2: Steps for the City Diagnosis characterisation

The different indicators are scored according to a normalisation criteria based on target values according to European plans or forecasts. A prioritisation is also carried out by the cities, in a way that reflects their priorities and needs regarding the different categories, application fields and indicators, since the intention is not to base the diagnosis only on the objective values, but also in the concerns and interests of the cities. This is done using an Excel Tool for pair-wise comparisons of the elements (Analytic Hierarchy Process, AHP), which is detailed explained in the 3.2.3 of the present document.

Through the prioritisation, weights are obtained for the indicators of each city, which are aggregated with their score in the last step, to reach the city indexes, which are calculated by category (4 indexes) and per application field (10 indexes). The used method of aggregation of these two elements is the linear aggregation, and in this way, some indicators could be compensated by others with better scored within the same category or application field (since they have been grouped together precisely because of the interrelation they have), however, despite this aggregated index, see beyond and reach the conclusion of the specific parts that are better or worse within each part will be always allowed.

¹⁴ CIVITAS website: <https://civitas.eu/>

2.2 Analysis of the existing city plans

None of the cities that are part of MAKING-CITY project are starting from a blank canvas. All of them have developed and applied city plans whose content and results can be considered as inputs to the city characterisation and diagnosis towards the definition of the Long Term vision.

In this document, the most relevant city plans have been identified and analysed for each of the eight cities of the project in order to identify information that can be useful for their characterisation, like the main targets defined and goals achieved, actions and areas identified to achieve the proposed targets, business models applied, barriers and methods for overcoming them, etc.

To analyse the plans of the cities a table template of information gathering was made (explained in Section 4.2 of the present document), so that all the plans were comparable to each other, both those of the city itself and those of some cities with others. Within this template, it is collected in a first approach the description of the plan, the implementation period, the scope of the plan, and the topics covered (energy, mobility, ICT, social). With this key information, it can already be made analyses about the plans of the city, the issues addressed in them, their scope or term of implementation. It also allows classifying them according these characteristics: their short, medium or long term planning, and their local, regional or national scope.

Then, more specific information is collected on the main targets of the plans, and within these targets, the actions defined to achieve this goal, if there are actuation areas identified to implement the previous actions, the current status of the implementation of the actions (finalised, just getting started, on-going, cancelled due to lack of budget, cancelled due to technical issues), the execution period of the action, and the financial scheme that is or will be applied for the deployment of the actions.

For the regional and national plans, the second approach of information collection has been simplified so that the actions are not repeated and taking into account that the measures or targets defined in these broader plans serve as the basis for the drafting of the local plans, in which the specific measures and areas of the city are already defined. Therefore, these plans only collect information about the targets and their related actions (or measures).

2.3 Modelling the energy demand side

Going beyond the analysis of the city characteristics and the evaluation of the city plans, to develop an energy system model of each city is required in order to undergone explorations of the future, i.e. energy scenarios.

Cities are frequently energy sinks where energy is consumed but not produced. Such peculiarity is detrimental since it causes unsustainable behaviours in people. Citizens do not realise the way the energy is produced; thus, they do not perceive the environmental consequences associated. Besides, it is a matter of self-sufficiency and citizen's empowerment, to take control on the relation between production schemes and consumption patterns. So, under that rationale the modelling of the city energy demand allows to make decisions with a higher level of detail, taking into consideration all the dimensions of the sustainability (economic growth, environmental protection, social aspects, all at once).

The measures or technologies that are expected to contribute in future years to improve the city energy demand profile are many and varied. While some of them are based on increases in efficiencies (for example, installing more efficient devices such as A++ dishwashers), some others are structural and require previous interpretation (insulation in façades of residential buildings).

The idea of creating scenarios to deeply analyse the city energy system is then founded on the previous work carried out. By means of the data extracted from the city plans diagnosis and the information derived from the calculated indicators, it is possible to create scenario narratives as a sort of storylines which evolve into the future. The energy system model of the city behaves as the tool/methodological framework where all relationships among technologies, both for demand and supply, take place. Therefore, energy balances are implemented, and emissions associated are reported consequently. The interpretation of the city needs and the subsequent implementation of specific measures or technologies or “solutions” operate as the script behind the scenario narratives. Hence, the relevance of developing energy system models is based on the exploration of long-term visions for the cities, thus assisting decision-makers in creating sustainable energy plans.

Finally, it should be expressed the existence of well-known methodologies and modelling frameworks (often software) oriented towards the development of energy scenario assessments. There are dozens of classifications depending on the approach (bottom-up, top-down or hybrid models), context (environmental, energy, economic, social), type of mathematical rationale (optimisation, simulation, agent-based...), types of equilibrium (partial, general), etc. The details on the energy systems modelling within MAKING CITY are included within D1.3 and its initial version D1.22.

2.4 City needs and priorities identification

City needs and priorities are identified after the whole process of analysing the characteristics and city level indicators, the analysis of the existing city plans and modelling the energy demand side.

Based on the previous work of characterisation, the main objective is to take into account the interest, opinions and wishes from a broader stakeholder group (private companies and citizens, should also be taken into account). This will serve to make a first approach to the city evaluated in order to understand better its initial situation and current problems. This analysis, combined with a definition of the long term city vision will allow the identification of the transition pathway of the city and the definition of the general objectives that will guide this transition.

In addition and as said before, the outcome from the city diagnosis and the indicators obtained afterwards should support the identification of the best measures to be implemented attending to the city needs. Those measures, broadly speaking, should be understood as a set of modelling implementations which will be explored (quantitatively) using energy scenarios within the energy system model.

Each scenario, usually a pair of them –a Business-as-Usual one plus an alternative one–, serves as basis for comparison. Whereas the BaU scenario feeds the ground to understand the evolution of the energy system of the city in terms of final energy demand and emissions associated (BaU is usually built under the paradigm of persistency, i.e. it will evolve as it does considering the physical rules plus the legal binding restrictions), the alternative scenario implements some measures or technologies pointed out by the experts or after the city diagnosis and plans evaluation. Those measures or technologies are decided *a priori* to evaluate the advantages of their deployment. In other words, the testing of deploying more or less, let's say renewable energy technologies, or efficiency-related options, is evaluated through the alternative scenarios. Depending on the type of modelling performed, it will be possible to discuss which the most optimal combination of technologies (and deployment levels) is, considering the environmental restrictions and social concerns at the same time.

3 City Diagnosis: analysis of the City Level Indicators

WP5 aims to monitor and evaluate the effectiveness of the project actions and interventions, compared to the initial situation, initial objectives and expected results. The evaluation framework defined in the Task 5.1 has a twofold scope in order to measure and assess the project activities at PED level (demonstration areas) and city level. The city level indicators are used to show to what extent overall policy goals have been reached, whereas project indicators are considered in the evaluation of the technical and non-technical actions in technical, economic and social aspects.

In the process to become a smart city, establishing a reliable metric is a key point to support cities to identify strengths and weaknesses and consequently set priorities for action. For this reason, WP1 and WP5 have worked aligned in order to establish a set of city level indicators useful for the city diagnosis and for the identification of their needs and priorities.

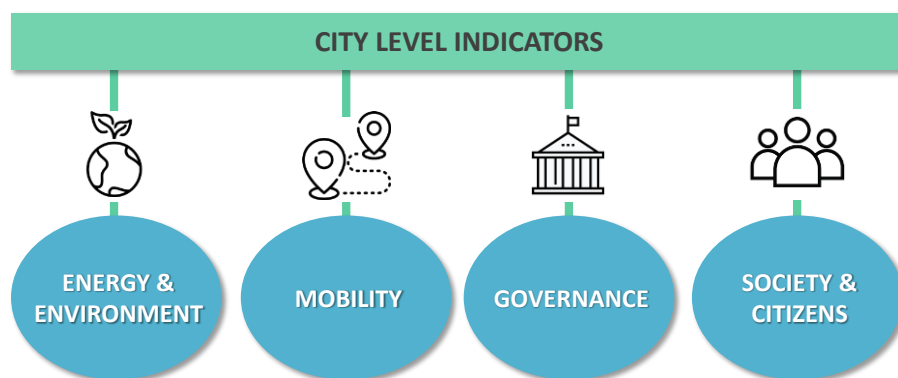


Figure 3: Classification of the City Level Indicators

Under WP5, common evaluation indicators are designed in order to evaluate the status of the city in the categories of Energy & Environment, Mobility, Governance and Society & Citizens. For the analyses within this WP1 and especially for the convenience of the City Diagnosis framework, a new application field has been added to Governance category in order to have the categories more balanced in terms of number of indicators.

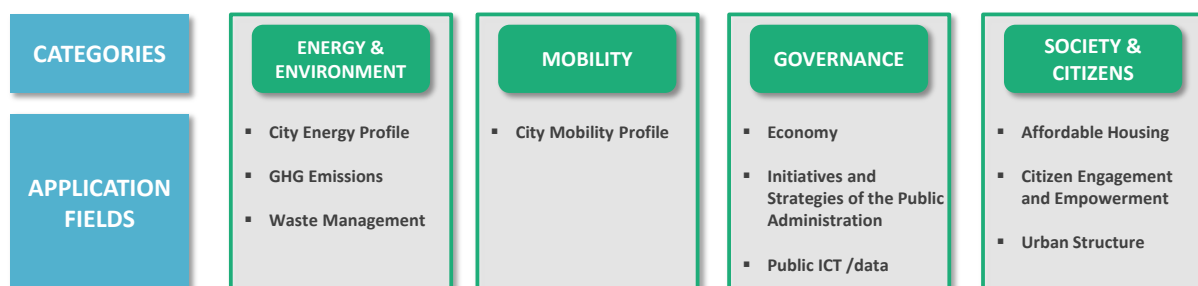


Figure 4: Application fields within the categories of the City Level Indicators

3.1 Classification and description of the indicators

Indicators can be classified in different groups by context, sector or application, but it is also important to highlight the indicator typology for evaluating the effects of different smart city solutions or basic city functions at target. According to the stage of the process, these different indicator types can be defined as follows:

- Input indicators refer to the resources needed for the implementation of interventions, measuring the quantity, quality, and timeliness of resources. Policies, human resources, materials, financial resources are examples of input indicators.
- Process indicators measure whether planned activities took place. Examples include holding of meetings, conducting training courses, distribution of smart meters.
- Output indicators add more details in relation to the product (“output”) of the activity, e.g. the number of smart meters distributed, the area of roof that has been isolated or the number of electric buses in the system.
- Outcome indicators measure intermediate results generated by outputs. Outcome indicators refer more specifically to the objectives of an intervention relating to the quantity and quality of the activities implemented. Often they are coverage indicators measuring the extent to which the target population has been reached, e.g. percentage of car owners using a parking app.
- Impact indicators measure the state with regard to a set city target (impact of policy), e.g. city's energy consumption, and can be used to evaluate for example the sustainability impacts of smart solutions.

In MAKING-CITY, the primary focus of the city level is on impact indicators. The aim is to investigate the degree to which smart city actions contribute to reaching city targets (societal goals: “doing the right things”) with regard to smart sustainable development and more technical actions related to e.g. energy.

Impact indicators also leave room for the cities to find their own solutions to achieve a certain performance, instead of prescribing the way they should reach that or the measures that have to be implemented. The latter ones have the risk to lower the possibility for innovative solutions to achieve the same goal, and might be outdated within a few years. A disadvantage of impact indicators is that impacts are only apparent after the project has been implemented and is in full use, which might take a few years. In addition, numerous contextual factors can influence the final impact reached. Nevertheless, the impact is the only measure that counts for reaching policy goals.

The set of city level indicators were selected in consensus on the basis, that they all should be relevant for the context of the project, easy to measure and monitor by all cities, and they should concentrate on the impact that can be evaluated in medium- or long-term. This means that the indicators are meant as continuous monitoring tools for cities, not only for the period of the project, but also after that.

3.1.1 Energy & Environment

Table 3: City Energy Profile indicators

City Energy Profile		
Indicator	Unit	Description
Final energy consumption per capita	MWh/cap	Annual final energy consumption for all uses and forms of energy. End users include residential, tertiary sector, public lighting, industry and transport.
Primary energy consumption per capita	MWh/cap	This indicator corresponds with the primary energy consumed in the city that is the energy forms found in nature (e.g. coal, oil and gas) which have to be converted (with subsequent losses) to useable forms of energy.
Primary energy sources (shares)	% and MWh/cap	Shares of different fuel types used for energy generation inside city boundaries [Solid fossil fuels, Natural gas, Oil and petroleum, Renewables and biofuels, Electricity from the grid].
Building connected to the DH-network or renewable energy grid	% of buildings/city	Percentage of buildings connected to high-efficiency district heating network or local renewable energy grid in the city.

Table 4: GHG Emissions indicators

GHG Emissions		
Indicator	Unit	Description
GHG emissions per capita	Tonnes CO ₂ /cap of	The CO ₂ emissions generated over a calendar year by all activities including indirect emissions outside city boundaries.

Table 5: Waste Management indicators

Waste Management		
Indicator	Unit	Description
Recycling rate	% of tonnes	Percentage of city's solid waste that is recycled.

3.1.2 Mobility

Table 6: City Mobility Profile indicators

City Mobility Profile		
Indicator	Unit	Description
Modal split	%	Shares of different modes of transportation. The indicator searches the total number but also to distinguish in inner-city traffic and commuter-traffic (from outside) [Walk, bike, public transport, car: private motor vehicle].
Fuel mix in mobility	%	Percentage of the market share of transport fuel for each type of fuel used [Gas oil and diesel oil, Gasoline, Blended biodiesels, Liquefied Petroleum Gases, Electricity, Other fuels].
Energy use for transportation	MWh/cap	Final energy consumption of the transport sector.
Access to public transport	% of people	Share of population with access to a public transport stop within 500m.
Public infrastructure promoting low-carbon mobility	km/100,000 people	Length of lanes in the city for low-carbon mobility per 100,000 inhabitants: cycling lanes (including the length of combined cycling and walking lanes, and streets with speed limit <=30 km/h).

3.1.3 Governance

Table 7: Economy indicators

Economy		
Indicator	Unit	Description
Unemployment rate	% of active population	Percentage of the labour force unemployed.
GDP (Gross Domestic Product)	€/cap	City's Gross Domestic Product per capita.

As these are the indicators has been added to the WP1 and in order to avoid delays and not ask for more information to the cities without the sufficient anticipation, these two indicators within Economy application field have been calculated at regional level with data from 2017 for Unemployment rate¹⁵, and from 2015 for the GDP¹⁶; so that although they are not the most updated, they are the last ones that appear in Eurostat reports and all cities are measured under the same standard.

¹⁵ Source for all cities: Eurostat, 2017 (regional level) <https://ec.europa.eu/eurostat/documents/2995521/8830865/1-26042018-AP-EN.pdf/bb8ac3b7-3606-47ef-b7ed-aadc4d1e2aae>

¹⁶ Source for all cities: Eurostat, 2015 (regional level) <https://ec.europa.eu/eurostat/documents/2995521/7962764/1-30032017-AP-EN.pdf/4e9c09e5-c743-41a5-afc8-eb4aa89913f6>

Table 8: Initiatives and Strategies of the Public Administration indicators

Initiatives and Strategies of the Public Administration		
Indicator	Unit	Description
Smart city factor in a city development strategy	Likert scale	Inclusion and level of detail of smart cities strategies in the urban strategic plans of the city. Likert scale: Not at all – 1 – 2 – 3 – 4 – 5 – Very detailed

Table 9: Public ICT / Data indicators

Public ICT / Data		
Indicator	Unit	Description
Quality of open data	Likert scale	The extent to which the quality of the open data produced by the city was increased. Likert scale: Not at all – 1 – 2 – 3 – 4 – 5 – Excellent

3.1.4 Society & Citizens

Table 10: Affordable Housing indicators

Affordable Housing		
Indicator	Unit	Description
Development of housing prices	% of change or % of €/m ²	Development of average price for buying an apartment per m ² in the city.
Housing cost overburden rate	%	The percentage of the population living in households where the total housing costs ('net' of housing allowances) represent more than 40% of disposable income ('net' of housing allowances).

Table 11: Citizen Engagement and Empowerment indicators

Citizen Engagement and Empowerment		
Indicator	Unit	Description
Citizen engagement/empowerment to climate conscious actions	Likert scale	Appreciation of the benefits of city actions; Energy empowerment at home, satisfaction, happiness of people. Likert scale: Not at all – 1 – 2 – 3 – 4 – 5 – High engagement
Encouraging a healthy lifestyle	Likert scale	The extent to which policy efforts are undertaken to encourage a healthy lifestyle. Likert scale: Not at all – 1 – 2 – 3 – 4 – 5 – Excellent

Table 12: Urban Structure indicators

Urban Structure		
Indicator	Unit	Description
Inhabitants in dense areas	% of people	Percentage of the population living in dense areas of the city (over 20 inhabitants/ hectare).

3.2 Methodology for the calculation of the city indexes

The methodology addresses to make a characterisation of the cities through the city level indicators. The final purpose of the methodology is to obtain some city indexes to be able to make an own analysis of the cities, showing the categories and application fields that are strong in the city and which of them need improvements and more attention, and also serves to fix future medium and long term goals and objectives.

According to the insights of CITYkeys¹⁷ [3]: “A variety of city indexes have been developed to compare cities. Many of them have the disadvantage that they rank cities relative to each other, not providing much incentive to the top-3 to improve, neither to solve unsustainable conditions. As cities consider themselves unique, they do not see many advantages in being compared with other cities. [...] If a smart city index would be constructed, cities would prefer weighting scheme that would be adapted to the local context, and that such a scheme would be adaptable by the cities themselves. Full transparency would be needed on indicator definition and calculations.”

With this learning, unlike other similar studies that have been carried out, whose purpose was to make a ranking of cities in terms of sustainable index or environmental impact [4], such as the Green City Index [5] or its European version [6, 7], the Urban Ecosystem Europe [8], or the Smart City Index [9], this study focuses on the cities themselves and their characteristics and not on the final objective of calculate a final index with which to establish comparisons.

In doing so, city diagnosis is carried out under four steps:

- Step I: Indicators Calculation, where objective results are obtained.
- Step II: Indicators Normalisation, where results are scored according to a scale (from 0 to 10).
- Step III: Prioritisation of categories, application fields and indicators (through the AHP method), where the cities reflect their priorities, targets and concerns.
- Step VI: Aggregation to calculate city indexes, where final indexes are obtained both per category and per application field, in order to achieve a complete city diagnosis.

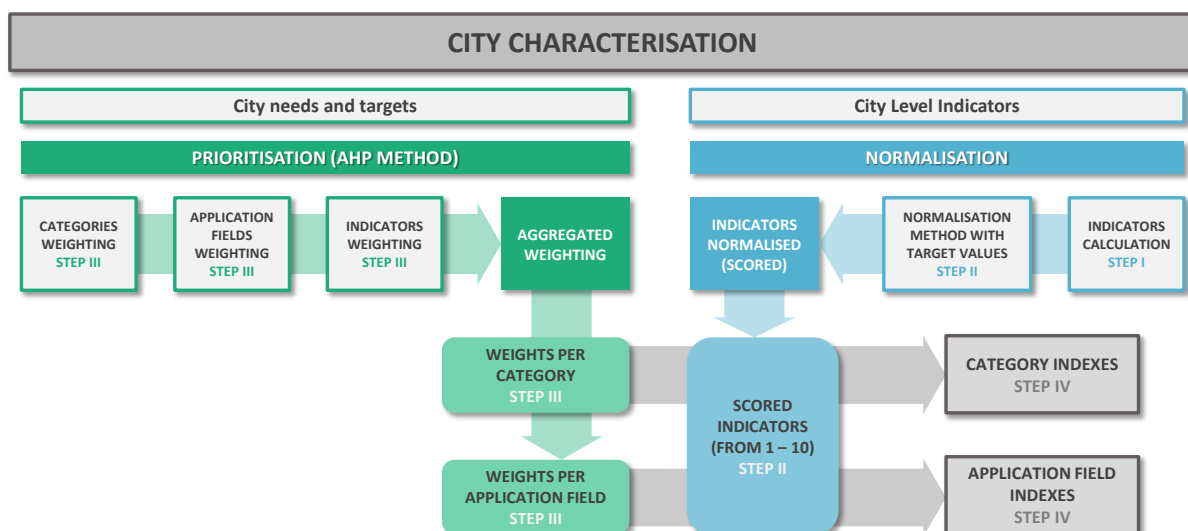


Figure 5: City characterisation indexes approach

¹⁷ CITYkeys EU project – Recommendations for the Smart City Index, D3.3, available online: <http://www.citykeys-project.eu/citykeys/resources/general/download/CITYkeys-D3-3-Recommendations-for-the-Smart-City-Index-WSWE-AJENM8>

Through these four steps, the characterisation of the city will be done through the City Level Indicators and the previous description of the city characteristics by each city. In this way, the characterisation will provide a real diagnosis of the city because the numbers obtained for the category and application fields indexes would be explained, justified and understood through the context and circumstances of each city. Numbers (indexes) alone only give a part of the analysis. To complement the indexes obtained within the study, context is provided for all cities, taking into account their own circumstances regarding climate, economic and size aspects; as well as the targets and challenges reflected through the analysis of the city plans.

3.2.1 Step I: Indicators Calculation

The first step is to calculate the city level indicators by each city.

The city level indicators have been grouped into different application fields, and these, in turn, in categories, thus establish three levels at which to make comparisons.

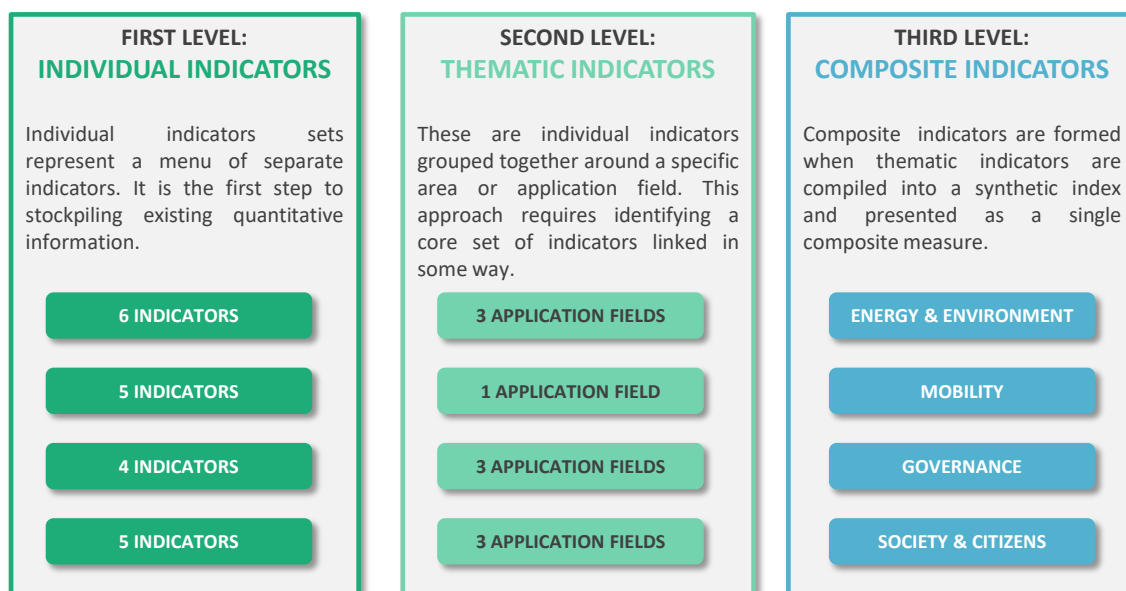


Figure 6: Levels of indicator groupings

The indicators will be calculated using available data, according to their definition and the formula provided. One of the biggest problems at this step is related to the lack of certain data. Due to the studied and careful selection of the indicators within the T5.1, this problem has been minimized in the cities, being non-existent in most of them. For cases where it has not been possible to obtain an indicator, data has been taken at regional or country level when available, what can be compared with the nearest neighbour method among the methods suggested by the European Commission in the 10 Step guide¹⁸, Step 3: Imputation of missing data.

The approaches suggested in this guide are summarized as follows:

- Data deletion: omitting entire records (for variables or cities) when there is a substantial number of missing data.
- Mean substitution: substituting a variable's mean value computed from available cases to fill in missing values.
- Regression: using regressions based on other variables to estimate the missing values.
- Multiple imputation: using a large number of sequential regressions with indeterminate outcomes, which are run multiple times and averaged.
- Nearest neighbour: identifying and substituting the most similar case for one with a missing value.
- Ignore them: take the average index of the remaining indicators.

For cases in which an indicator could not be calculated and the national (or preferably regional if possible) did not work or did not exist, the estimate has been done by comparing the city with another

¹⁸ From the European Commission website: COIN (Competence Centre on Composite Indicators and Scoreboards). Online: <https://composite-indicators.jrc.ec.europa.eu/?q=10-step-guide/>, Step 3: Imputation of missing data, online: <https://composite-indicators.jrc.ec.europa.eu/?q=10-step-guide/step-3-imputation-missing-data>

with similar characteristics in the terms of the purpose of the indicator. An example of this is the case of Vidin is public infrastructure promoting low-carbon mobility indicator, of which there were no data for the city, and the estimate has been made based on the similarity of the city of Vidin with that of Bassano del Grappa in terms of inhabitants, area, and, very important, percentage of trips by bike (from the modal split indicator data). This has also been done with the modal split indicator for the city of Lublin, in which the estimate was made by similarity with the Polish city of Gdarisk, of which data for this indicator did exist¹⁹.

To make the collection of indicator data easier and more clear (visual), an excel template (see Figure 7 below) was shared with the cities so that each one filled it in with their own data. In this way, the units in which each indicator is measured and the disaggregation that had to be done in those requiring more than one figure were fixed; with what they are well prepared to be compared and normalised in a common way and between the different cities under the same criteria.

CITY LEVEL INDICATORS							
City:							
Category	Application field	Indicator	Formula	UNIT	Disaggregation	VALUE	
Energy & Environment	City Energy Profile	Final energy consumption per capita	Final energy consumption / Total city population	MWh/cap			
		Primary energy consumption per capita	Primary energy consumption / Total city population	MWh/cap			
		Primary energy sources (shares)	(Primary energy source / Total primary energy sources) x100	%	Solid fossil fuels		
					Natural gas		
					Oil and petroleum		
					Renewables and biofuels		
	Building connected to the DH-network or renewable energy grid	(Nº of buildings connected to the DH / Total number of buildings) x100	% of buildings/city	Electricity from the grid			
				Solid fossil fuels			
				Natural gas			
				Oil and petroleum			
GHG Emissions	GHG emissions per capita	GHG emissions of the city (tonnes) / Total city population	Tonnes of CO ₂ /cap				
	Waste Management	Recycling rate	(Total amount of the city's solid wasted recycled / Total amount of solid waste produced) x100	% of tonnes			
Mobility	City Mobility Profile	Modal split	Percentage of shares of different modes of transportation within the city	%	Walk		
					Bike		
					Public transport		
					Car (private motor vehicle)		
		Fuel mix in mobility	Percentage of shares of different transport fuels used in the city	%	Gas oil and diesel oil		
					Gasoline		
					Liquefied petroleum gases		
					Electricity		
		Energy use for transportation	Final energy consumption of the transport sector (MWh) / Total city population	MWh/cap			
Public infrastructure promoting low-carbon mobility	[Length of bicycle lanes (km) / Total city population] x100.000	km/100.000 people					

¹⁹ Data for cities Modal Split indicator website: EPOMM http://www.epomm.eu/tems/compare_cities.phtml

Governance	Economy	Unemployment rate	(Number of working-age city residents without work / Total labour force) x100	% of active population		
		GDP (Gross Domestic Product)	GDP / Total city population	€/cap		
	Initiatives and Strategies of the Public Administration	Smart city factor in a city development strategy	Specific smart city factor? What is the level of detail? Likert scale: Not at all - 1 - 2 - 3 - 4 - 5 - Very detailed	Likert scale		
	Public ICT / Data	Quality of open data	Likert scale: Not at all - 1 - 2 - 3 - 4 - 5 - Excellent	Likert scale		
Society & Citizens	Affordable Housing	Development of housing prices	% of change (unit can differ by country)	% of change or % of €/m ²		
		Housing cost overburden rate	(Population living with housing cost overburden / Total city population) x100	%		
	Citizen Engagement and Empowerment	Citizen engagement/ empowerment to climate conscious actions	Likert scale: Not engagement - 1 - 2 - 3 - 4 - 5 - High engagement	Likert scale		
		Encouraging a healthy lifestyle	Likert scale: Not at all - 1 - 2 - 3 - 4 - 5 - Excellent	Likert scale		
	Urban Structure	Inhabitants in dense areas	Population living in dense areas / Total city population	% of people		

Figure 7: Template for City Level Indicators data gathering

In addition to the excel template, for those indicators measured by Likert scale (quality indicators), the corresponding scale description has been added to each of them, as shown in the

Table 13 below, so that these indicators are measured under the same criteria in all cities. The definitions have been adapted from those for similar indicators in CITYKeys (indicators for smart city projects and smart cities).

Table 13: Description of the different Likert scales used by quality indicators

Indicators with Likert scale	
Indicator	Likert scale description
Smart city factor in a city development strategy	Likert scale: Not at all - 1 - 2 - 3 - 4 - 5 - Very detailed 1. <u>Not at all</u>: there is a complete absence of a smart city factor from the side of the government in the urban strategic plans of the city. 2. <u>Poor</u>: the smart city factor is not detailed or well integrated in the urban strategic plans of the city. 3. <u>Neutral</u>: the smart city factor included in the development strategy of the city has had no significant, positive or negative, impact for smart city initiatives. 4. <u>Somewhat detailed</u>: the smart city factor has to some extent detailed in the urban strategic planning and has some benefits for the development of smart city initiatives. 5. <u>Very detailed</u>: there is a very detailed smart city factor integrated in the development strategy of the city that stimulates the environment for smart city initiatives to a great extent.
Quality of open data	Likert scale: Not at all - 1 - 2 - 3 - 4 - 5 - Excellent 1. <u>Not at all</u>: most of the data are not available to the public or only upon appointment with an expert. 2. <u>Poorly</u>: most of the data are available to the public as structured data (e.g. excel

	instead of imagen scan of a table). 3. <u>Somewhat</u>: most of the data are available to the public, in a non-proprietary open format (e.g. CSV). 4. <u>Good</u>: most of the data are available using URIs to denote things, so that people can point at your data. 5. <u>Excellent</u>: all government data are available and linked to other data to provide context (neatly structured).
Citizen engagement /empowerment to climate conscious actions	Likert scale: No engagement - 1 - 2 - 3 - 4 - 5 - High engagement 1. <u>None</u>: there is any effort to create a consciousness on climate actions. 2. <u>Little</u>: there is a small effort to engage citizens in climate conscious actions. 3. <u>Somewhat</u>: some initiatives have been developed to engage citizens in climate conscious actions. 4. <u>Significant</u>: some climate conscious actions have been executed to get citizens engaged/empowered. 5. <u>High</u>: the city has engaged/empowered citizens to climate conscious actions.
Encouraging a healthy lifestyle	Likert scale: Not at all - 1 - 2 - 3 - 4 - 5 - Excellent 1. <u>Not at all</u>: no measures were taken to encourage a healthy lifestyle. 2. <u>Poor</u>: there was little encouragement of a healthy lifestyle. 3. <u>Somewhat</u>: there was some encouragement of a healthy lifestyle with the implementation of some measures. 4. <u>Good</u>: a sufficient encouragement of a healthy lifestyle was translated into several offline (biking facilities, public sports facilities) and online (i.e. app reminders) initiatives. 5. <u>Excellent</u>: a healthy lifestyle was extensively encouraged offline (biking facilities, public sports facilities, pedestrian networks) and online (i.e. exercise apps).

3.2.2 Step II: Indicators Normalisation

Although within the Step I of calculation we ensure that the indicators collection of the cities are expressed in the same units, ranges and scales, the normalisation gives a score to each indicator, regarding some criteria, to be able to compare and diagnose or understand at a glance the state of the city according to certain aspects.

The European Commission collects the series of commonly used methods of normalisation²⁰:

1. Ranking of indicators across countries: it is the simplest normalisation approach, consisting of ranking the indicators according to the values of the countries.
2. Standardisation (or z-scores): for each indicator the average value and the standard deviation across counties are calculated. The normalised indicator value for a city is then calculated as the ratio of the difference between the raw indicator value and the average divided by the standard deviation. This is the most common normalisation technique because it converts all indicators to a common scale. With this approach, the range (minimum, maximum) differs among the normalised indicators.
3. Re-scaling: each indicator for a given city at a given time is calculated as the ratio of the difference between the raw indicator value and the minimum value divided by the range. This method uses the range rather than the standard deviation. All normalised indicators have identical range (0,1).
4. Distance to a reference country: this method divides the indicator value for a given country at a given point in time with the value of a reference country at an initial time.
5. Categorical scales: each indicator is assigned a categorical score, which can be either numerical or qualitative. Sometimes, the scores are based on the percentiles of the distribution of the indicator value across the countries.
6. Indicators above or below the mean: this type of normalisation distinguishes among values that are above, close to, or below, an arbitrarily defined percentage threshold around the mean. The normalised value is 1 if the indicator value is above the percentage threshold around the mean, -1 if it is below, and 0 otherwise. This means that the threshold creates a neutral region around the mean, where the normalised value is zero.
7. Methods for Cyclical Indicators: this is done by most institutes conducting business tendency surveys, in order to reduce the risk of sales signals and to better forecast cycles in economic activities. When indicators are in the form of time series, the normalisation is done by subtracting the mean over time and then by dividing by the mean of the absolute values of the difference from the mean.
8. Percentage of differences over consecutive time points: each indicator value for a country at a given time point is normalised by subtracting the corresponding value of the previous time point and dividing by the indicator value. The normalised value represents the percentage growth with respect to the previous year instead of the absolute level.

The method used to make normalisation and assign scores combines the Standardisation method (or z-scores), the re-scaling, and the distance to a reference country. The method transforms the indicator values to have an identical range (0-10), where 10 is always the best value, and 0 is the worst; and information regarding relative distances between indicators is retained.

²⁰ From the European Commission website: COIN (Competence Centre on Composite Indicators and Scoreboards), Step 5: Normalisation, online: <https://composite-indicators.jrc.ec.europa.eu/?q=10-step-guide/step-5-normalisation>

In first place, a target value has been assigned to each indicator. This target or “ideal” value receives a score of 10, which will be the score of all cities that reach or exceed it. This target is obtained for most of the indicators from European plans or forecasts. For indicators that do not have a defined European target, this is assigned to the best value among the eight project cities or to the average of the values of the cities, as consider. And finally, qualitative indicators, which are those measured on Likert scale, have already a best value (target) which would be 5 according to the scale.

Once having the target value, which may be the minimum or maximum, depending on the indicator, the opposite value is calculated, that is, the worst value, to which the zero score will be assigned. This value is calculated using the standard deviation and the average value of the project city figures in the following way:

- If the worst value searched for will be the maximum value:

$$\text{Max} = \text{Average} + 2.5 * \text{Standard deviation}$$

- If the worst value searched will be the minimum value:

$$\text{Min} = \text{Average} - 2.5 * \text{Standard deviation}$$

With the correspondent worst value for each indicator, the maximum or the minimum, or both in case the that the target value is an average value, and they are inadvisable values above and below; the indicators values of the cities are scored following the Min-Max method, consisting of calculating the difference between the best value (target), and dividing it by the difference between the maximum and minimum value.

Score of the indicator = $\left(\frac{|X - \text{target value}|}{|\text{Target value} - \text{Worst value}|} \right) \times 10$, where X is the value of the indicator, target value and worst value would be the maximum and the minimum values or vice versa, depending on the indicator; and multiplied by 10 to have the score scaled from 0 to 10.

The following tables **Error! No se encuentra el origen de la referencia.** Table 14 to Table 17 show the values established as targets and those as worst for each indicator, calculated as explained above. The source or way in which the target value has been obtained has also been included in order to better understand and identify where it comes from for each indicator.

Table 14: Energy & Environment indicators normalisation methodology

ENERGY & ENVIRONMENT INDICATORS					
Application field	Indicator	Unit	Target value	Worst value	Source of the Target value
City Energy Profile	Final energy consumption per capita	MWh/cap	16.93	37.26	Covenant of Mayors ²¹ [10]
	Primary energy consumption per capita	MWh/cap	33.73	49.18	EEA (European Environment Agency) ²² [11]

²¹ Covenant of Mayors: Monitoring Indicators 2016, from the website

https://publications.jrc.ec.europa.eu/repository/bitstream/JRC97924/jrc97924%20%20com%20monitoring%20indicators_online.pdf

²² EEA (European Environment Agency): Trends and projections in Europe 2018, from the website <https://www.eea.europa.eu/publications/trends-and-projections-in-europe-2018-climate-and-energy>

	Primary energy sources (renewables and biofuels)	%	20%	0%	Eurostat ²³
		MWh/cap	2.29	0.00	Covenant of Mayors ²⁴ [10]
	Building connected to the DH-network or renewable energy grid	% of buildings/city	Values in Table 18 according to the Heating degree days		Euroheat ²⁵
GHG Emissions	GHG emissions per capita	Tonnes of CO ₂ /cap	4.11	10.63	Covenant of Mayors ²⁴ [10]
Waste Management	Recycling rate	% of tonnes	50%	0%	EEA (European Environment Agency) ²⁶ [12]

Table 15: Mobility indicators normalisation methodology

MOBILITY INDICATORS					
Application field	Indicator	Unit	Target value	Worst value	Source of the Target value
City Mobility Profile	Modal split (use of non-car transport: walk, bike and public transport)	%	74%	19%	Kadiköy value (best value) (30% target in Covenant of Mayors ²⁴ is exceeded by almost all cities)
	Fuel mix in mobility (electric mobility)	%	10.00%	0.00%	Eurostat ²⁷
	Energy use for transportation	MWh/cap	5.16	12.13	Covenant of Mayors ²⁴ [10]
	Access to public transport	% of people	100%	62%	Value of: Groningen, León, Kadiköy and Vidin (best value)
	Public infrastructure promoting low-carbon mobility	Km/100.000 people	244.40	0.00	Average value of MAKING-CITY cities

²³ Eurostat: news release January 2018, from the website <https://ec.europa.eu/eurostat/documents/2995521/8612324/8-25012018-AP-EN.pdf/9d28caef-1961-4dd1-a901-af18f121fb2d>

²⁴ Covenant of Mayors: Monitoring Indicators 2016, from the website https://publications.jrc.ec.europa.eu/repository/bitstream/JRC97924/jrc97924%20%20com%20monitoring%20indicators_online.pdf

²⁵ Euroheat: Top District Heating and Cooling Indicators 2013, from the website <http://www.euroheat.org/wp-content/uploads/2016/03/2015-Country-by-country-Statistics-Overview.pdf>

²⁶ EEA (European Environment Agency): Environmental indicator report 2018, from the website <https://www.eea.europa.eu/publications/environmental-indicator-report-2018>

²⁷ Eurostat: Share of transport fuel from renewable energy sources, from the website <https://ec.europa.eu/eurostat/web/products-eurostat-news/-/DDN-20180312-1>

Table 16: Governance indicators normalisation methodology

GOVERNANCE INDICATORS					
Application field	Indicator	Unit	Target value	Worst value	Source of the Target value
Economy	Unemployment rate	% of active population	5.00%	17.26%	Sustainable Development Goal 8 ²⁸
	GDP (Gross Domestic Product)	€/cap	22,095	0	Average value of MAKING-CITY cities
Initiatives and Strategies of the Public Administration	Smart city factor in a city development strategy	Likert scale	5	1	Qualitative indicator
Public ICT/ Data	Quality of open data	Likert scale	5	1	Qualitative indicator

Table 17: Society & Citizens indicators normalisation methodology

SOCIETY & CITIZENS INDICATORS					
Application field	Indicator	Unit	Target value	Worst value	Source of the Target value
Affordable Housing	Development of housing prices	% of change	2.50%	-20.07% / 26.47%	The balance ²⁹ (based on the Ideal GDP growth, which resembles the growth that housing should consequently have).
	Housing cost overburden rate	%	6.60%	20.17%	Oulu value (best value)
Citizen Engagement and Empowerment	Citizen engagement to climate conscious actions	Likert scale	5	1	Qualitative indicator
	Encouraging a healthy lifestyle	Likert scale	5	1	Qualitative indicator
Urban Structure	Inhabitants in dense areas	% of people	86.4%	50.4%	Average value of MAKING-CITY cities

As the cities are all European and have no substantial differences between them, they have not been clustered, since the targets do not vary according to the circumstances of the cities. However, a clustering for the indicator *Building connected to the DH-network or renewable energy grid* has been carried out, since for this specific indicator the temperature of the city influences the greater or lesser need to implement a DH system.

The classification that has been carried out to cluster the cities has been done according to the heating degree-days, dividing it into 3 types of climate. In addition, Table 18 below also shows the

²⁸ Sustainable Development Goal 8: Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all, website <https://sustainabledevelopment.un.org/sdg8>. Targets: https://www.un.org/sustainabledevelopment/wp-content/uploads/2019/07/E-Infographic_08.pdf

²⁹ The balance, website: <https://www.thebalance.com/what-is-the-ideal-gdp-growth-rate-3306017>

correspondence made of each type of climate established with the target percentage of buildings connected to the District Heating network or renewable energy grid.

Table 18: Heating degree-days classification and target values regarding DH-network

Classification of cities according to the Heating degree days		Building connected to the DH-network or renewable energy grid	
Climate	Heating degree days	Target value	Worst value
Cold climate	> 3,000	50%	0%
Temperate climate	2,000 – 3,000	15%	0%
Warm climate	< 2,000	2%	0%

The following Table 19 shows the assignment of each type of climate defined with each project city according to their heating degree-days, so that according to the resulting climate type, the cities will have different targets in this indicator.

Table 19: Cities clustering according to their heating degree-days

Classification of cities according to the Heating degree-days during the year 2018		
City	Heating degree days in the year 2018 ³⁰	Climate
Groningen	2,235.0	Temperate climate
Oulu	4,655.0	Cold climate
Bassano del Grappa	1,423.0	Warm climate
León	2,340.0	Temperate climate
Kadiköy	934.0	Warm climate
Trenčín	2,235.0	Temperate climate
Vidin	2,187.0	Temperate climate
Lublin	2,827.0	Temperate climate

³⁰ Data collected from Degree Days website: <https://www.degreedays.net/>

3.2.3 Step III: Prioritisation of categories, application fields and indicators

Although city plans establish the priorities and articulate the public policy of the cities, within this step, the cities are asked about their needs, priorities and concerns in order to get a better understanding of the city context when the indicators are analysed.

The third step consists in assigning different weights to every normalised indicator and group of indicators.

There are several methods for weighting indicators [13] that can be categorized into groups: equal weighting, statistic-based method and public/expert opinion-based weighting.

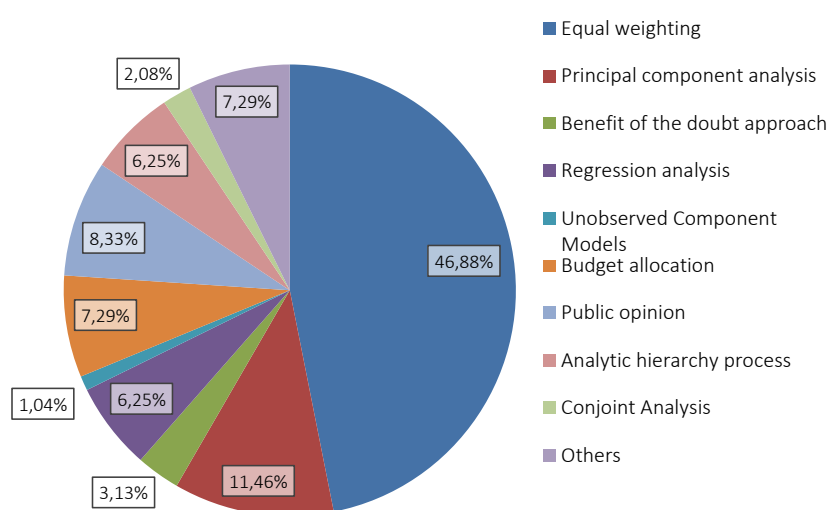


Figure 8: Proportion of method used for indicator weighting

Equal weighting is a method itself, in which all variables are given the same weight. This method could result in an unbalanced structure in the composite index when there are variables grouped into dimensions and those are further aggregated into the composite (because the dimensions grouping the larger number of variables will have higher weight).

PCA (Principal components analysis), Benefit of the doubt approach (BOD), Regression Analysis (RA) and Unobserved component models (UCM) are within **Statistic-based method**, while Budget allocation (BAL), Public opinion (PO), Analytic hierarchy process (AHP) and Conjoint analysis (CA) are within **Public/Expert opinion-based**.

The method adopted for this step is the Analytic hierarchy process (AHP), which is a multi-criteria decision making approach introduced by Saaty [14, 15]. The AHP [16, 17] is a decision support tool which can be used to solve complex decision problems. It uses a multi-level hierarchical structure of objectives, criteria, sub-criteria, and alternatives. The pertinent data are derived by using a set of pairwise comparisons. These comparisons are used to obtain the weights of importance of the decision criteria, and the relative performance measures of the alternatives in terms of each individual decision criterion.

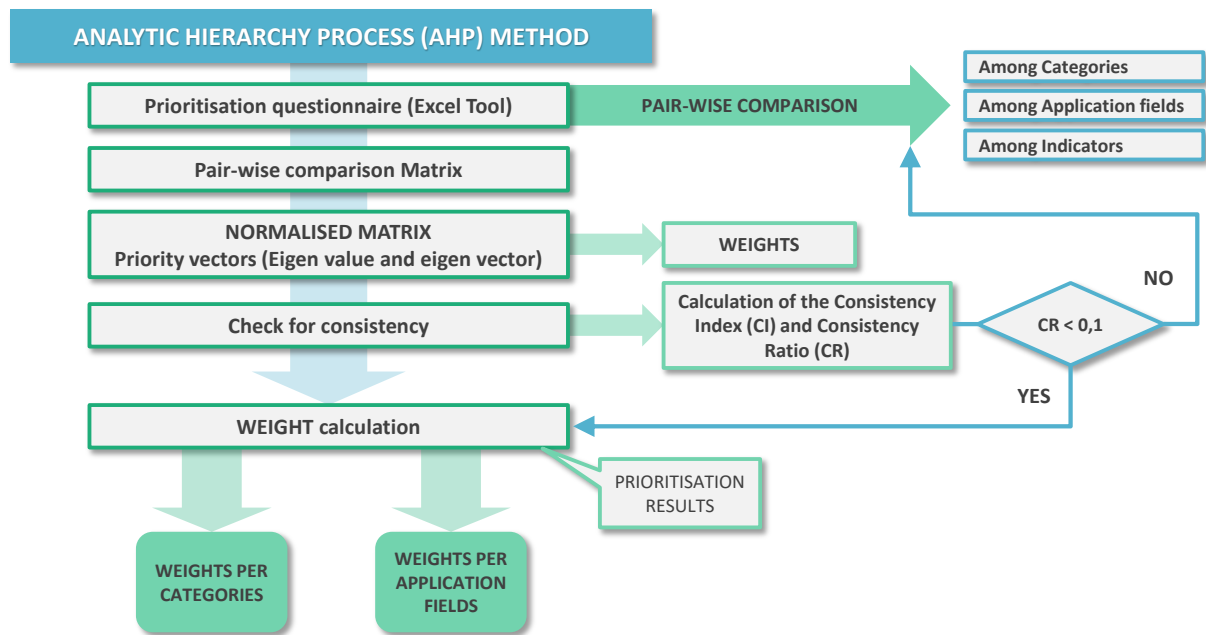


Figure 9: Analytic Hierarchy Process (AHP) approach

AHP method is based on the following three principles [18]: decomposition, comparative judgment, and synthesis of priorities. It is a theory of measurement for dealing with quantifiable and intangible criteria that has been applied to numerous areas.

The first step is to structure the indicators into a hierarchical framework with successive levels of goal, criteria and alternatives; which are the categories and application fields to structure the indicators as shown in next Figure 10.

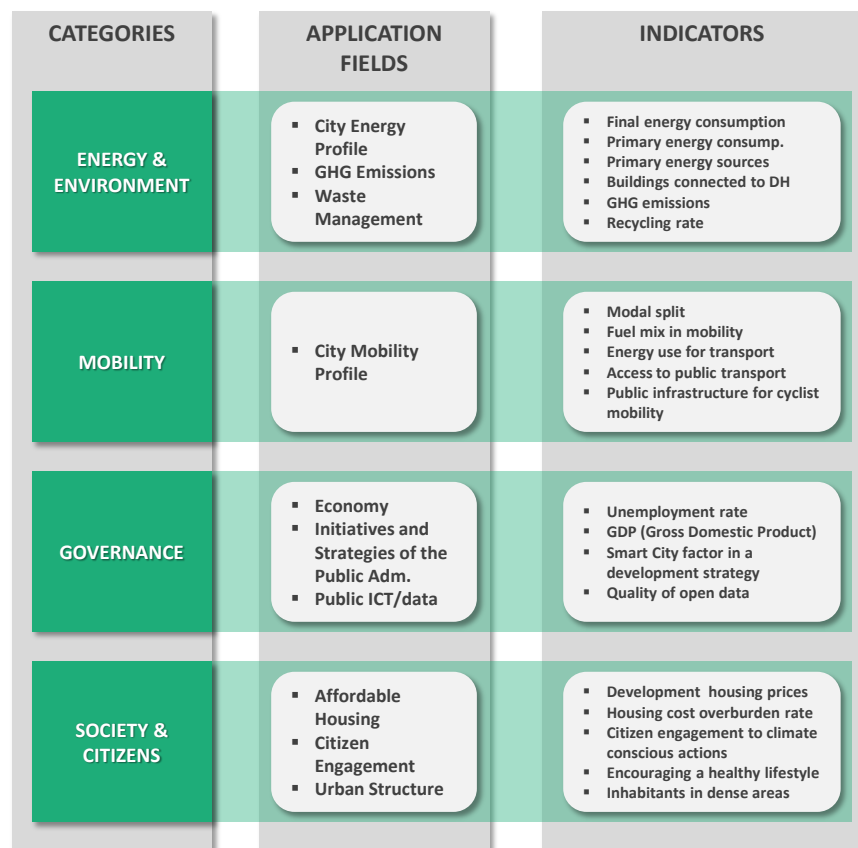


Figure 10: Top down structure for MAKING-CITY indicators

Second step is the comparison analysis, once the hierarchy has been structured, the ratio priorities must be established for each node of the hierarchy. This is done through pair-wise comparisons with respect to the importance of the item to the parent node.

Third step is aggregate the local weights into a composite priority. This final step is done by multiplying local weights by the product of all higher-level priorities. Within the hierarchy, this process transforms the local weights into global weights that measure the importance of each node in the total hierarchy.

The pair-wise comparison of the second step within the AHP is structured in the following parts (or exercises for city municipalities to do), according to the structure of the MAKING-CITY indicators:

- **Category prioritisation:** pair-wise comparisons among the 4 categories of indicators.
- **Energy & Environment prioritisation:**
 - Pair-wise comparison among the three application fields within this category.
 - Pair-wise comparison among the four indicators within the first application field.
- **Mobility prioritisation:** pair-wise comparison among the five indicators within the single application field.
- **Governance prioritisation:**
 - Pair-wise comparison among the three application fields within this category.
 - Pair wise comparison among both indicators within the first application field.
- **Society & Citizens prioritisation:**
 - Pair-wise comparison among the three application fields within this category.
 - Pair-wise comparison among both indicators within the first application field (Affordable Housing).
 - Pair-wise comparison among both indicators within the second application field in this category (Citizen Engagement and Empowerment).

For the last step of the AHP methodology, the calculation of composite priority is done by using a nine-point scale. The deployment of AHP involves successive comparisons between each alternative, criterion by criterion, according to the fundamental scale of Saaty (1980) [14], as presented in Table 20.

Table 20: Scale of relative importance of the AHP method

The comparison scale		
Scale	Definition	Comments
1	Equal importance	Element A is just as important as element B
3	Moderate importance	Experience and judgement slightly favour element A over B
5	Essential importance	Experience and judgement strongly favour element A over B
7	Very strong importance	Element A is much more important than element B
9	Extreme importance	The greater importance of element A over B is beyond doubt
2, 4, 6, 8	Intermediate values	

EXAMPLE OF PRIORITISATION EXERCISE: Energy & Environment prioritization

In order to better understand the pair-wise comparison, below there is an example of how this exercise was developed through an Excel tool.

First, cities should decide which of both categories in the comparison consider most important (A or B) and then, scale the importance of the selection (from 1 to 9 based on the criteria in Table 20).

To obtain all the weights of a category, more than one Matrix will have to be solved. First, one to compare the different application fields of the corresponding category (there are three in the case of Energy & Environment), and secondly, comparisons of the indicators will be established within each application field.

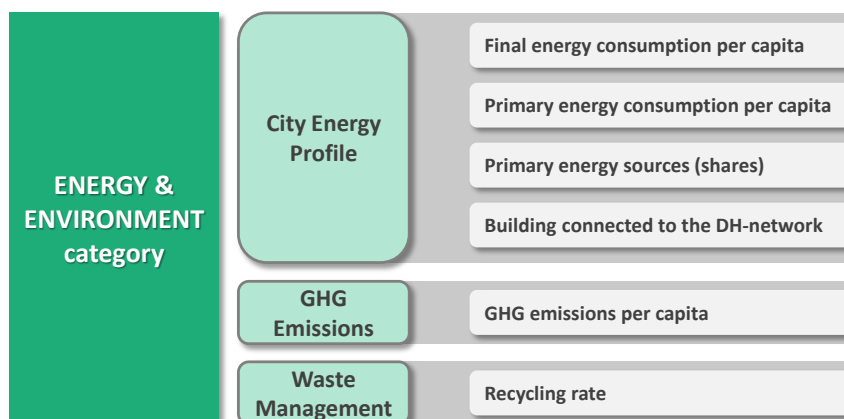


Figure 11: Energy & Environment structure

In the case of Energy & Environment category, only one of the application fields has more than one indicator (as shown in Figure 11), so for the other two fields, the weight of its single indicator will be 100%. This first comparison exercise, done through the Excel tool, is shown in tables Table 21 and

Table 22 below.

Table 21: Example of the pair-wise comparison among Energy & Environment application fields

ENERGY & ENVIRONMENT application fields		Comparison	
A	B	More important (A/B)	Scale (1-9)
City Energy Profile	GHG Emissions	B	4
	Waste Management	A	2
GHG Emissions	Waste Management	A	5

Table 22: Example of the pair-wise comparison among City Energy Profile indicators

CITY ENERGY PROFILE indicators		Comparison	
A	B	More important (A/B)	Scale (1-9)
Final energy consumption per capita	Primary energy consumption per cap	A	2
	Primary energy sources	A	2
	Buildings connected to DH-network	A	6
Primary energy	Primary energy sources	A	1

consumption per capita	Buildings connected to DH-network	A	4
Primary energy sources	Buildings connected to DH-network	A	5

The results of these pair-wise comparison are represented in comparison matrix (tables Table 23 and

Table 24), to obtain the weights of each element.

Table 23: Example of the Energy & Environment application fields comparison MATRIX

COMPARISON MATRIX of the Energy & Environment application fields			
APPLICATION FIELDS	City Energy Profile	GHG Emissions	Waste Management
City Energy Profile	1	1/4	2
GHG Emissions	4	1	5
Waste Management	1/2	1/5	1
SUM	5.50	1.45	8.00

Table 24: Example of the City Energy Profile indicators comparison MATRIX

COMPARISON MATRIX of the City Energy Profile indicators				
INDICATORS	Final energy consumption per cap	Primary energy consumption per cap	Primary energy sources	Buildings connected to DH-network
Final energy consumption per cap	1	2	2	6
Primary energy consumption per cap	1/2	1	1	4
Primary energy sources	1/2	1	1	5
Buildings connected to DH-network	1/6	1/4	1/5	1
SUM	2.17	4.25	4.20	16.00

From the comparison matrix, next step is to compute the priority vector, which is the normalised Eigen vector of the matrix. The normalised matrices below (tables Table 25 and Table 26) are an approximation of Eigen vector (and Eigen value). This approximation works well for small matrix, and it is easy to compute since all that is needed is to normalise each column of the matrix. The normalised principal Eigen vector can be obtained by averaging across the rows, and it is also called priority vector, which shows the relative weights among the categories that are being compared.

Table 25: Example of the categories normalised matrix and obtaining relative weights

NORMALISED MATRIX of the Energy & Environment application fields				WEIGHT
APPLICATION FIELDS	City Energy Profile	GHG Emissions	Waste Management	
City Energy Profile	0.18	0.17	0.25	0.20
GHG Emissions	0.73	0.69	0.63	0.68
Waste Management	0.09	0.14	0.13	0.12
SUM	1	1	1	1

Table 26: Example of the categories normalised matrix and obtaining relative weights

NORMALISED MATRIX of the City Energy Profile indicators					WEIGHT
INDICATORS	Final energy consumption per cap	Primary energy consumption per cap	Primary energy sources	Society & Citizens	
Final energy consumption per cap	0.46	0.47	0.48	0.38	0.45
Primary energy consumption per cap	0.23	0.24	0.24	0.25	0.24
Primary energy sources	0.23	0.24	0.24	0.31	0.25
Buildings connected to DH-network	0.08	0.06	0.05	0.06	0.06
SUM	1	1	1	1	1

Aside from the relative weight, consistency needs to be checked. The comparison matrix is considered to be adequately consistent if the corresponding consistency ratio (CR) is less than 10% (Saaty, 1980 [14]). The CR coefficient is calculated from the consistency index (CI), which is estimated by adding the rows in the comparison matrix and multiply the resulting vector of priorities obtained earlier. This yields an approximation of the maximum Eigen value, denoted λ_{MAX} . Then, the CI value is calculated by using the formula: $CI = (\lambda_{\text{MAX}} - n) / (n - 1)$, where n is the matrix size. Next, the consistency ratio (CR) is obtained by dividing the CI value by the Random Index (RI): $CR = CI / RI$, as given in the following Table 27.

Table 27: Random Index (RI) for the different n matrix

RANDOM INDEX (RI)									
n	2	3	4	5	6	7	8	9	10

RI	0	0.58	0.90	1.12	1.24	1.32	1.41	1.45	1.51

For the Energy & Environment application fields: $CI = 0.01$; and $RI = 0.58$; so $CR = 0.02$; what meets $CR < 0.1$; and therefore the matrix and prioritization is consistent.

For the City Energy Profile indicators: $CI = 0.01$; and $RI = 0.90$; so $CR = 0.01$; what meets $CR < 0.1$; and therefore the matrix and prioritization is consistent.

Final weights per category and per application field within the Energy & Environment category would be as follows (Table 28).

Table 28: Energy & Environment Indicators Weighting per Category and per Application field

ENERGY & ENVIRONMENT					
Application field	Indicator	WEIGHT per Category		WEIGHT per App Field	
City Energy Profile	Final energy consumption per capita	8.98%	100%	44.58%	100%
	Primary energy consumption per capita	4.80%		23.85%	
	Primary energy sources (shares)	5.12%		25.42%	
	Building connected to the DH-network	1.24%		6.15%	
GHG Emissions	GHG emissions per capita	68.06%		100%	100%
Waste Management	Recycling rate	11.79%		100%	100%

As in the example, the AHP method is applied in the same way to calculate the weights of the application fields and indicators of the rest of the MAKING-CITY categories, obtaining the corresponding weights as reflected in previous Table 28 for all the categories in the case of each city.

3.2.4 Step IV: Aggregation to calculate the city indexes

For this last step of the MAKING-CITY methodology, there are several aggregation techniques. The purpose of this step is to aggregate the indicators and their weights to obtain a composite index. These composite indexes will be calculated per categories and per application fields, so that at the end of this analysis it is clear for each city its strengths and weaknesses.

According to the European Commission 10 Step Guide³¹ and to the OECD [19], the most common aggregation techniques are as follows [4]:

- **Additive methods:** this method is consisting of sum up the normalised values of sub-indicators to form a sustainability index. The simplest additive aggregation method entails the calculation of the ranking of each city according to each individual indicator and summation of the resulting rankings (it is based on ordinal information). The second method is based on the number of indicators that are above and below a given benchmark; this uses nominal scores for each indicator to calculate the difference between the number of indicators above and below and arbitrarily defined threshold around the mean. By far, the most widespread linear aggregation is the summation of weighted and normalised individual indicators.
- **Geometric aggregation:** it is a less compensatory approach. This method utilizes multiplicative instead of additive functions. The compensability between is allowed with certain limitations. These limitations exist because the ability of indicators with very low scores is limited to be fully compensated for by indicators with high scores.
- **Non compensatory multi-criteria approach (MCA):** in both additive and geometric aggregations the substitution rates among indicators are equal to the weights of the indicators up to a multiplicative coefficient. For the weights to be interpreted as “importance coefficients”, non-compensatory aggregation procedures must be used to construct the composite indicators. This procedure is based on decision-maker preferences and is centred on the fact that a general objective of most indices is to create rankings. Therefore, the core of this method is to construct a ranking algorithm that is more consistent than the linear aggregation rule. This last method is not compatible with the selected method AHP for weighting, since at least with the multi-criteria methods require weights as importance coefficients.

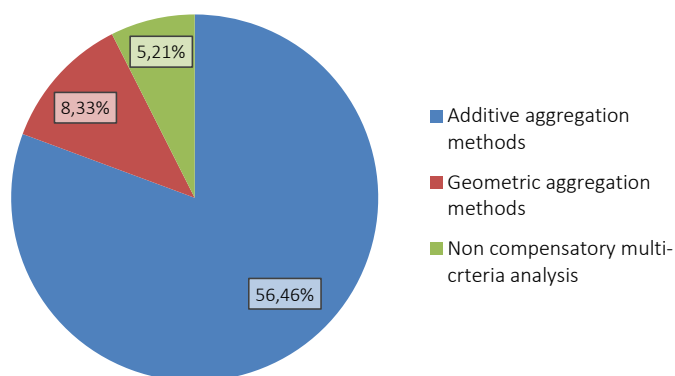


Figure 12: Proportion of method used for indicator aggregation

The OECD [19] states that linear aggregation method is useful when all individual indicators have the same measurement unit, provided that some mathematical properties are respected. Geometric aggregation are better suited if the modeler wants some degree of non-compensability between

³¹ From the European Commission website: COIN (Competence Centre on Composite Indicators and Scoreboards), Step 7: Aggregating indicators, <https://composite-indicators.jrc.ec.europa.eu/?q=10-step-guide/step-7-aggregating-indicators>

individual indicators or dimensions. Furthermore, linear aggregations reward base-indicators proportionally to the weights, while geometric aggregations reward those cities with higher scores.

In addition, in both linear and geometric aggregation, weights express trade-offs between indicators. A deficit in one dimension can thus be offset (compensated) by a surplus in another. The selected method to construct the indexes is the **linear aggregation**. This is because after normalisation step, all the indicators are scored on the same scale, and it is also convenient for this diagnostic analysis that some of them can be compensated by other better rated ones that fall within the same category or application field (since they have been grouped together precisely because of the interrelation they have).

The aggregation is carried out in two ways, obtaining two types of diagnoses: one more general with four indexes of the categories; and another one more in detail or specific that includes the ten indexes for the application fields. This is in accordance with the previous obtaining of the weights by category and application field, so that once the scoring in Step II and the weighting in Step III are calculated, the aggregation in this Step IV is done directly by multiplying each other and adding it into each category or application field.

For each city, apart from the numerical obtaining of these indexes, a graphic representation is also made in the form of a radar diagram, comparing it visually with the maximum (best) indexes obtained among the project cities, and their average indexes, as it is shown below with exemplary data (figures Figure 13 and Figure 14).

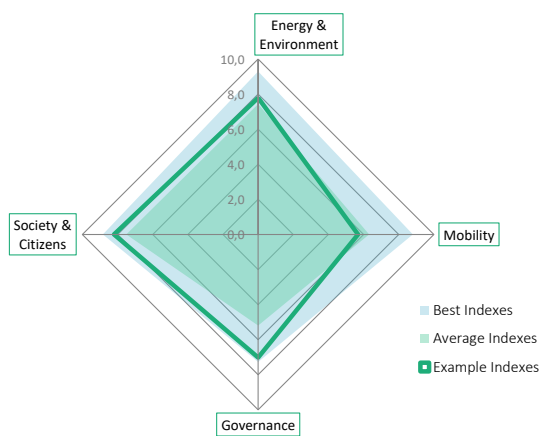


Figure 13: Radar view of an example Indexes per Category

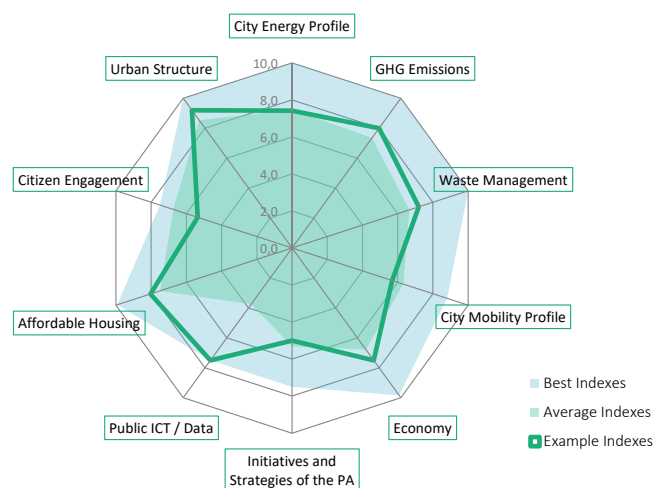


Figure 14: Radar view of an example Indexes per Application Field

In addition to the indexes obtained and its visualisation in the graphics, explanations have been added to each group of indexes achieved for each city, in order to put in the context of the city the figures obtained and understood it under the city circumstances.

4 City Diagnosis: analysis of the existing city plans

One of the main objectives of the MAKING-CITY project is guiding the urban energy transition according to a long term approach properly combined with the already existing medium term plans and short term roadmaps formulated as implementation projects to reach an effective and viable set of actions, fostering a consolidated and impact-based energy transition. For this reason, the analysis of the current status of the cities from a planning point of view is very important not only as input for the city characterization but also as starting point for the development of their Long Term Plans.

The participation in Global Covenant of Mayors³² (at EU level, Covenant of Mayors³³) can be considered as the unique comparable reference regarding energy transition in cities. The reference time-horizon is 2030, therefore with 11 years ahead, this initiative can be considered as a mid-term planning. On the contrary, longer term energy planning in cities has been normally evaded. There is a clear need to be systematically learning from the past, but planning also the future, updating continuously the cities strategies with a combined vision deployed in three levels: longer-term vision, mid-term strategy and short-term execution plans.

Currently city energy plans are starting to be designed with a 2030 horizon, according to the standard city commitments, as for instance those reflected in the SECAPs and other more specific city plans (e.g. Sustainable Urban Mobility Plans, Digital Agendas). MAKING-CITY is going to carry out a huge challenge, consisting on developing not only a 2030 approach but a longer term 2050 city vision that guarantees a seamless city transformation from planning to implementation and further upscaling.

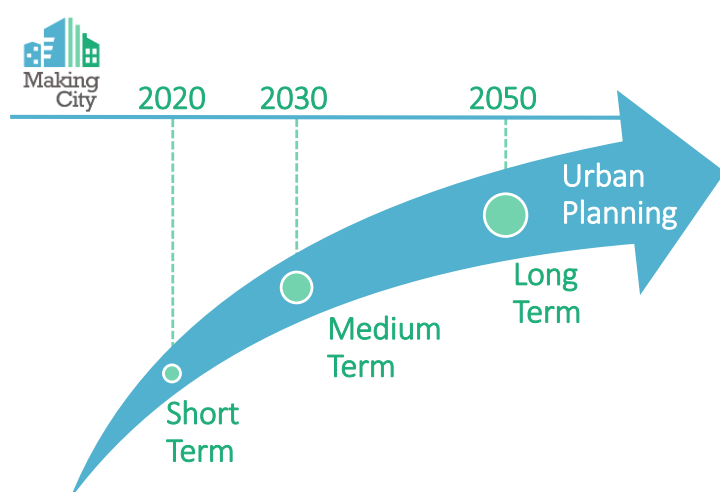


Figure 15: Layers Planning process

MAKING-CITY is going to address procedures and methodologies to support cities in their long term urban planning towards an adequate energy transition, paving the way of the planning, implementation and up-scaling process.

This procedure will be approached by a 3-layers planning process: long term planning 2050 will be the high level approach, medium term approach (SEAP/SECAPS) towards 2030 and short term (execution plan) with a time horizon of about 5 year.

The starting point for achieving the Long Term Urban Plan for each city is the analysis of the existing city plans as input to the city diagnosis. This work has been carried out by the eight cities and their associated local partners following the procedure included in chapter **¡Error! No se encuentra el origen de la referencia.** and taking into account the main plans and European targets close to the development of MAKING-CITY project.

³² Global Covenant of Mayors, website: <https://www.globalcovenantofmayors.org/>

³³ Covenant of Mayors (Europe), website: <https://www.covenantofmayors.eu/en/>

4.1 Analysis of city plans towards the development of a City Vision 2050

In a first approach, the existing city plans have been identified by the MAKING-CITY cities. They have started by reviewing the different plans that affect their city considering the relation to the project at local, regional and national levels, since each European country has different resources, climate and energy markets. In the following Table 29 can be seen the main plans identified by each city in the different scales.

Table 29: Plans identified by the MAKING-CITY cities classified by their scope

CITY	LOCAL PLANS	REGIONAL PLANS	NATIONAL PLANS
Groningen	- The Next City; the Groningen living quality first - Groningen CO₂ -Neutral 2035 and Routemap - Housing Strategy - Programme Living Quality - Programme on Traffic and Transport - Economic Agenda 2015 - 2019	- Regional Housing Document Groningen-Assen Region - Heat Plan Province of Groningen, 2016-3	- Climate Agreement
Oulu	- Sustainable Energy and Climate Action Plan (SECAP) - Environment Programme of the City of Oulu: towards a carbon-neutral Oulu	- Primary energy source changes in Oulu Energy	- Finland will achieve carbon neutrality by 2035 - Reducing the carbon footprint of construction and housing - Building a carbon neutral society and improving the quality of construction - Low-emission transport
Bassano del Grappa	- PAES (Action Plan for Sustainable Energy) - P.E.B.A.: Programme for architectonic barriers elimination	- PERFER: Regional Energy Plan and Strategic Environment Evaluation - P.R.T.: Regional Plan for Transportation - Regional Strategy for Sustainable Development (SRSvS)	

CITY	LOCAL PLANS	REGIONAL PLANS	NATIONAL PLANS
León	- Integrated Sustainable Urban Development Strategy of León - Strategic Plan of León 2018 - 2027 - General Urban Development Plan / León Master Plan of Urban Development - Strategic Plan to Control the Air Quality of León - Sustainable Urban Mobility Integrated Plan - Carbon footprint improvement of León City Council - Assessment of risks and climatic vulnerabilities of the municipality of León	- Energetic efficiency strategy of Castilla y León 2020 - Urban Regeneration Strategy in CyL (ERUCYL)	- Spanish Urban Agenda - Energy and Climate Integrated National Plan 2021 - 2030
Kadıköy	- Kadıköy Municipality Revised Strategic Plan - Kadıköy Municipality Energy Action Plan - Kadıköy Spatial Strategic Plan - Kadıköy Urban Transformation Plan	- Istanbul Regional Plan - IMM Strategic Plan - Istanbul Climate Change Action Plan - Istanbul 1/100,000 Scale Environment Regulation Master Plan	- 11th Development Plan - Energy Efficiency Action Plan - Energy Efficiency Strategic Paper - National Climate Change Action Plan
Trenčín	- Programme of Social and Economic development of the city of Trenčín (with a vision to 2040)	- Programme of Social and Economic development of the Self-Governing Region of Trenčín - Sustainable Energy Action Plan (SEAP) – The Self-Governing Region of Trenčín	- Energy Policy of the Slovak Republic

CITY	LOCAL PLANS	REGIONAL PLANS	NATIONAL PLANS
Vidin	- Municipal Development Plan for Vidin Municipality - Municipal Programme and Action Plan for Energy Efficiency - Municipal Programme for integration of RES and use of biofuels - Programme and Action Plan for reducing levels of PM₁₀ and reaching the established norms for their content in the ambient air in Vidin municipality - Waste Management Programme	- Plan for Energy Efficiency for Vidin District	- National Energy Efficiency Action Plan - National Nearly Zero-Energy Building Plan 2015 – 2020 - National Renewable Energy Action Plan
Lublin	- Development Strategy for the City of Lublin - Low Carbon Economy Plan - Sustainable Mobility Plan - The Revitalization Programme for Lublin	- Plan for the sustainable development of public mass transport for the commune of Lublin and Neighbouring municipalities	

In relation to the address of this Work Package, one of the main objectives of the previous identification and analysis was to know the scope of the existing planning in the cities in order to understand the starting point of each of the cities towards the City Vision 2050 and the updating of the SEAP/SECAP in the medium term.

Table 30: Plans identified by the MAKING-CITY cities classified by period of implementation

CITY	SHORT-TERM PLANS	MEDIUM-TERM PLANS	LONG-TERM PLANS
Groningen	- Housing Strategy - Programme Living Quality - Programme on Traffic and Transport - Economic Agenda 2015 - 2019 - Heat Plan Province of Groningen, 2016-3	- The Next City; the Groningen living quality first - Groningen CO₂ –Neutral 2035 and Routemap - Regional Housing Document Groningen-Assen Region - Climate Agreement	- MAKING-CITY City Vision 2050 (long-term city plan of Groningen)

CITY	SHORT-TERM PLANS	MEDIUM-TERM PLANS	LONG-TERM PLANS
Oulu	- Environment Programme of the City of Oulu: towards a carbon-neutral Oulu - Building a carbon neutral society and improving the quality of construction	- Sustainable Energy and Climate Action Plan (SECAP) - Primary energy source changes in Oulu Energy - Finland will achieve carbon neutrality by 2035 - Reducing the carbon footprint of construction and housing - Low-emission transport	- MAKING-CITY City Vision 2050 (long-term city plan of Oulu)
Bassano del Grappa	- PAES (Action Plan for Sustainable Energy) - PERFER: Regional Energy Plan and Strategic Environment Evaluation	- P.E.B.A.: Programme for architectonic barriers elimination - P.R.T.: Regional Plan for Transportation - Regional Strategy for Sustainable Development (SRSvS)	- MAKING-CITY City Vision 2050 (long-term city plan of Bassano del Grappa)
León	- Integrated Sustainable Urban Development Strategy of León - General Urban Development Plan / León Master Plan of Urban Development - Strategic Plan to Control the Air Quality of León - Sustainable Urban Mobility Integrated Plan - Energetic efficiency strategy of Castilla y León 2020 - Urban Regeneration Strategy in CyL (ERUCYL)	- Strategic Plan of León 2018 - 2027 - Carbon footprint improvement of León City Council - Assessment of risks and climatic vulnerabilities of the municipality of León - Spanish Urban Agenda - Energy and Climate Integrated National Plan 2021 - 2030	- MAKING-CITY City Vision 2050 (long-term city plan of León)

CITY	SHORT-TERM PLANS	MEDIUM-TERM PLANS	LONG-TERM PLANS
Kadıköy	- Kadıköy Municipality Revised Strategic Plan - Kadıköy Spatial Strategic Plan - Kadıköy Urban Transformation Plan - Istanbul Regional Plan - IMM Strategic Plan 2015 - 2019 - Istanbul 1/100,000 Scale Environment Regulation Master Plan - 11th Development Plan - Energy Efficiency Action Plan - Energy Efficiency Strategic Paper - National Climate Change Action Plan	- Kadıköy Municipality Energy Action Plan - Istanbul Climate Change Action Plan	- MAKING-CITY City Vision 2050 (long-term city plan of Kadıköy)
Trenčín	- Programme of Social and Economic development of the city of Trenčín (with a vision to 2040) - Programme of Social and Economic development of the Self-Governing Region of Trenčín - Sustainable Energy Action Plan (SEAP) – The Self-Governing Region of Trenčín - Energy Policy of the Slovak Republic		- MAKING-CITY City Vision 2050 (long-term city plan of Trenčín)

CITY	SHORT-TERM PLANS	MEDIUM-TERM PLANS	LONG-TERM PLANS
Vidin	- Municipal Development Plan for Vidin Municipality - Municipal Programme and Action Plan for Energy Efficiency - Municipal Programme for integration of RES and use of biofuels - Programme and Action Plan for reducing levels of PM₁₀ and reaching the established norms for their content in the ambient air in Vidin municipality - Waste Management Programme - Plan for Energy Efficiency for Vidin District - National Energy Efficiency Action Plan - National Nearly Zero-Energy Building Plan 2015 – 2020 - National Renewable Energy Action Plan		- MAKING-CITY City Vision 2050 (long-term city plan of Vidin)
Lublin	- Development Strategy for the City of Lublin - Low Carbon Economy Plan - Sustainable Mobility Plan (I STAGE) - The Revitalization Programme for Lublin	- Sustainable Mobility Plan (II STAGE) - Plan for the sustainable development of public mass transport for the commune of Lublin and Neighbouring municipalities	- MAKING-CITY City Vision 2050 (long-term city plan of Lublin)

To understand the framework of the different plans in the cities, there is also a classification of the plans by the topics covered by them. There have been four topics identified (Figure 16), and the plans can address more than one, even all four. The following Table 31 shows if the cities cover the topics with their different planning (including regional and national).

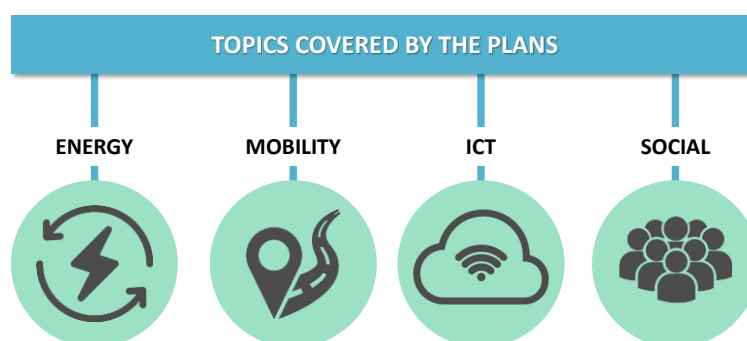


Figure 16: Topics covered by the plans

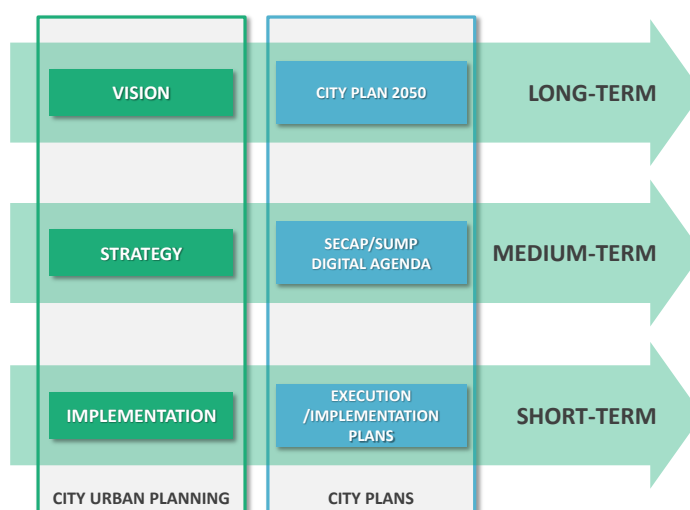
Table 31: Topics covered by the different plans identified by the MAKING-CITY cities

CITY	ENERGY	MOBILITY	SOCIAL	ICT
Groningen	✓	✓	✓	✓
Oulu	✓	✓	✓	✓
Bassano del Grappa	✓	✓	✓	✓
León	✓	✓	✓	✓
Kadıköy	✓	✓	✓	✓
Trenčín	✓	✓	✓	
Vidin	✓	✓	✓	✓
Lublin	✓	✓	✓	✓

In terms of energy transition, longer term energy planning in cities has been normally evaded. There is a clear need to be systematically learning from the past, but planning also the future, updating continuously the cities strategies with a combined vision deployed in three levels:

- Long-term vision
- Medium-term strategy
- Short-term execution plans

The term energy transition designates a significant change for an energy system at long-term, that could be related to one or a combination of changes related to structure, scale, economics, and energy policy.

**Figure 17: Long, medium and short term planning concepts**

One of the most important barriers why cities have not tackled a Long-term vision in cities is the lack of specific tools to understand or evaluate what is going on in them, how the scenarios are deployed and will evolve in energy terms and therefore to be prepared to make the right decisions including taking corrective measures if monitoring is reflecting that the targets are not met.

Working with a 30-years-ahead plan requires not only this improved municipal structure, but also appropriate tools in order to work with this longer-time horizon.

4.1.1 Short Term Plans

The short-term planning is identified with the execution plans, since its time horizon is about 5 years. These implementation plans are where the city's specific plans are more real execution projects that try to contribute to achieve the objectives of other plans with a greater horizon in which actions are not defined so specifically to be executed.

They include all city's implementation projects, as well as roadmaps. A roadmap enables the planning and implementation of the path to achieve desired objectives (from the planning of the city or from larger scale/scope plans), while serving as an excellent communication tool. Roadmaps link strategy to future actions and explicitly incorporate a plan for needed capabilities and technologies to be in place at the right time.

4.1.2 Medium Term Plans

Regarding energy transition in cities, the unique comparable reference that can be found in Europe is the Global Covenant of Mayors for Climate and Energy³⁴. The reference time-horizon is 2030, therefore with 11 years ahead, this initiative can be considered as medium-term planning.

Global Covenant of Mayors has three initiatives to address the compelling need for research, innovation, technical assistance, and city-level intelligence to help cities contribute to a global climate solution. These initiatives detailed below, focus on developing the next generation of knowledge, data, tools and technical support through which local policy-makers can tackle sustainable challenges.

Table 32: Global Covenant of Mayors initiatives

INITIATIVES OF THE GLOBAL COVENANT OF MAYORS		
INNOVATE4CITIES ³⁵	DATA4CITIES ³⁶	INVEST4CITIES ³⁷
A city-led research and innovation initiative that identifies specific data. Information and technology priorities and works with governments, academia, business and other partners to drive investment in these areas and thus enables cities to meet their full climate and sustainable ambition.	Following the Paris Agreement, cities have been on an accelerated journey to harness data to empower big bets on climate action, including the development of the GCoM Common Reporting Framework. This initiative builds the technological capacity and evidence to show the importance of city action and the need for future investment in cities.	The Invest4cities initiative aims to enhance and accelerate cities and local governments' access to domestic and international financial investment in projects critical to the realization of their GCoM commitments.

In Europe, the Covenant of Mayors³⁸ endorse a shared vision for 2050: accelerating the decarbonisation of their territories, strengthening their capacity to adapt to unavoidable climate change impacts, and allowing their citizens to access secure, sustainable and affordable energy. More than 7,000 cities have committed mitigation actions with the objective to reach very ambitious CO₂ emissions reduction (SEAP targeted at 2020, SECAP targeted at 2030) and some of them even have also an adaptation plan to fight against climate change (Adaptation plans supporting SEAPs and climate actions –not mandatory– in the SECAPs).

The CoM has a minimum requirements explained in Figure 18 below.

³⁴ Global Covenant of Mayors, website: <https://www.globalcovenantofmayors.org/>

³⁵ Global Covenant of Mayors, INNOVATIVE4CITIES: <https://www.globalcovenantofmayors.org/our-initiatives/innovate4cities/>

³⁶ Global Covenant of Mayors, DATA4CITIES: <https://www.globalcovenantofmayors.org/our-initiatives/data4cities/>

³⁷ Global Covenant of Mayors, INVEST4CITIES: <https://www.globalcovenantofmayors.org/our-initiatives/invest4cities/>

³⁸ Covenant of Mayors (Europe), website: <https://www.covenantofmayors.eu/en/>

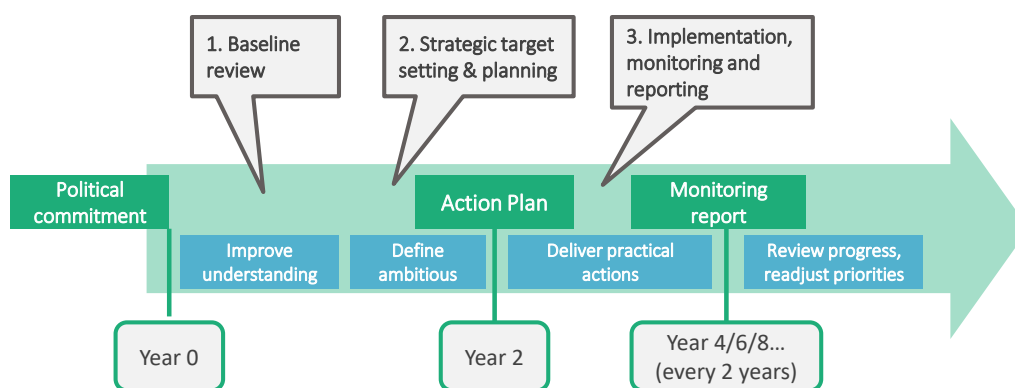


Figure 18: Covenant of Mayors' requirements

The signatory cities commitments pledge action to support implementation of the EU 40% greenhouse gas-reduction target by 2030 and the adoption of a joint approach to tackling mitigation and adaptation to climate change.

Table 33: MAKING-CITY cities status related to the signature of Covenant of Mayors³⁹

CITY	Adhesion year to CoM	Baseline year	SEAP/SECAP year	Overall CO ₂ emission reduction target		Monitoring year
				2020	2030	
Groningen	31/05/2017	2014	2017	-	100%	-
Oulu	20/06/2011	1990	2012	20%	30%	2015 and 2017
Bassano del Grappa	29/11/2012	2008	2014	20%	-	-
León	04/12/2015	-	-	-	30%	-
Kadıköy	04/01/2012	2010	2016	20%	30%	2018
Trenčín	-	-	-	-	-	-
Vidin	-	-	-	-	-	-
Lublin	-	-	-	-	-	-

When cities officially joining the Covenant of Mayors, signatories commit to develop a Sustainable Energy (and Climate) Action Plan within two years.

The **SEAP** is the document that defines the concrete actions, responsibilities and timing to achieve the local authority's medium-term energy consumption and CO₂ emissions reduction targets for their geographical area. For the CoM signatories, action in the following sections is mandatory in the SEAP: buildings, including municipal, residential and commercial buildings, transportation and municipal lighting. Other sectors that provide significant emissions reduction potential may also be included, such as waste and water treatment plants, local heat and electricity production, urban and land-use planning, and industry.

SECAP is the upgrade version of the SEAP and therefore it maintains the same procedure. The main differences between both actions plans are their targets and timeframes.

³⁹ Data from Covenant of Mayors (Europe) for Climate & Energy, Signatories:
<https://www.covenantofmayors.eu/about/covenant-community/signatories.html>

SUMP (Sustainable Urban Mobility Plans) are one of the main tools to tackle transport and mobility in urban areas.

Table 34: SEAP, SECAP and SUMP approaches⁴⁰

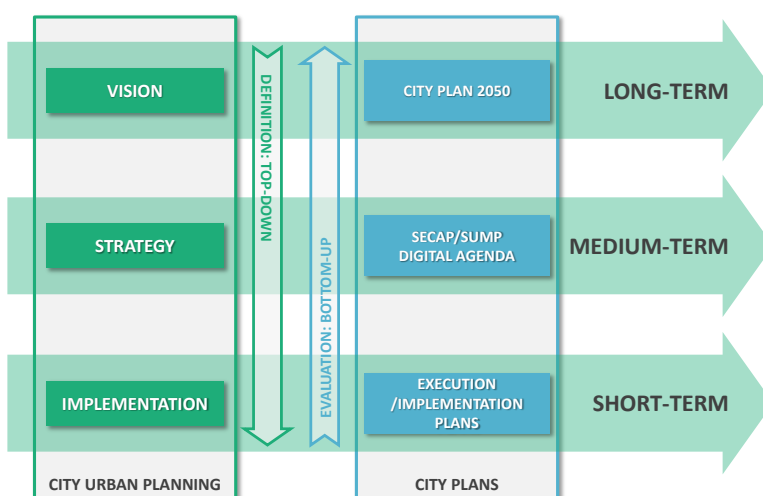
	SEAP	SECAP	SUMP
TIMEFRAME	2020	2030	~ 2030
ACTION SECTORS	- Municipal, tertiary and residential buildings - Transport - Public lighting - Green public procurement - Local heat/cold production - Local electricity production - Others (e.g. industry, agriculture, forestry)	- Municipal, tertiary and residential buildings - Transport - Public lighting - Green public procurement - Local heat/cold production - Local electricity production - Others (e.g. industry, agriculture, forestry) - Land Use Planning - Environment and Biodiversity	Mobility and transport of people and goods in urban and sub-urban environments.
PROCESS STEPS	- Political commitment - Involvement of stakeholders - Planning - Baseline definition - Adapting administrative structure - Establishment of a long-term vision - Identification of clear objectives - SEAP/SECAP elaboration - Actions implementation - Monitoring and reporting progress		- Political commitment - Context analysis - Initiation of stakeholders' involvement process - Definition of vision, objectives, indicators, measures - Elaboration ex-ante evaluation (including a cost/benefit analysis) - Actions implementation - Monitoring and evaluation

⁴⁰ From the EU project SIMPLA: *Harmonising SEAPs & SUMP*, website: <http://www.simpla-project.eu/en/>

	SEAP	SECAP	SUMP
OBJECTIVES	- (At least) 20% CO₂ emissions reduction by 2020	- (At least) 40% CO₂ emissions reduction by 2030 - Climate adaptation	- Accessibility - Balanced development of all transport modes - Reduced environmental impacts (including CO₂ reduction) - Improved road safety and security - More attractive cities and better quality of life for citizens
BASELINE	- Comprehensive overview of energy generation and consumption	- Comprehensive overview of energy generation and consumption - Risk and vulnerability assessment	- Context analysis mainly based on transport infrastructure, mobility and socioeconomic data
CENTRALIZED MONITORING	Report to Covenant of Mayors Office		Each local authority responsible for its own monitoring and evaluation
REPORT	Monitoring Emission Inventory (MEI) every four years, standardized and mandatory report submitted every two years		Not formalized

4.1.3 Long Term Plans

As shown before (Table 30), none of the MAKING-CITY cities has developed a long-term plan. The need for cities to develop advance long term planning strategies to reach a new 2050 city vision approach has also been mentioned. So the analysis and conclusions within the present document will serve as input when developing the Long term vision for each of the cities.



The Methodology for the long term planning will align the **vision** to define new tools and procedures towards sustainability, combined with the **strategy** level, where already existing and solid plans will be considered, and these previous frameworks with the **implementation** level, where the specific plans of the city are more real execution projects that try to contribute to achieve the objectives of the upper levels of the Methodology.

Figure 19: Methodology for the long term planning

MAKING-CITY will foster a mixed top-down and bottom-up approach for the consolidation of the energy transition of EU cities, as it is shown in the previous Figure 19. The **top-down** approach will be based on impact-based tools that define scenarios considering the demand-side and supply-side characterisation at different time-frames. The **bottom-up** strategy will provide monitoring and evaluation procedures at different levels, so that the results of each of the frameworks are considered as a valid reference to update upper levels.

4.1.4 European targets

Measures to fight against climate change and reduce greenhouse gas emissions are a priority for the European Union. Leaders of the EU have committed to transform Europe into a low-carbon energy-efficient economy and they have set the goal of reducing greenhouse gas emissions by 80-95% by 2050 compared to 1990 levels.

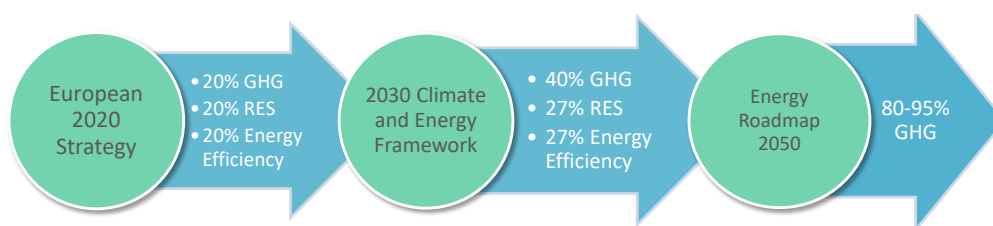


Figure 20: European Energy Targets

The first set of EU targets for the year 2020 were established in 2007 and enacted in legislation in 2009 and consisted to cut in 20% the greenhouse gas emissions compared with 1990, to increase 20% of total energy consumption from renewable energy and to increase 20% the global energy efficiency. They are also headline targets of the Europe 2020 Strategy developed in 2010. These targets were modified and the new current EU targets for 2030 are more ambitious. The goals for 2030 are to cut at least 40% the greenhouse gas emissions compared with 1990, increase at least 27% of total energy consumption from renewable energy sources and to increase at least 27% the energy efficiency. Moreover, the EU climate action policies establish global goals with a longer time-horizon by 2050. For this year, EU aims to cut its emissions by 80-95% compared to 1990 levels and turning EU into a highly energy efficient and low-carbon economy.

Furthermore, the Europe 2020 strategy⁴¹ is about the growth and jobs for the current decade. It focuses on smart, sustainable and inclusive growth in order to improve Europe's competitiveness and productivity and underpin a sustainable social market economy. To reach this objective, the EU has adopted targets to be reached by 2020 in five areas:

- **Employment:**
 - 75% of the population aged 20 to 64 years to be employed.
- **Research & Development:**
 - 3% of GDP to be invest in the R&D sector.
- **Climate change & energy:**
 - Greenhouse gas emissions to be reduced by 20% compared to 1990.
 - Share of renewable energy sources in final energy consumption to be increase to 20%.
 - Energy efficiency to be improved by 20%.

⁴¹ From the Europe 2020 Overview, within the European Commission website (Eurostat): <https://ec.europa.eu/eurostat/web/europe-2020-indicators>

- **Education:**
 - Share of early school leavers to be reduced under 10%.
 - At least 40% of 30 to 40 years old to have completed tertiary or equivalent education.
- **Poverty and social exclusion:**
 - At least 20 million people fewer at risk of poverty or social exclusion.

European 2020 targets and key objectives within the different plans and programmes are summarized in Table 35 below.

Table 35: European 2020 targets⁴²

2020 targets	
Plans & Programmes	Key objectives
EU environmental action programme to 2020	- To protect, conserve and enhance the Union's natural capital - To turn the Union into a resource-efficient, green, and competitive low-carbon economy - To safeguard the Union's citizens from environment-related pressures and risks to health and wellbeing
Climate and energy targets 2020	- 20% cut in greenhouse gas emissions (from 1990 levels) - 20% of EU energy from renewables - 20% improvement in energy efficiency
Energy strategy	- Making Europe more energy efficient by accelerating investment into efficient buildings, products and transport - Building a pan-Europe energy market by constructing the necessary transmission lines, pipelines, LNG terminals and other infrastructure - Protecting consumer rights and achieving high safety standards in the energy sector - Implementing the Strategic Energy Technology Plan - Pursuing good relations with the EU's external suppliers of energy and energy transit countries
EU biodiversity strategy	- Protect species and habitats - Maintain and restore ecosystems - Achieve more sustainable agriculture and forestry - Make fishing more sustainable and seas healthier - Combat invasive alien species - Help stop the loss of global biodiversity
The circular economy action plan	

⁴² From the 2020 targets of the European Commission website: https://ec.europa.eu/info/energy-climate-change-environment/overall-targets/2020-targets_en

European 2030 targets and key objectives within the different plans and programmes are collected in Table 36 below.

Table 36: European 2030 targets

2030 targets	
Plans & Programmes	Key objectives
Climate and energy framework	- At least 40% cuts in greenhouse gas emissions (from 1990 levels) - At least 32% share for renewable energy - At least 32,5% improvement in energy efficiency
Energy union	- Building the energy union - Governance of the energy union - Clean energy for all Europeans

For the 2030 Energy Strategy, the European Commission has proposed the following policies to meet the previous targets⁴³:

- A reformed EU emissions trading scheme (ETS).
- New indicators for the competitiveness and security of the energy system, such as price differences with major trading partners, diversification of supply, and interconnection capacity between EU countries.
- First ideas on a new governance system based on national plans for competitive, secure, and sustainable energy. These plans will ensure stronger investor certainty, greater transparency, enhanced policy coherence and improved coordination across the EU.

European 2050 targets and key objectives within the different plans and programmes are summarized in the following Table 37.

Table 37: European 2050 targets⁴⁴

2050 targets	
Plans & Programmes	Key objectives
Climate neutral economy by 2050: Paris Agreement	- Mitigation: reducing emissions - Transparency and global stocktake: - Adaptation - Loss and damage - Role of cities, regions and local authorities

⁴³ From the 2030 Energy Strategy of the European Commission website: <https://ec.europa.eu/energy/en/topics/energy-strategy-and-energy-union/2030-energy-strategy>

⁴⁴ From the 2050 targets of the European Commission official website: https://ec.europa.eu/info/energy-climate-change-environment/overall-targets/2050-targets_en

Environmental action programme vision to 2050	- To protect, conserve and enhance the Unions natural capital - To turn the Union into a resource-efficient, green, and competitive low-carbon economy - To safeguard the Union's citizens from environment-related pressures and risks to health and wellbeing

The Energy Roadmap 2050⁴⁵ explores the transition of the energy system in ways that would be compatible with this greenhouse gas reductions targets while also increasing competitiveness and security of supply. This Roadmap set out four main routes to a more sustainable, competitive and secure energy system in 2050: energy efficiency, renewable energy, nuclear energy and carbon capture and storage. It combined these routes in different ways to create and analyse seven possible scenarios for 2050. The conclusions of the analysis are:

- Decarbonising the energy system is technically and economically feasible. In the long run, all scenarios that achieve the emissions reduction target are cheaper than the continuation of current policies.
- Increasing the share of renewable energy and using energy more efficiently are crucial, irrespective of the particular energy mix chosen.
- Early infrastructure investments cost less, and much of the infrastructure in the EU built 30 to 40 years ago needs to be replaced anyway. Immediately replacing it with low-carbon alternatives can avoid more costly changes in the future.
- A European approach is expected to result in lower costs and more secure energy supplies when compared to individual national schemes. With a common energy market, energy can be produced where it is cheapest and delivered to where it is needed.

⁴⁵ From the 2050 Energy Strategy of the European Commission website: <https://ec.europa.eu/energy/en/topics/energy-strategy-and-energy-union/2050-energy-strategy>

4.2 Methodology for the analysis of the existing city plans

In this section, the method for analysis of existing city plans is going to be defined. The analysis of the plans will include the analysis of targets defined, if there are actuation areas identified, the implementation status of the actions, their execution period and the financial scheme applied of the local, regional and national plans identified as relevant for the objective of the long term city planning.

4.2.1 Template for collecting information

The following template (Table 38) is aimed to obtain synthetic and comparable information on the most important aspects of the plans identified. The intention is to extract in a concise way the most basic information of the plan, and then, the main targets in a very visual way.

Table 38: Information to be extracted from the Local plans

 ANALYSIS OF THE EXISTING CITY PLANS				
City				
PLAN #1				
Title	Title/name of the Plan/Programme/Strategy/Study			
Description of the Plan	Brief description/summary of the main aspects within the plan.			
Implementation Period	The timeframe of the plan (in years) to know if it is a ST, MT or LT plan			
Scope of the Plan	The scale at which the plan is formulated [Local, Regional, National]			
Topics covered	Energy	Mobility	ICT	Social
Defined Targets				
Target #1				
Target	Name one by one the main targets/objectives of the plan			
Related actions	The actions identified/defined in the plan to achieve the previous goal (if any)			
Actuation areas	The actuation areas of the city identified to implement the previous actions (if any)			
Implementation status	The current status of the implementation of the previous actions: [Finalised, Just getting started, On-going, Cancelled due to lack of budget, Cancelled due to technical issues]			
Execution period	The time period in which the actions must be executed			
Financial scheme	The financial scheme that were or will be applied for the deployment of the actions			

The template has some parts with limited response option, so that it simplifies the comparison and can lead to different classifications. These are the scope of the plan, which can only be local, regional and national, and the topics covered in the plan: energy, mobility, ICT, and social.

The second part of the collection of the information about the plans is somewhat more flexible, since as many rows as targets has the plan must be added, filling in the corresponding sections within each target. Within the information gathered about the targets of the plans, the implementation status of the actions has also a limited response, in order to unify the different situations that can occur in this aspect: Finalised, Just getting started, On-going, Cancelled due to lack of budget, Cancelled due to technical issues.

For the regional and national plans, this second part is simpler than for the local plans, since there are local plans which define the areas of actuation of the different actions in the cities, and consequently, the implementation status, execution period and financial scheme are also aspects developed locally. National and regional plans simpler template is shown below (Table 39).

Table 39: Information to be extracted from the Regional and National plans

 ANALYSIS OF THE EXISTING CITY PLANS				
City				
PLAN #1				
Title	Title/name of the Plan/Programme/Strategy/Study			
Description of the Plan	Brief description/summary of the main aspects within the plan.			
Implementation Period	The timeframe of the plan (in years) to know if it is a ST, MT or LT plan			
Scope of the Plan	The scale at which the plan is formulated [Local, Regional, National]			
Topics covered	Energy	Mobility	ICT	Social
Defined Targets				
Target #1				
Target	Name one by one the main targets/objectives of the plan			
Related actions	The actions identified/defined in the plan to achieve the previous goal (if any)			

Some regional plans are collected into the Local plans template. This is due to the different understandings that there are by “region” for the different cities or countries, depending on whether it is an effectively wide territory that includes several cities and the actions within regional plans are general for that wide territory, or if it is a somewhat wider territory than the city but whose plans define concrete actions for it.

After the schematic analysis and basic information gathering, cities have to explain better or more in detail to point out the most relevant issues within the plans identified: the main targets defined, the main actions identified to achieve the goals, the actuation areas identified within the city, and the financial schemes.

4.2.2 Targets Defined

In this section, cities will analyse the main targets defined in the different city plans they have identified. This analysis will be carried out taking into account the main aspects of the MAKING-CITY project, and also if these targets are aligned with the European ones.

As mentioned before (section 4.1.4 of the present document), the Europe 2020 strategy aimed to turn the EU into a smart, sustainable and inclusive economy delivering high levels of employment, productivity and social cohesion. It set out a vision of Europe's social market economy for the 21st century. It presented the priorities to reinforce: smart, sustainable and inclusive growth; with the following EU headline targets:

- 75% of the population aged 20 – 64 should be employed
- 3% of the EU's GDP should be invested in R&D
- The “20/20/20” climate/energy targets should be met (including an increase to 30% of emissions reduction if the conditions are right)
- The share of early school leavers should be under 10% and at least 40% of the younger generation should have a tertiary degree
- 20 million less people should be at risk of poverty

These EU goals were proposed to be translated into national targets and trajectories by each Member State, so within this section it will be checked and Table 40 below is used for a quick view of the targets achieved.

Table 40: Template for City targets aligned with the European ones

City targets aligned with the European 2020 targets			
EU target	Plan in which is included	Is the target achieved?	Is there a more ambitious one?
75% population aged 20-64 employed	Name only a plan in which the target is included (preferably local)	(YES/NO)	(YES/NO): name if so
3% of GDP invested in R&D sector			
Reduction 20% of GHG emissions			
Increasing 20% of share of RES			
Improved 20% energy efficiency			
Early school leavers' share reduced under 10%			
40% of 30-40 years old with tertiary education			
~~20 million less people at risk of poverty~~	Not included since it is a general figure for the EU but not a specific target for countries (and even less for cities).		

After the quick check in the previous table, cities will make a description about the main targets defined in the city plans analysed, whether these targets are aligned with the European ones. Although these are common targets that can be found in more than one of the plans analysed, it is about focusing on the main ones, local ones, which are the ones that most affect the city, since in

some ways the regional ones include the locals, and national in turn include both previous, so locals are the most specific.

4.2.3 Identification of Actions

In this section, the cities will identify the main actions planned to be implemented to achieve the defined previous goals. They have also to identify if there are actions that are going to be carried out by the city council and are not within any of the mentioned plans, but also aim to achieve these goals.

Cities are also asked about the implementation status of these actions, as well as their timelines.

4.2.4 Actuation Areas identified and Financial schemes

In some cases (mainly in local plans and especially in the short-term ones) actuation areas have been selected and defined by the cities. It is also possible that there are no actuation areas identified in the plans, but the municipality does have identified those areas because of their needs, deficiencies or problems of any kind.

At any case, it is also necessary to know if the city has started to act in these areas or if no actuation has been planned so far although needing areas have been identified in some way. Cities are asked about the actuation areas identified to implement the actions in the plans, and also to add a map where the main actuation areas are pointed out.

It is also required to briefly describe the financial schemes or innovative business models that will/are taking place for the deployment of the actions.

4.2.5 Main needs and priorities identified from the analysis of the existing city plans

The identification of priorities and needs comes directly from the existing city plans analysed in the previous chapters. Cities will also take into account for this section the interests, opinions and wishes of the city itself and its citizens.

The future lines of research and work of the cities and within the WP1 of MAKING-CITY project will try to solve with plans (the city vision to 2050 and the updated or new SECAPs) the city diagnosis to include in that new urban and city planning the weaknesses identified for each city and the needs identified that are not already covered or not covered enough by existing plans.

5 City Diagnosis: Groningen

5.1 General overview of the city



De Gemeente Groningen (municipality of Groningen) is located in the province of Groningen in the northern part of the Netherlands, along with 11 other municipalities. The Netherlands knows three administrative levels: the national government, twelve provinces and 355 municipalities. The municipality of Groningen consists of the city of Groningen (202,000 inhabitants; >2,000 inhabitants/km²), the suburb of Haren (17,000 inhabitants) and a rural area mostly east of the city (12,000 inhabitants). The city has 231,354 inhabitants (1 January 2019) in an area of 180 km², with a population density of 1,285 inhabitants per km².



Figure 21: What Groningen is

The city of Groningen is by far the largest urban area in the North of the Netherlands, making it also the centre of education, commerce, services and jobs for an area of about 10,500 km² with over 1.7 million inhabitants. The city hosts over 135,000 jobs, two universities and over 60,000 students, making that a large share of its population is made up of students. Education, health care and government are prime employers in the city, while the city has only little industry.

Relevant features of the city of Groningen are its high share of bikes in transportation, with over 60% of all trips made on bike, making it the world's leading biking city. Groningen is also the youngest city of the Netherlands, with an average age of 36.4 years. The city has almost 1000 years history, and has traditionally been among the larger urban settlements in the country. As a consequence, Groningen has a relatively large share of old housing; 16% before 1925 and 44% before 1965.



Figure 22: Groningen's highlights

Being located in the North of the Netherlands implies that Groningen has a sea climate (Köppen Cfb). Summer high temperatures are typically around 20-22 °C, with only few days in excess of 30 °C. In

winter, daytime temperatures typically are around 4 - 5 °C, with mild frost being fairly common during the night. Temperatures below -10 °C occur, but are rare, certainly during daytime. Despite a relatively mild climate, heating is required for at least half of the year, while air conditioning for cooling is currently still limited (mostly in public and commercial buildings). Located at 53 degrees North latitude does significantly affect possibilities for solar energy (solar heating, solar boilers and PVs) due to limited hours of sunlight in winter, but gives high potential during summer months. Wind potentials are high, with average wind speeds of 7 m/s at 100m during the year. Wind occurs, similar as precipitation, throughout the year. There is little to no potential for hydro energy, with less than 10 meters of high difference within the municipal boundaries.

Table 41: Groningen climate characterisation

CLIMATE CHARACTERISATION	Sea climate
Average annual temperature	9.3 °C
Total annual precipitation	812 mm
Winter average temperature	2.4 °C
Summer average temperature	17.0 °C

5.2 City characterisation

5.2.1 Energy & Environment characterization

Groningen is highly committed to push for a swift transition from a fossil fuel based energy system to one based on renewables. In doing so, both generation and efficiency are prime targets. Groningen generates 5.9% (2017) of renewable energy generation in its mix, but the first largest projects on both efficiency and generation have been completed in the last years, with several under development. Also, since 2012 the rate has gone up from 2.9%. It is expected that with ongoing projects growth will go up to 9.4% in 2022.

A key challenge in the Groningen region is the ending of natural gas extraction in the so called 'Groningen Field'. The Groningen field (discovered in 1959) was among the 10 largest natural gas deposits in the world. High levels of extraction allowed for Dutch society to become highly dependent on natural gas; for heating, electricity and industrial use. Starting in the early 1990s, mild earthquakes have hit the region, causing problems to real estate and safety. Notably since the 2010s, the frequency and intensity of the earthquakes has increased. The Dutch government has decided to lower gas extraction dramatically and aims to stop altogether *at least* before 2030, with current plans aiming for an earlier date, currently set at 2023. Import of natural gas is foreseen, but not as an end goal. As such, a significant change in especially heating systems is crucial. Groningen, being the big city in the same region of the gas field, aims to pioneer in developing a non-gas based city. Key projects include the development of Warmtestad (a public company) aiming to deliver heat from sustainable services (biomass, residual and geothermal).

Groningen suffers few environmental problems. Air quality has a moderate quality, which in a Dutch context implies it is among the best in the country for any larger urban area. There is little heavy industry and previous polluted sites are either cleaned-up or under control. Waste management is efficient, with high amounts of recycling, and also includes the production of local biogas from waste in the city. The same goes for sewage, which is also used for the production of biogas. A significant share of biking in the modal split further decreases overall levels of air pollution and noise.

5.2.2 Mobility characterization

Groningen is a world leading bike city, with 65% of all trips within the city being made on bike. Biking is supported by an extensive network of standalone bike lanes, both independent of and next to key roads. Roads with speed limits of 50 km/h or more are with few exceptions all accompanied with a separate bike line. Many other roads with a speed limit of 30 km/h are used extensively by bikes, with some having separate bike lanes and many not. The city centre is only partly accessible by car, whilst no car traffic is possible through the city, as all cars entering the city in a specific zone have to leave the centre from the same zone (no traffic between zones is allowed). This further accommodates biking, as it is often the most time efficient means of travel in the city. High numbers of (roofed) parking places for bikes finally ensure biking is easy, safe and efficient.

With 60,000 students and 135,000 jobs Groningen attracts a high number of commuters, while being a regional capital also attracts people for tourism and services. The city is served by three national highways and several regional roads. In addition, the city is served by five different train routes several dozens of bus lines. The national train system runs on (green) electricity, but the regional trains all run on diesel. Buses in the region are almost 50% electric with the first busses on hydrogen also being part of the fleet. Shipping is relevant, but modest, with Groningen being an inland harbour.

5.2.3 Governance characterization

As is common in the Netherlands, the Municipality of Groningen has the instruments and responsibilities to be leading in spatial and environmental planning. The city is traditionally dominated by left-wing and progressive political coalitions. In also being a student city, the city aims to be vibrant and tolerant. In doing so, the city is also fairly open to citizen engagement and actively promotes various activities (e.g. community energy, urban gardening, sports, etc.). In line with Dutch governance traditions, discussion policies with key stakeholders is a common practice in Groningen, where despite the formal role of the municipality, there is scope for debate and discussion. This is also expressed in a strong collaborative network on city policies in Groningen between the municipality, the boards of the two universities and the university hospital. Notably, work on attracting talent, promoting entrepreneurship, housing for young people and international climate are among their priorities.

Trust in Government is fairly good, with 67% of citizens trusting their public administration. Increasingly, Groningen also uses online tools to open up information about city indicators and policies. Not all online tools are well connected, easy to find and not all are fully filled. Ongoing work is to improve this over the coming years.

5.2.4 Society & Citizens characterization

Groningen is a young city, with an average age of 36.4 (lowest in the Netherlands). With only 1.64 persons per household (the Netherlands 2.15), Groningen has a high share of single person households (partly related to student population). Housing in the city is for 38% privately owned, 37% is social housing and 25% is private rental. Groningen has a relatively low average income per capita (33.5 K€ compared to a Dutch average of 41.9 K€).

Housing prizes are moderate and even low when compared to other large urban areas in the Netherlands (average Groningen 226K, average Netherlands 287K⁴⁶). Nevertheless, housing prizes are high as compared to its surrounding region (province except Groningen-city: 194K). The last years there has been a shortage on the housing market, with limited supply not being able to keep up with demand. The result is that the drop in housing prizes after the 2008 economic crises had been compensated by 2017 (below figures go to 2016).

On its total population in 2018 (201,000), a total of 34,000 were students (17%). This has a significant impact on city life, notably regarding the night life, bars and sports clubs and also affects specific neighbourhoods. In addition, there is a relative high share of poor households, with 15.4% of the households earning below the low-income border (e.g. 1040 € for a single person household) as compared to 8.2% in the Netherlands (CBS Statline, 2018).

⁴⁶ Data from CBS-Statline, 2018

5.3 City indexes calculation

5.3.1 Indicators Normalised

As explained in section [Error! No se encuentra el origen de la referencia.](#), the indicators of Groningen have been normalised according to the ranking of indicators method, and the results of this normalisation are gathered in the table below (Table 42). The calculation of the indicators is included in deliverable D5.1 as well as in the annexes of this document (Annex A: Groningen, [A.1](#)).

Table 42: Groningen Indicators Normalised

ENERGY & ENVIRONMENT		
Application field	Indicator	SCORE
City Energy Profile	Final energy consumption per capita	5.72
	Primary energy consumption per capita	10.00
	Primary energy sources (shares)	6.08
	Building connected to the DH-network	0.67
GHG Emissions	GHG emissions per capita	7.72
Waste Management	Recycling rate	10.00
MOBILITY		
Application field	Indicator	SCORE
City Mobility Profile	Modal split	9.81
	Fuel mix in mobility	0.20
	Energy use for transportation	8.24
	Access to public transport	9.44
	Public infrastructure promoting low-carbon mobility	10.00
GOVERNANCE		
Application field	Indicator	SCORE
Economy	Unemployment rate	8.39
	GDP (Gross Domestic Product)	10.00
Initiatives and Strategies of the Public Administration	Smart city factor in a city development strategy	7.50
Public ICT/ Data	Quality of open data	5.00
SOCIETY & CITIZENS		
Application field	Indicator	SCORE
Affordable Housing	Development of housing prices	6.12
	Housing cost overburden rate	7.94
Citizen Engagement and Empowerment	Citizen engagement to climate conscious actions	7.50
	Encouraging a healthy lifestyle	7.50
Urban Structure	Inhabitants in dense areas	10.00

5.3.2 Categories, application fields and indicators prioritised

As explained in section 3.2.3 Step III: Prioritisation of categories, application fields and indicators, the indicators of Groningen have been prioritised according to the city needs and targets, through the AHP method, and the results of this prioritisation are gathered within Table 43 below.

Table 43: Groningen Indicators Weighting per Category and per Application field

ENERGY & ENVIRONMENT					
Application field	Indicator	WEIGHT per Category		WEIGHT per App Field	
City Energy Profile	Final energy consumption per capita	1.15%	100%	11.38%	100%
	Primary energy consumption per capita	3.30%		32.76%	
	Primary energy sources (shares)	2.44%		24.19%	
	Building connected to the DH-network	3.19%		31.66%	
GHG Emissions	GHG emissions per capita	46.63%		100%	100%
Waste Management	Recycling rate	43.30%		100%	100%
MOBILITY					
Application field	Indicator	WEIGHT per Category		WEIGHT per App Field	
City Mobility Profile	Modal Split	47.12%	100%	47.12%	100%
	Fuel mix in mobility	8.67%		8.67%	
	Energy use for transportation	5.12%		5.12%	
	Access to public transport	29.31%		29.31%	
	Public infrastructure promoting low-carbon mobility	9.78%		9.78%	
ENERGY & ENVIRONMENT					
Application field	Indicator	WEIGHT per Category		WEIGHT per App Field	
Economy	Unemployment rate	18.43%	100%	87.50%	100%
	GDP (Gross Domestic Product)	2.63%		12.50%	
Initiatives and Strategies of the PA	Smart city factor in a city development strategy	54.85%		100%	100%
Public ICT / Data	Quality of open data	24.09%			100%
SOCIETY & CITIZENS					
Application field	Indicator	WEIGHT per Category		WEIGHT per App Field	
Affordable Housing	Development of housing prices	8.73%	100%	16.67%	100%
	Housing cost overburden rate	43.64%		83.33%	
Citizen Engagement and Empowerment	Citizen engagement/ empowerment to climate conscious actions	15.21%		50.00%	100%
	Encouraging a healthy lifestyle	15.21%		50.00%	
Urban Structure	Inhabitants in dense areas	17.21%		100%	100%

5.3.3 Aggregation and calculation of the city indexes

As explained in section 3.2.4 Step IV: Aggregation to calculate the city indexes, the indicators of Groningen have been aggregated according to the Linear aggregation method, and the results are city

indexes per category and per application fields, collected within the following tables Table 44 and Table 45 below.

Table 44: Groningen Indexes per Category

CATEGORIES INDEXES	
Category	City Index
Energy & Environment	8.49
Mobility	8.81
Governance	7.13
Society & Citizens	8.00

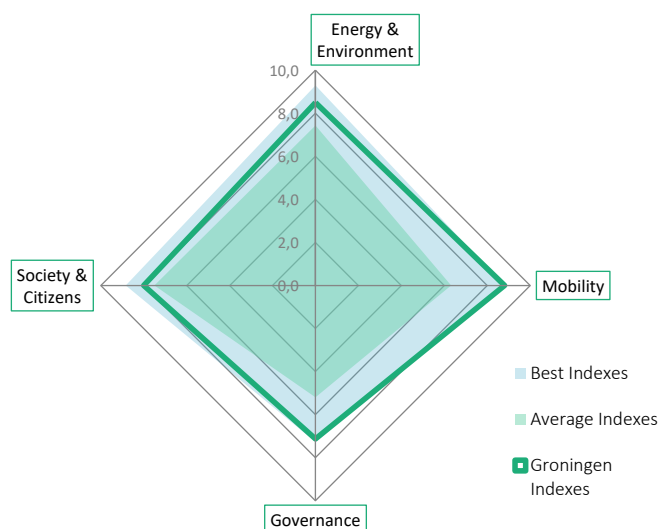


Figure 23: Radar view of Groningen Indexes per Category

Regarding the indexes resulting for the city of Groningen, in all categories the city is above the average of cities indexes, having the best one in Mobility and almost in Governance, and a very good one in Energy & Environment. It can be also noted that since all the indexes are in some way balanced in terms of the score obtained, it is understood that there are no significant imbalances to deal with in this city or issues that because they are especially neglected may be positively distorting the index of another category.

In terms of **Energy & Environment**, it has a very good index, as mentioned before, which is very important as this would be a relevant category in terms of energy planning and European 2020 targets. Within this category, best scores are given to Primary energy consumption and Recycling rate, while the lowest one is for building connected to the DH-network, which is relatively low compared to the heating degree-days the city has. The main priorities for Groningen in this regard are GHG emissions and recycling rate, where it has already good scoring, while maybe it should have given a higher priority to the lowest scored indicator: buildings connected to DH-network, as mentioned before.

The index within **Mobility** category for Groningen is the best among the rest of the cities, so the city should not worry much on this issue. It has high scores on all mobility indicators except in which all cities fail: fuel mix in mobility, which means that it is very far from the European targets and will have to focus its next efforts towards electric mobility. The priorities of the city focus mainly on the modal split (which is important in order to reduce private vehicle use) and on the access to public transport, which is in line with the previous one. Lowest priority for Groningen in terms of mobility lies in the energy use for transport, what would not be very important if they focus their effort on those priorities mentioned above, since by getting improvements in these, the energy used for transport indicator will automatically be positively affected.

In relation to **Governance** category, the city has a quite good index, close to the best one within the project cities, with all the scores of the indicators above 5. Best scored indicator is the one of GDP, what is relevant because it indicates that there is not remarkable energy poverty in the use of energy for heating or cooling homes, or for the use of different modes of transport, which puts more value, if possible, on the indexes obtained in the previous categories. In addition, the city has a relatively good score on ICT indicators (smart city factor and quality of open data), which being the weakest point in general for all cities, indicates a good trend. Main priorities have been given to smart city factor in a

city development strategy indicator, followed by the quality of open data, which is a sample of the awareness of its relatively weak points.

Society & Citizens category has a good index for Groningen, with all indicators scored above 5. Although indicators scores are balanced, the one that gets a better score is inhabitants in dense areas, which means that the city has many suitable areas to develop PED. Housing cost overburden rate the main priority for the city, being balanced the rest of weights, as well as the scores are.

The good indexes in all categories mean that Groningen is on the right track and to know their next needs or priorities, it will have to look closely those indicators scored lower or set the strictest European targets in order to get to be a nearly zero-carbon city.

Table 45: Groningen Indexes per Application Field

APPLICATION FIELDS INDEXES		
Category	Application Field	City Index
ENERGY & ENVIRONMENT	City Energy Profile	5.61
	GHG Emissions	7.72
	Waste Management	10.00
MOBILITY	City Mobility Profile	8.81
GOVERNANCE	Economy	8.59
	Initiatives and Strategies of the PA	7.50
	Public ICT / Data	5.00
SOCIETY & CITIZENS	Affordable Housing	7.63
	Citizen Engagement and Empowerment	7.50
	Urban Structure	10.00

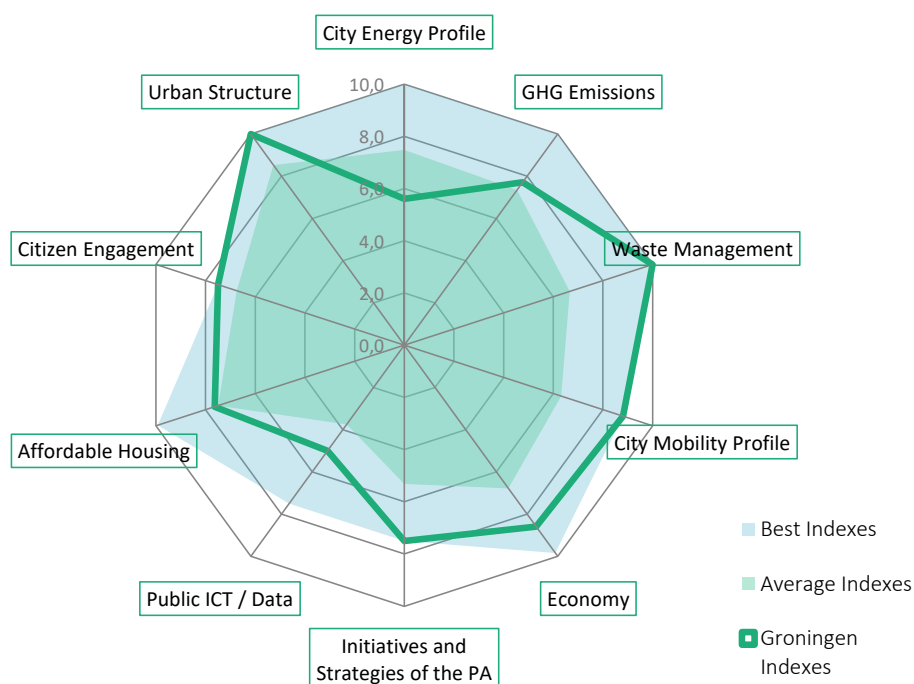


Figure 24: Radar view of Groningen Indexes per Application Field

In view of the indexes for the applications fields in Groningen, all of them are above the average index of the project cities except the city energy profile. This is due to the few buildings connected to the DH-network, although it is good in terms of primary energy consumption and quite good in final energy consumption per capita, even if they are not meeting the European target. The best index within the application fields of Groningen is for the urban structure, suitable to develop PED areas due to its density; and the waste management; followed by the city mobility profile and economy.

5.4 Analysis of the existing city plans

5.4.1 Main City Plans identified

Within this section, the main information of the existing plans that Groningen has identified is included, following the process explained in the section 4.2 Methodology for the analysis of the existing city plans, of the present document. The whole information gathered for each of these plans is collected in the annexes of this document (Annex A: Groningen, A.2).

Table 46: Groningen Short Term plans

Main city plans identified – Short Term			
Plan	Scope	Description	Topics covered
Housing Strategy	Local	Strategic vision on housing in Groningen. Describes the needed quantity and quality of the housing in Groningen, both for the owner-occupied homes and the rental sector (both commercial and social). Also describes on which households to focus in the policy.	Energy Social
Programme Living Quality	Local	Promotion of an integrated approach to ensure sectoral action helps create liveable environments where people want to live; targeting both existing inhabitants and the increase of possibilities to attract skilled talents.	Social Mobility
Programme on Traffic and Transport	Local	Programme aiming for further reduction of car traffic by promoting notably biking and walking and a further greening of public transport and car-mobility. Essence is to maintain accessibility while promoting energy efficiency and liveability.	Mobility
Economic Agenda 2015 - 2019	Local	Pursue becoming an international knowledge city, an attractive city and entrepreneurial city through intensive cooperation with strategic partners.	Energy Social ICT
Heat Plan Province of Groningen, 2016-3	Regional	Plan of relevance for developments in the city of Groningen. Although most of the sustainable heating efforts will take place in the industry, residential neighbourhoods are mentioned as well. Energy conservation is stressed as a relevant for this challenge, but still, the plan is focusing on large scale, central heating projects.	Energy

Table 47: Groningen Medium Term plans

Main city plans identified – Medium Term			
Plan	Scope	Description	Topics covered
The Next City; the Groningen living quality first	Local	Strategic vision for the city of Groningen, integral vision for urban development (housing, work, mobility, energy, social).	Energy Mobility Social

Groningen CO ₂ - Neutral 2035 and Routemap	Local	Plan to become a CO ₂ neutral city. The routemap is a more specific program for the period until 2023 and then 2035. The goals mentioned are the ones for 2035. In 2023 there are intermediate goals.	Energy
Regional Housing Document Groningen-Assen Region	Regional	The document has references regarding urban energy initiatives, with an overview of agreements and policies regarding residential areas.	Energy
Climate Agreement	Regional	Joinment of forces between the Dutch government and more than 100 stakeholders, including large businesses, NGOs, and other governmental levels, to come up with a climate plan covering the themes of: Buildings, Electricity, Industry, Mobility and Agriculture.	Energy Mobility

5.4.2 Main targets defined in the city plans

As mentioned in Section 4.1.4, the Europe 2020 strategy aimed to become sustainable, smart and economy inclusive. Following Table 48 shows the relation between the main European targets with the targets on the city of Groningen planning, including a somewhat broader spectrum of plans than those addressed in the previous section.

Table 48: Groningen targets aligned with the European ones

GRONINGEN targets aligned with the European 2020 targets			
EU target	Plan in which is included	Is the target achieved?	Is there a more ambitious one?
75% population aged 20-64 employed	Coalition Agreement (<i>Coalitieakkoord</i>) 2019 - 2022	To some extent ⁴⁷	
3% of GDP invested in R&D sector	Policy Letter (<i>Beleidslevenbrief</i>) 2011	NO	
Reduction 20% of GHG emissions	Groningen CO ₂ –Neutral 2035 and Routemap (<i>Routekaart Groningen Energieneutraal</i>)	NO ⁴⁸	YES: 100% reduction by 2035
Increasing 20% of share of RES	Groningen CO ₂ –Neutral 2035 and Routemap	NO	YES: 64% by 2035
Improved 20% energy efficiency	Groningen CO ₂ –Neutral 2035 and Routemap	NO	YES: 34% reduction by 2035
Early school leavers' share reduced under 10%	Plan of Action Early School Leaving (<i>Plan van Aanpak Vroegtijdig Schoolverlaten</i>)	YES	YES: Reduce further (currently 2%)
40% of 30-40 years old with tertiary education	(not a target of Groningen since it is currently accomplished)	YES	

⁴⁷ Not measured in this way, but the unemployment rate is 7.20% of active population in 2017, source (by region): <https://ec.europa.eu/eurostat/documents/2995521/8830865/1-26042018-AP-EN.pdf/bb8ac3b7-3606-47ef-b7ed-aadc4d1e2aee>

⁴⁸ Not achieved but GHG emissions per capita are quite close to the EU target. Groningen GHG emissions: 5.40 tonnes of CO₂ /cap. EU target: 4.11 tonnes of CO₂ /cap.

The central ambitions of the city of Groningen are expressed in its comprehensive city strategy “The Next City”, while targets are also set in the new Coalition Agreement (2019 – 2022). We shortly discuss the key targets based on the core ambitions of the Next City, while linking to the EU targets and key sectoral policies.

1. The facilitation of growth towards 250,000 inhabitants. The focus is on building 20,000 homes, while
 - Maintaining a compact city, also allowing for “Maintain and promote” (*Meerjarenprogramma Verkeer & Vervoer*: Programme on Traffic and Transport 2019 – 2022).
 - Building energy neutral homes (or better) so as to support energy ambitious (Housing Strategy).
 - The existing housing stock remains attractive, implying all houses need to become free of natural gas within the next 15 – 20 years (Housing Strategy and Roadmap Energy-Neutral).
2. Job availability matches growth of city and region. The city aims (also see Economic Agenda 2015 – 2019) for
 - Creating 15,000 new jobs.
 - Remain the key energy-hub for the Netherlands, while shifting from gas to renewables.
 - Green growth, including the greening of existing companies (Roadmap and Energy-Neutral).

Groningen faces a relatively low employment rate (below 70%) and thus continues to focus on adding jobs. EU targets are not explicitly mentioned, but labour participation and investments in creative sectors (e.g. including research and development) are mentioned. Energy is only implicitly mentioned for generating jobs, with mostly energy efficiency of industry and offices being mentioned. The city has no policies on increasing the share of Tertiary education. The level for 30 - 40 year old already is above 50%.

3. The growing city remains liveable and attractive to all citizens. This ambition explicitly targets inequality (reduce percentage of poor households), public space (climate change and sustainable and slow mobility) and energy efficient and green individual buildings (e.g. green roofs).
4. Speeding up energy transition. The central ambitious for 2035 are to
 - Improve energy efficiency by 34%.
 - Generate 31% of all energy in the municipality based on renewables.
 - Import 33% renewable energy from outside.
 - Become CO₂ neutral.

The Roadmap Energy-Neutral is the leading policy document, with explicit targets for the year 2023 on the themes Housing, Industry, Offices and light industrial buildings, Mobility and Energy Production. Distinct targets include solar PV on roofs, solar thermal installation, heat pumps and district heating, while sectoral policies also address energy:

- Housing Strategy: “Energy Neutral in 2035” is one of its four main targets, while “Good quality and affordable housing” also targets energy efficiency.
- Programme Living Quality/ Meerjaren Programma Leefkwaliteit (2019 – 2022): two out of three main ambitions target energy transition, but to a modest degree, through climate change adaptation in the ambition to create “Robust and Resilient Places” and walking and biking and sustainable food in the ambition “Healthy Safe & Sustainable Living”.
- Programme on Traffic and Transport/ Meerjarenprogramma Verkeer & Vervoer (2019-2022): three of its five key ambitions target energy transition: 1) “Promotion of

Sustainable Transport” aims for electric vehicles, more biking and less cars, 2) “Greening of Urban Logistics” aims for more bike-cargo and a smarter bundling of delivery serves to reduce CO₂ emissions, 3) “Maintain and promote biking”.

- Economic Agenda 2015-2019: targets an “International Knowledge City”, an “Entrepreneurial City” and an “Attractive City”, while including a focus on more green companies and for Groningen and its region to remain the a key energy-hub for the Netherlands.
- 5. Everyone joins in an inclusive city with limited inequalities, translated mostly in social and cultural activities and services, including sports, healthcare, education, shops, etc. Energy efficiency in houses is seen as an ambition (also Housing Agenda). Similarly, accessibility to public transport is mentioned as an ambition. Reducing poverty (currently at 7.9%), further reducing early school leavers (currently at 2.3%) are all ambitions, but not stated in the Next City (but visible in other policies).

The ambitions typically overlap, are complementary and without contradictions. The EU 2020 targets are not explicitly referred to, but all except tertiary education feature clearly. On energy the city goes far beyond EU ambitions (also for 2040) and has extensive policies in place, despite not yet meeting the 2020 targets. Employment is a key ambition in various programmes, but also largely depends on national policies. Groningen has an 11% unemployment rate, and faces a significant group of people not able to work or not participating in the job market. Investment’s in R&D are not measured or explicitly targeted locally; nationally the ambition is 2.5%. Groningen does actively pursue the growth of the creative sector. In the Netherlands the targets for education (early school leavers and tertiary education) are easily met, also in Groningen. Groningen is among the cities with the highest share of poor households, which also means it is an explicit target for the city (*Coalitieakkoord* 2019-2022, *Nota Perspectief* 2015-2018).

The main concerns following the analysis include:

- A rapid development of additional housing within the city limits is hard to combine with high ambitions due to high costs (brownfield developments, land prizes and additional energy measures versus the need for cheap housing).
- Housing associations cannot invest in both swift additions and expensive energy measures.
- Implementation remains challenging as much depends on the willingness to invest of other stakeholders (e.g. housing associations, home owners, project developers, companies, etc.).
- Despite clear poverty issues, energy poverty is not targeted.

5.4.3 Main actions identified to achieve the defined goals

The Next City means to provide long term guidance and direction. Concrete actions are identified in the sectoral plans. We here discuss them based on the headings of the Next City, with a focus on the ambitions of [Table 48](#).

1. Facilitate Growth.

- 20,000 new houses; currently ongoing, about half in existing urban fabric.
- All new houses need to be energy neutral; current building projects are typically without connections to the natural gas grid and energy neutral. Projects approved before the Housing Strategy are also performing very good in respect of energy efficiency, but not all fully energy neutral.
- Green the existing housing stock; district heating in the North-West of the city (being developed), allow individual homeowners (next to housing associations) (to be developed), smart city pilots (first finished), create 1000 energy-neutral social rent

houses (to be developed), the promotion of collective heat pumps (first are finished) and information provision for home owners to invest through the municipal energy portal (finished).

2. Job availability matches growth of city and region.

- Innovation at Zernike Campus related to energy centres (Entrance & Energy Academy Europe) (largely finished).
- Healthy aging and energy as the core themes for economic innovation (attract business, stimulate entrepreneurship, link with education and research on these themes); also accepted as core themes by the two universities.
- 137,500 jobs in 2019 (finished; in 2018 145,100).
- 1,000 jobs plan (on-going).
- Covenants and agreements with main employers (finished).
- Contribute to regional Research and Innovation Strategy for Smart Specialization (finished).

3. Growing city remains liveable and attractive to all citizens.

- Do a climate stress-test; finished.
- Creation of two ecological zones; on-going.
- Develop a climate adaptation plan; on-going.
- Additional bike parking and removing obstacles in the inner city; on-going.
- 400 additional EV charging stations; on-going.
- No-emission zones; under investigation.
- Tenders for emission free public transport; existing.
- Coalition with stakeholders for promoting CO₂ free logistics, the bundling delivery services, cargo bikes; existing.

4. Speeding up energy transition.

- 7.5% saving on heat transition.
- 80 MWp solar PV on roofs in 2023; on-going, currently (2018) 42.5 MWp, large projects started (e.g. *Woldjerspoor*, *Vierverlaten*, *Rodehaan*).
- 10 MWp solar boilers on roofs; on-going, first pilots are finished.
- 5% housing on heat grid (6000 homes) and 5% of companies on district heating grid; work is on-going (currently about 1500 buildings done).
- 100% offices at least energy label C, 20% at least label A; on-going, largely facilitated by Dutch legislation.
- 1% efficiency improvement in industry per year; ongoing, largely facilitated by Dutch legislation.
- Installing 5000 heat pumps (3000 air and 2000 solar); work on-going, first collective heat pumps finished.
- Start a project's Solar on Company roofs' in 2019; started.
- Expand wind production; on-going, two projects starting (*Westpoort* and *Stainkoelen*).

5. Everyone joins in



- Development of the Neighbourhood Energy-approach in 34 neighbourhoods; on-going, three Neighbourhood Energy visions are finished.
- Introduce basic-job for 500 people; starting.

The biggest challenges the city faces are:

- Uncertainty in expanding sustainable sources for heat due to cancellation of a geothermal well at Zernike Science Park.
- Dependence on investments by housing associations, companies and home owners.
- Limited budget for Neighbourhood Energy-approach.
- New targets in the Climate Accord will likely affect plans.

5.4.4 Actuation areas identified and financial schemes

The plans are only modestly assigned to individual areas. Of course, there are the plans for the neighbourhood Energy-visions and plans. These mean to translate municipal ambitions into fit-for-purpose and fit-for-place solutions in all 37 neighbourhoods of the municipality. The first three are under way in the neighbourhoods of *Paddepoel* (1), *Reitdiep* (2) and *Noorderplantsoenbuurt* (3), as reflected in Figure 25.

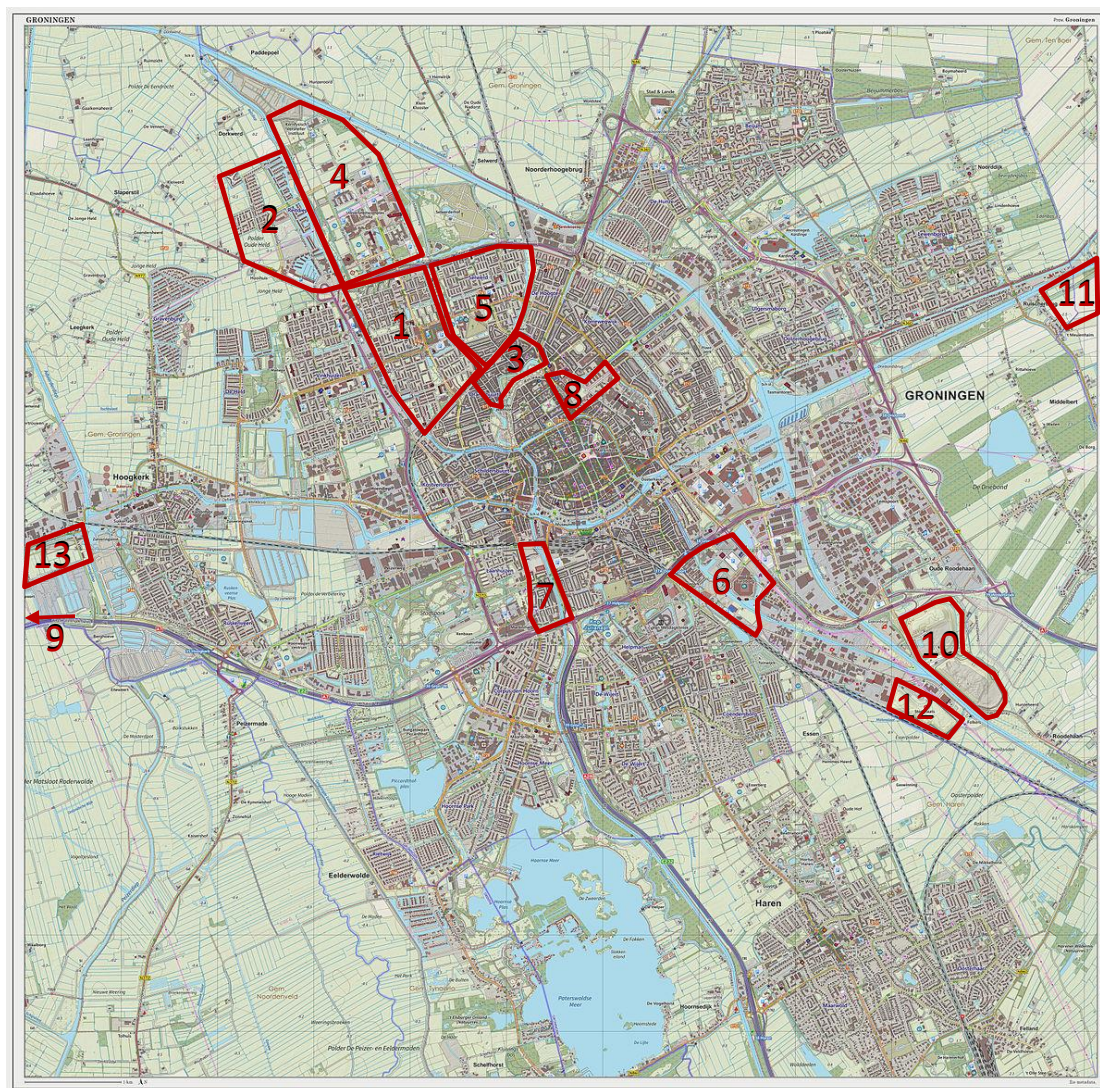


Figure 25: Actuation areas in Groningen

Various larger projects and ambitions are linked to individual zones, however:

- The largest district heat network is planned in the North-West of the city, prioritizing *Zernike Campus* (4), *Paddepoel* (1) and *Selwerd* (5).
- Several smaller district heating networks target other areas: *Europapark* (6), *Grunobuurt* (7), *Ebbingekwartier* (8).
- Wind energy is foreseen in the industrial areas of *Westpoort* (9) and *Stainkoelen* (10), while *Meerstad-Noord* (new urban district) (11) is also considered.
- Solar has been constructed especially at *Woldjerspoor* (12), *Zernike* (4) and *Vierverlaten* (13), currently, *Westpoort* (9) and *Meerstad-Noord* (11) are areas of consideration.

Furthermore, the inner-city is targeted specifically for further reducing car dependency and the promotion of biking and walking. When it comes to green growth, notably Zernike Campus is mentioned several times as a place to accelerate growth.

In terms of financing, there are significant budgets currently assigned to the various plans of the municipality (see Annex A, A.2). In addition there are investments in larger projects including:

- *Warmtestad*: 50% municipal owned heat company; 70 million, 10 million from the municipality.
- *Vierverlaten*: solar park; 2.4 million.
- Energy neutral houses; new projects; 4.5 million.
- Neighbourhood energy approach; 34 projects; 1.76 million.

Various financial schemes also exist, which can be used to invest in energy efficiency and production (see Table 49 below).

Table 49: Main financial instruments in Groningen

Name	Financing
SDE+	Operating grant for larger producers and investors who receive financial compensation for generated renewable energy equal to the difference between the cost price of renewable energy and the market price.
ISDE	Investment subsidy for sustainable energy on heat for smaller companies, home owners and associations of home-owners.
EIA	The Energy Investment Allowance (EIA) gives companies an average 13.5% tax advantage for energy-saving technology and sustainable energy.
SEEH	Subsidy regulation for energy efficiency own homes. Meant for home-owner. Up to 20% of costs subsidized.
Taxes	There is a low tax rate on isolation (9% instead of 21%) to stimulate isolation measures and there is a tax deduction scheme for taxes on buying and installing solar panels.
GRESKO	The Groningen Energy Service Company is responsible for the integral energy management of municipal government real estate.

5.4.5 Main needs and priorities identified from the analysis of the existing city plans

A key struggle for Groningen is translating its high energy ambitions into practical and affordable actions. There are multiple causes listed here as bullet points:

- Financial arrangements (how to include various stakeholders on whom the municipality depends).
- Innovative business cases (on the level of individual homes, housing associations and communities).
- Clarity on (national) rules and regulations.
 - On financing and legal conditions for heat grids and inclusion of home owners.
 - Possibilities for pilot experiments (Dutch: *wettelijke experimenteerruimte*).
 - Buffering of electricity (scale, ownership).
- Availability of high quality staff and expertise.
- Data availability, management and dissemination; notably to:
 - Show how measures related to energy affect the purchasing power of households and energy poverty.
 - Identify the distribution of costs and benefits on different societal groups.
 - Show impacts on the generation of jobs, entrepreneurship and thus, economic growth.
- Limited integration between (energy) poverty issues in energy transition policies.
- Limited integration between economic development policies and energy transition policies.

6 City Diagnosis: Oulu

6.1 General overview of the city



Oulu is the capital of northern Finland, with over 200,000 inhabitants. It is one of the growing cities in Finland, with an area of 3,818 km², and is also the oldest city in Northern Finland. It is located in the Gulf of Bothnia in the Oulujoki River delta with good access from anywhere. The city has the highest population in Northern Finland and the fifth highest population in Finland. The city was founded by King Charles IX of Sweden in 1605, and in the nineteenth century the city was Finland's leading exporter of tar, and was a favourite destination for thousands of domestic and international leisure and business travellers.



Figure 26: What Oulu is

Oulu provides good opportunities for studies, work and R&D, especially in the hi-tech sector. Nowadays, the region is well known for its technology, with the hi-tech growth being quite prominent after the establishment of the University of Oulu in 1958, which gave room for development and innovation. In addition to the University of Oulu, there are several research institutes, including VTT Technical Research Centre of Finland and the University Hospital. There is also the multidisciplinary Oulu University of Applied Sciences.

There are two science parks in the region: Technopolis Plc, which was Scandinavia's first science park, and Medipolis Ltd., as well as a technology centre, Ii Micropolis Ltd. The region is home to many hi-tech companies, due to it possessing a well-established ecosystem for wireless technologies. This is further emphasized by its being one of the first constructors of the 5G test network. Examples of companies investing in Oulu include Nokia, Bitwise, Spent, MediaTek, and Kionix. The sector currently employs over 10,000 people. In addition to this, there is also traditional large-scale industry in Oulu like pulp and paper mill and chemical industry and a port, which serves them. There has however been a normal Western European transition from heavy industries to smaller, knowledge- and service-based companies as employers.

Transport connections are direct and fast, regardless of the means of transport or direction. Oulu railway station is one of the busiest in Finland, and it is operated by state railways VR. Considering active transportation modes, Oulu contains over 800 km of pathways for pedestrians and bikers and is quoted as an "excellent city for cycling". The transport mode share of cycling is one of the highest in

Finland. Oulu has an international airport, which the second largest in Finland by passenger volume. In road traffic, even if there are some minor traffic jams during morning and afternoon rush hours, there are normally no remarkable congestion problems. By local bus service it is possible to get round the city in 5 to 30 min intervals. The bus service quality has been made better during recent years and the development is still going on.



Figure 27: Oulu's highlights

Oulu consists of the cultural life of a modern business and tourism city; it also has extensive shopping opportunities as well as the northern arctic nature exoticism. The uniqueness of the city is based on the fact that the hustle and bustle of the city centre areas, for example, make it easy to deviate to the peace and the greenery of the park, the sandy beach or the frozen sea. The Oulu Region also has a lively cultural climate, both in established and DIY-scenes.

Oulu's climate is considered subarctic continental, where winters could be cold, snowy, and dark, while summers are quite warm and short. The lowest temperature was recorded to be -36.1°C in January, while the highest temperature was recorded to be 31.7 °C in July. Precipitation is low compared to many peers outside Finland close to coast. Snow depth in February may be e.g. 50 cm and snow cover is there from about November to April. However, the recent years have been warmer and snowy time has decreased.

Table 50: Oulu climate characterisation

CLIMATE CHARACTERISATION	Subarctic Continental climate
Average annual temperature	2.7 °C
Total annual precipitation	450 mm
Winter average temperature	-9.6 °C (January)
Summer average temperature	16.5 °C (July)

6.2 City characterisation

6.2.1 Energy & Environment characterization

Oulu is located close to the northern end of the Gulf of Bothnia, which has quite good potential for renewable energy. Thinking about the future, especially wind power potential is high.

Traditional fuel in Finland is wood, which was nearly only heat source until the beginning of the 20th century. Also after that it has had a big role. Traditional fuelwood use has been continued in detached houses and in summer cottages, now as an additional source of energy with about 15% share of all heat use in Finland. The main heating method in detached houses is electricity, directly by electrical resistances, or to run air to air/water or ground source heat pumps.

Oil was the main heat source in the new buildings in 60's and 70's, but now it seems to be phased out quite naturally. Oil price is in relative increase, compared to especially heat from different kind of heat pumps. In larger Oulu area the share of oil heating is already now under 10% and in central areas practically zero. There is no gas network in Oulu. Neither coal has practically no use currently in Oulu, earlier it was used a bit e.g. in industry. In whole Finland the coal use is to be banned in 2029.

In urban and suburban areas the clearly dominating heating method is district heating (DH), from 1960's on in Oulu. Practically all larger buildings in those areas are connected to DH. In the whole city area about 2/3 of the heat is supplied by DH and for the rest the buildings are in many cases in remote places, for which DH connection is not feasible.

A major part of the DH is produced in combined heat and power (CHP) plants. The fuel was originally peat and for a small share oil, but this mix is gradually replaced by wood, which now represent a bit under half of the total DH CHP fuel use, the rest being peat. Oil use is negligible in Oulu DH system, it is used only for peak boilers in coldest winter days.

The oldest CHP unit, which started in 1977, is taken out of use in 2020 and replaced by a new one, which is planned to use 85% wood as a fuel, the rest being sorted waste. In about 2040 all the peat will be replaced by wood, which in practice is by-products from forest industries (bark, sawdust, low-quality trunk wood) and more and more forest fuels (branches, tops, stumps and small-diameter wood from thinning).

The other existing CHP plant is to be decommissioned in 2035. After that there is a need for new DH production facilities, in addition to the soon starting new CHP plant. Heat pump applications demonstrated in Making-City may well be a part of the solution.

DH is currently produced also in *StoraEnso's* quite large pulp and paper mill. The input from there covers about 15% of the DH supply. The fuel for that is mainly wood, by-products from forest industry itself. There is also chemical industry in the city, for which there is a CHP plant using fuel derived from industrial and municipal waste.

CHPs produce slightly fewer than 50% of the electricity consumption of the city. 15% comes from the hydropower plant close to the city centre and roughly 3% from windmills inside city borders. The rest is bought from the national grid. In surrounding areas there is a lot of hydro and wind power production, the amount of those well exceeding the city needs.

The hydropower potential is nearly used but there is a plenty of room for new wind power. Around Oulu, there are plans to build wind power especially in the coast but also bit inland. In the maximum case the amount would be manifold compared to the use in Oulu area. At least a part of that new capacity will very probably be realized also. Also, a new nuclear power plant will probably be built in about 100 km south-west from Oulu

The Finnish building code is quite tight already now, actually so that the significant further tightening would not be economically feasible even in the long term. The energy efficiencies of also the older

Finnish buildings are relatively good, i.e. due to the cold climate the buildings have always been quite well insulated compared to the ones in more southern countries. U-value of outer wall in older building stock may be in average roughly 0.3 - 0.4 W/m²K, while currently it is about half of that. Windows have been 3-fold from 1970s. With selective coatings the current 3- or 4-fold glass standard window is equal to 6-fold window without coatings. In all new buildings exhaust air heat recovery is a standard. The development is due not only to the technical development, but also the fact that the energy used to be cheaper, even if it is not expensive now either when compared to many other countries.

Due to relatively good basic level, the energy renovations are mainly feasible only when done in conjunction with other renovation. On the other hand, the cold climate calls for good insulation and thus when renovating, the energy efficiency is usually improved adding more insulation, changing windows for new ones etc.

Waste handling is generally well organized and there is very little waste that is dumped to landfill. However, the material recovery share could be improved from current about 50%. The rest goes mainly to CHP plants, separate ones for municipal solid waste nowadays.

Perhaps the most difficult issues or problems to be solved in Finland, are the high level of general consumption leading e.g. to the non-availability of some resources and decreased biodiversity, and transportation. Both of these require more than just technical changes.

In energy sector there is also however still room to improve. Even if we are in the middle of the forests, the forest fuels cannot cover all the needs that they are intended to do in some plans (CHPs, smaller boilers and stoves, liquid biofuels, new raw materials...). One solution to save wood or anything combustible is to use heat pumps + electricity from wind and (new) nuclear etc., and at least from the writers' point of view, heat pumps can well be combined with CHP DH so that they complete each other.

6.2.2 Mobility characterization

City of Oulu is well known for its cycling infrastructure and especially its winter cycling environment. The city boasts the highest cycling modal share in Finland (almost 20%). Citizens keep on cycling throughout a year and cycling has been made an easy choice also during the wintertime. A kind of speciality among the Finnish cities is that there is a lot of cycle lanes, which go even visually separated from motorized vehicle routes, in the forests or between buildings. This makes cycling comfortable. The same lanes are usually used by pedestrians, which in turn is a common solution in Finland.

Public transport has been steadily growing and during the last five years it has clocked a record number of passengers with more than 28% growth in 2015-2018. Topography is almost flat and hence supports cycling and walking especially on short distances.

However, city of Oulu faces the very same challenges as other cities in Finland: land use is dispersed, more than 50% of trips longer than 2 km are made by car, growing number of people are commuting by car and the city is lacking of an efficient, rail based public transport system for shorter distances.

For longer distances, train services are quite good and popular. There are both day and night services. Oulu railway station serves close to 1 million passengers by year, about the same than the airport. Bus connections for longer distances are in general moderate. The ticket price decrease in the previous years (due to at least competition) has increased the number of passengers.

Investments on the infrastructure are not totally coherent with climate targets. There are intentions and even money for promoting walking, cycling and public transport but on the other hand existing roads for motorized traffic are reconstructed with more lanes etc. There has however probably been a shift towards greener choices in the recent years.

To limit the traffic growth, the city aims in densifying the urban structure. The sprawl is not especially bad in Oulu, but e.g. commercial services tend to be centralized. In most of the cases the distances are tolerable and in principle the daily activities can be handled using bike or public transport, depending on the life situation of course. A very common use of car and perhaps the most difficult one to replace is to get children to hobbies, among the other personal activities. Also commuting by car is often quicker than by more sustainable transport modes.

6.2.3 Governance characterization

The City Council of Oulu is elected in a local election arranged every four years. During the 2017 - 2021 period the Oulu City Council has 67 board members⁴⁹.

The City Council is the highest decision-making organ of the city. The council guides the development of the city in a concrete manner by wielding economic power. The council makes decisions concerning the basis of economy and financing: tax rate, the basis of payments in general, borrowings and guarantees. The council also sets qualitative and operative objectives for the various administrative sectors.

City of Oulu Administrative Organisation 1.1.2019

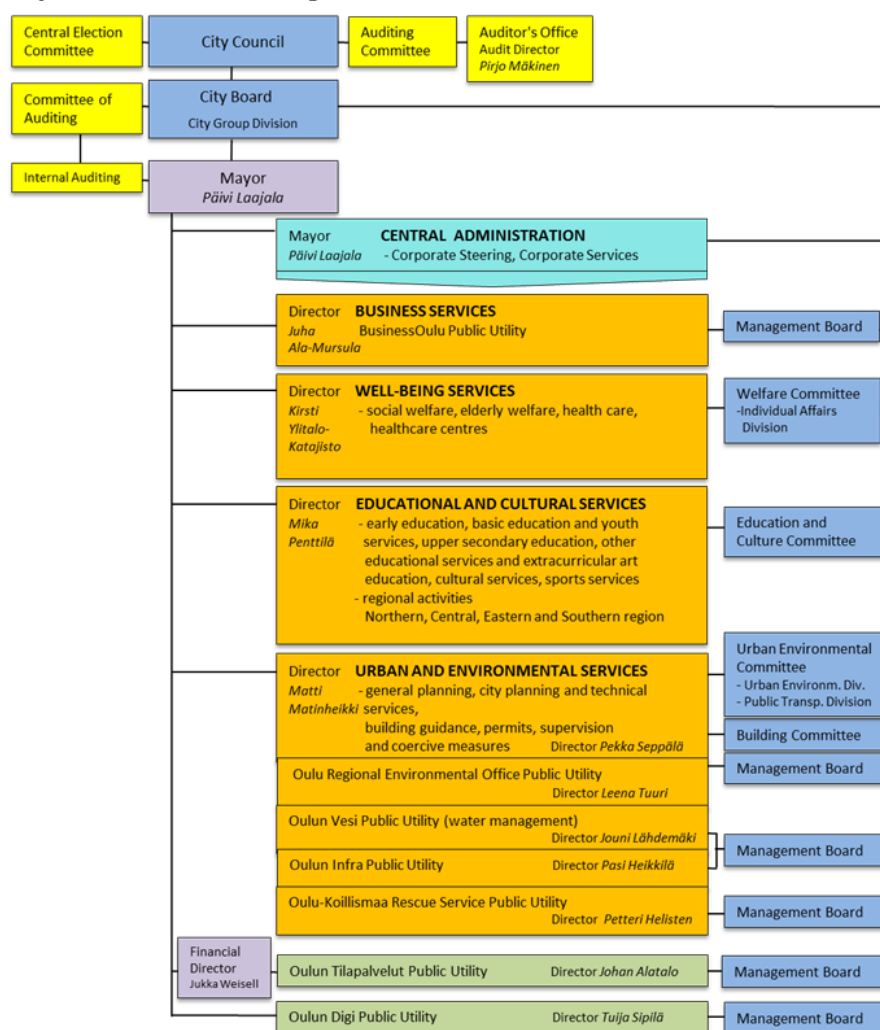


Figure 28: Oulu Administrative Organisation

⁴⁹ <https://www.ouka.fi/oulu/paatoksenteko-ja-hallinto/kaupunginvaltuusto-kokoonpano>

The council makes decisions concerning the structure of municipal administration: municipal committees, offices and institutions and the way they share their mutual authorities. The council appoints elected officials and major municipal officeholders. The council follows the management and results of City matters through the closed accounts, annual report and auditor's report.

The meetings of the council are public. The agendas of the meetings and the minutes of the decisions of the City Council are available to view in all libraries⁵⁰, in Oulu10⁵¹ and on the Internet⁵² (in Finnish).

The City Board consists of 13 members elected by the City Council for a four-year term.

The City Board is responsible for municipal administration and economy, preparation of the matters to be decided by the City Council and making sure that the decisions made by the council are implemented and in accordance with the law.

The City Board represents the municipality: it uses its right to speak and performs various judicial actions on its behalf. The tasks of the City Board are defined in the by-laws. The Mayor and the Financial Director present the matters to be decided by the City Board. The City Board's 13 members all have a personal deputy. The mayors of the City Council can attend and address the meetings.

The public cannot attend these meetings, but the decisions of the board are in the public domain. The media is also informed of the decisions.

The City of Oulu's services comprise:

- Well-being services
- Educational and cultural services
- Urban and environmental services

The Department of Central Administration is responsible for the preparation and expert tasks related to development and decision-making.

The Department of Well-Being Services provides social and health care services to local residents in accordance with the law and decrees. It is also responsible for the prevention of social problems and their adverse effects in Oulu.

Well-Being Services operates within a contract guidance model where the purchaser is responsible for arranging the social and health care services in the city. The purchaser is represented by the social and health care committee and a purchasing team consisting of civil servants and experts. The provider is responsible for providing the city's own social and health care services. The provider is represented by directors reporting to the board of directors of social and health care service provision and by the majority of the Well-Being Services staff.

The Department of Well-Being Services is headed by Kirsti Ylitalo-Katajisto.

The Department of Educational and Cultural Services is in charge of early education, basic education and upper secondary education as well as services related to youth, culture, sports and leisure activities.

Educational and Cultural Services comprise:

- Early childhood education services
- Basic education and youth services
- Upper secondary education and other educational services

⁵⁰ <https://www.ouka.fi/oulu/kirjasto/>

⁵¹ <https://www.ouka.fi/oulu/english/oulu10-service-point>

⁵² <https://www.ouka.fi/oulu/paatoksenteke-ja-hallinto>

- Cultural services
- Sports and leisure activity services

The Department of Educational and Cultural Services is headed by Mika Penttilä.

The Department of Urban and Environmental Services is responsible for strategic land use planning and services related to urban planning (general planning).

- City planning and technical services
- Building guidance, permits, supervision and coercive measures (building inspection)
- Regional environmental services (Oulu Regional Environmental Office)

Urban and environmental services is headed by Matti Matinheikki.

The field of urban and environmental services includes:

- Urban and environmental services
- Environmental Office of the Oulu Region
- Building supervision

The Department of Central Administration is responsible for the preparation and expert tasks related to development and decision-making.

The Department of Central Administration is headed by mayor Päivi Laajala.

6.2.4 Society & Citizens characterization

The population of the city of Oulu was 203,567 at the end of year 2017. Compared to the previous year there was a growth of 1757 inhabitants. In the region of Oulu, the growth was 2140 inhabitants including also the growth of the city of Oulu.

Main reason for this growth has been the high and stable natural increase. However, during the last few years there have been signs of decline in the birth rate, just as in the whole country.

Even though the birth rate has gone down, about 2100 children were born in Oulu in 2018. The net migration has been on average about 1000 persons per year during the last five years. In 2018 the net migration was 1002 persons, including 491 immigrants. The share of immigration diminished in the net migration from the previous year.

Youth is distinctive to the population structure of Oulu. The number of children and adolescents is big, and the shares of older age groups are lower than in the whole country. The number of the day-care children decreased during the last year. Decreasing birth rate and the negative net migration of families with small children during the last few years are the main causes in the background. The number of the school children aged 7-15 increased by 340 children last year.

The aging of the baby boomers is also seen as more rapid growth of older age groups. In 2018 the number of over 65-year-olds increased by approximately 1180 persons.

6.3 City indexes calculation

6.3.1 Indicators Normalised

As explained in section [\[Error! No se encuentra el origen de la referencia. \[Error! No se encuentra el origen de la referencia.\],](#) the indicators of Oulu have been normalised according to the ranking of indicators method, and the results of this normalisation are gathered in the table below (Table 51). The calculation of the indicators is included in deliverable D5.1 as well as in the annexes of this document (Annex B: Oulu, B.1).

Table 51: Oulu Indicators Normalised

ENERGY & ENVIRONMENT		
Application field	Indicator	SCORE
City Energy Profile	Final energy consumption per capita	6.61
	Primary energy consumption per capita	10.00
	Primary energy sources (shares)	10.00
	Building connected to the DH-network	10.00
GHG Emissions	GHG emissions per capita	7.54
Waste Management	Recycling rate	10.00
MOBILITY		
Application field	Indicator	SCORE
City Mobility Profile	Modal split	4.94
	Fuel mix in mobility	2.00
	Energy use for transportation	6.89
	Access to public transport	1.59
	Public infrastructure promoting low-carbon mobility	10.00
GOVERNANCE		
Application field	Indicator	SCORE
Economy	Unemployment rate	6.63
	GDP (Gross Domestic Product)	10.00
Initiatives and Strategies of the Public Administration	Smart city factor in a city development strategy	7.50
Public ICT/ Data	Quality of open data	7.50
SOCIETY & CITIZENS		
Application field	Indicator	SCORE
Affordable Housing	Development of housing prices	9.64
	Housing cost overburden rate	10.00
Citizen Engagement and Empowerment	Citizen engagement to climate conscious actions	7.50
	Encouraging a healthy lifestyle	7.50
Urban Structure	Inhabitants in dense areas	6.85

6.3.2 Categories, application fields and indicators prioritised

As explained in section 3.2.3 Step III: Prioritisation of categories, application fields and indicators, the indicators of Oulu have been prioritised according to the city needs and targets, through the AHP method, and the results of this prioritisation are gathered within Table 52 below.

Table 52: Oulu Indicators Weighting per Category and per Application field

ENERGY & ENVIRONMENT					
Application field	Indicator	WEIGHT per Category		WEIGHT per App Field	
City Energy Profile	Final energy consumption per capita	1.94%	100%	9.28%	100%
	Primary energy consumption per capita	3.33%		15.97%	
	Primary energy sources (shares)	12.19%		58.38%	
	Building connected to the DH-network	3.42%		16.37%	
GHG Emissions	GHG emissions per capita	70.77%		100%	100%
Waste Management	Recycling rate	8.35%		100%	100%
MOBILITY					
Application field	Indicator	WEIGHT per Category		WEIGHT per App Field	
City Mobility Profile	Modal Split	13.88%	100%	13.88%	100%
	Fuel mix in mobility	14.17%		14.17%	
	Energy use for transportation	14.14%		14.14%	
	Access to public transport	13.80%		13.80%	
	Public infrastructure promoting low-carbon mobility	44.01%		44.01%	
ENERGY & ENVIRONMENT					
Application field	Indicator	WEIGHT per Category		WEIGHT per App Field	
Economy	Unemployment rate	43.81%	100%	87.50%	100%
	GDP (Gross Domestic Product)	6.26%		12.50%	
Initiatives and Strategies of the PA	Smart city factor in a city development strategy	31.02%		100%	100%
Public ICT / Data	Quality of open data	18.90%			100%
SOCIETY & CITIZENS					
Application field	Indicator	WEIGHT per Category		WEIGHT per App Field	
Affordable Housing	Development of housing prices	6.56%	100%	20.00%	100%
	Housing cost overburden rate	26.22%		80.00%	
Citizen Engagement and Empowerment	Citizen engagement/ empowerment to climate conscious actions	13.70%		33.33%	100%
	Encouraging a healthy lifestyle	27.41%		66.67%	
Urban Structure	Inhabitants in dense areas	26.11%		100%	100%

6.3.3 Aggregation and calculation of the city indexes

As explained in section 3.2.4 Step IV: Aggregation to calculate the city indexes, the indicators of Oulu have been aggregated according to the Linear aggregation method, and the results are city indexes per category and per application fields, collected within the following tables Table 53 and Table 54 below.

Table 53: Oulu Indexes per Category

CATEGORIES INDEXES	
Category	City Index
Energy & Environment	8.19
Mobility	6.56
Governance	7.27
Society & Citizens	8.13

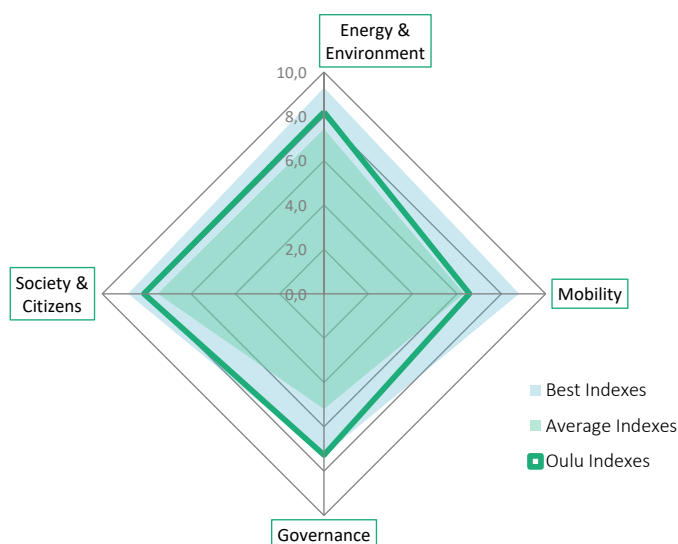


Figure 29: Radar view of Oulu Indexes per Category

Seeing the results of the indexes for the categories of the city of Oulu, in the four categories it is above the average indexes of the cities, having the best one in Governance and very good ones in Energy & Environment and in Society & Citizens. Categories indexes are almost balanced, which means that there is not a worrying or too low category with respect to the others that could otherwise cause the index of another because of the wrong reason.

In relation to **Energy & Environment** category, Oulu has a very good index, which is very important for the category itself and in which it is worth highlighting the climate of the city, the coldest of all cities and with notable difference in terms of heating degree-days. It really has good score in almost all indicators; meeting the European targets in all of them but final energy consumption and GHG emissions per capita, in which the score is also acceptable. Priority of the city focus mainly on GHG emissions, which indicates that the city is aware of where their weakest point is in this category, while the rest of indicators are balanced in terms of priority of the city.

Mobility category has the lowest index for Oulu, even if it is not a bad one and still being over the average indexes of the project cities. Best value (and with notable difference from the rest of the project cities) is Public infrastructure promoting low-carbon mobility, which means that the city has a great infrastructure for cycling mobility. Energy use of transport has also a good score, while the lowest scores are for access to public transport indicator, and fuel mix in mobility, which indicate that the city needs to improve the network of public transport stops to improve access to them for its inhabitants (less than 500 metres) and also electric or low-emissions mobility needs to be improved. Highest priority, as reflected in the numerical results, is for public infrastructure for cycling mobility, which shows the great interest of the city in this regard. The remaining priorities are shared equally among the other mobility indicators.

The index within **Governance** category is the best one among the project cities, with adequate scores in all indicators, being especially good in GDP indicator, which is an important sign to refuse energy poverty as a main reason to have good index in energy category. Main priority of Oulu is given to unemployment rate, which is in line with their scores as it is the lowest one within this category. Other

priorities for Oulu are the smart city factor and the quality of open data, which are well scored as well; and it is understandable that the city has not given much priority to GDP indicator since they are very good in this aspect.

Regarding **Society & Citizens**, it has a really good index, with all indicators above 5 and with good scores in general. Their best score is for housing cost overburden rate indicator, followed by development of housing prices one. Lowest score falls on inhabitants in dense areas indicator, which means that there are not too many areas dense enough that become suitable for the development of PED areas. Priorities of the city on this regard are quite balanced, being housing cost overburden rate, healthy lifestyle and the urban structure the main ones, which makes sense in the view of the highest scored indicators (meaning that it has been a priority for the city) and the lowest one (meaning that Oulu is aware of their less strength).

Oulu has good index in all categories, which means that the city is on the right track and must follow a similar trajectory, focusing more in detail on the things that may be weaker within each category.

Table 54: Oulu Indexes per Application Field

APPLICATION FIELDS INDEXES		
Category	Application Field	City Index
ENERGY & ENVIRONMENT	City Energy Profile	9.69
	GHG Emissions	7.54
	Waste Management	10.00
MOBILITY	City Mobility Profile	6.56
GOVERNANCE	Economy	7.05
	Initiatives and Strategies of the PA	7.50
	Public ICT / Data	7.50
SOCIETY & CITIZENS	Affordable Housing	9.93
	Citizen Engagement and Empowerment	7.50
	Urban Structure	6.85

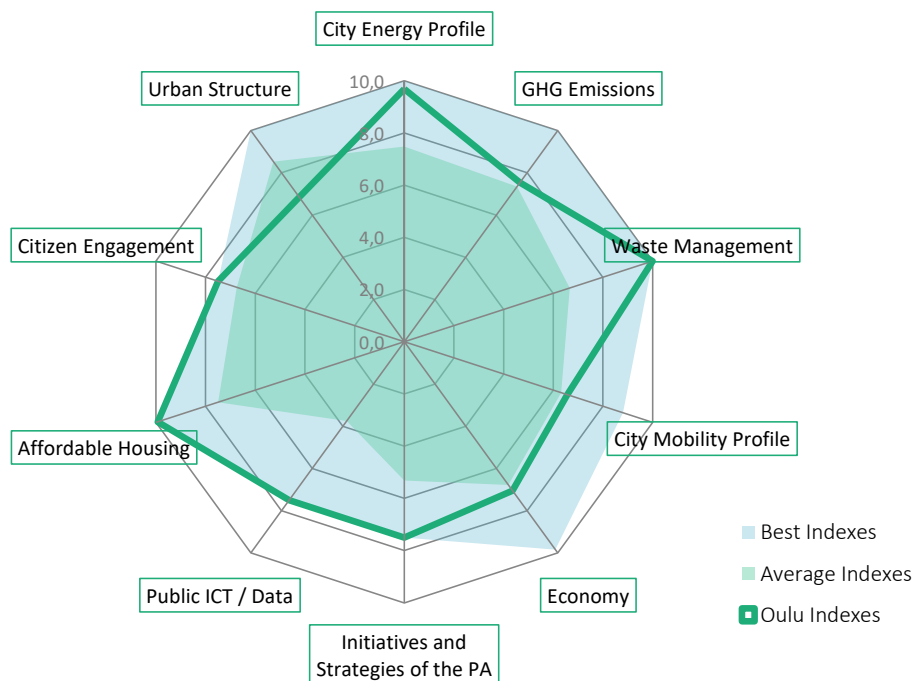


Figure 30: Radar view of Oulu Indexes per Application Field

Regarding the indexes resulting for the city of Oulu, all application fields are above the average index of the project cities except the one of urban structure. In addition, all indexes are above 5 and well valued the most of them, but this gives an idea of the strongest and weakest points in the city.

The best index within the application fields of Oulu is the waste management, followed by the city energy profile (even when it is the coldest city) and affordable housing.

6.4 Analysis of the existing city plans

6.4.1 Main City plans identified

Within this section, the main information of the existing plans that Oulu has identified is included, following the process explained in the section 4.2 Methodology for the analysis of the existing city plans, of the present document. The whole information gathered for each of these plans is collected in the annexes of this document (Annex B: Oulu, B.2).

Table 55: Oulu Short Term plans

Main city plans identified – Short Term			
Plan	Scope	Description	Topics covered
Environment Programme of the City of Oulu: towards a carbon-neutral Oulu	Local	Environment Programme is one of the implementation programmes of the Oulu city strategy 2026. The Programme ensures that the guidelines set out in the city strategy are followed and that the environmental objectives are reached. The carbon-neutral Oulu 2040 guideline is the most central one as regards steering the Environment Programme. The Environment Programme creates the basis for setting joint environmental objectives for services, public utilities, and municipal enterprises and for developing courses of action. The Environment Programme covers the city's activities in their totality, strengthens the possibilities to develop business life, and provides guidance for the decision-makers, the staff, the residents, and the enterprises of the city in the field of environmentally responsible action.	Energy Mobility
Building a carbon neutral society and improving the quality of construction	National	We will finalise the reform of the Land Use and Building Act in the parliamentary preparations. The main objectives of the reform are to create a carbon neutral society, strengthen biodiversity, improve the quality of construction and advance digitalisation. It is also important to take into account the economic and social sustainability of community structures.	Energy Social ICT

Table 56: Oulu Medium Term plans

Main city plans identified – Medium Term			
Plan	Scope	Description	Topics covered
Sustainable Energy and Climate Action Plan (SECAP)	Local	The GHG emissions inventory in SECAP covers all energy-related emissions from municipal buildings equipment and facilities, tertiary buildings, residential buildings and public lighting. Furthermore, emissions from road transport and waste management are included. Emissions from the industrial sector are excluded. Oulu has committed to a 40% GHG reduction by 2030 (carbon neutral by 2040). The direct per capita emissions in Oulu in 1990 were 7.8 tonnes of CO ₂ eq., so the target for 2030 is 4.7 tonnes of CO ₂ eq.	Energy Mobility

Primary energy source changes in Oulu Energy	Regional	Peat, which represents now nearly half of the primary energy sources in local CHP plants, is gradually and quite quickly replaced by wood, wind, nuclear and ambient heat. The reduction of CO ₂ emissions can be even over 100%, since using wood ash as a fertiliser in peatland forests increases the forest growth as a whole.	Energy
Finland will achieve carbon neutrality by 2035	National	The Government will work to ensure that Finland is carbon neutral by 2035 and carbon negative soon after that. The Government is committed to reforming the climate policies of the European Union and Finland so that we can do our part to limit the global mean temperature increase to 1.5 °C. Finland aims to develop the EU's long-term climate measures so that the EU can achieve carbon neutrality before 2050. This means tightening the emissions reduction obligation for 2030 to at least 55% below the 1990 emissions level. We will continue our Nordic climate and energy cooperation in order to achieve carbon neutrality and will work to strengthen the position of the Nordic countries as leaders in international climate policy.	Energy
Reducing the carbon footprint of construction and housing	National	A set of measures will be implemented to decrease the carbon footprint of housing, improve the energy efficiency of the existing building stock and support the transition to emissions-free heat generation.	Energy Mobility
Low-emission transport	National	The targets for reducing emissions from transport must be in line with Finland's carbon neutrality targets. By 2030, Finland will reduce transport emissions by at least 50% compared to the 2005 level. This is a step towards carbon-free transport. In order to reduce transport emissions, measures will be taken to reduce transport performances, to promote the transition towards more sustainable mobility and to phase out fossil fuels.	Energy Mobility ICT Social

6.4.2 Main targets defined in the city plans

There are many targets within the city plans, which are expressed more in detail in section [6.4.3 together with the corresponding or related actions to each of them](#). However, one very big target is climate neutrality by 2040. It should also take place remembering at the same time e.g. biodiversity and well-being of people.

The targets are in many cases aligned with the ones on the Europe 2020 Strategy, which eases the job. Following [Table 57](#) shows the relation between the main European targets with the ones on the city of Oulu planning, including somewhat broader spectrum than those addressed in the previous section.

Table 57: Oulu targets aligned with the European ones

OULU targets aligned with the European 2020 targets			
EU target	Plan in which is included	Is the target achieved?	Is there a more ambitious one?
75% population aged 20-64 employed	Municipal trial concerning employment	To some extent ⁵³	NO, the program is in preparation
3% of GDP invested in R&D sector	(not a specific target included in the plans)	Nearly YES	
Reduction 20% of GHG emissions	Environment Programme of the City of Oulu	YES	YES: climate neutrality by around 2040
Increasing 20% of share of RES	Environment Programme of the City of Oulu	YES	YES: nearly 100% RES in CHP production by 2040
Improved 20% energy efficiency	Environment Programme of the City of Oulu	To some extent	
Early school leavers' share reduced under 10%	Education Programme	YES	
40% of 30-40 years old with tertiary education	(not a target of Oulu since it is currently accomplished)	YES	

6.4.3 Main actions identified to achieve the defined goals

In the above mentioned city plans there also a list of actions, compiled actions from other programmes or single decisions. In the following there is selected some of the main energy-related ones from the Environment Programme of the City.

1. A sustainable habitat with a lively city centre:

- The city centre and the suburbs will be planned and built sustainably to provide diversity in affordances: different building lots, places for many styles of living, functionalities and services.
- The share of building inside the existing urban structure will be increased while acknowledging the values of the cultural environment and green environments. This, together with diversity of affordances, keeps the distances short to promote walking and cycling.
- The services will be directed into hubs that are accessible by public transport and by other sustainable modes of mobility. Remote mall areas outside urban or suburban areas are not built.

2. Environment-friendly mobility:

- A plan for sustainable urban mobility will be made by the end of 2022.
- The offer and service level of public transport will and has been increased especially in the areas of best user potential.

⁵³ Not measured in this way, but the unemployment rate is 9.60% of active population in 2017, source (by region): <https://ec.europa.eu/eurostat/documents/2995521/8830865/1-26042018-AP-EN.pdf/bb8ac3b7-3606-47ef-b7ed-aadc4d1e2aae>

- The pedestrian and cycling route network and cycling-related services will be developed to increase their year-round use. The starting point is already quite good, however, with over 800 km of walking and cycling lanes and even much more, if the surroundings are also counted. Also winter maintenance is in tolerable level, although there are always chances to increase the quality still.
- Public transport into new areas will begin operating at an early phase of area construction to make people used to it from the beginning.
- The prerequisites for low-emission public transport, for car-sharing, and for the use of low-emission cars will be created. This is in fact more EU-level issue, since the bottleneck is the lack of moderately priced EVs. The infrastructure may probably follow soon, if there are EVs enough.

3. Effective use of energy:

- The specific consumption of the city's real estate will be reduced and the realization of investments in energy efficiency will be ensured. The city's own energy consumption will be reduced by a least 10 percent by 2025 from the 2014 level in accordance with the Municipal Energy Efficiency Agreement.
- Use of excess energy (exhaust air, sewage water, industrial heat...) will be increased and possibilities to make use of it will be acknowledged in urban planning already.
- Digital solutions will be used to reduce energy consumption in real estate and in rented apartments. These could be displays to make energy use more conscious, self-learning thermostats to automatically decrease the heating when not home and, switching heat source etc. The last one is actually a flexibility issue, but that can be promoted using digital solutions.
- Citizens and companies will be provided with counselling and guidance regarding energy efficiency in building and in the use, maintenance, and lifespan sustainability of buildings. This is already now actively done by the building supervision of the city.

4. Carbon-neutral energy production:

- Use of peat in combined heat and power production (and also in elsewhere, in minor places) will be reduced and finally ended up by about 2040. A separate plan for that will be made in 2020. Use of wood fuels is increased, to replace peat. Wood fuels are different kinds of residues roundwood harvesting, sawmills and pulp & paper industries, not specially harvested trees for energy only.
- Wood ash is used fertiliser in peatland forests, where it is more needed than in mineral soils (from where it originates, but where the minimum nutrient is nitrogen.) Increasing forest growth is important as it increases carbon sink and make it possible to produce more wood quicker for different purposes.
- Possibilities for distributed energy production will be increased. Small-scale energy production will be encouraged and bidirectional energy deliveries will be promoted. E.g. solar power is already now sold as turnkey solutions and biogas from landfill and is used, in the future where it gives the most added value. Wind power is a bit larger (unit size now 3 - 5 MW) and very important regionally already now. Suitable new places are searched for actively.
- The share of using renewable energy in the city's own real estate will be increased. These can be heat pumps especially outside district heating network, solar power etc.

5. A fully functional circular economy:

- A Circular Economy Roadmap will be made out by the end of 2020. The measures to be implemented in 2021 - 2026 will be selected from the Roadmap.
- The material efficiency of building and maintenance activities will be improved. Use of surplus masses and recycling of demolition materials will be enhanced. Control of land masses will be directed to named persons and coordination between projects will be developed. Different alternatives are compared, based on mass balances, economy and emissions.

6. Adapting to climate change:

- An account on carbon sinks will be made by the end of 2020. Further measures are determined on the basis of the account. Increasing the sinks is one way to mitigate the climate change, in addition to emission reductions.
- Growing stocks in the forests are maintained so that the carbon storage and growth are high. The newest methods of forestry based on national research results are used. Because in Finland there are a lot of forests (about 200,000 km²) and consequently a lot of forest industries, the forest carbon balance is an essential question in Finland generally also.
- Climate change education will be increased and the northern dimension of climate change will be acknowledged.

7. A safe, healthy, and cosy habitat:

- The healthiness and safety of the built habitat will be seen to with timely and targeted maintenance. There is local and national-level guidance given for property owners in this issue.
- Good quality of indoor air in city-owned real estate will be maintained using real-time measurement data. Indoor problems have been discussed a lot, so this a crucial issue. Energy savings must not sacrifice indoor climate, thus we must be very careful with this.
- Construction of healthy and safe buildings will be promoted with quality guidance of newbuilding and repair construction. The building supervision of City of Oulu is one of the national leaders in this.

8. Environmentally responsible Oulu citizens:

- Citizens, companies and personnel in all duties will be encouraged to make environmentally responsible decisions and the city will show an example with its own action. Also schools are involved.
- Recycling rate will be increased by additional guidance for waste sorting.
- Life-cycle emissions and costs will be introduced in the planning and decision-making stages of major projects.

9. Sustainable practices in the City of Oulu Group:

- The need for travel will be reduced by favouring remote work and remote negotiations. The emissions from travel will be reduced by using sustainable modes of transport.
- Single service and freight transportations will be combined when possible and thus the total amount of driven km's reduced.
- The share of renewable fuels in the city's own transports will be increased. Also EVs may be an alternative at some phase.
- The share of local ingredients in the meals will be increased. Food waste will be reduced.

- Facilities will be designed for multi-use spaces to increase the utilisation rate, and later to decrease the total space need.

10. Sustainable procurement:

- The need for items to procure, their environmental effects, and their lifespan costs will be taken into account in procurement.
- A set of environmental criteria and a demand for them to be fulfilled will be added in the tenders and contracts. A minimum demand or a comparison criterion with a significant weight will need to be used as environmental criteria. Incentives may be used to promote environmentally friendly procurement during a contract period.

In addition to the Environment Programme of the City, there is e.g. quite tight national building legislation for new buildings and as a new subsidy, that for energy renovation of all kind of apartment buildings.

Nearly all these actions are implemented continuously. A citation from the Environment Programme:

“The responsibility for implementing the Environment Programme and for generating data lies with the services, public utilities, and municipal enterprises. They are also in charge of reporting on the committee and board levels.

The follow-up team of the environment programme will be tasked with the follow-up and development of the implementation of the programme. Its implementation will be subject to regular communication, and an environmental balance sheet will be annually annexed to the city's balance sheet. The annual environmental balance sheet on the activities of the entire city will be laid out by the Environment Office that is also in charge of programme co-ordination and of follow-up development.

The implementation of the Environment Programme will be evaluated by a third-party assessor halfway through its implementation in 2022. The evaluation will note progress made in implementing the programme and in attaining the objectives in relation to the measures accomplished so far and to their effects. The changes needed to re-direct the focus areas of the programme during the remainder of the programme period for example will be made on the basis of the evaluation.”

Figures [Figure 31](#) and [Figure 32](#) below show the route to carbon neutrality and its related climate actions, according to the Environment Programme of the City.

MEASURE	M€	IN CHARGE	TIMETABLE									
			2019	2020	2021	2022	2023	2024	2025	2030		
City bikes	1	Urban and Environmental Services										
Implementation of the Baana cycling network by 2030	4-5	Urban and Environmental Services										
Switch to low-emission buses in public transport	*	Urban and Environmental Services										
Doubling the number of public transport passengers	6	Urban and Environmental Services										
The waste sorting plant	22	Oulun Energia Public Utility										
The Laanila bioenergy plant	200	Oulun Energia Public Utility										
Enhancing denitrogenation	30	Oulun Vesi Public Utility										
Energy efficiency investments, city-owned real estate	9	Estates Services										

Figure 31: Some climate actions in Oulu related to those realized by city or its companies



The actions mentioned concern mainly the whole city area, with slightly different emphasis in different areas, but however. Clear boundaries cannot be shown for most of the actions. In [Figure 33](#) there is a map around the city centre, in which the following places are indicated:

1. Kaukuvainio district. The circle surrounds the whole area. The buildings, which formulate the PED area, are in about the middle of the circle. The lower red rectangle is the old mall (now demolished). The new is a bit north from, YIT apartments in old mall's place and Sivakka buildings a bit west and south from that. The area consists mainly of apartment blocks, but there are also some terraced houses on the south-west corner and detached houses on the north-western area. New apartment blocks, also the others than those belonging to Making-City, are built in central area.
2. New combined heat and power (CHP) plant in Laanila industrial area, fuel effect 200 MW. It uses mostly wood (+peat and classified waste). The owner is Oulu Energy. There is already a waste-fuelled CHP plant supplying chemical industry in the area and DH network. That one will keep on running also when the new plant is complete in autumn 2020. The new plant will produce roughly half of the DH needs of the city. Peat use will be gradually decreased and is to be practically zero by 2040. The new plant helps in this.
3. The old CHP plant in Toppila. The older one of two units is closed down in 2020 and the newer one in about 2035. The main fuel has been originally peat for both of the units, but now more and more wood is used.

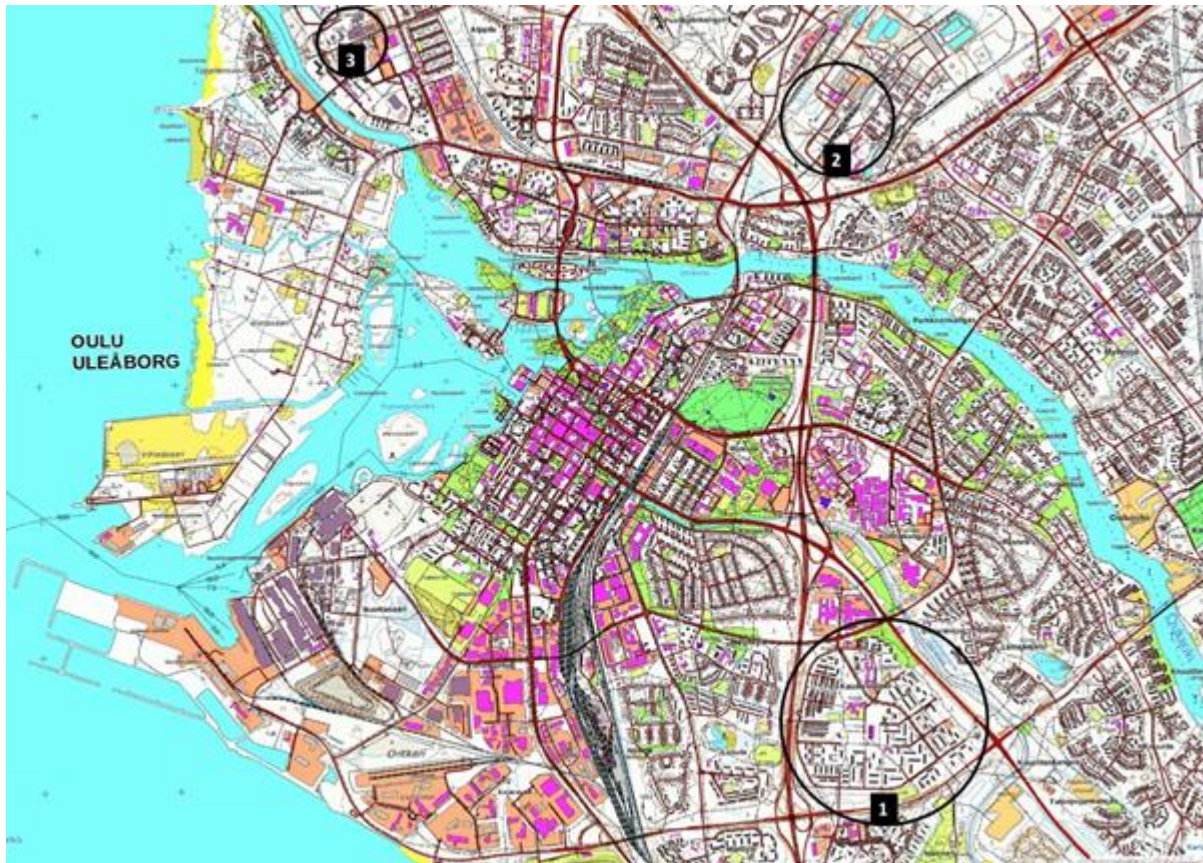


Figure 33: Kaujovainio area and the places of old (3) and new (2) combined heat and power plants.

In Figure 33 above, black buildings are different kind of apartments, and magenta-coloured public or commercial premises.

The most impactful actions for now are funded by the city or city-owned companies. In national level there are many kinds of subsidies to promote either R&D or directed investments of sustainability actions.

One of the focuses of development of state-subsidized housing is to increase energy-efficiency and possibilities to use renewable energy. The Housing Finance and Development Centre of Finland encourages building energy-efficiently. This Centre has granted energy subsidies for renovating small residential buildings more energy-efficient. The subsidies ceased in 2017 due to financial situation of the state. The former subsidy was 25% of total cost of the renovation.

In November 2019, the Ministry of the Environment published a plan to reintroduce the energy subsidies for residential buildings, now with revised qualifications. According to the draft decree on energy subsidies for residential buildings, subsidies would be granted for projects to improve the energy efficiency of all residential buildings, totalling 20 million € in 2020 and 40 M€ per year in 2021 and 2022. The subsidy would be 20% of total cost of the renovation, including design and planning costs. To qualify for the grant, the only requirement would be that, at the end of the renovation project, it can be demonstrated that the building's energy performance has been sufficiently improved. Additional subsidy would be granted for projects that renovate buildings to almost zero energy levels or more energy-efficient than the existing legislation requires. If accepted, the subsidies will become available in 2020 and granted by The Housing Finance and Development Centre of Finland.

The energy subsidies are thought to increase innovations in energy. More renewable energy will be produced and emissions generated by housing will be reduced.

6.4.5 Main needs and priorities identified from the analysis of the existing city plans

There are three main issues related to greenhouse gas emission reduction, which we'd like to indicate here: power and heat, transportation and general consumption. They are here in the order of difficulty, starting from the easiest one.

1. Power and heat production is completed with wind, heat pumps and flexibility elements. The situation looks good.

In Finland there will be a strong increase also in other capital-intensive electricity production methods than wind, namely nuclear and solar power. All these production methods have high investment cost compared to the variable cost, both in terms of money and resource use. This means that they should produce as much as they can. More, for obvious reasons, solar and wind power are not enough alone throughout the year.

Condensing power use is already now close to zero and will even more be so. (Wood-)CHPs and hydropower can handle the seasonal and shorter-term regulating task quite largely, but there is still need for having additional flexibilities. Heat pumps, as demonstrated in MAKING-CITY, can offer flexibility. If there is both CHP and heat pumps in the DH network, by alternating their use according to electricity production-consumption-balance, the system can extremely well help in having the electricity balance. With heat storages flexibility is increased even more and when using them actively, CHP or heat pumps also alone can take part in regulating the electricity balance. The same applies also in smaller level, concerning PEDs etc.

This development seems to be proceeding well. So, power and heat sector will be nearly emission-free perhaps in the following two decades. What comes to energy efficiency of the buildings, the new ones in Finland have the consumption so low (nearly 30 cm thick wall insulation, window U-values well under 1 etc.) that it is not very feasible to increase much from that. Older buildings may consume space heating energy e.g. 3-fold compared to the new ones, but the renovations are not very often feasible only for energy reasons. When the power and heat production is going to be emission-free, it may be wise to renew the building envelopes with "natural" cycle, i.e. when they need repairs in every case.

All in all, electricity and heat production is on good track and it is known what to do. But these things must however be done, and they need a bit "push" and also some trials concerning e.g. the practical operability of heat pumps in DH networks, with different heat sources. As a part of that we are considering the use of heat from refrigeration in all forms to be used for heating in new projects. Also we'd like to point out that system should be designed as a whole, not by doing partial optimizations.

2. Transportation is challenging, even if the starting point could be also much worse.

In Oulu the cycling traffic mode share is one of the largest in Finland, despite the cold climate. There are also projects going on to make the cycling routes better by for instance separating walking and cycling. The network of combined walking and cycling routes has a high coverage already now. It is possible to get "everywhere" by bike.

Also local bus services are on tolerable level (depending on who you ask), and the passenger number has increased in recent years. There are plans to have either tram or, more probably, high-capacity buses on the most popular lines. In addition, new special public transport lanes are constructed. The amount of services has been also increased. Buses run on diesel, but there are plans to have other

energy sources (biogas/electricity) in the future. The used models are quite light and thus fuel efficient.

But the bad news is that car traffic is also increasing. On the other hand, it has been predicted that the take-over of electric vehicles can be surprisingly fast, especially if the markets for the used electrical cars are created. However, EV does not solve the large space need of the private car nor the high resource consumption of the manufacturing of the cars. (This is related to issue 3 in this list). So, despite EVs, it makes sense to further promote walking, cycling and public transport. The general, global tendency of having all the services in big units and also that of having separate “performance places” for everything people do, increase the traffic. EVs can decrease the harmful effects of this, but not totally remove.

Thus there is a need to have the services closer to the people or on the city centre, easily accessible by public transport, i.e. the grocery stores etc. should be in smaller units. This need has been recognized and the possibilities for promoting that are studied. The city has an urban planning monopoly, but on the other hand the private companies do their decisions on the locations and store sizes by themselves.

3. General consumption increase increases also the resource use in many cases. This is hard to tackle, since consumption is wanted eagerly to be increased, for economic growth and taxes from the economy.

Even if the new stuff has better environmental performance, it is possible that the increased consumption eats up the possible benefit. Producing stuff needs material resources. There may also be a classical rebound effect so that the saving is used to consume and produce more. Or, the old things remain and the new ones are just an addition to these. This is not necessarily always the case, but it is possible and not rare.

The preferable choice over the higher consumption of materials is doing things better. The amount may be the same or even less, but the pieces are in better order or so. Having the better as choice, it does not necessarily need any more resources than just knowledge and thinking, wisdom, courage, self-confidence etc. This can be called the most material resource-efficient way of doing things. A pre-requisite is, of course, that there is that kind of human resources available enough.

This definitely is not the case in many practical situations. People may not be stupid or bad, but e.g. lack of time or pressure from outside can pave the path for the “worse” decisions. In concrete terms, the choices which directly or indirectly lead to high consumption are often easy to select. Also the urge for growth from single producer’s point of view may lead to the manufacturing of short-lifetime products. Consumer electronics is a good (or bad) example of this. The situation gets even worse when everything is wanted to be digitalized.

There is something very strange in that we must do something often pointless, buy some crap, to have money for e.g. health services. In simple level that is clear (to get the taxes from the transactions etc.), but in deeper level it begins to seem quite bizarre. Back in the everyday life, a single city can do little to help this. To have the services funded and taxes collected, there must be economical prosperity and even better if there is growth.

What we at least can do is to try to go from growth in quantity to growth in quality. This is more easily said than done, but perhaps increasing again the respect for the traditional good planning for the long-lasting, repairable and recyclable equipment, buildings, etc. would be one solution. The promoting of e.g. cycling (a better choice) is also on our scope. Also we dare perhaps to suggest some modifications in the Finnish innovation funding system, which now seem to be targeted strongly to just make the companies grow, no matter how. There should be more mental and monetary encouraging to do things better, so that the lifetime of the product is increased, for example.

7 City Diagnosis: Bassano del Grappa

7.1 General overview of the city



Bassano del Grappa city is located in the Vicenza province of the region of Veneto, in northern Italy. According to a census in 2018, the population of Bassano del Grappa city is approximately 43,500. The city is located at an altitude of 129 metres above sea level and covers an area of 46.79 km², with a density of 920 inhabitants per km².



Figure 34: What Bassano del Grappa is

The climate of the Bassano del Grappa area is mild, and generally warm and temperate. There is a great deal of rainfall in Bassano del Grappa, even in the driest month. The average annual temperature in Bassano del Grappa is 12.7 °C. About 965 mm of precipitation falls annually. The city lies at the foothills of the Venetian Pre-Alps, and is crossed by the Brenta river, and it is one of the most populated and developed cities in Veneto.

Table 58: Bassano del Grappa climate characterisation

CLIMATE CHARACTERISATION	Mild climate
Average annual temperature	12.7 °C
Total annual precipitation	965 mm
Winter average temperature	2.0 °C (January)
Summer average temperature	23.0 °C (July)

In addition to its industrialised economy in strong growth and a lively cultural activity, Bassano has a well-established gastronomic tradition, which has been at the centre of its tourism industry. The industrial sector is divided into many sectors, ranging from textiles to the construction of equipment, and from the most traditional productions to the most modern and technologically advanced. The tertiary sector consists of a good commercial network and services, including banking. Cultural and

tourism is also enlivened by the publication of local periodicals. The panorama of the structures is quite complex and appropriate to the function and its importance in the provincial context. Social services of the city aim to guarantee assistance both for children, the elderly and the city strive to create an inclusive mobility to all citizens. Cultural services are offered for both tourists and locals ranging from library services to museums. Accommodations offer both catering and accommodation possibilities. Sports enthusiasts are presented with an equally satisfying picture at the municipal gymnasium, velodrome. The health service is guaranteed by the local hospital.



Figure 35: Bassano del Grappa's highlights

Mobility and traffic profile into and around the city during the week cycle highly reflect the touristic nature of the city. Three main highways and three train lines connect the city to the major neighbouring cities.

With respect to energy consumption and generation, the city uses a diversified mix of both renewable and non-renewable energy sources for its various energetic needs. Recent trends show a growth in the capacity of energy generation from renewable energy sources. The city mainly uses renewable energy generated from hydroelectric, biogas plants and solar power installations. The city is taking initiatives that increase the user of clean energy development to reduce release of GHG emissions.

7.2 City characterisation

7.2.1 Energy & Environment characterization

In 2014, Bassano del Grappa Municipality adopted a PAES (Action Plan for Sustainable Energy), which analysed the consumption of energy divided between the public and private sector, subdivided in sectors of use of energy. The scope of the plan is to fix objectives in the reduction of the use of energy and in the implementation of renewable source of energy. The current energy consumption of the Bassano del Grappa area is equal to 804,842 MWh with a result of 211,465 tons of CO₂. The local administration together with stakeholders and population share and plan the implementation of the objectives and have started from 2014.

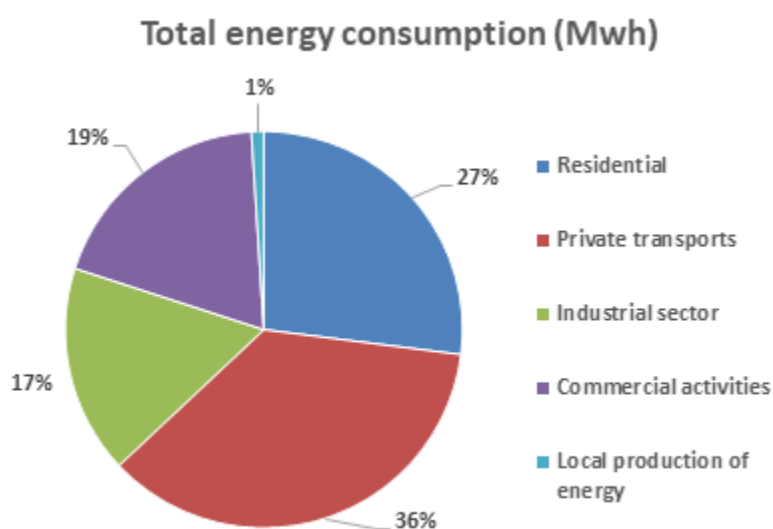


Figure 36: Bassano del Grappa total energy consumption

The analysis of energy consumption indicates that 63% derives from the private sector (residential and transport); 17% from industry and 19% from commerce. Mid and long-term Local and Regional goals aim at a reduction of non-renewable energy sources in these sectors with a target of 20% reduction of CO₂ emissions by 2020.

In order to achieve this goal, Bassano del Grappa city is increasing the capacity of energy generation from renewable sources to fulfil the citizens' energy demands.

The city mainly uses renewable energy generated from biogas plants, solar power and hydropower in addition to the fossil fuel sources. The city is taking initiatives that increase the user of clean energy development to reduce release of GHG emissions.

The city is among the top five communes by the capacity of electric energy generated from Biogas, with a capacity of 6 MW.

There is also a growing trend in the installation of photovoltaic panels at residential and administrative buildings. Additionally, the installation of photovoltaic plants in the large horizontal roof surfaces of large commercial and Industrial areas is significantly increasing.

Recently, additional new hydropower units are installed on the Brenta River to exploit it for increasing the capacity of renewable energy sources. Considering the importance of energy efficiency, a Sustainable Energy Action Plan (SEAP) is developed. This initiative is developed as document that indicates how the signatories will meet the objectives set for 2020. Taking into account the data of the Basic Emission Inventory, the document identifies the most suitable intervention sectors and the most appropriate opportunities to reach the CO₂ reduction target. New hydroelectric plants are being planned thanks to the tariff incentives provided for renewable energy, after which the revenues will be reinvested by the Consortium in the territory. From the environmental point of view, there is the advantage of reducing harmful emissions into the atmosphere that would occur with other forms of energy. With this new hydroelectric plant, in fact, the consumption of 15.4 tonnes of oil per year will be saved and the emission of 43 tonnes of CO₂ will be avoided. Currently the sixth hydroelectric power station is in the process of development.

7.2.2 Mobility characterization

Based on a feasibility analysis commissioned by Municipality in 2013 (*Biciplan*; Detailed Plan for Cycle Mobility) it is interesting to note that when traveling within the Municipality of Bassano del Grappa, for reasons of study or work, the bicycle is used by 14% of the citizens, to which is added a 17% on foot. Of course, more than half of the journeys take place by car, but the percentages on alternative sustainable means are in any case quite significant. This percentage drops drastically if we consider the journeys from Bassano to the neighbouring Municipalities (2% by bike). Going deeper into the data relating to bicycle travel within the Municipality and analysing travel times, it appears that almost all the journeys made, both by bicycle and on foot, within the Municipality take place in less than 15 minutes (94%), to which is added a 6% of movements that take place within the half hour. On the other hand, if the data relating to other means of transport are analysed, it is clear that the car is also used for very short distances: 85% of journeys take place for less than 15 minutes.

This is a significant percentage and it is believed that a large part of these movements, which cover a very short distance, are potential trips by bicycle, once good cycling services are guaranteed. Up to date the total number of existing cycle routes currently in Bassano del Grappa amounts to approximately 15.5 km only. In addition, there is not a real cycle network but rather individual sections, very often not connected to each other, and this means that the individual tracks are very unviable and exploitable.

The new city government has planned to invest a lot of funds on improving bicycle infrastructures with the aim of supporting more sustainable micro-mobility within the city. The municipality intends also redeveloping and increasing the satisfaction of the needs of pedestrian traffic and vehicle parking for the prevailing advantage of the residents by creating limited areas characterized by general precedence for pedestrians compared to vehicles and by a speed limit for vehicles equal to or less than 30 km/h.

Travels made by means of public transports (train, busses, school-busses) are only the 3% of the total when travels within the city are considered and 12% when travelling to the neighbouring Municipalities.

Recent surveys carried by ISTAT (National Institute of Statistics) related to mobility by car into and out of Bassano del Grappa city have shown that there are more than 37,000 daily commuter displacements. Out of this commuting flux, approximately 45% accounts from outside Bassano and the other 35% accounts for displacements within Bassano. This commute distribution shows that Bassano, being also an historical city, is a great attraction for journeys for both local and foreign tourists. The investigations developed on the vehicular flows affecting the Bassano del Grappa network have highlighted the following macro numbers: on average weekdays, in the 24 hours, approximately 66,000 real entry vehicles and 65,000 real vehicles are counted out; on Saturdays instead, the total number of vehicles (entering + exiting the city) in the 24 hours increase significantly compared to the average weekday to from 131,000 to 136,000, while on Sundays there is a 17% decrease.

An interesting fact is that the value of the total real flows entering and leaving the cordon of the monitored sections has remained almost unchanged since 1998 - 2000 (years of execution of the previous survey campaign) to date.

7.2.3 Governance characterization

The city administration is organized into five functional departments and two support providing units. The five functional units include 1) Resources, Development, 2) Personal Services (Summer Work and Entertainment) Heritage, 3) Culture and Museum, 4) Public Works, Traffic and Civil Protection and 5) Urban Planning, Environment, Trade, Sustainability. The two supporting services include Human resources and Local police command.

The fourth and fifth functional departments, i.e., Public Works, Traffic and Civil Protection and Urban Planning, Environment, Trade, sustainability are highly relevant to the development that is being made in the MAKING-CITY project, thus there is a strict collaboration with these departments for the work that will be conducted in this project. Among some of the main responsibilities assigned to these departments are the following:

Sustainable urban planning (Landscape functions, sustainability) oriented coordinated planning of European initiatives, Certificate of Destination Urban Planning, plan approval acts Landscape Authorizations, Landscape Authorizations Construction Activity, Architectural and Cultural Heritage, suitability for accommodation, Secretary for Economic Activities, Environmental Litigation Environment - Urban ecology Thermal plants - Elevators - Regional cadastre.

7.2.4 Society & Citizens characterization

The municipality of Bassano del Grappa is located in the north east of Italy in the heart of Veneto region, one of the regions with the highest GDP in Italy.

The city occupies a strategic position in the region, being at the foot of the Alps but still largely still in the Venetian plain, it can simultaneously control the countryside, the Brenta river and be in the middle of the main traffic routes. From a historical point of view, these factors have greatly influenced the economic growth and importance of Bassano, both in ancient times and in war times.

Accordingly, Bassano del Grappa nowadays has a relatively high average income per capita compared to the Italian average. Approximately 23,000 people are working, that is the 55% of the inhabitants of the town of Bassano del Grappa are working. 32% work in production industries, 18% work in service industries, 21% in administration and 28% work in other activities.

Bassano is a city of art, and as such also rich in cultural events that make it a lively city, very appreciated in the area for the sunset aperitifs among the many bars of the historical center, surrounding the famous Ponte Vecchio (Old bridge) designed by the architect Andrea Palladio in 1569.

The city has five historical “contrade” (similar to districts) within the city: *Campese*, *Marchesane*, *San Michele*, *Sant'Eusebio* and *Valrovina*. From an administrative point of view these are also recognized as neighborhoods. However, in practice, some of these neighborhoods themselves contain smaller inhabited areas (as streets, groups of houses) also called *contrade*: there are thus *contrade* within *contrade*.

All the 43,481 inhabitants of Bassano del Grappa (47.6% = female; 52.4% = male) live in these five *contrade* of which 19,196 inhabitants live in family units. Although the average age of the population of the Bassano del Grappa city is 45.4 years old (higher than the Italian average) the literacy rate of the city is 99.6%, which is higher than the national average.

7.3 City indexes calculation

7.3.1 Indicators Normalised

As explained in section [\[Error! No se encuentra el origen de la referencia. \[Error! No se encuentra el origen de la referencia.\],](#) the indicators of Bassano del Grappa have been normalised according to the ranking of indicators method, and the results of this normalisation are gathered in the table below (Table 59). The calculation of the indicators is included in deliverable D5.1 as well as in the annexes of this document (Annex C: Bassano del Grappa, C.1A.1).

Table 59: Bassano del Grappa Indicators Normalised

ENERGY & ENVIRONMENT		
Application field	Indicator	SCORE
City Energy Profile	Final energy consumption per capita	9.10
	Primary energy consumption per capita	10.00
	Primary energy sources (shares)	8.00
	Building connected to the DH-network	10.00
GHG Emissions	GHG emissions per capita	8.60
Waste Management	Recycling rate	10.00
MOBILITY		
Application field	Indicator	SCORE
City Mobility Profile	Modal split	1.38
	Fuel mix in mobility	0.00
	Energy use for transportation	6.35
	Access to public transport	9.16
	Public infrastructure promoting low-carbon mobility	5.16
GOVERNANCE		
Application field	Indicator	SCORE
Economy	Unemployment rate	9.05
	GDP (Gross Domestic Product)	10.00
Initiatives and Strategies of the Public Administration	Smart city factor in a city development strategy	2.50
Public ICT/ Data	Quality of open data	2.50
SOCIETY & CITIZENS		
Application field	Indicator	SCORE
Affordable Housing	Development of housing prices	3.13
	Housing cost overburden rate	8.82
Citizen Engagement and Empowerment	Citizen engagement to climate conscious actions	7.50
	Encouraging a healthy lifestyle	7.50
Urban Structure	Inhabitants in dense areas	10.00

7.3.2 Categories, application fields and indicators prioritised

As explained in section 3.2.3 Step III: Prioritisation of categories, application fields and indicators, the indicators of Bassano del Grappa have been prioritised according to the city needs and targets, through the AHP method, and the results of this prioritisation are gathered within Table 60 below.

Table 60: Bassano del Grappa Indicators Weighting per Category and per Application field

ENERGY & ENVIRONMENT					
Application field	Indicator	WEIGHT per Category		WEIGHT per App Field	
City Energy Profile	Final energy consumption per capita	0.80%	100%	2.44%	100%
	Primary energy consumption per capita	9.26%		28.13%	
	Primary energy sources (shares)	11.34%		34.45%	
	Building connected to the DH-network	11.52%		34.98%	
GHG Emissions	GHG emissions per capita	33.74%		100%	100%
Waste Management	Recycling rate	33.33%		100%	100%
MOBILITY					
Application field	Indicator	WEIGHT per Category		WEIGHT per App Field	
City Mobility Profile	Modal Split	2.91%	100%	2.91%	100%
	Fuel mix in mobility	18.41%		18.41%	
	Energy use for transportation	6.33%		6.33%	
	Access to public transport	16.73%		16.73%	
	Public infrastructure promoting low-carbon mobility	55.62%		55.62%	
ENERGY & ENVIRONMENT					
Application field	Indicator	WEIGHT per Category		WEIGHT per App Field	
Economy	Unemployment rate	5.56%	100%	16.67%	100%
	GDP (Gross Domestic Product)	27.78%		83.33%	
Initiatives and Strategies of the PA	Smart city factor in a city development strategy	33.33%		100%	100%
Public ICT / Data	Quality of open data	33.33%			100%
SOCIETY & CITIZENS					
Application field	Indicator	WEIGHT per Category		WEIGHT per App Field	
Affordable Housing	Development of housing prices	29.16%	100%	87.50%	100%
	Housing cost overburden rate	4.17%		12.50%	
Citizen Engagement and Empowerment	Citizen engagement/ empowerment to climate conscious actions	3.50%		10.00%	100%
	Encouraging a healthy lifestyle	31.47%		90.00%	
Urban Structure	Inhabitants in dense areas	31.71%		100%	100%

7.3.3 Aggregation and calculation of the city indexes

As explained in section 3.2.4 Step IV: Aggregation to calculate the city indexes, the indicators of Bassano del Grappa have been aggregated according to the Linear aggregation method, and the results are city indexes per category and per application fields, collected within the following tables Table 61 and Table 62 below.

**Table 61: Bassano del Grappa
Indexes per Category**

CATEGORIES INDEXES	
Category	City Index
Energy & Environment	9.29
Mobility	4.85
Governance	4.95
Society & Citizens	7.07

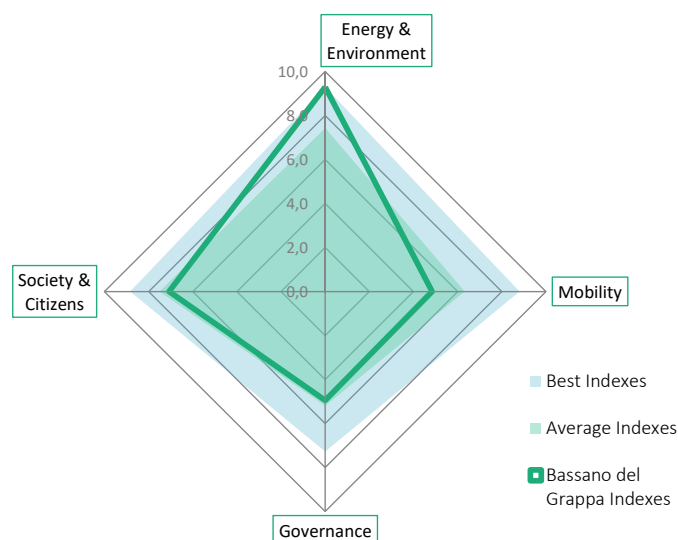


Figure 37: Radar view of Bassano del Grappa Indexes per Category

The results of the categories indexes for the city of Bassano del Grappa stand out that the category of Energy & Environment has the best index of all cities, Society & Citizens has a good index too, but Mobility and Governance index is little below 5, so it is clear where they will have to focus their efforts in the coming years.

Regarding **Energy & Environment** category, Bassano has the best index among the project cities, and each individual indicator within it also has a very high score, reaching the target value in almost all of them. City's priorities are distributed mainly among GHG emissions per capita and recycling rate, the rest of them being less priority. It should be noted that although the climate of Bassano and its heating degree-days are not the coldest, they do have a good percentage of building connected to DH-network, amply meeting the target value for its kind of climate. This is another example of its concern and initiatives in terms of energy and environment.

The index within **Mobility** category for the city is a bit low. The low scores within mobility are fuel mix in mobility (which is almost the same in all project cities, but points out the need to improve electric or low-emissions mobility) and modal split, meaning that there is a high number of private car transports. Best score is given to access to public transport, which would be a good thing, especially in order to improve the two indicators mentioned above with the lowest scores. The highest priorities for the city are public infrastructure for cycling, which is a good aspect to improve since it is also not one of the best scored aspects for Bassano; followed by fuel mix in mobility and access to public transport, which in turn are one of the indicators that need more improvement and another that denotes having been a priority given the high score obtained.

In terms of **Governance** category, Bassano del Grappa has an index little below 5. This is due to the priority given to both the smart city factor and quality of open data, which are not the strongest points in the city. Although the index is not the best, it has good scored in unemployment rate and GDP, which remarks in turn the importance of their good index in energy because of the almost non-existence of energy poverty that could distort that index.

Society & Citizens category has an acceptable index for Bassano, with good scores in all indicators except in development of housing prices one. Priorities of the city are mainly focused on encouraging a healthy lifestyle, inhabitants in dense areas and development of housing prices; which is aligned with the best ones in which efforts have been done, and the lowest one in which the next efforts should focus and shows that the city is conscious.

The city generally has quite acceptable values in all categories, none excessively low, but there is enough difference between some to know where to focus the next efforts: Mobility and Governance.

Table 62: Bassano del Grappa Indexes per Application Field

APPLICATION FIELDS INDEXES		
Category	Application Field	City Index
ENERGY & ENVIRONMENT	City Energy Profile	9.29
	GHG Emissions	8.60
	Waste Management	10.00
MOBILITY	City Mobility Profile	4.85
GOVERNANCE	Economy	9.84
	Initiatives and Strategies of the PA	2.50
	Public ICT / Data	2.50
SOCIETY & CITIZENS	Affordable Housing	3.84
	Citizen Engagement and Empowerment	7.50
	Urban Structure	10.00

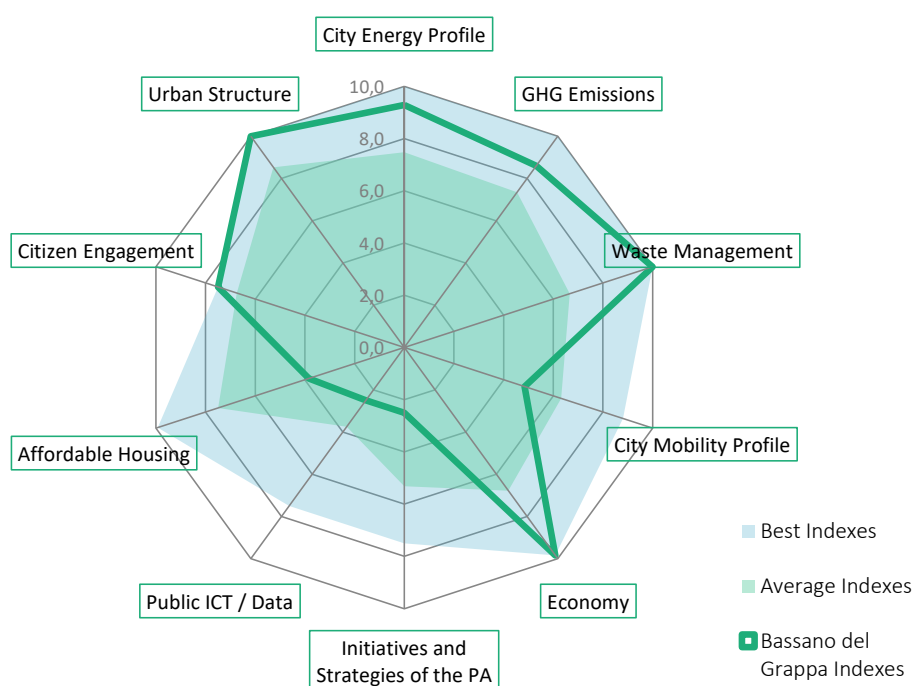


Figure 38: Radar view of Bassano del Grappa Indexes per Application Field

Regarding the results of the city of Bassano del Grappa about the application fields, there are some imbalances between them. Better ones are waste management, urban structure, economy and city energy profile; while the lowest ones that will need to gather the next efforts are initiatives and strategies of the public administration and public ICT, followed by affordable housing.

7.4 Analysis of the existing city plans

7.4.1 Main City plans identified

Within this section, the main information of the existing plans that Bassano del Grappa has identified is included, following the process explained in the section [4.2 Methodology for the analysis of the existing city plans](#), of the present document. The whole information gathered for each of these plans is collected in the annexes of this document (Annex C: Bassano del Grappa, [C.2](#)).

Table 63: Bassano del Grappa Short Term plans

Main city plans identified – Short Term			
Plan	Scope	Description	Topics covered
PAES (Action Plan for Sustainable Energy)	Local	The scope of the plan is to fix objectives in the reduction of the use of energy and in the implementation of renewable source of energy.	Energy
PERFER: Regional Energy Plan and Strategic Environment Evaluation	Regional	Increase in the burden sharing of renewable source of electricity for households and transports, renewables must cover 10.3% of the total energy consumption.	Energy Mobility

Table 64: Bassano del Grappa Medium Term plans

Main city plans identified – Medium Term			
Plan	Scope	Description	Topics covered
P.E.B.A.: Programme for architectonic barriers elimination	Local	Improvement of the urban accessibilities to the historical city centre.	Mobility Social
P.R.T.: Regional Plan for Transportation	Regional	Promoting a sustainable mobility system from a social, economic and environmental point of view.	Energy Mobility Social ICT
Regional Strategy for Sustainable Development (SRSvS)	Regional	SRSvS is the regional adaptation of the National Strategy for Sustainable Development (SNSvS) masterplan. The SNSvS is in turn the Italian transposition of EU's 2030 Agenda.	Energy Mobility Social ICT

7.4.2 Main targets defined in the city plans

As mentioned in Section 4.1.4, the Europe 2020 strategy aimed to become sustainable, smart and economy inclusive. Following Table 65 shows the relation between the main European targets with the targets on the Bassano del Grappa planning.

Table 65: Bassano del Grappa targets aligned with the European ones

BASSANO DEL GRAPPA targets aligned with the European 2020 targets			
EU target	Plan in which is included	Is the target achieved?	Is there a more ambitious one?
75% population aged 20-64 employed	Regional Strategy for Sustainable Development (SRSvS)	YES	
3% of GDP invested in R&D sector	Regional Strategy for Sustainable Development (SRSvS)	NO	
Reduction 20% of GHG emissions	- PAES (Action Plan for Sustainable Energy) - Regional Strategy for Sustainable Development (SRSvS)	YES	YES: 40%
Increasing 20% of share of RES	- PAES (Action Plan for Sustainable Energy) - PERFER: Regional Energy Plan and Strategic Environment Evaluation	NO	
Improved 20% energy efficiency	PAES (Action Plan for Sustainable Energy)	NO	
Early school leavers' share reduced under 10%	Regional Strategy for Sustainable Development (SRSvS)	YES	
40% of 30-40 years old with tertiary education	Regional Strategy for Sustainable Development (SRSvS)	NO	

As in many European countries, in Italy the main targets for economic, industrial, social, technological and energy development are defined first at national level and then at regional level. In this context, these targets are contained in the SRSvS (Regional Strategy for Sustainable Development) of the Veneto region, a programmatic and strategic document that every two years is financed and updated regarding the specific actions to be taken and objectives to be achieved. With this cascade strategy the municipalities can adopt the strategies and plans necessary indicated by the region so that the objectives of these targets can be reached also at the local level.

Regarding energy sustainability alone, the municipality of Bassano del Grappa in 2014 developed the PAES (Action Plan for Sustainable Energy) a document that serves to develop a multi-year energy strategy in those sectors for which it is possible to carry out (and evaluate the impact) interventions aimed at saving and energy efficiency, which therefore offer the most appropriate opportunities to reach the goal of reducing CO₂ emissions. Through the PAES, concrete reduction measures are defined, together with the time, responsibilities and economic resources that are made available to achieve these objectives, in order to translate the long-term strategy into actions.

Taking into consideration the link between the local development plans and the regional development plans, such as the Regional Energy Plan and Strategic Environment Evaluation (PERFER - strongly influenced by the European 2020 Agenda before and 2030 today) it is not surprising to note a broad adherence of the PAES' targets with those set by the European Union. In particular, through the adoption of the PAES, the Municipality undertakes to implement policies aimed at:

- Reduce the CO₂ emissions by 20% (-42,881 tonnes of CO₂ eq.) from 2008;

- Increase energy production from renewable sources by 20%;
- Increase efficiency and energy savings in the municipal area by 20%.

To reach these “broad” targets, several sub-targets are defined in the PAES, which can be summarized as follows:

- A general efficiency improvement of thermal systems of the building heritage of the Municipality;
- Increase investments in the energy efficiency of public lighting systems;
- Purchase of green electricity for the Public Administration and distribution of photovoltaic systems in the territory;
- Increased public support on the improvement of electrical and thermal efficiency in private and industrial buildings;
- Improve energy efficiency of private vehicles and support electric mobility;
- Development of cycling mobility.

Among these targets, one of the main sectors in which Bassano del Grappa is developing in recent years is urban mobility, in particular through the adoption of the Regional Plan for Transportation (PRT) and other local interventions. In the vision of sustainable growth of the municipality of Bassano del Grappa, actions related to mobility have a triple positive outcome: environmental, social and commercial/touristic. While on the one hand encouraging the use of bicycles and public transport can have a strong impact on the reduction of energy consumed and its environmental impact, on the other it allows to increase the perceived quality of the neighbourhood of the historical part of the city, in turn enhancing tourism and the economic growth of commercial activities in the city centre.

In the same wavelength, the main goal of the Programme for architectonic barriers elimination (PEBA) is to improve the city's accessibility for all citizens.

All these targets are in line with the vision of the European Union for 2020 but also for 2030 as summarized in the targets defined by the Regional Strategy for Sustainable Development.

7.4.3 Main actions identified to achieve the defined goals

At the local level, through the adoption of the PAES, the Regional Strategy for Sustainable Development and other actions not attributable to specific strategic plans, numerous actions have been taken on the Bassano area with the aim of reducing the energy impact of the transport, production and housing facilities of the city:

- Photovoltaic systems to be installed in the building heritage of the Municipality or realized on an energy account through the transfer of the surface right by the Public Administration (status = action concluded).

From 2014 to 2020 the installation trend of photovoltaic systems has seen a considerable acceleration, thanks above all to public incentives. The municipality has contributed to the energy production from renewable sources by granting surface rights for the installation of two photovoltaic systems located respectively at the Public Swimming Pool (with a capacity of 199 kW) and at the sports facilities (with a power of 131 kW). In addition, the proceeds of the surface rights where the plants are installed were destined to finance actions or projects related to sustainability.

- Efficiency improvement of thermal systems of the building heritage of the Municipality (status = on-going action)

The municipality has started a series of actions aimed at redeveloping the heating systems of some public buildings. Different types of interventions are being completed, such as the inclusion of temperature control systems for individual rooms and the sizing of generators to meet the thermal demand profile in an optimal manner. The first interventions will take place in few public schools with the aim of generating a demonstration model, which can then be applied to the many contexts of the Bassano building heritage.

- Purchase of green electricity for the Public Administration (status = action in definition)

The Municipality of Bassano del Grappa will evaluate the purchase of green electricity for its supplies. This action will be carried out after an important redevelopment of the use of electricity in its users in order to compensate for the likely increase in purchase costs per kWh renewable compared to traditional supply (energy from fossil sources).

- Energy saving of public lighting and containment of light pollution (status = action in preparation)

The municipality is evaluating the adoption of some strategies for the energy saving of the public lighting network such as the use of high efficiency lamps and devices to control and regulate the luminous flux. These actions aim to favour the rationalization of operating costs, also with the use of energy from renewable sources and through the implementation of technologically advanced management models for energy containment and differentiated valorisation of the different areas of the city. In addition to the reduction of light and optical pollution, these actions will allow greater safety for people and vehicles through correct and rational lighting and the prevention of visual glare. It will also allow a better exploitation of urban centres and external meeting places, of landscape and environmental assets and of monumental and architectural cultural heritage.

- Energy efficiency actions in the industrial sector (status = action in definition)

Some actions have been discussed concerning the energy efficiency intervention in the industrial sector for different productive sectors (chemical sector, rubber and plastic production sector, mechanical sector, steel industry sector). In this action the municipality is evaluating its support for the construction of plants for the production of renewable energy, energy efficiency interventions on the sheds of industrial buildings and renewal of the industrial machinery fleet.

- Detection of mobility fluxes within the municipality (status = in preparation/ on-going)

The municipality has started a campaign of traffic surveys in the area with the aim of planning sustainable mobility that is with low social and environmental costs. The general objective is to promote "multimodality", in order to recreate conditions of better liveability in built-up areas, greater environmental quality, better use of public spaces, greater fluidity, comfort and safety in car journeys, on foot, by bike and by public transport.

- Feasibility study of urban bike mobility (status = action concluded).

The municipality has conducted a feasibility study for the improvement of urban mobility by bicycle with the aim of:

- Study the demand for cycling, the shape and the functions of the territory, evaluating the critical points of the existing routes;
 - Plan the urban cycle network by identifying no. 13 priority itineraries of about 62 km divided into existing, to be redeveloped, project and low-traffic roads;
 - Analyse the cycling in the Historic Centre, identifying possible routes that allow the crossing of the centre in an easy and fast way;
 - Analyse the network of routes dedicated to leisure and cycling tourism;
 - Identify and propose the necessary interventions with the relative summary estimate of the expected expenditure;
 - Propose new ad hoc road signs for cycling;
 - Propose a marketing strategy, which involves setting up and launching an information and awareness campaign to promote cycling.
- Preparation of the new Sustainable Energy and Climate Action Plan (SECAP): Bassano del Grappa is taking the first steps in the preparation of a SECAP (thus updating the old PAES).

7.4.4 Actuation areas identified and financial schemes

Almost all identified actions are, or will be, implemented at the whole city level except to the photovoltaic systems installed on the public swimming pool and sport facilities and the thermal system intervention on the public schools. These areas are reported with yellow circles in the map (Figure 39).

Coloured lines in Figure 39 represent the 13 itineraries identified in the feasibility study for the urban bike mobility.

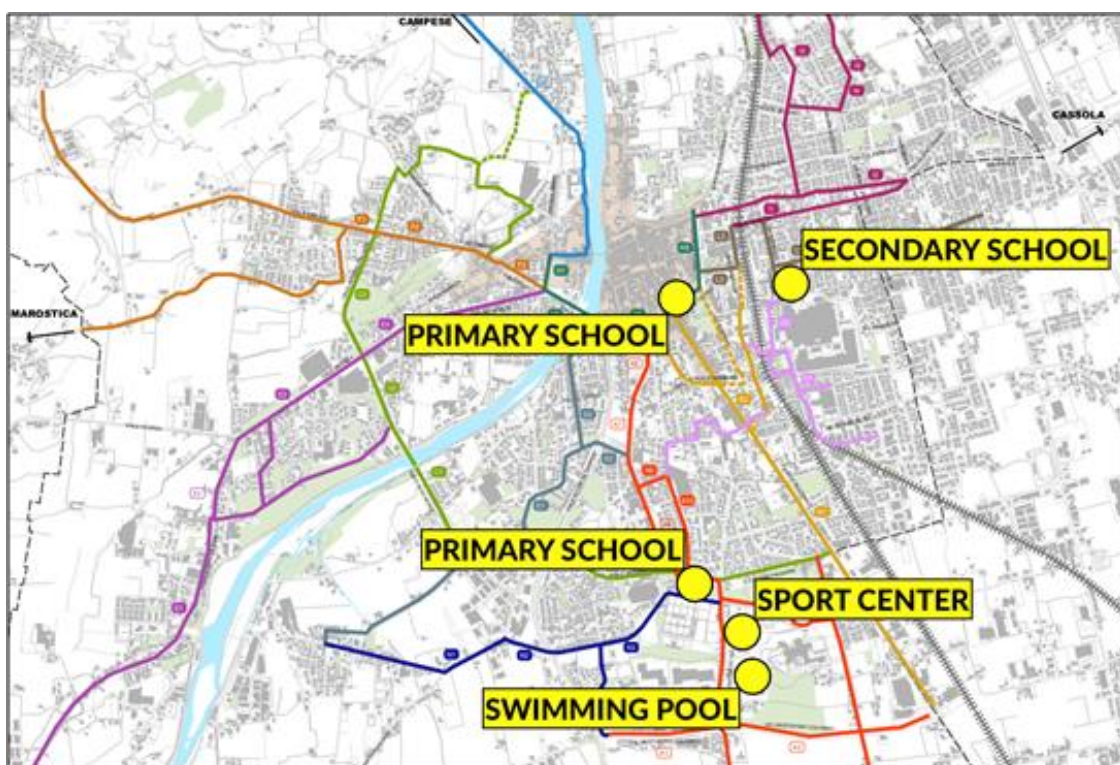


Figure 39: Main actuation areas in Bassano del Grappa

The actions that are in the preparation or definition phases, it is difficult to hypothesize specific areas of intervention in the territory: the city government has recently been changed and many strategic decisions regarding the choices of the last administration are pending. Due to this context it is impossible at the moment to define financial schemes or innovative business models that will support the planned interventions. Perhaps the development of the new sustainable energy and climate action plan (SECAP) in 2020 will push toward the implementation of these action plans.

7.4.5 Main needs and priorities identified from the analysis of the existing city plans

Through the different plans of Bassano del Grappa many targets and specific actions have been identified that will support the city efforts to reach the European 2020 targets.

Main priorities of the city planning are related to energy savings, such as the ones included in the PAES (Action Plan for Sustainable Energy) and PERFER (Regional Energy Plan and Strategic Environment Evaluation) are:

- Reach the European goal of reducing CO₂ emissions
- Increase energy production for renewable sources
- Increase efficiency and energy savings in the municipal area

Other needs and priorities identified for the city are related to mobility, with the developed Regional Plan for Transportation (PRT). Related to mobility there are some outcomes such as environmental, social and commercial or tourism, and the encouragement of the use of bicycles and public transport would have a positive environmental impact.

In terms of mobility there is another approach on a limited traffic zone in the historical centre.

Other priorities in Bassano del Grappa are related to the development of social housing or accessibility improvements, this last within the Programme for architectonic barriers elimination.

ENIGMA and PLUS projects are projects related to the public sustainable lighting. First one is intended to foster the next generation of public lighting systems developing breakthrough solutions in the field of smart ICT-based lighting through the Pre-Commercial Procurement (P.C.P.) which is supported by the EU. PLUS project (Public Lighting for Sustainable Urban Spaces) promotes the development of a correct and innovative public lighting planning.

8 City Diagnosis: León

8.1 General overview of the city



The city of León is one of the main provincial capitals in *Castilla y León*, a Spanish objective region in the European Union.

In demographic terms, León is the fourth city of the region. It is a medium-sized city with a population of 124,722 inhabitants in 2018, boasting a significant expansion throughout the 20th century. The municipality of León displays a complex structure in which the urban area together with minor suburban developments amount to a small agglomeration of almost 200,000 inhabitants for which the Local Authority must cater in terms of all services.

The municipality has an extension of 39.2 km² and its density is 3,182 inhabitants/ km². The Urban Area of León amounts to 195,078 inhabitants and an area of 411.44 Km² (descending the density to 474.13 inhab./km² in the urban area). The housing density for León is 20.08 dwellings/hectare compared to 2.84 dwellings/hectare of the Urban Area.



Figure 40: What León is

In 2015 the average age of the population was 46.65 years and it continues to grow, the population pyramid shows a clear problem of sustainability

Since the 90s Leon has lost population, although lately at a slower pace. Its ageing rate is high, as in the case of the Autonomous Community. Unemployment rate is higher than the regional rate. There is a low rehabilitation of the housing stock. Economic activity indices reflect the challenge of consolidating strong activities to replace sectors under stress. The tourist sector is growing thanks to the attractiveness of the city and the better connections to Madrid by train.

León is a two-thousand year old city, founded by the Romans, boasting many attractive features. It is located at a meeting point of several cultures and at the crossing of such important roads as *Ruta de la Plata* –the ancient Roman ore-exporting route- *Camino de Santiago* – the famous medieval pilgrimage way- and the *Mesta*, -the Spanish main cattle-trading route in medieval times-. This has all led to a very rich cultural and built-up heritage of quite different periods and styles in Leon: The Gothic Cathedral, the Romanesque Church of *San Isidoro* and the Renaissance *San Marco's* Hostel are the main monuments in the city.

On June 18, 2013, the UNESCO recognized León as "Cradle of the Parliament ", because here, in 1188, the king Alfonso IX summoned for the first time in Europa's history the common people to Court, with voice and vote in *San Isidoro's* Royal Collegiate church.

León is the only capital of Castilla y León which urban morphology is linked to a "homogeneous urban widening (*ensanche*)". This "widening" reports on the economic vigour of the city in the early XX century.

The municipal boundary is situated at an average altitude of 870m, (the city centre 837m) on a river terrace at the confluence of the rivers *Bernesga* and *Torío*.

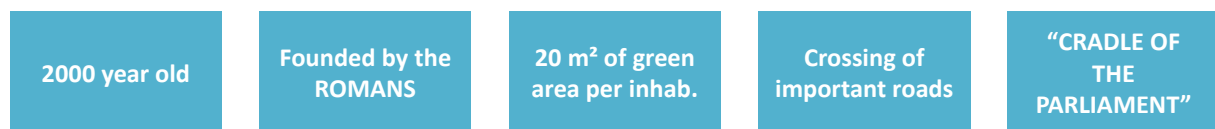


Figure 41: León's highlights

At the beginning of the 1990s there was an outflow of population from the cities to the nearby areas, in a process that leads to the urbanization of the surrounding rural countryside, in a process of "peri-urbanization" or "nearby-urbanization". León has no longer a city compact morphology, in the last decades it has become a fragmented structure. This process has led to the imbalance between the city and the surrounding fields, so that the traditional logic of confrontation/ complementarity between countryside and city has changed. Therefore, we need actions to revalue the compact-city model, we need the environmental assessment of the environs, and we need to draw up and to devise the growth of the diffuse city.

At municipal level, the compactness and occupation in the central area of the city stand out against the dispersion in the periphery. Especially in the districts of the northern limit of the city, where there are large empty spaces and wastelands next to areas with high population density.

León has 20 m² of green area per inhabitant, (including two riverbanks, *Torio* and *Bernesga* Rivers, and two forest areas, *Monte de S. Isidro* and *Candamia*). This ratio is among the highest in Spain. However, they are unevenly distributed, as in the northern neighbourhoods this ratio is drastically reduced (3 m² of green area per inhabitant), and some of these green spaces are scattered, untreated or neglected.

It highlights the serious problem of empty dwelling, 19.49% of the municipality. The residential buildings are old, functionally obsolete and with poor quality dwellings.

The municipality of León has an oceanic climate, tending to dry summers, according to the climatic classification of Köppen. The average annual temperature is between 11 and 11.4 °C and the average annual rainfall between 500 and 600 mm that is distributed irregularly throughout the year; December is the rainiest month, with 66 mm, and July the driest, with just 19 mm. It also snows, mainly between November and May.

Given the historical data for the period 1981-2010, the climatology of the municipality is characterized by a large thermal amplitude, 16.6 °C, with cold winters of average temperatures of 3.2°C in January (coldest month), and warm summers, with average temperatures of 19.8 °C in July (hottest month), resulting in an annual average of 11.1 °C.

Thermal amplitude is registered in the year, in each month and even daily with differences of 20°C between the maximum and minimum temperature in the same day.

There are frosts 19.6% of the days of the year, mainly concentrated between the months of November and April.

The winds have an average speed of 11.3 km/h, being the months with the highest winds March, April and May, with speeds close to 13 km/h, where the gusts approach 40 km/h on average.

Table 66: León climate characterisation

CLIMATE CHARACTERISATION	Oceanic climate
Average annual temperature	11.1 – 11.4 °C
Total annual precipitation	500 – 600 mm (irregularly)
Winter average temperature	3.2 °C (January)
Summer average temperature	19.8 °C (July)

8.2 City characterisation

8.2.1 Energy & Environment characterization

Leon has a high number of old houses with a low rate of rehabilitation in aspects related to its energy performance. This situation is aggravated by high vacant housing rates, above average, poor degree of accessibility, and a profile of elderly occupants with low purchasing power.

The city of León has an extreme climate, so the regulatory requirements regarding thermal insulation are very high. The percentage of housing built under the current regulations, CTE, is low, in León 91.98% of the buildings predate the CTE (Spanish Technical Code of Construction), and 56.25% before the NBE-CT-79 (the previous regulation), which means low or zero level of thermal conditioning. There is therefore a potential for improvement in energy saving and CO₂ reduction.

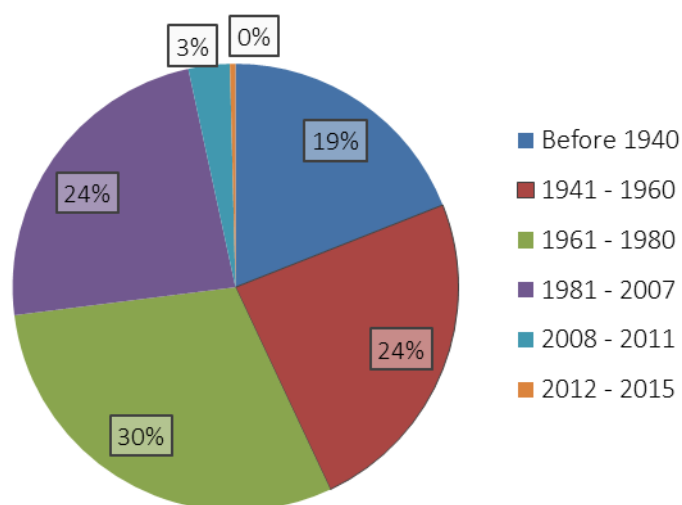


Figure 42: Percentage of housing per construction year in León

Of the municipality's main dwellings, 92.38% (53,110) have heating and 6.02% (3,460) have not. Individual heating predominates (30,595), which is a priori less efficient, but with figures not much higher than the number of dwellings with collective heating (22,515). These are main dwellings, where it is possible to make energy efficiency operations profitable. There is a significant percentage of coal heating systems.

With regard to the municipal buildings, 50% have natural gas as their main energy source for heating; 36% have diesel; 11% have electricity; and another 3% have propane or biomass.

León City Council has renewable energy facilities in some municipal buildings (biomass, solar, hydroelectric), although many of them have had maintenance problems that have resulted in most of them not being operational. There are a number of potentialities and opportunities that must be exploited:

- EREN (Regional Energy Agency) is located in the municipality.
- There is a large group of companies in this sector that in the last years have been settling in the city or the next environment.
- Having high solar radiation rates throughout the year, as well as high biomass resources in the immediate environment, should serve to facilitate greater implementation and development of solar energy and bioenergy.

The Municipality of León, based on its social and environmental responsibility, has joined the commitment to reduce greenhouse gas emissions, adhering to the Covenant of Mayors for Climate and Energy and the State Carbon Footprint Registry.

Table 67: León emissions inventory. Calculation of the carbon footprint 2018

	SECTOR	SOURCE	TOTAL /HAB'18 [Tco ₂ e]	TOTAL'18 [Tco ₂ e]
SCOPE I	TRANSPORT	Total transport	2.06	256,629.55
	FIXED FACILITIES	Natural gas	1.47	182,976.32
		Diesel B	1.22	151,704.59
		Diesel C	0.47	58,077.42
		Fuel oil	0.02	2,045.24
		LPG	0.00	252.21
	AIR CONDITIONING	HFC	0.00	167.00
SCOPE II	ELECTRICAL CONSUMPTION	Electricity	1.40	174,481.90
TOTAL			6.62	826,334.23

Table 68: Consumption and emissions in León 2018

	CONSUMPTION [MWh]	EMISSIONS [Tco ₂ e]
BUILDINGS, EQUIPMENT/FACILITIES AND INDUSTRY		
Buildings and municipal equipment/facilities	262,358.60	69,812.20
Buildings and tertiary equipment/facilities (non-municipal)	513,861.03	124,024.30
Residential buildings	607,673.38	197,334.80
Street lighting	-	-
Industry (not ETS)	606,918.49	133,707.18
Sub-total	1,990,811.50	524,878.48
TRANSPORT		
Municipal fleet	4,597.22	1,220.11
Public transport	7,675.29	2,062.40
Private and commercial transport	952,723.16	255,364.67
Sub-total	964,995.68	258,647.18
TOTAL	2,955,807.18	783,525.67

León, with 20% in selective urban waste collection and despite being in a better position than the Spanish average, has a lot of work to do to reach the 50% that Europe has set for 2020.

Both the water and sewage facilities each have their own information collected in a GIS, which allows them to create different scenarios and plan by choosing the most appropriate ones.

The Municipality of León has a 51% shareholding in the Water Joint Venture of León. The current water consumption is 129 litres/ day (2014), one of the lowest rates in Spain. The system has two inputs, two reservoirs, of good quality raw water. The supply is assured for about 20 years.

The Municipal association for the sewage facilities of León and its surrounding areas (SALEAL), a local entity created by seven municipalities, is responsible for the sewage and purification service, covering a population of 200,000 people.

Around 40-50% of the cost of operating a WWTP (wastewater treatment plant) is in energy. Given this, SALEAL has adopted a strategy to reduce energy demand while maintaining the efficiency of the purification process and the sustainability of the installation. The association has set the objective of minimizing the energy footprint of sewage and purification, in order to reach an energy self-sufficiency in the WWTP.

The model of efficient mobility and energy depends on taking advantage of:

- the scale of the city;
- the new competitive sectors linked to ICT;
- the potential for improvement in energy efficiency of the residential sector, and in general of the building stock, due to the low rate of energy rehabilitation.

We have to bring about a drastic change that benefits the environment and the health of its citizens.

8.2.2 Mobility characterization

The Sustainable Urban Mobility Plan of León (2014), with a 2021 horizon, will be updated and coordinated with SECAP. Data from the 2014 SUMP show us a city with a high dependence on the private car, despite being a medium-sized city on a human scale.

In the city of León the average travel time is 17.10 minutes, that is, a citizen of León spends 46 minutes a day getting around, below the 1h and 10 minutes of an average Spaniard. The majority of journeys are on foot (64.4%), 0.28% by bicycle and 35.4% by motorized mobility. Within this last group, only 6% use the public transport, which allows to state that there is a high dependence on the private vehicle. On a working day a León citizen makes an average of 2.7 motorized trips, is lower than the national average.

Given the configuration and size of the city, it is convenient for walking and cycling. Walking mobility (64.4%) represents a high percentage compared to other cities of similar size.

Public transport presents problems such as overlapping of lines, unattractive frequencies (between half and one hour), city bus network with an exclusively radial configuration, traffic congestion at odd times, little attention to certain neighbourhoods and lack of complex network relationships; low commercial speed and excessive travel times due to no direct routes. The number of trips by public transport in León a year, per capita is 38, well below similar cities. The average age of the bus fleet in 2015 was 9.8 years. A real time information system has been incorporated at the stops and is also accessible via the Internet and via an app.

With regard to the bicycle, the city currently has a bike lane network of around 15 km, that is unfinished and in many cases unconnected. There is a municipal bike loan system that has become obsolete and relegated to groups that have no other means of transport. So this area has a lot of potential for improvement.

The city's access roads present a radial form that determines the relationship of the municipality of León with its outskirts. This network is complemented by inner and outer ring roads, none of them are completed or comes full circle. This radial network encourages the centre-periphery movements, although there is a shortage of crossways.

There is no culture of inter-modality with public transport and no "park and ride" facilities as such.

León participates in the European projects CityMobil 2, PORTAL INTEGRA and European Project TIDE, and supports initiatives such as the Spanish Observatory of Metropolitan Mobility (WMO) and the Civinet Network Spain and Portugal.

As part of its commitment to sustainable mobility, the City of León has launched a network of charging points for electric vehicles for passenger cars, mopeds, motorcycles and vehicles for disabled people. This network consists of 10 stations with two points each.

According to the information provided by the Statistical Portal of the Directorate General of Traffic (DGT), in November 2018, the fleet of vehicles in the municipality of León amounted to 78,561 vehicles, of which 75.92% were passenger cars (50.76% diesel passenger cars and 49.07% petrol passenger cars; only 0.11% of passenger cars used LPG-Liquefied Petroleum Gas and 0.03% were electric).

Of the total number of vehicles registered in the municipality of León, 98.95% use diesel and gasoline, only 73 vehicles use LPG (0.09%) and 44 are electric (0.06%).

The ratio of passenger cars per capita has fluctuated between 0.456 and 0.478 in the last two decades.

The model of efficient mobility and energy depends on taking advantage of the scale of the city and the new competitive sectors linked to ICT. The size of the city is optimal to turn the city into 0 emissions in public transport and bring about a drastic change that benefits the environment and the health of its citizens.

8.2.3 Governance characterization

It is a governance model with 4 administrative levels, with different responsibilities i.e. national (1), regional (1), provincial (9) and local (2248), not always agreeing on perspectives and actions, even between the different departments of the same organization.

- Different departments within each public authority.
- Regional authority is responsible for spatial and energy planning, and local level is responsible for implementing plans and projects.

Holistic planning:

- Regional planning is not integrated. Low level of collaboration and understanding between energy and spatial planning.
- Minimum role of stakeholders within regional planning and collaboration between private sector & authorities just for specific projects.
- Late policies focused on integrated planning (results yet to be seen).

System complexity:

- Complex system: four levels of governance and many stakeholders interested and involved often with different points of view and interests.

The local corporations do not have exclusive jurisdiction on their own, they do not have authority to legislate. This authority has only been transferred to the State and the Autonomous Communities (regions). The municipalities only have the authority to regulate and to draw up bylaws, and can only exercise this jurisdiction transferred by the State or Autonomous legislator. Therefore, the local entities have a subordinate role.

Among the City Council own competences, (compulsory by law) established by the Local Government Regulatory Law, these are related to energy and planning:

- Urban Planning: planning, development, management, fulfilment and urban planning discipline. Protection and management of the historical heritage. Promotion and management of social housing with financial sustainability criteria. Building conservation and rehabilitation.

- Urban environment: in particular public parks and gardens, management of urban solid waste and protection against noise, light and atmospheric pollution in urban areas.
- Drinking water supply and sewage disposal.
- Road / street network infrastructure (public lightning, cleaning, etc.), providing access to population centres and paving of public roads.
- Other municipal facilities (public buildings) i.e. sports facilities of public use, libraries, markets....
- Traffic regulation, car parking and mobility (public transport: bus and bikes services) (only within municipal limits).
- Cooperate with the relevant educational authorities in obtaining the sites necessary for the construction of new educational establishments. Conservation, maintenance and monitoring of locally owned buildings for public centres for children's education, primary education or special education.
 - There is not an "Energy service" specifically.

The municipalities exercise autonomously the competences they have by law for the management of their interests. The municipalities exercise its competences under their own responsibility and always taking into account coordination in its planning and implementation with the other public administrations.

Many of the recent urban renewal and regeneration operations, supported by state and regional regulations, have an "integrated nature", that is, these operations coordinate social, environmental and economic measures, in addition to the strictly physical ones. All this, in order to achieve, through a unitary strategy, many and varied objectives; energy efficiency and economic recovery, environmental sustainability, social cohesion and improving the quality of life of all citizens, both in housing and buildings and in urban areas.

In this broader sense, we highlight other municipal competences:

- Assessment and reporting of situations of social need and immediate attention to persons at risk or situation of social exclusion.
- Information and promotion of tourist activity (at local level).
- Promoting the citizens participation in the efficient and sustainable use of information and communication technologies.

It should be pointed out the planning for the Economic Sustainability of Municipal Services and Investments with the "Adjustment plan of the Municipality of León 2012 – 2032". It includes measures based on analysis and priorities, with the aim of ensuring the sustainability over time of the delivery of the different municipal public services.

8.2.4 Society & Citizens characterization

Regarding education, Leon's data of school dropout, failure and truancy are better than the national average data. Although there is an educational imbalance, levels are drastically worse in certain neighbourhoods.

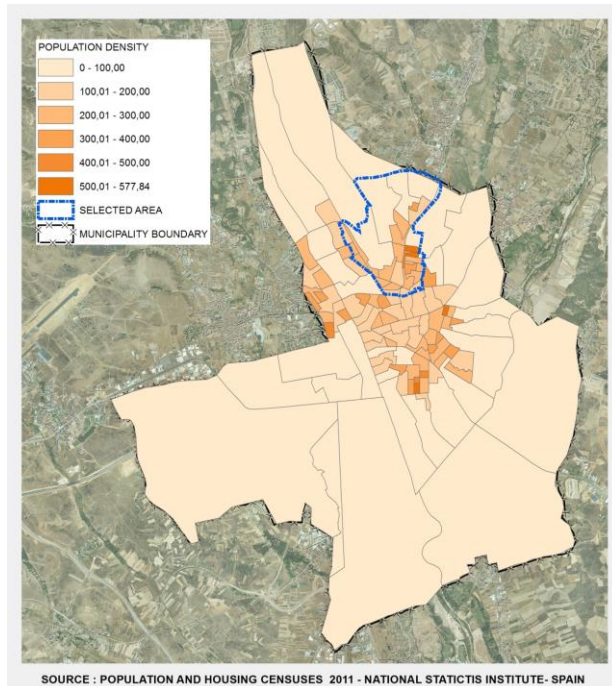


Figure 43: Population density in León

In León, there has been an increase in the number of people who, so far, hadn't had situations of social exclusion and there has been an increase in inequality and social fracture, that is, the rate and risk of poverty have increased significantly.

The combination of population ageing with the loss of young population is one of the main problems that the city of León has to face up to. In 2015 the average age of the city was 46.36 years, compared to 43.2 years in Spain. In the time of 5 years (2009 to 2014), the city of León has lost 7,559 people under the age of 55 and has increased by 2,805, the people over the age of 55.

One of the consequences is the high percentage of empty housing in León, 19.49% of total housing compared to 13.7% of empty housing at national level.

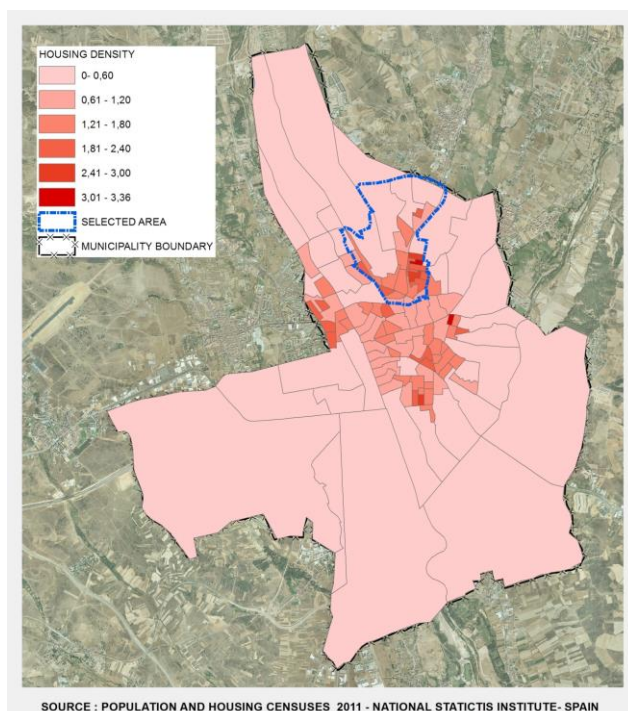


Figure 44: Housing density in León

This phenomenon has worsened due to population movements within the Urban Area (the City Centre is empty because of population movements from the capital to the surrounding municipalities), which causes great imbalances. These movements have gone against city planning forecasts, leading to unsustainable basic urban services.

As proof of this exodus of prepared young people, very few of the 2,800 students who enter the University of León each year settle in León to live and work.

The productive system of the capital is characterized by poor modernization of its structures, low activity rate (the second lowest in Spain) and lack of competitiveness (of the small size business).

The economic environment of León has been deeply affected by traditional economic sectors that have been in crisis for years, such as the mining and agricultural sectors, that has lost many jobs in recent years. This situation is aggravated by the poor entrepreneurial spirit that exists. We are therefore facing a city in clear risk of economic degradation.

The city depends heavily on the services sector and small commerce.

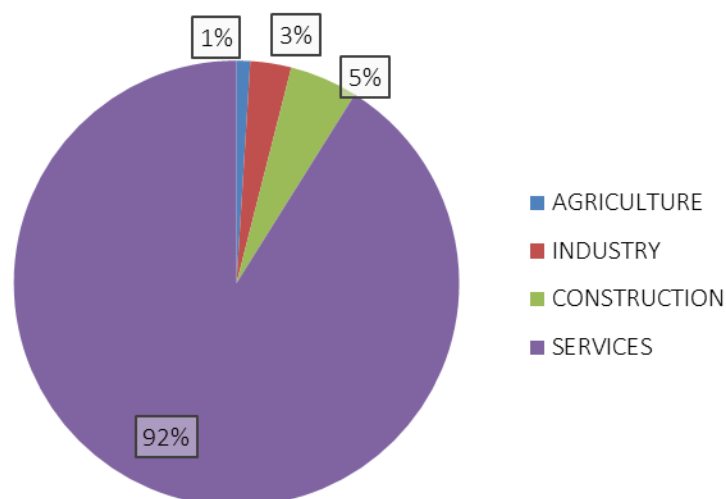


Figure 45: Distribution of the number of companies in the Municipality by sector

The lack of inclusion of new technologies in the population creates a significant digital divide. This situation is aggravated by a highly ageing population and the exodus of young people. The digital divide is a factor in exclusion of the most vulnerable population such as the elderly and immigrants.

New technologies remain the unfinished business of most SMEs based in León, a subject that is necessary for business competitiveness.

Amongst León's assets is the scale of the city, its average size, allows having a high quality of life. This quality of life is closely related to its environmental assets, with one of the highest per capita green area ratios in Spain (including two riverbanks, and two forest areas).

It has a high tourist potential, still to be developed, both the city and the province.

The new competitive sectors are:

- The biotechnology industry with an important development in both the city and the province of León, with state of the art infrastructures and trained human resources available.
- The Technological Park of León, technology-based companies from León and others such as HP are having very important growth ratios.
- The University of León, with about 13,000 students. The main degrees are related to new technologies, health, agri-food engineering, mining engineering, forestry engineering and all areas related to the economic sectors present in the region.
- Relevant infrastructures such as INCIBE (National Institute of Cyber Security) and EREN (Regional Energy Agency)
- Foundation super-computing centre of Castile and León, public entity created by the regional government and the University of León, which aims to improve the R&D&I tasks of the University, research centres and companies in León.
- The MUSAC (Museum of Contemporary Art of Castile and Leon) as a major cultural infrastructure in the city.

8.3 City indexes calculation

8.3.1 Indicators Normalised

As explained in section [¡Error! No se encuentra el origen de la referencia. ¡Error! No se encuentra el origen de la referencia.](#), the indicators of León have been normalised according to the ranking of indicators method, and the results of this normalisation are gathered in the table below (Table 69). The calculation of the indicators is included in deliverable D5.1 as well as in the annexes of this document (Annex D: León, [D.1](#)).

Table 69: León Indicators Normalised

ENERGY & ENVIRONMENT		
Application field	Indicator	SCORE
City Energy Profile	Final energy consumption per capita	5.13
	Primary energy consumption per capita	7.98
	Primary energy sources (shares)	0.16
	Building connected to the DH-network	0.00
GHG Emissions	GHG emissions per capita	5.56
Waste Management	Recycling rate	0.13
MOBILITY		
Application field	Indicator	SCORE
City Mobility Profile	Modal split	9.44
	Fuel mix in mobility	0.02
	Energy use for transportation	5.72
	Access to public transport	10.00
	Public infrastructure promoting low-carbon mobility	1.15
GOVERNANCE		
Application field	Indicator	SCORE
Economy	Unemployment rate	3.33
	GDP (Gross Domestic Product)	10.00
Initiatives and Strategies of the Public Administration	Smart city factor in a city development strategy	7.50
Public ICT/ Data	Quality of open data	0.00
SOCIETY & CITIZENS		
Application field	Indicator	SCORE
Affordable Housing	Development of housing prices	8.09
	Housing cost overburden rate	8.30
Citizen Engagement and Empowerment	Citizen engagement to climate conscious actions	5.00
	Encouraging a healthy lifestyle	5.00
Urban Structure	Inhabitants in dense areas	10.00

8.3.2 Categories, application fields and indicators prioritised

As explained in section 3.2.3 Step III: Prioritisation of categories, application fields and indicators, the indicators of León have been prioritised according to the city needs and targets, through the AHP method, and the results of this prioritisation are gathered within Table 70 below.

Table 70: León Indicators Weighting per Category and per Application field

ENERGY & ENVIRONMENT						
Application field	Indicator	WEIGHT per Category		WEIGHT per App Field		
City Energy Profile	Final energy consumption per capita	13.66%	100%	43.79%	100%	
	Primary energy consumption per capita	8.44%		27.06%		
	Primary energy sources (shares)	6.67%		22.34%		
	Building connected to the DH-network	2.12%		6.81%		
GHG Emissions	GHG emissions per capita	49.05%		100%	100%	
Waste Management	Recycling rate	19.76%		100%	100%	
MOBILITY						
Application field	Indicator	WEIGHT per Category		WEIGHT per App Field		
City Mobility Profile	Modal Split	42.38%	100%	42.38%	100%	
	Fuel mix in mobility	7.79%		7.79%		
	Energy use for transportation	29.71%		29.71%		
	Access to public transport	16.86%		16.86%		
	Public infrastructure promoting low-carbon mobility	3.27%		3.27%		
ENERGY & ENVIRONMENT						
Application field	Indicator	WEIGHT per Category		WEIGHT per App Field		
Economy	Unemployment rate	64.65%	100%	85.71%	100%	
	GDP (Gross Domestic Product)	10.78%		14.29%		
Initiatives and Strategies of the PA	Smart city factor in a city development strategy	18.17%		100%	100%	
Public ICT / Data	Quality of open data	6.41%		100%	100%	
SOCIETY & CITIZENS						
Application field	Indicator	WEIGHT per Category		WEIGHT per App Field		
Affordable Housing	Development of housing prices	3.24%	100%	12.50%	100%	
	Housing cost overburden rate	22.70%		87.50%		
Citizen Engagement and Empowerment	Citizen engagement/ empowerment to climate conscious actions	57.87%		85.71%	100%	
	Encouraging a healthy lifestyle	9.64%		14.29%		
Urban Structure	Inhabitants in dense areas	6.54%		100%	100%	

8.3.3 Aggregation and calculation of the city indexes

As explained in section 3.2.4 Step IV: Aggregation to calculate the city indexes, the indicators of León have been aggregated according to the Linear aggregation method, and the results are city indexes per category and per application fields, collected within the following tables Table 71 and Table 72 below.

Table 71: León Indexes per Category

CATEGORIES INDEXES	
Category	City Index
Energy & Environment	4.14
Mobility	7.43
Governance	4.59
Society & Citizens	6.18

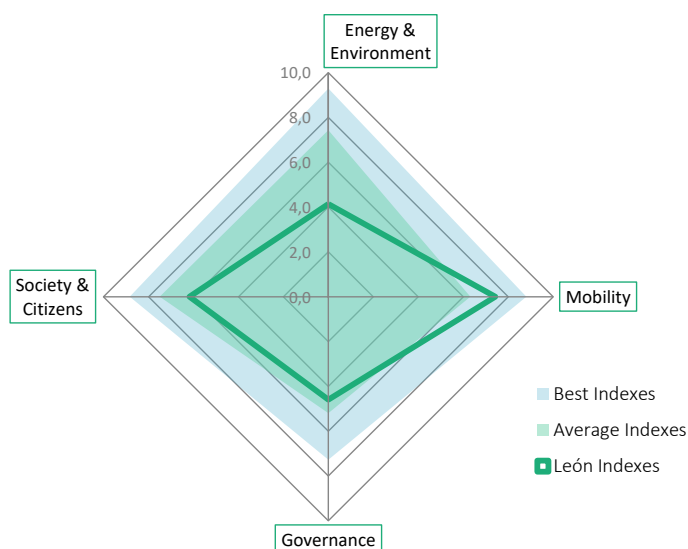


Figure 46: Radar view of León Indexes per Category

In view of the indexes for the categories of the city of León, it has a very good index in Mobility category, but an index below 5 in Energy & Environment and Governance category, which indicates where León will have to focus in the coming years.

Regarding **Energy & Environment** category, the index is below 5, which means that it is a category in which the city will have to focus their next efforts in order to improve the values of the indicators. Although the best value within this category for León is in primary energy consumption indicator, primary energy sources and the recycling rate, as well as building connected to DH-network, have the low scores, which means that city of León is far from the European targets in that terms. Between the lowest ones, lowest is building connected to the DH-network, as there are not DH network in the city, which is very convenient for a city with Temperate climate such as León does, and even more taken into account its significant number of heating degree-days. Highest priority for the city is GHG emissions, which somewhat increases the total index of the category because it is one of the best scores.

In terms of **Mobility**, León has his best index in this category. The best scores are for the modal split and access to public transport indicators, which in turn means that there are a good percentage of non-private motor vehicles mobility and that all inhabitants in the city have a public transport stop within 500 metres. Lowest scored indicator is the fuel mix in mobility, followed by the Public infrastructure promoting low-carbon mobility, which means that the improvements for the city will be in terms of electric or low-emission mobility, and in cycling infrastructure. The main priority for León in terms of mobility is the modal split, followed by energy use for transportation, which show where the city has been focused and where will focus for the next years.

The city has a **Governance** index little under 5, which means it is a category to improve. Although scores for GDP and Smart City factor in a city development strategy are good, the other two indicators have a really low score, meaning that the city has to focus their efforts in the employment and in the public ICT and data. The main priority for the city lies in the unemployment rate, which makes sense in relation to the low score of this indicator.

The index within **Society & Citizens** category is acceptable, with all scores above 5. Best scored indicator is inhabitants in dense areas, meaning that León has many suitable areas to develop PED; and there is any indicator with a really low score. Main priority is given to the citizen engagement to climate conscious actions, what seems appropriate being not one of the highest scored and when compared with the low related index in terms of energy and environment.

Although the city has some low indexes, in general terms they are not too low, and serves to indicate the city where to focus its next efforts (Energy & Environment and Governance), and what line continuing in terms of Mobility and Society & Citizens.

Table 72: León Indexes per Application Field

APPLICATION FIELDS INDEXES		
Category	Application Field	City Index
ENERGY & ENVIRONMENT	City Energy Profile	4.44
	GHG Emissions	5.56
	Waste Management	0.13
MOBILITY	City Mobility Profile	7.43
GOVERNANCE	Economy	4.28
	Initiatives and Strategies of the PA	7.50
	Public ICT / Data	0.00
SOCIETY & CITIZENS	Affordable Housing	8.28
	Citizen Engagement and Empowerment	5.00
	Urban Structure	10.00

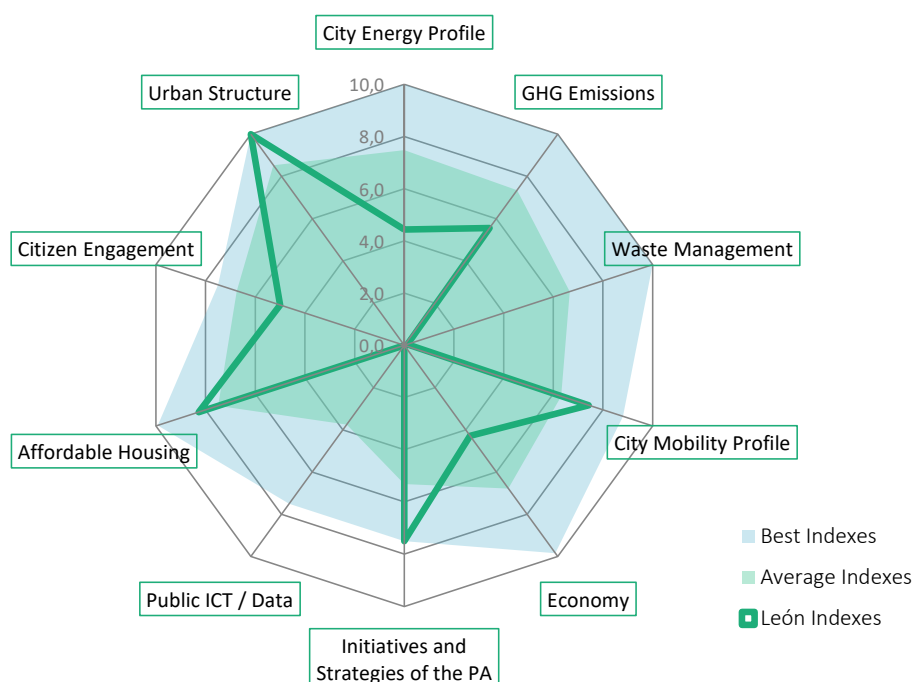


Figure 47: Radar view of León Indexes per Application Field

In relation to the resulting indexes for the city of León on the application fields, there are some of them with a low index pointing out the needs or aspects of the city that need to be improved. Focus on the best application fields in León there are city mobility profile, initiatives and strategies of the public administration, affordable housing and urban structure. Lowest indexes are waste management, and public ICT and data; which are pointing out the ones that will need to gather the next efforts of the city.

8.4 Analysis of the existing city plans

8.4.1 Main City plans identified

Within this section, the main information of the existing plans that León has identified is included, following the process explained in the section [4.2 Methodology for the analysis of the existing city plans](#), of the present document. The whole information gathered for each of these plans is collected in the annexes of this document (Annex D: León, [D.2](#)).

Table 73: León Short Term plans

Main city plans identified – Short Term			
Plan	Scope	Description	Topics covered
Integrated Sustainable Urban Development Strategy of León	Local	Strategic paper formulated in the context of second public call of the State to co-finance under ERDF the implementation of Integrated Sustainable Urban Development Strategies for cities. North of León ISUDS is a sectoral and detailed strategy for the north area of the city comprising six neighbourhoods, and composed of 14 lines of action covering 4 thematic objectives prescribed by the ERDF call. The Strategy in turn establishes 4 strategic goals specifically designed facing city level challenges. These strategic objectives are the pillars to achieve a positive transformation of the north area.	Energy ICT Mobility Social
General Urban Development Plan / León Master Plan of Urban Development	Local	The Master Plan of León establishes a long-term territorial model for León without a specific time horizon. It is the urban planning instrument and sets up the urban planning for the entire extension of the municipality and classification of land, the detailed urban planning in urban units, the general regulations for the different land uses and building, for the protection of the resources and the regime of the different categories of land. In addition, the general systems are designed, which includes road and transport infrastructure, public open spaces, facilities, and basic infrastructure and urban services.	Energy Mobility Social
Strategic Plan to Control the Air Quality of León	Local	The "Air Quality Control Strategy" was approved in 2003 and the "Air Quality Improvement and Action Plan of León" in 2006. Additionally, in 2012 a Municipal Atmosphere Protection Ordinance is approved. These three documents involve the adoption of a series of measures to achieve the improvement and regulation of the municipality's air quality, avoiding, preventing and reducing the harmful effects on health and environment caused by pollutants (sulphur dioxide, nitrogen dioxide, suspended particles, carbon monoxide and ozone).	Energy Mobility
Sustainable Urban Mobility Integrated Plan	Local	The SUMP is structured through five fields: public transport, parking, road network and transport, bicycle and pedestrian mobility. Specific targets and measures necessary to achieve them are established in each of the sectoral plans. It also	Mobility

		drafts several intervention plans and global improvement covering all mobility scopes in the municipality: Cross Intermodal transport Special Plan, Traffic Safety Special Plan, Awareness, education and promotion of sustainable mobility Special Plan, Special mobility plan for attractor centres, Accessibility for all Special Plan.	
Energetic efficiency strategy of Castilla y León 2020	Regional	Strategy on energy efficiency, established in the program of actions to be carried out in the coming years, its financing, energy indicators, monitoring and who should do what, in order to meet the objectives marked by the EU. The Strategy establishes three main objectives, and then, sector by sector, the specific objectives and the derived measures. The sectors are industry, building, transport, public services and Castilla y León administration.	Energy
Urban Regeneration Strategy in CyL (ERUCYL)	Regional	This plan is an orientation guide in the processes of rehabilitation, regeneration and urban renewal that are developed in the region, whether promoted by private initiative or by different public administrations. Its main objective is to develop measures on rehabilitation, regeneration and urban renewal, and on sustainability, coordination and implementation in the area of urban planning in Castilla y León.	Energy

Table 74: León Medium Term plans

Main city plans identified – Medium Term			
Plan	Scope	Description	Topics covered
Strategic Plan of Leon 2018 - 2027	Local	Strategic document drawn up to define a medium-long term vision for future León. It includes a diagnosis of León, a future city model and the catalogue of projects to be developed to achieve it, as well as the road map, and its control and monitoring method. The Strategic Plan establishes as its main mission to improve the positioning of León in each of the five areas or levers of competitiveness detected (quality of life, economic development, tourism and city brand, infrastructure and connectivity and government and participation). The city vision to achieve is multiple; León seeks to be a city for its inhabitants, a city for innovation, opportunities, attractive, green and accessible, and a reference city as a logistic hub in the Atlantic arch.	Social ICT Mobility
Carbon footprint improvement of León City Council	Local	The document identifies the main sources of GHG emissions at city level, calculating the carbon footprint of the years 2013, 2014, 2015 and 2016, and the parameters on which the calculations are made. The Plan establishes a 30% reduction in carbon emissions from 2015 to 2030, and year-to-year reduction targets between 1.5-2%. The reduction is for the City Council as an entity, which means that the actions are	Energy Mobility

		only for buildings, facilities and workers from the municipality, and not for the entire city (for citywide emissions, targets will soon established in the Covenant of Mayors).	
Assessment of risks and climatic vulnerabilities of the municipality of León	Local	Assessment study of climate risks and vulnerabilities faced by the municipality of León, in order to establish appropriate mitigation and adaptation measures. The document collects information about relevant risks and dangers to the municipality; socioeconomic, physical and environmental vulnerabilities of the municipality; impacts foreseen by sectors; and adaptation actions to climate change, both integral and specific for a specific sector.	Energy Mobility Social
Spanish Urban Agenda	National	It is an Action Plan in favour of people, the planet and prosperity, which also intends to strengthen universal peace and access to justice. It is a strategic framework to guide the meaning of sustainable urban policies with social, environmental and economic objectives. It does not have a normative range, it is based on the voluntariness of the commitments of the Public Administrators and the rest of the stakeholders. The Urban Agenda should promote improvements, at least in the areas of: regulation and planning, financing, knowledge, governance and transparency and participation.	Energy Mobility Social
Energy and Climate Integrated National Plan 2021-2030	National	Plan to determine the degree of compliance with the objectives of the European Union as a whole. The Plan identifies the challenges and opportunities along the five dimensions of the Energy Union: discharge; renewable energies; energy efficiency; energy security; the internal market for energy and research, innovation and competitiveness. Within the measures contemplated in this Plan, the following results can be achieved in 2030: 21% reduction in GHG emissions compared to 1990, 42% renewables on the final use of energy, 39,6% improvement in energy efficiency, and 74% renewable energy in electricity generation.	Energy Mobility

8.4.2 Main targets defined in the city plans

In general terms, plans are aligned with the Europe 2020 targets, as well as with European, national and regional regulations.

There are few plans and strategies with such defined, specific and concrete targets. In a generic way, there are objectives and lines of action that will be developed and settled in specific actions. These action lines and objectives are aligned with the Europe 2020 targets, as gathered in [Table 75](#), and the actions they imply will certainly help to achieve these European targets.

Table 75: León targets aligned with the European ones

LEÓN targets aligned with the European 2020 targets			
EU target	Plan in which is included	Is the target achieved?	Is there a more ambitious one?
75% population aged 20-64 employed	Similar targets with similar intent have been included in: - Strategic Plan of León 2018 - 2027	To some extent ⁵⁴	
3% of GDP invested in R&D sector		NO	
Reduction 20% of GHG emissions	Energetic efficiency strategy of Castilla y León 2020	NO	YES: 20% reduction by 2020 (30.24% CO ₂ reduction compared to 1990)
Increasing 20% of share of RES	Similar targets with similar intent have been included in: - Energetic efficiency strategy of Castilla y León 2020 - Integrated Sustainable Urban Development Strategy of León (not covers the whole city)	NO	
Improved 20% energy efficiency		NO	
Early school leavers' share reduced under 10%	Similar targets with similar intent have been included in: - Strategic Plan of León 2018 – 2027 - Integrated Sustainable Urban Development Strategy of León (not covers the whole city)	NO	
40% of 30-40 years old with tertiary education			

But as some final indicators do not always fully coincide with the European 2020 targets, below is a summary for those examples:

- The Integrated Sustainable Urban Development Strategy of León (which not covers the whole city), includes some similar targets to the last three European ones in the Table 75, such as
 - Number of people benefited from physical, economic and social regeneration of the urban environment.
 - Percentage of people with access to local social services.
- The Strategic Plan of León 2018 – 2027 has also similar targets to the European 2020 ones (first two and last three), such as
 - Promote quality employment and the generation of work opportunities
 - Generate business dynamism as an asset to boost the economy.
 - Population attraction and retention.
 - Optimization of social services management.
 - Encouraging job opportunities to attract and retain people (with education programmes and professional training).

⁵⁴ Not measured in this way, but the unemployment rate is 14.10% of active population in 2017, source (by region): <https://ec.europa.eu/eurostat/documents/2995521/8830865/1-26042018-AP-EN.pdf/bb8ac3b7-3606-47ef-b7ed-aadc4d1e2aae>

Regarding energy targets, the city signed the Covenant of Mayors in 2015. This implies a commitment to meet the target of reducing CO₂ emissions by 40%, and increasing resilience to climate change impacts through the implementation of a SECAP.

The SECAP (Climate and Sustainable Energy Action Plan) will be designed and implemented in the near future, in line with the SUMP (Sustainable Urban Mobility Plan). This document will set as objectives for 2030:

- Reduce CO₂ emissions by at least 40%.
- Increase energy efficiency by 27%.
- Increase renewable energy consumption by 27%.

In addition, for the mobility sector (within the SUMP), the commitment to reduce GHG emissions by 50% by 2030 compared to 2012 levels will be included.

The rest of plans and strategies developed at local level without a clear associated funding and without a monitoring plan on their implementation, will be integrated into the new SECAP and will provide analysis, ideas and reflections on that regards.

In terms of social European targets, the Local Plan for Social Inclusion 2017-2020 itself states that the European 2020 strategy and the objectives of the National Social Inclusion Plan guide the aim of this active local social inclusion plan. It is structured in strategic lines, which are settled on general objectives that will serve as the basis for defining the specific actions that will be implemented once the Plan is approved.

In relation to economy, in Spain, and particularly in the city of León, unemployment is one of the most pressing problems. And to solve it, it has to be "attacked" from all possible fronts:

- Economic dynamism, encouraging business creation, entrepreneurship, etc.
- Education programmes and professional training.

If such plans were to succeed, it would contribute to all economic and social objectives: unemployment reducing, investment increasing in the R&S sector, school leaver reduction, educational level increasing of population and population at risk of poverty reduction.

In general terms, targets are mainly aimed at mitigating the main challenges of the city, which are:

- The ageing of the population (the demographic challenge).
- The lack of "truly" and real involvement of the population.
- The lack of economic dynamism (high unemployment rate, low activity rate, low competitiveness, etc.).

Obviously, in the specific energy plans (SECAP, Carbon footprint improvement Plan, etc.) the main concerns, objectives and targets are around energy efficiency. But when strategic plans are drawn up for the city (without the constraints of the ERDF as happens in EDUSI), for example, the Strategic Plan of León 2018-2027 (and its complementary Plan: León - Smart City), or when in urban regeneration issues the state regulations are transposed to regional level, then the main concerns, objectives and targets are economic and social ones.

In this sense, the Urban Regeneration Strategy in Castilla y León (ERUCYL) is a clear example of this. ERUCYL adapts to the regional reality the objectives of the state law (Law 8/2013) of rehabilitation, regeneration and urban renewal, without excluding any. Thus, the state law is oriented to the improvement of the energy efficiency of the residential heritage (State law that emerges as a development of Directive 2012/27/EU and the 20-20-20 targets), while when urban regeneration is transposed into the regional legal framework (Law 7/2014), the social dimension is accentuated,

focusing on the physical and functional recovery of the most vulnerable urban spaces physically, socially and economically.

The ERUCYL, whose main objective is the development of the autonomous law, indicates that: "The emphasis is more on social concern than on solving a globalized problem of massive use of fossil fuels that is complemented by another of energy inefficiency".

8.4.3 Main actions identified to achieve the defined goals

There are actions identified in the plans to achieve defined objectives, and there also are actions that are carrying out, which are "outside the plan", meaning that they are not included in any plan.

In general, León is at the beginning of many sustainable and energy transition roads, SECAP is being prepared, SMART CITY lines are starting, and EDUSI and Local Plan for Social Inclusion are still starting. At the moment, therefore, León is on the way from the objective and course of action to the definition of the specific action, exhaustively detailed, and subsequently its actual and effective implementation.

In addition, the pace of development of actions (especially at the beginning of the implementation) is related with the political rhythm, where there is always a bit pause at the beginning of a new legislature, and especially when there is a change of political party. In addition to this, and above all, the city has been greatly affected by the economic and political crisis.

León also has many papers but few actions actually implemented. We need to unify the variety of plans and strategies to avoid duplicities and contradictions (that is, be effective and efficient), but above all we need to IMPLEMENT the actions, and monitor and control them.

Tools are also needed to achieve both social support and acceptance, as well as financing.

So far, there are many plans without clear associated funding and without a monitoring plan on their implementation, or not specific enough. On the energy regard, all these plans will be integrated into the new SECAP, which will try to unify and solve all these issues with non-implemented actions.

8.4.4 Actuation areas identified and financial schemes

Almost all plans and strategies cover the whole municipality except the Integrated Sustainable Urban Development Strategy of León 2017-2023, which focuses on the North of Leon thanks to the EDUSI (Integrated Sustainable Urban Development Strategy): between-tracks neighbourhoods, comprising six neighbourhoods: *Inmaculada*, *Asunción*, *Cantamilanos*, *Ventas*, *San Esteban* and *San Mamés*.

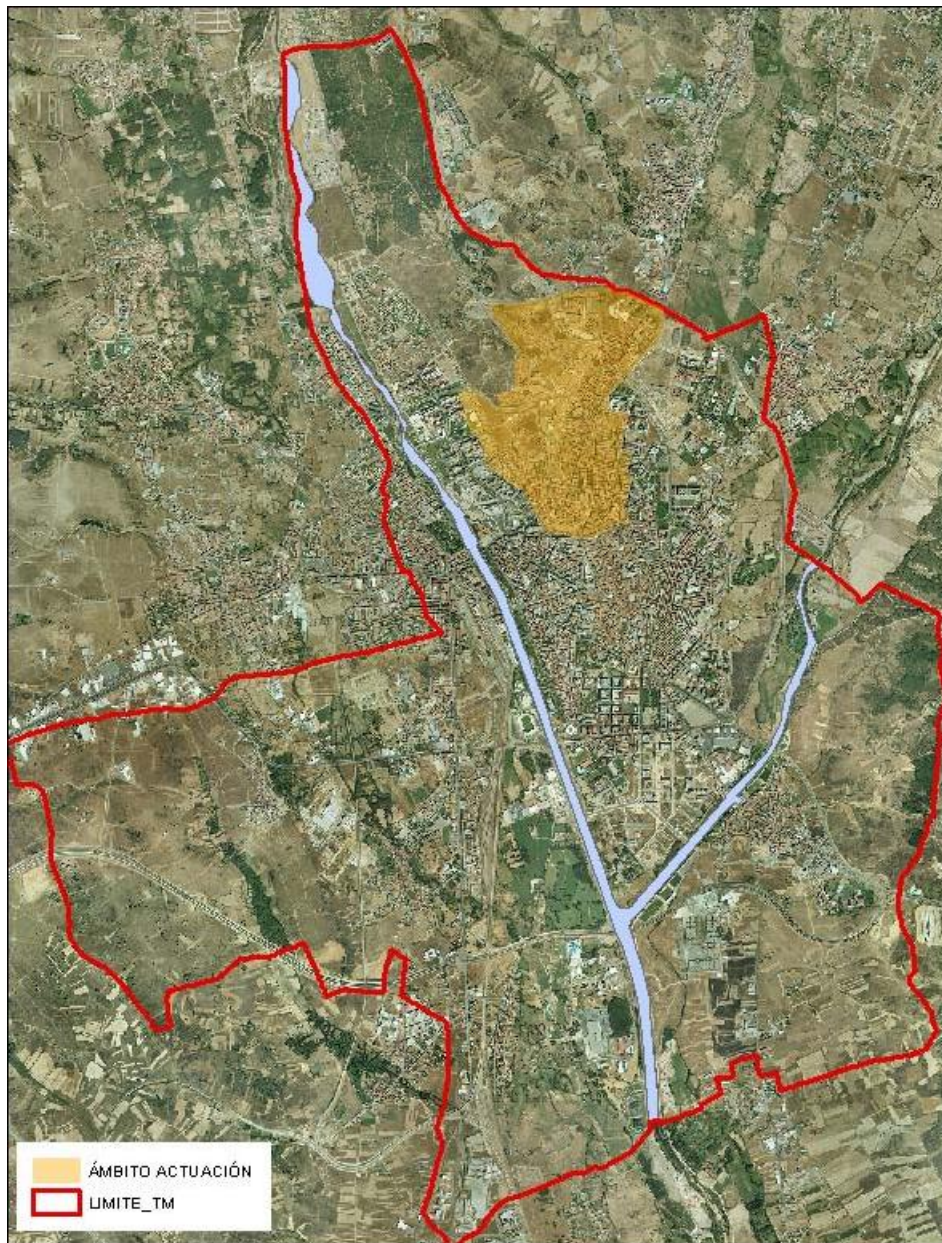


Figure 48: Main actuation area in León

The Strategic paper formulated in the context of second public call of the State to co-finance under ERDF the implementation of Integrated Sustainable Urban Development Strategies (ISUDS) for cities. This document was formulated after a city level previous and wider one (EDUSI León XXI21).

The Carbon footprint improvement Plan of León City Council, dated on December 2017, is a plan for the León City Council as an entity, and not for the entire city.

As mentioned above, León is in a very incipient state in almost all these plans or strategies, either they are starting or are still in the making. In addition, due to the crisis and the economic situation of the municipality, it is subject to León City Council Adjustment Plans 2012-2022 and 2012-2032 and the Economic-Financial Consolidation Plan 2012-2022.

At the moment, there are no financial schemes or innovative business models for the deployment of these actions. Perhaps in the development, specific design and implementation of some of these courses of action, some examples may emerge.

8.4.5 Main needs and priorities identified from the analysis of the existing city plans

As mentioned in previous section 8.4.2, in sectoral plans, main needs and priorities identified refer to that particular sector of the city. But when strategic plans are proposed for the entire city, such as the Strategic Plan of León 2018 – 2027, without guidelines of a call, or when in relation to urban regeneration, state laws are transposed at regional level; then the main priorities identified are economic and social.

What is clear is that main problems of the city are related to:

- Demographic challenge, aging population and exodus of young people. The Shrinking city spiral is aggravating and hindering all areas of the city, with lack of critical mass to face certain projects, lack of financial resources of an increasingly smaller and aging population and therefore more demanding services, etc.
- Economic challenge. Related to the previous one, there is a low competitive economy and low activity rate, low entrepreneurial spirit, high unemployment rates (with low training and school failure among the unemployed population).
- Energy and environment challenge. Energy and mobility model is low efficient at all levels: there is a great dependence on private cars, low-quality old housing stock, lack of maintenance of RES facilities, large number of empty homes and premises, etc.
- Technological challenge. With the digital divide and lack of inclusion of new technologies.

We cannot wait to solve the first two challenges and most pressing ones to deal with after the rest of them, we must attack on all fronts so that no sector is off the hook. In addition, these other challenges may be the key to solving the first ones, such as an economic activation around RES, which retains population and reverses the exodus of young people.

In summary, the key piece for León is, given the economic and demographic status, how to make actions viable and how to implement these actions. For that purpose, we need:

- In the face of an aging society, reluctant to change: campaigns and mechanisms that help us to really involve citizens. They need to see energy efficiency not as a burden but as a saving in the medium and long term, not as an imposition to fulfil but as something undeniably necessary that helps us improve in many aspects (social, economic, environment, health, etc.). This would help us to be able to manage real data, to be able to show the positive impacts of all kinds that energy transition brings, such as generation of jobs, activating economy and business activity.
- Faced with a low rate of economic activity: economic resources, innovative business models and incentives that make the necessary actions viable.
- In addition, entrepreneurs and companies with experience and skilled labour force are necessary, in order to ensure optimal operation of existing RES facilities have had maintenance problems that have resulted in most of them not being operational.

9 City Diagnosis: Kadıköy

9.1 General overview of the city



Kadıköy is one of the central districts of the metropolitan city of Istanbul. Located on the southwest of Anatolian part of the city, it's surrounded by Marmara Sea on the west and south.

Consisting of 21 neighbourhoods, Kadıköy has 25.2 km² land area, located at an altitude of 120m, and its population is 458,638 according to latest data of TurkStat. There are 29,486 buildings (including both residential and tertiary) and building density is 12 stock/area in ha. With its cosmopolitan structure and central location, Kadıköy is very attractive for the national and foreign population.

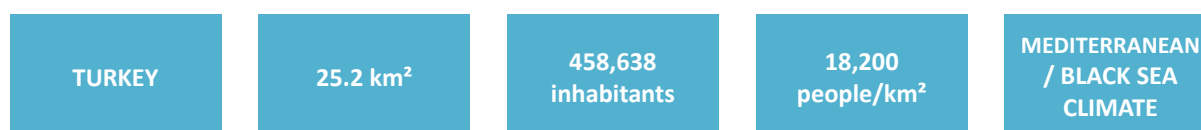


Figure 49: What Kadıköy is

Istanbul / Kadıköy is located in the Marmara Region, has a transition climate under the influence of Mediterranean, Blacksea, Balkans and Anatolia Climate. Marmara Region is a junction point of Mediterranean Climate and Blacksea Climate. The summer months are hot and rainy in Kadıköy and the winter months are mild and rainy. The climate is under the influence of the Marmara Sea. The effect of the sea starts to decrease as you go from coast to inland. The average temperature is 3 °C in the coldest months and 23 °C in the hottest months. The average annual rainfall is 800 millimetres. The highest measured temperature was 41 °C and the lowest temperature was -9 °C. The average annual temperature is 14 °C.

As in all other districts of Istanbul on the coast in Kadıköy, the difference in temperature and humidity is felt due to the proximity to the shore and the openness of the ground.

Table 76: Kadıköy climate characterisation

CLIMATE CHARACTERISATION	Mediterranean / Black Sea climate
Average annual temperature	14 °C
Total annual precipitation	800 mm
Winter average temperature	3 °C (coldest months)
Summer average temperature	23 °C (hottest months)

The Municipality of Kadıköy joined Covenant of Mayors (CoM) in 2012 under the coordination of the Directorate of Environmental Protection and Control. With this agreement, Kadıköy Municipality has prepared the “Kadıköy Municipality Sustainable Energy Action Plan” which aims to reduce district greenhouse gas emissions by 20% until 2020. In 2015, calculations were uploaded to the system and approval was obtained. In line with the objectives of the Paris Climate Agreement, the last plan was transformed into Kadıköy Sustainable Energy and Climate Change Strategy and Action Plan.

Our municipality for this purpose "Capacity Development Program on Climate Change in Turkey" were entitled to receive from the grant.

Within the scope of “Kadıköy Municipality, Integrated and Participatory Climate Action Project“, it plans to increase its mitigation targets by being included in the new formation which aims to reduce its emissions by 40% by 2030 on COM platform. Kadıköy Sustainable Energy Action Plan, prepared for this purpose, aims to reduce emissions within the limits of Kadıköy 's authority.

The adaptation strategy aims to mitigate the apparent impacts of climate change and thus enhance the quality of urban life. The adaptation approach focuses on management of high and abruptly changing temperatures, waste resources management, flood and soil erosion mitigation, and coastal flood mitigation. It is important for cities to develop a sustainable urban structure resistant to long-term and abrupt impacts in fight against climate change. Therefore, the provision of sustainability with long-term reduction strategies is possible by making cities more resistant to shocks, such as climate change, with adaptation strategies that can respond to abrupt changes. The transformation process, delivering a holistic approach to fight against climate change, will be possible with the activation of reduction and adaptation strategies in cities.



Figure 50: Kadıköy's highlights

The issue of green spaces, biodiversity and corridors comprising the primary thematic area designated for Kadıköy refers to those necessary actions taken for human-nature adaptation which is one of most fundamental issues in the process of adaptation to climate change. It includes a number of benefits such as developing a green-blue network system designed to protect and improve biodiversity, balancing the said system in terms of green space amount, access and distribution as well as reducing the heat island impact.

The second topic includes long-running practices for mitigating the impact of urban heat island and reducing the dense population of and pressure over cities. It is, in particular, necessary for rapidly urbanizing and dynamically developing urban regions like Kadıköy to mitigate the environmental damage caused by growth, on the one hand, and to enhance the living comfort of urbanites by mitigating the heat island impact resulting from the over-density of cities, on the other hand.

The water areas addressed under the third topic play a significant role for adaptation strategies to urban climate change. Accordingly, there are some developing design concepts such as water-sensitive urban design (WSUD). The water-sensitive urban design integrates water management, natural hydrological and ecological cycle management, protection and preservation, and urban planning and design with one another. The latest solution patterns in the form of a Sponge City are experimented in the cities exposed to water-induced urban threats.

The public health addressed under the fourth topic is one of the issues of top priority for enhancing urban living standards during the climate adaptation process. The potential actions applicable to this topic include a set of practices such as supporting individual wellbeing, providing sustainable mobility solutions that help improve the quality of urban live and putting unhealthy areas in the city into re-use.

9.2 City characterisation

9.2.1 Energy & Environment characterization

There are two main role changer issues against linear growth in terms of massive urbanization in Kadıköy. First of all, in 2008, the municipal physical borders were changed and total area of the city was diminished by 39%. A new municipality was constituted and 16 km² of Kadıköy was shared between 2 municipalities (*Atasehir* and *Umraniye*). This change affected and reduced the building stock (including residential and tertiary buildings), energy consumption and GHG emissions in city data.

On the other hand, in Turkey, rapid population growth, informal settlements, and buildings and infrastructures vulnerable to natural hazards are seen as the most important problems of cities. Particularly disaster risk cannot be disregarded, as large parts of various cities are facing risks from earthquakes, floods and landslides and have experienced loss of lives in the recent past. Urban regeneration is an important planning tool implemented by local and central governments in order to reduce disaster risk and to design liveable environments for the citizens. The Law on the Regeneration of Areas under Disaster Risk, commonly known as the Urban Regeneration Law, was enacted in 2012 (Law No. 6,306, May 2012). The regulation on Implementation of Law No. 6,306 explains the fundamental steps of the urban regeneration process.

The relevant institutions furnished with various authorities such as expropriation, confiscation and changing the type and place of your property which makes urban regeneration projects very important in terms of property rights⁵⁵. Kadıköy has already prepared Municipal Urban Regeneration Plan in parallel with Urban Regeneration Law and areas under disaster risks have been identified. Urban regeneration and reconstruction projects (so called urban regeneration and on-site transformation projects) have been started in 2013 it is planned to demolish and rebuild approximately 95% of the city until 2025. As a result of these demolitions and resettlements to other municipalities, the population and building stock of the city is decreasing currently but they will heavily increase in 5-10 years after all of the areas are transformed. This matter of fact massively affects forecasted data of newbuilding stock and population.

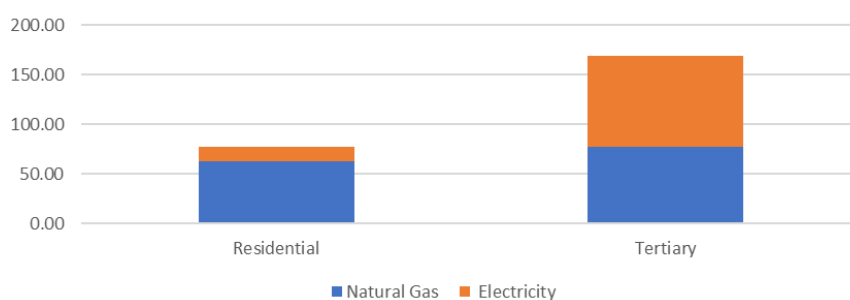
All of the building stock data is derived and processed from Kadıköy GIS Spatial Infrastructure Data and maps. Total construction area in the city is approximately 39,701,756.17m² of which 35,802,560.14 m² (90.18%) is residential; 143,376.97 m² (0.36%) is office; 775,168.18 m² (1.95%) is education; 61,496.51 m² (0.15%) is hotel; 236,804.51 m² (0.60%) is public administration; 1,649,049.09 m² (4.15%) is commerce; 108,853.24 m² (0.27%) is sport and 327,172.42 m² (0.82%) is health care area.

Total energy consumptions regarding buildings and transport sectors are summarized in [Table 77](#) below. It is noted that 64% of overall energy consumption in the city is from buildings sector whereas 36% is from transportation sector. There are no industrial buildings but industrial facilities (temporary concrete production plants will be demolished after urban regeneration process is over) exist in the city. There is no power generation in Kadıköy.

⁵⁵ E Candas, J Flacke, T Yomralioglu, Understanding Urban Regeneration In Turkey derived from https://www.researchgate.net/profile/Tahsin_Yomralioglu/publication/307530250_UNDERSTANDING_URBAN_REGENERATION_IN_TURKEY/links/5817764e08ae90acb24291b4/UNDERSTANDING-URBAN-REGENERATION-IN-TURKEY.pdf

Table 77: Total energy consumptions of Kadıköy

Kadıköy	Mwh	%
Energy Consumption in Buildings, Equipment/Facilities and Industries (Residential, commercial and industrial consumptions)	3,542,800	64.64%
Municipal Buildings & Facilities	13,332.94	0.3%
Other Buildings & Facilities Other Than Municipal Buildings	543,909.52	13.0%
Residential Buildings	2,768,422	47.6%
Municipal Street Lighting	2,150	0.1%
Industry	214,986	3.5%
Energy Consumption in Transportation (Vehicles)	1,938,122	35.36%
Municipal Vehicle Fleet	26,864	0.5%
Mass Transportation Municipal Buses	291,280	5.3%
Mass Transportation Metro	6,604	0.2%
Urban Vehicles	1,613,375	29.4%
Power Generation	0	0.00%
Total	5,480,922	100%
Consumption and Emissions per Capita	12	

**Figure 51: Kadıköy final energy consumptions /m² by fuel types**

According to the data collection⁵⁶, average energy consumption per year 77.32kWh/m² for residential buildings (including both residential blocks and single-family housing) and 168.76kWh/m² for tertiary buildings (including commercial, public administration, etc.).

Main fuel types of final energy consumptions are 62.42kWh/m² natural gas and 14.80kWh/m² electricity for residential buildings and 77.20kWh/m² natural gas and 91.57kWh/m² electricity for tertiary buildings. It should be noted that first natural gas grid was started in 1992 in Kadıköy.

⁵⁶ Kadikoy SEAP (2016) Final Consumptions and Kadikoy GIS Spatial Infrastructure Data from Kadikoy GIS shape file.

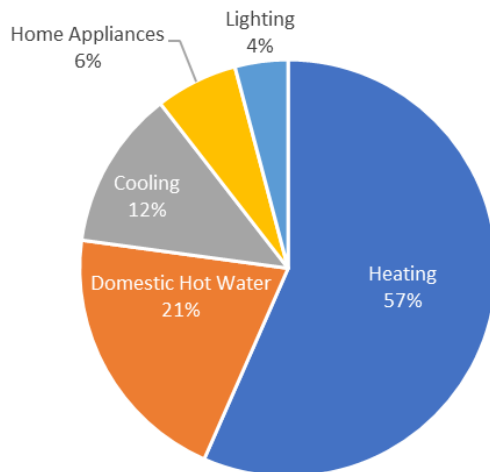


Figure 52: Residential energy consumption (data derived from a user in Kadıköy)

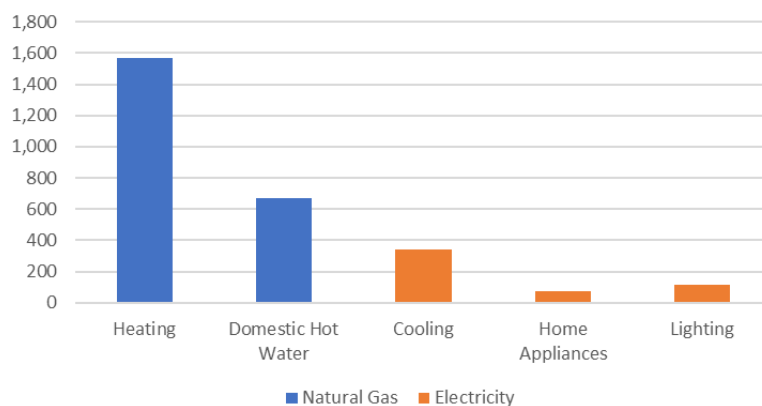


Figure 53: Kadıköy residential sector final consumption (in GWh) by fuel types and by activities

According to the sources, residential sector in Kadıköy consumes a total amount of final energy of 2.8 TWh annually with natural gas as the main source. This data cites that climate dominates the heating demand in the district and although cooling demand is high in Istanbul, the residential profile doesn't prefer cooling consumption and consents the indoor comfort environment.

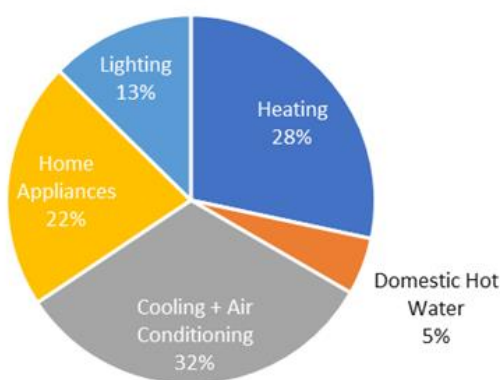
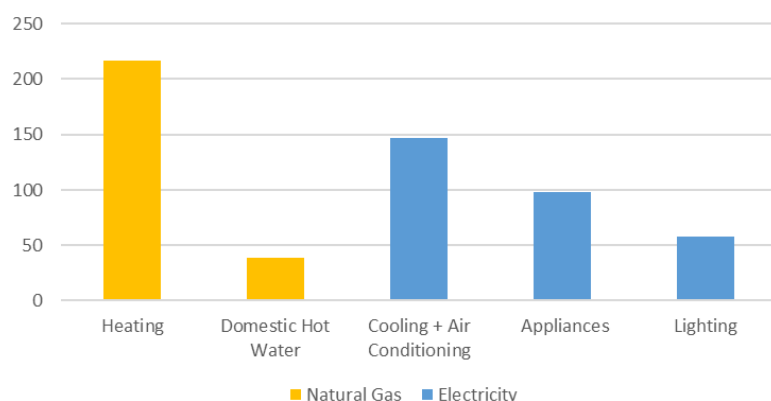


Figure 54: Tertiary energy consumption (data derived from a user in Kadıköy)

Tertiary buildings data of Kadıköy has been gathered from Kadıköy Sustainable Energy Action Plan prepared in 2016 by Demir Energy and Kadıköy GIS Spatial Infrastructure Data. Energy bills of a corporate user in Kadıköy have also been reviewed to calibrate the existing data.

It may be detected that main consumption in tertiary buildings is the cooling + air conditioning (32%) with electricity as the main source. It is followed by heating with natural gas as the main source, whereas appliances and lighting outreach ~35% of the total consumption.



According to the final consumption in Gigawatt-Hours in tertiary sector by activity and by fuel, tertiary sector in Kadıköy consumes a total amount of final energy of 0.6 TWh annually with natural gas as the main source.

Figure 55: Kadıköy tertiary sector final energy consumption (in GWh) by fuel types and by activities

9.2.2 Mobility characterization

Kadıköy has always been an important junction for the link between the two sides of the city, Rumelia and Anatolia; and on a larger scale, it has also a vital importance for the connection between the Balkans and Middle East. That is why one of two main terminals of Turkish State Railways, Haydarpaşa Terminal, was built in this area in 1909; the rail service temporarily ceased to function in 2013, because of the ongoing Istanbul-Ankara high-speed railway and Marmaray undersea tunnel constructions. In addition to the national railway system, the terminuses of Anatolian side of Istanbul metro and metrobus systems are located in Kadıköy. The district is also home of one of the largest intra-city bus stations and garages in Istanbul. In addition to these land transportation facilities, Kadıköy has several historical ferry quays which connect the two sides of the city.

Energy consumption data has been reached using several reference and assumptions mostly based on two major sources; Kadıköy Municipality Reports and TÜİK (Turkish Statistical Institute). The total energy consumption within Kadıköy is calculated as 237.1 GWh/year (Table 78).

Table 78: Kadıköy public transportation modes and energy consumption⁵⁷

	Ferry	Train	Metro	Metro-Bus	Bus	Car	Private Transport
Fuel Type	Diesel	Electric	Electric	Diesel	Diesel	Diesel / LPG / Gasoline	Diesel
Number of vehicles	146	n.a.	n.a.	n.a.	815	106	1252
Energy Consumption [GWh]	99.4	7.1	10.56	0.05	58.7	0.553	60.74
Total Consumption [GWh]	237.1						

⁵⁷ For calculation of the energy, only km of distance within Kadıköy District has been taken into account.

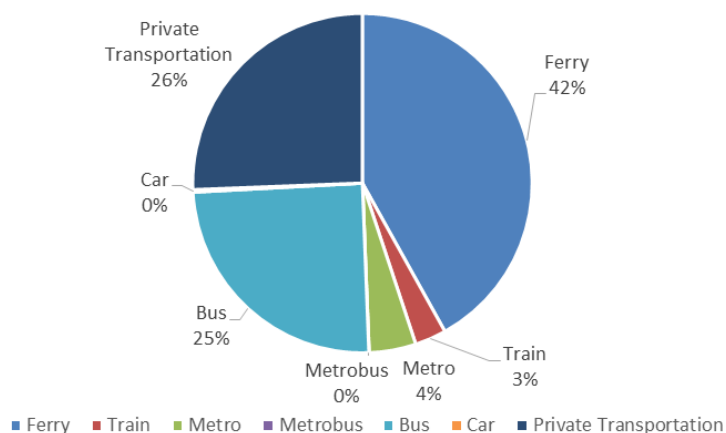


Figure 56: Energy consumption of public transportation by means of vehicle type

As could be seen from in the figure, the most energy consumption is in ferry transportation with 99.4 GWh/year followed by Public bus services and privately owned mini-bus and “dolmus” services with 60.74 and 58.7 GWh/year consumption. The total energy consumptions should be considered together with the total passengers for analysis. The major transportation means is the ferry and public bus system. The total passenger moved in and out of Kadıköy is estimated to be 40,558,800 in a year.

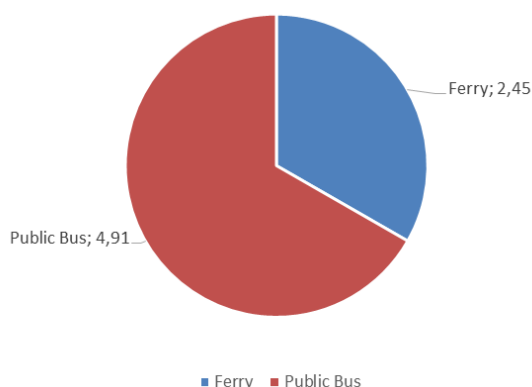


Figure 57: Energy consumption per passenger [KWh/passenger]

The public bus system serves to a total of 11,944,760 passengers within the year. There is no data or statistics on private mini-bus and “dolmus” transportation. When number of passengers is taken into account, the energy consumptions of bus and ferry compare as it is shown in the next figure.

Besides public transportation, Kadıköy is one of the most vehicle populated districts in Istanbul and Turkey. There are 182,194 private cars and 17,722 motorbikes, reaching to 243,262 vehicles in total.

Table 79: Number of public transport means, fuel type and travelled distance of Kadıköy

Type of Vehicle	Fuel Type	km travelled	# vehicles	Energy Consumption [GWh]
Private Cars	Diesel	834,886,871	63,649	320.1
	Gasoline	624,370,984	47,600	349.3
	LPG	930,575,911	70,944	884.2
Motorbikes	Gasoline	66,741,052	17,722	14.82
Light Trucks	Diesel	598,003,795	33,511	901.2
Trucks	Diesel	392,543,505	8,583	805.9

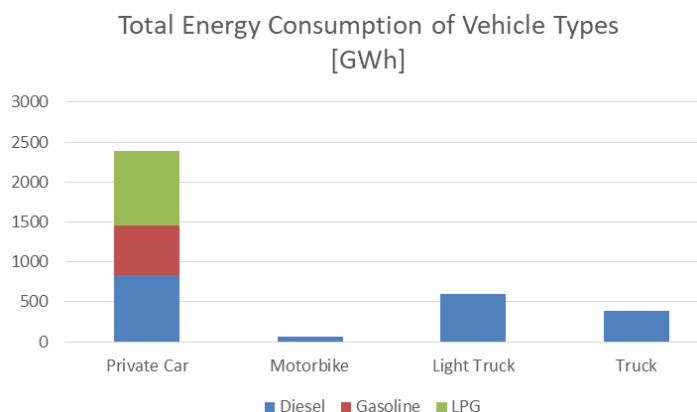


Figure 58: Total energy consumption of vehicle type [GWh]

There are no reports, statistical data or information on how much distance is travelled within Kadıköy District. The information under distance travelled under the above table is based on the Turkish annual average distance per vehicle type. Hence it would not be accurate for the purpose of this analysis to consider the energy equivalent of these total travels totally to Kadıköy. A private car registered to Kadıköy is estimated to travel 13,117 km/year however there is no assumption of figure on how much of these travels are within Kadıköy. However, the total energy consumption of vehicle types is presented as follows anyway.

9.2.3 Governance characterization

In the early republican period, Kadıköy was declared as an administrative district on March 23, 1930 and later on, organised as a municipal district bound to the Istanbul Metropolitan Municipality in 1984.

Kadıköy Municipality's overall approach to the concept of public administration is; representing a local administration which forges democracy on local and national levels through its genuine support to increase the involvement of citizens of each and every neighbourhood, regardless of their identity, to the decision-making processes. Foundation basis; organs; administration; function; authority and responsibilities; together with working terms and conditions of Kadıköy Municipality are designated according to the Municipality Law No: 5393. In this context, the Municipality primarily deals with infrastructure, social services, environment & sustainability, culture and arts, youth and sports and employment issues in Kadıköy.

Kadıköy Municipality defines its mission as: "in order to set a participatory, innovative, modern, equitable, liberalistic and strong community and atmosphere for each individual, especially prioritizing the children and the youth, it targets to be a local government functioning within its duties, authorization and responsibilities and ensuring the sustainability of its services". Acting with this mission, it adopts the vision of "being a local government adopting participatory governance and leader in innovation". The mission and vision of the Municipality identify the general framework of its priorities, putting "human-being" at the core of its services. The Municipality acts prioritizing the happiness and well-being of citizens it is responsible for serving, and it takes its power from the inclusion of the society and the related partners in its decision-making processes. For this end, developing programmes and projects through active participation of senior citizens and improving their participation in decision-making processes comprise the ground for ageing policies of the Municipality.

The major priority of Kadıköy Municipality, which has the belief and vision that a good local government could be achieved via the share of information based on the transparency principle and through the involvement of the society, is to maintain its functions with a participatory approach. Kadıköy Municipality provides its services with an innovative, modern, liberalistic and equity-based

perspective, while it puts great emphasis on the sustainability of services and aims to create a powerful society and an environment for all individuals, prioritizing children and young people.

The Municipality attaches importance on collaboration to achieve its mission successfully. Hence, in order to obtain information on different problems encountered by local governments and related solutions & experiences as well as to share its own knowledge & experiences by developing national and international partnerships; Kadıköy Municipality has foreign sister city relationships and memberships to international networks (World Health Organization (WHO), WHO Age Friendly Cities, ICLEI, Covenant of Mayors, Eurocities, ECCAR, EASPD and ELDW).

Kadıköy has the largest proportion of older people over the age of 65 in Turkey, which is one of the reasons why Kadıköy is committed to becoming an age-friendly city. As one of the primary local actors in social service provision, Kadıköy Municipality adopts specific principles and policies targeting the elderly population and provides a range of services for this population group which amounts 83.674 people in 2015. Since ageing is a priority area in Kadıköy district, Kadıköy Municipality is proud to be the second municipality from Turkey, which has recently become a member of WHO Global Network of Age-friendly Cities and Communities. Furthermore, in April 2016, the Municipality attended the recent pilot exercise of WHO age-friendly environments of Europe, and successfully completed and submitted its report to WHO. For Kadıköy Municipality it is strongly important to put effort in order to converge its policies targeting the older people to the global agenda. Our programmes and projects for 65+ citizens provide evidence that the population group of the elderly comprise an essential part of our social policy framework.

9.2.4 Society & Citizens characterization

Kadıköy has always been known for its multi-cultural, multi-ethnic, multi-lingual and multi-religious society structure. At the beginning of the 20th century, Kadıköy had a more cosmopolitan demographic structure with its predominantly Turkish, Armenian, Greek and Jew residents. Despite the gradual changes in the demographics, today's Kadıköy is also a cosmopolitan area. It has several historical mosques, churches, synagogues.

Cultural management, citizen engagement in social life and youth participation in culture & art are major priority areas related to culture. We aim to extend and improve appropriate cultural - art activities within the society at local scale; allocate public spaces for culture-art activities; ensure content and cultural communication for the participation of citizens with diverse backgrounds; create common areas and activities which different age and social groups will come together. On the other hand, Kadıköy Municipality is mostly known with its wide range of cultural & art activities.

Kadıköy is also an important centre for the post-secondary education in the city. The main campus of the fourth largest university in Turkey - according to the latest official enrolment figures - Marmara University is located on the western edge of the district. The university has also two more campuses in Kadıköy. In addition to this one, there are also two more public higher education institutions within the borders of the district: Istanbul University State Conservatory and Istanbul Medeniyet University. Apart from these public higher education institutions, there are also private universities in the district. The district is also home to several historical and prestigious secondary schools, such as Kadıköy Anatolian High School, Kemal Atatürk Anatolian High School, Erenköy Girls High School, Haydarpaşa Anatolian High School, Istanbul Saint Joseph French High School so on and so forth.

9.3 City indexes calculation

9.3.1 Indicators Normalised

As explained in section [¡Error! No se encuentra el origen de la referencia. ¡Error! No se encuentra el origen de la referencia.](#), the indicators of Kadiköy have been normalised according to the ranking of indicators method, and the results of this normalisation are gathered in the table below (Table 80). The calculation of the indicators is included in deliverable D5.1 as well as in the annexes of this document (Annex E: Kadiköy, [E.1](#)).

Table 80: Kadiköy Indicators Normalised

ENERGY & ENVIRONMENT		
Application field	Indicator	SCORE
City Energy Profile	Final energy consumption per capita	10.00
	Primary energy consumption per capita	10.00
	Primary energy sources (shares)	0.38
	Building connected to the DH-network	0.00
GHG Emissions	GHG emissions per capita	10.00
Waste Management	Recycling rate	0.00
MOBILITY		
Application field	Indicator	SCORE
City Mobility Profile	Modal split	10.00
	Fuel mix in mobility	1.00
	Energy use for transportation	10.00
	Access to public transport	10.00
	Public infrastructure promoting low-carbon mobility	0.15
GOVERNANCE		
Application field	Indicator	SCORE
Economy	Unemployment rate	3.55
	GDP (Gross Domestic Product)	5.57
Initiatives and Strategies of the Public Administration	Smart city factor in a city development strategy	2.50
Public ICT/ Data	Quality of open data	2.50
SOCIETY & CITIZENS		
Application field	Indicator	SCORE
Affordable Housing	Development of housing prices	6.47
	Housing cost overburden rate	7.86
Citizen Engagement and Empowerment	Citizen engagement to climate conscious actions	7.50
	Encouraging a healthy lifestyle	7.50
Urban Structure	Inhabitants in dense areas	10.00

9.3.2 Categories, application fields and indicators prioritised

As explained in section 3.2.3 Step III: Prioritisation of categories, application fields and indicators, the indicators of Kadıköy have been prioritised according to the city needs and targets, through the AHP method, and the results of this prioritisation are gathered within Table 81 below.

Table 81: Kadıköy Indicators Weighting per Category and per Application field

ENERGY & ENVIRONMENT					
Application field	Indicator	WEIGHT per Category		WEIGHT per App Field	
City Energy Profile	Final energy consumption per capita	0.81%	100%	5.67%	100%
	Primary energy consumption per capita	2.79%		19.52%	
	Primary energy sources (shares)	3.92%		27.42%	
	Building connected to the DH-network	6.77%		47.38%	
GHG Emissions	GHG emissions per capita	42.86%		100%	100%
Waste Management	Recycling rate	42.86%		100%	100%
MOBILITY					
Application field	Indicator	WEIGHT per Category		WEIGHT per App Field	
City Mobility Profile	Modal Split	7.78%	100%	7.78%	100%
	Fuel mix in mobility	3.75%		3.75%	
	Energy use for transportation	22.06%		22.06%	
	Access to public transport	29.21%		29.21%	
	Public infrastructure promoting low-carbon mobility	37.19%		37.19%	
ENERGY & ENVIRONMENT					
Application field	Indicator	WEIGHT per Category		WEIGHT per App Field	
Economy	Unemployment rate	7.05%	100%	87.50%	100%
	GDP (Gross Domestic Product)	1.01%		12.50%	
Initiatives and Strategies of the PA	Smart city factor in a city development strategy	58.70%		100%	100%
Public ICT / Data	Quality of open data	33.24%			100%
SOCIETY & CITIZENS					
Application field	Indicator	WEIGHT per Category		WEIGHT per App Field	
Affordable Housing	Development of housing prices	2.38%	100%	16.67%	100%
	Housing cost overburden rate	11.90%		83.33%	
Citizen Engagement and Empowerment	Citizen engagement/ empowerment to climate conscious actions	21.43%		50.00%	100%
	Encouraging a healthy lifestyle	21.43%		50.00%	
Urban Structure	Inhabitants in dense areas	42.86%		100%	100%

9.3.3 Aggregation and calculation of the city indexes

As explained in section 3.2.4 [Step IV: Aggregation to calculate the city indexes](#), the indicators of Kadıköy have been aggregated according to the Linear aggregation method, and the results are city indexes per category and per application fields, collected within the following tables [Table 82](#) and [Table 83](#) below.

Table 82: Kadıköy Indexes per Category

CATEGORIES INDEXES	
Category	City Index
Energy & Environment	4.66
Mobility	6.00
Governance	2.61
Society & Citizens	8.59

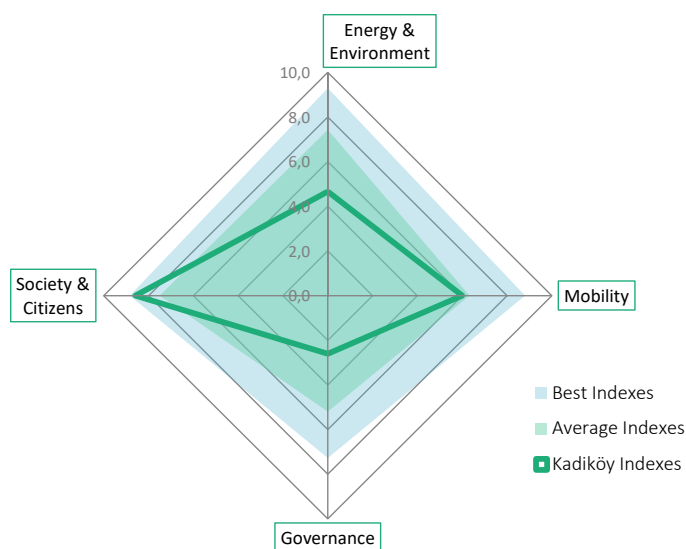


Figure 59: Radar view of Kadıköy Indexes per Category

Regarding the indexes resulting for the city of Kadıköy, Society & Citizens index is almost the best among the project cities, but the city will have to focus on Energy & Environment and Governance categories, whose indexes are below 5, especially the Governance one.

In terms of **Energy & Environment** category, the index is little below 5, which means that this category will require some efforts and dedication in the coming years by the city. Within this category there are big contrasts in the scoring of the indicators, from final and primary energy consumption and GHG emissions, in which the goals of the European Union have been met; to a really low score in the rest of indicators. This means that Kadıköy has a low production of renewable energy in the city, does not have buildings connected to the DH-network (although it is the warmest city with the least heating degree-days, it is recommended to connect a small percentage of buildings in order to make savings in energy terms), and also does not reach the target in recycling terms. In addition, Kadıköy gives the highest priority in this category to both GHG emissions and recycling rate indicators, which are in turn the best and worst scored ones, showing where the city has made great effort and where the city should concentrate the future efforts.

Mobility category has an acceptable index, meeting the European targets in most of the indicators, such as modal split, energy use for transport and access to public transport. The lowest scores are for fuel mix in mobility (such as the other cities, it should focus their efforts on electric or low-emissions mobility), and for public infrastructure promoting low-carbon mobility, which means that cycling infrastructure is needed to be improved. This points out where the city has to focus, which is in accordance with its main priorities, given to public infrastructure for cycling mobility and access to public transport.

In relation to **Governance**, the city has a bad index within this category, so the next efforts of Kadıköy should focus on improve mainly the smart city factor and the quality of open data, which are the lowest scored indicators. Priorities of the city focus on these two indicators, so it is aware of its weakness. Relative low index in GDP can cause energy poverty, which together with the not

particularly cold climate of the city, can contribute to the improvement of the energy and environment index without the city carrying out exemplary practices in this terms.

Focusing on **Society & Citizens**, Kadıköy has a really good index here, with all indicator scores above 5 and being inhabitants in dense areas the best scored and main priority for the city, which means that practically the entire city is suitable for the development of PED areas.

With these indexes by category, the strengths and weaknesses of the city of Kadıköy are very well reflected, and its efforts for the near future should be focused mainly on Energy & Environment and Governance.

Table 83: Kadıköy Indexes per Application Field

APPLICATION FIELDS INDEXES		
Category	Application Field	City Index
ENERGY & ENVIRONMENT	City Energy Profile	2.62
	GHG Emissions	10.00
	Waste Management	0.00
MOBILITY	City Mobility Profile	6.00
GOVERNANCE	Economy	3.80
	Initiatives and Strategies of the PA	2.50
	Public ICT / Data	2.50
SOCIETY & CITIZENS	Affordable Housing	7.63
	Citizen Engagement and Empowerment	7.50
	Urban Structure	10.00

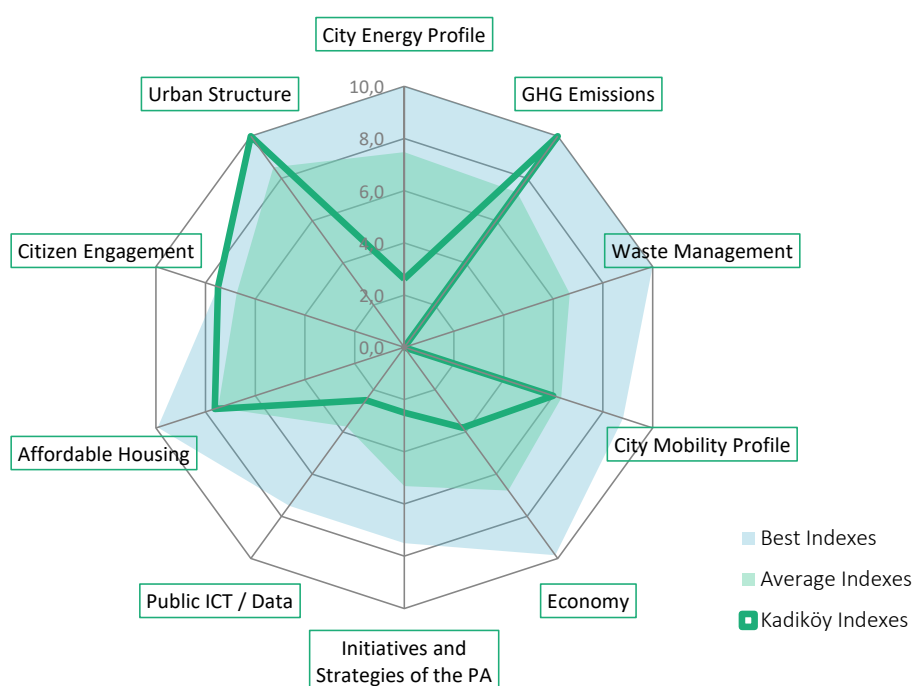


Figure 60: Radar view of Kadıköy Indexes per Application Field

In the view of the indexes for the application fields of Kadıköy, there are some quite good and some other that will have to be improved. The best application fields in Kadıköy are GHG emissions and urban structure; followed by affordable housing and citizen engagement and empowerment. Mobility index is also quite good one. Lowest indexes in application fields are waste management, economy, initiatives and strategies of the public administration and public ICT and data; so it is clearly remarked where to focus the next city efforts and investments.

9.4 Analysis of the existing city plans

9.4.1 Main City plans identified

Within this section, the main information of the existing plans that Kadıköy has identified is included, following the process explained in the section [4.2 Methodology for the analysis of the existing city plans](#), of the present document. The whole information gathered for each of these plans is collected in the annexes of this document (Annex E: Kadıköy, [E.2](#)).

Table 84: Kadıköy Short Term plans

Main city plans identified – Short Term			
Plan	Scope	Description	Topics covered
Kadıköy Municipality Revised Strategic Plan	Local	It is an organisational plan, Strategic Plan of Kadıköy adopts the vision as "adopting participatory governance, to be a leading municipality in innovation".	Energy Social
Kadıköy Spatial Strategic Plan	Local	Identifying disaster (lood, tsunami) risk areas and buildings in flood risk areas, and suitable areas for settlements within the district.	Energy Mobility Social ICT
Kadıköy Urban Transformation Plan	Local	Plan to identify derelict buildings located in urban transformation zones, risk zones according to disaster and ground sustainability, and to prioritize zones for urban transformation actions.	Energy Social ICT
Istanbul Regional Plan	Regional	Vision of the Plan: "Unique İstanbul; City of Innovation and Culture With Creative and Free Citizens". The Plan adopts a sustainable, holistic and multi-dimensional approach on local development to address a variety of topics ranging from industrial transformation and entrepreneurship to health and education, institutional capacity and governance, transport, energy and environment.	Energy Mobility Social ICT
IMM Strategic Plan 2015 - 2019	Regional	Local government of the brand city that makes life easier with sustainable and innovative solutions and generates global values for the urban development and the civilization. IMM has planned new projects together with the existing projects that were produced to present the right to "Live in a Healthy Environment" that complies with this goal and called as a fundamental right to İstanbul residents.	Energy Mobility
Istanbul 1/100,000 Scale Environment Regulation Master Plan	Regional	With this plan, it is aimed to be a city that has been strengthened on a global scale by passing through a comprehensive structural transformation process. The vision of the plan consists on (1) identifying the historical, cultural and natural identity values of the city; (2) highlighting the advantages of the city in the fields of culture and tourism; (3) improving the quality of life by reflecting environmental,	Energy Mobility Social

		economic and social sustainability principles; (4) using institutional and spatial plans as an efficient tool in an effective and participatory urban management / governance structure.	
11th Development Plan (updated in 2019)	National	The Plan aims at advancing the society to high prosperity levels, in line with the 2023 targets. In the energy sector, the focus will be on meeting the energy demand resulting from high growth in a manner that is timely, adequate, reliable and affordable. In addition, domestic and renewable resources will be utilized to the highest possible extent in order to ensure a reliable domestic energy supply. Macroeconomic stability in order to ensure stable prices.	Energy Social
Energy Efficiency Action Plan	National	Energy Efficiency strategies in buildings, industry and technology, energy, transportation, agricultural activities.	Energy Mobility
Energy Efficiency Strategy Paper	National	This 'strategy paper' is an executive policy annex to the 2007 Energy Efficiency Law. The Paper aims to detail a set of federal policies that decrease energy intensity (the amount of energy consumed per capita) by at least 20% by the year 2023. It also includes strategies which are aimed at providing supply security energy, decreasing energy costs, protecting environment.	Energy
National Climate Change Action Plan	National	The Plan aims to integrate Turkey's future development and environmental plans and to proceed seamlessly, and without losing pace. Turkey, to provide its people with welfare and high living standards with less carbon intensity, aims to promote energy efficiency, increase the use of clean and renewable energy resources and to integrate its development policies with climate change policies.	Energy Social

Table 85: Kadıköy Medium Term plans

Main city plans identified – Medium Term			
Plan	Scope	Description	Topics covered
Kadıköy Municipality Energy Action Plan	Local	For the purposes of the Covenant of Mayors, signed by Kadıköy Municipality in 2012, the Municipality prepared the Sustainable Energy Action Plan with the intent to reduce GHG emissions across the district by 20% by 2020 and uploaded it to the Covenant of Mayors system and obtained approval in 2015.	Energy
Istanbul Climate Change Action Plan	Regional	Istanbul aims to reduce the greenhouse gas emissions of the city by 20% in 2030 compared to the normal scenario by taking into account the national climate. The use of fossil fuels for energy purposes, cattle husbandry, intensive agricultural practices, loss of forest areas for economic activities and inadequate waste management practices cause greenhouse gas emissions. Making the ecosystem, social	Energy Mobility Social

structure and economy of the city resistant to climate change and to reduce the greenhouse gases causing climate change, to observe the historical heritage and current mega cent dynamics of the city and to improve the city's charm and living conditions.

9.4.2 Main targets defined in the city plans

As mentioned in Section 4.1.4, the Europe 2020 strategy aimed to become sustainable, smart and economy inclusive. Following Table 86 shows the relation between the main European targets with the targets on the city of Kadıköy planning.

Table 86: Kadıköy targets aligned with the European ones

KADIKÖY targets aligned with the European 2020 targets			
EU target	Plan in which is included	Is the target achieved?	Is there a more ambitious one?
75% population aged 20-64 employed	Similar targets with similar intent have been included in: - İstanbul Regional Plan	To some extent ⁵⁸	
3% of GDP invested in R&D sector			
Reduction 20% of GHG emissions	- Kadıköy Municipality Energy Action Plan - İstanbul Climate Change Action Plan	YES	YES: 33% reduction by 2030
Increasing 20% of share of RES	Kadıköy Municipality Energy Action Plan	NO	
Improved 20% energy efficiency	Kadıköy Municipality Energy Action Plan	NO	
Early school leavers' share reduced under 10%	Similar targets with similar intent have been included in: - Kadıköy Municipality Revised Strategic Plan		
40% of 30-40 years old with tertiary education	- İstanbul Regional Plan		

The Regional scale Plan of İstanbul⁵⁹ sets out an overall regional development vision (2023), strategies and objectives to guide planning and investment decisions for İstanbul. The Plan's vision for 2023 rests upon İstanbul's uniqueness, stemming from its historical, social and cultural richness and heritage accumulated over the centuries; its unmatched geostrategic location bridging continents, precious natural resources, dynamic economy, and vibrant social life. It aims to blend these unique assets to inspire and foster innovation and creativity as the driving forces of local development and adopts a sustainable, holistic and multi-dimensional approach on local development to address a variety of topics ranging from industrial transformation and entrepreneurship to health and education, institutional capacity and governance, transport, energy and environment.

⁵⁸ Not measured in this way, but the unemployment rate is 13.80% of active population in 2017, source (by region): <https://ec.europa.eu/eurostat/documents/2995521/8830865/1-26042018-AP-EN.pdf/bb8ac3b7-3606-47ef-b7ed-aadc4d1e2aae>

⁵⁹ İstanbul Regional Plan 2014-2023, İstanbul Development Agency, 2016, İstanbul

All barriers preventing access to information, physical accessibility, local participation, and economic purchasing power will be eliminated to achieve being smart city target where sustainable economic development and high living standards are targeted with every physical and social investment, resources are managed mindfully, and decisions are taken collaboratively. Three main axes of the 2023 Istanbul Vision:

- Globally decisive, high value-added, innovative and creative economy
- Fair sharing, inclusive and learning society
- Joyful, authentic urban spaces and sustainable environment

The Strategic Plan of Metropolitan Area of Istanbul⁶⁰ has three major action areas such disaster, environment and transportation services management where historical development of the organization, legal liabilities and legislations, service areas, stakeholders and internal and external environment of the organization were analysed. In the scope of disaster management; earthquake-oriented risk analyses, preparation of disaster and emergency plans, emergency management and awareness raising training sub-services are held. Sustainable environmental management policy that is compliable with the facts of the world has generated a compulsory strategy for Istanbul. IMM has planned new projects together with the existing projects that were produced to present the right to “Live in a Healthy Environment” that complies with this goal and called as a fundamental right to Istanbul residents. IMM aims developing transportation infrastructures by means of revision of master transportation plan of Istanbul and new planning and project design activities with the concept of upper scale planning for implementing a healthy transportation infrastructure. I

Istanbul Climate Change Action Plan⁶¹ aims to enhance resilience of the city’s ecosystem, social structure and economy against climate change and reduce greenhouse gas emissions, while supporting IMM’s vision and objectives, taking into consideration the historical heritage and current megacity dynamics, and improving the city’s attractiveness and living conditions. Mitigation actions of the plan aim to enhance resilience of the city’s ecosystem, social structure and economy against climate change and reduce greenhouse gas emissions, while supporting IMM’s vision and objectives. Together with all its stakeholders, Istanbul aims to reduce the increase in its greenhouse gas emissions by 33% percent in 2030 compared to the business-as-usual scenario taking into account national climate change strategies, socio-economic dynamics of the city and global impacts of climate change impacts. Adaptation actions of the plan aim to improve its climate resilience, Istanbul aims to reduce disaster risks and recovery periods especially ecosystems, infrastructures and socio-economic systems, and strengthen the most vulnerable elements of these identified systems.

Defined action areas under Master Plan⁶² of the Metropolitan Area of Istanbul can be summarized as follows;

- Identify the historical, cultural and natural identity values of the city,
- Highlight the advantages of the city in the fields of culture and tourism,
- Improve the quality of life by reflecting environmental, economic and social sustainability principles, in an effective and participatory urban management / governance structure that transforms its economic structure into a trade and service-oriented economy based on science and technology to gain the status of an empowered city on a global scale,

⁶⁰ Istanbul Strategic Plan 2015-2019, Istanbul Metropolitan Municipality, Istanbul

⁶¹ Istanbul Climate Change Action Plan, Istanbul Metropolitan Municipality, Istanbul Environmental Management and Trade Inc.

⁶² Istanbul 1/100.000 Scale Environment Regulation Master Plan

- Use institutional and spatial plans as an efficient tool in an effective and participatory urban management / governance structure.

Apart from regional and metropolitan area scale strategic plans, district level strategic plan of Kadıköy is described as a means for the participation of citizens in decision-making processes. However, in general, the strategic planning and implementation processes are not being carried out on the basis of participation. As an organisational plan, Strategic Plan of KM⁶³ adopts the vision as: "adopting participatory governance, to be a leading municipality in innovation". It has many actions within the 5 strategic fields as

1. Organisational Development
2. Social Development
3. Urban Development and Structure
4. Environment and Health Management
5. Cultural and Artistic Development

Enhancing physical and architectural accessibility is the main goal of the spatial strategic plan of the district. Participation is highlighted in the plan and "providing services for all segments of the society without any discrimination", "Social Improvement", the "Rights of the Elderly and Pensioners" are mentioned as core principles of the planned actions. Apart from spatial decision, KM intends to reduce greenhouse gas emissions across the district 20% by 2020 and uploaded it to the Covenant of Mayors system and obtained approval in 2015. The "Sustainable Energy Actions" on GHG reduction, which is the first part of Kadıköy Municipality Climate Change and Adaptation Plan, set out a roadmap which is designated by the participation of urban stakeholders and designed to reduce emissions from energy consumption across different sectors. This plan originates from the urban-scale GHG inventory. Based on BAU scenario, the emissions per capita is reduced from 3.34 tons CO₂ eq. to 3.18 (5% decrease). As shown in KCAAP, the emissions per capita across Kadıköy can be reduced by approximately 40% in 2030 compared to 2016 with the reduction measures indicated for every sector.

As seen in "Sustainable Energy Action Plan⁶⁴" prepared for Kadıköy, the reduction strategy incorporates the practices such as storing and absorbing carbon, reducing energy demand, reducing vehicle demand with recreational facilities provided in the city and its immediate vicinity (reducing vehicle demand with the increased number of walkways) and enabling food production in the city and its immediate vicinity as based on the direct mitigation of carbon emission which is the primary source of climate change. The adaptation strategy aims to mitigate the apparent impacts of climate change and thus enhance the quality of urban life.

Kadıköy Climate Action and Adaptation Plan (KCAAP) fulfils two key functions; first, it sets out a detailed reduction strategy (Sustainable Energy Action Plan – Report 1) for the mitigation of urban greenhouse gases resulting in climate change by keep extensive records of energy and GHG densities across Kadıköy, and secondly, it lays the cornerstones of a Climate Adaptation Strategy that will make the district more resistant against resulting adverse impacts of climate change already happening.

The adaptation strategy for Kadıköy aims to mitigate the apparent impacts of climate change and enhance the quality of urban life. The focus is on subjects such as management of high and abruptly changing temperatures, waste resources management, flood and soil erosion mitigation, and coastal flood mitigation. It is important for cities to develop a sustainable urban structure resistant to long-term and abrupt impacts in fight against climate change. The pillars of strategy proposed for climate adaptation are developing an urban green belt, enabling green settlement practices in zones most

⁶³ Kadıköy Municipality Revised Strategic Plan, 2015 – 2019 (and revised for period 2017 – 2019)

⁶⁴ Kadıköy Municipality Sustainable Energy and Climate Adaptation Action Plan, Report 1 & 2, 2018

affected by heat island impact and adopting the modes of developments prioritizing pedestrian-bicycle-mass transit systems.

9.4.3 Main actions identified to achieve the defined goals

Kadıköy Climate Action and Adaptation Plan's aim is that to fulfil two important functions. First of all, plan indicates a detailed mitigation strategy on the reduction of the city greenhouse gases which cause climate change of Kadıköy. Secondly the climate adaptation strategies provide the city resistant to the negative effects of climate change. An important step has been taken for the realization of the sustainable and resilient Kadıköy through the participatory practices. Considering this process below actions has been defined to reduce GHG effects of Kadıköy within the plan. The actions are designed to ensure residential energy efficiency, use of renewable energy sources in residential buildings, use of energy efficient lighting system and district heating systems.

56% of existing urban buildings shall be transformed via in-situ transformation and constructed in accordance with the applicable regulations by 2030. 14% of existing buildings (other than 56%) are projected to complete exterior, roof and weather insulation applications by 2030. Heat insulation for existing residential buildings will achieve 10% electricity saving and 40% energy saving from heating fuels. Additionally, the projection is that residential buildings will have 30% percent reduced coal consumption and switch to natural gas and other fuels (e.g. biomass). Primary actions can be listed as: detection of heat leakages, performance of necessary insulations, discussion of some practices such as tax incentives, etc.

Use of energy-efficient lighting systems in existing residential buildings, street lighting (PV integration with street lighting systems) and tertiary buildings are another energy efficiency action area of the plan. It is projected that 15% saving will be achieved for electricity consumptions after primary replacement of those lamps that are most commonly used in residential buildings and then of all lamps with LED lamps. All lighting systems across the city are projected to be replaced with LED lighting systems by 2030. Replacing all street lighting systems with LED systems will provide 60% saving. Based on the subject information from those functions under the control of the Directorate of Parks and Gardens, 95% of fixtures under the responsibility of the Directorate were transformed as of March 2018 in accordance with regulations and 99% of fixtures would reportedly be replaced by the end of 2018. However, it is apparent that the district has still potential of reduction considering the lighting systems remaining within the jurisdiction of other bodies and organizations such as Istanbul Metropolitan Municipality and Directorate General of Highways. And KM intends to bring to life PV applications in a number of parks with the responsibility for developing model practices for the public.

Carrying out feasibility studies on heating of residential buildings through district heating systems by using alternative system (Heating Pumps, Geothermal, Biomass systems) is another action of the plan. The inclusion of district heating systems in the central government's agenda will expedite the steps to be taken in this respect. TUBITAK (Scientific and Technological Research Council of Turkey) completed a study analysing the potential of thermal power plants to utilize waste heat throughout Turkey. The projection was that 25% of the residential buildings located in Kadıköy would be heated through the monocentric heating of several buildings and the potential switchover to renewable resources with the elimination of cost and supply issues associated with applicable technologies.

The consideration is that 90% of the district's building stock (with 25% equivalence increase) will be renewed as a result of in-situ transformations in the upcoming 25 years, energy-efficient urban renewable for residential buildings renewal projects for areas under earthquake risk became fore front for the district. As a result of the currently ongoing urban renewal projects such as *Fikirtepe* Neighbourhood, further in-situ transformations were planned for neighbourhoods including old settlement locations, such as *Hasanpasa*, *Caferaga*, etc.

Actions such as raising awareness among commercial building owners of the subject matter, providing assistance in finding easy financial facilities and demonstrating financial gain via simplified feasibility studies will be carried out for energy-efficient restorations for existing tertiary buildings (heat insulation) and Municipal buildings (heat insulation and lighting) within the district. The intention is to provide 40% energy efficiency with energy efficiency applications (heat insulation, thermostatic valve use, energy management system, etc.) applicable to 50% of municipal buildings.

9.4.4 Actuation areas identified and financial schemes

Within the scope of the Urban Transformation Strategy Document prepared, it is aimed to identify the areas with the highest risk of disaster in Kadıköy district boundaries. In this context; the areas which are at risk in terms of construction and ground conditions and flood / tsunami risks and which should be intervened in the event of a disaster are identified. As result of this identification, two sub-regions shown in [Figure 61](#) below come to the fore.

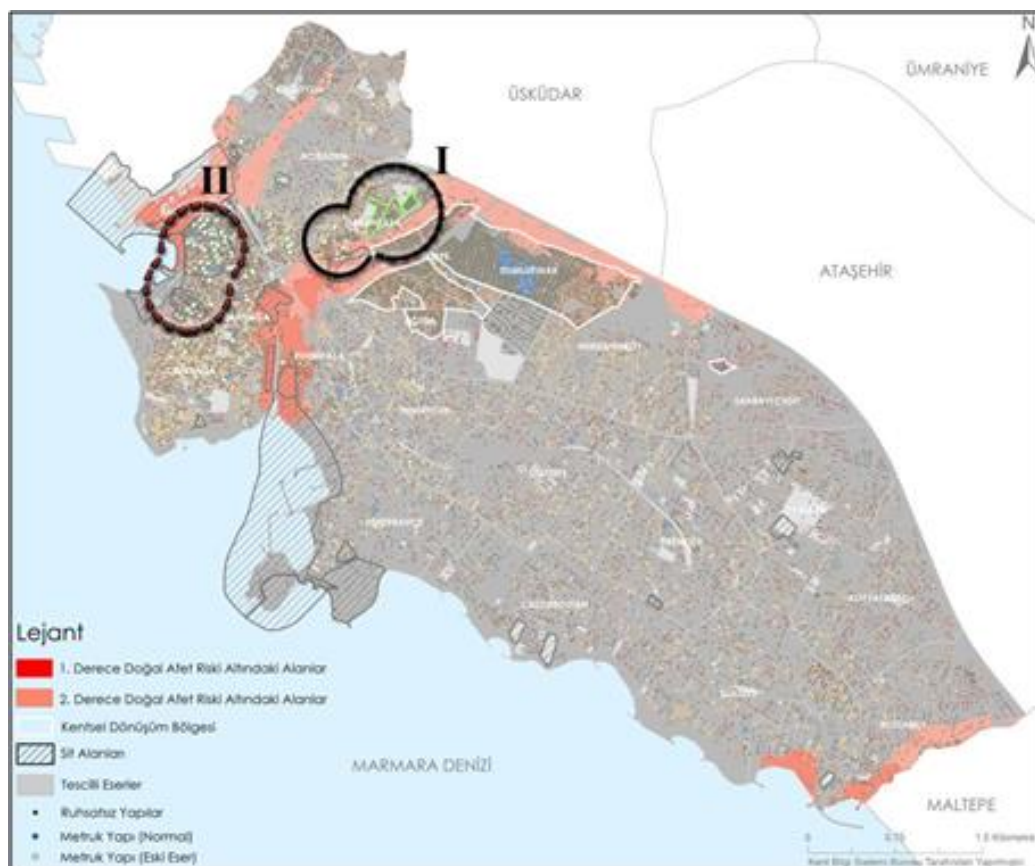


Figure 61: Dedicated Urban Transformation Areas in Kadıköy

When the existing construction conditions, insufficient urban reinforcement and green areas are considered together for those two regions, it is predicted that the increase in the zoning that will cause additional population density will bring new problems. It is understood that the existing construction conditions cannot be exceeded especially by taking into consideration that the second zone is a protected area.

These regions have a relatively weak economy and a fragile social structure when their social and economic conditions are evaluated within the district as a whole. This makes it difficult for the rights holders to cover all of the costs that will arise from the renewal and transformation process. The lack of implementation tools such as TOKİ (Housing Development Administration of Turkey) and KIPTAS (Istanbul Metropolitan Municipality organization) shows that the cost problems in the urban

transformation cannot be solved by district municipality. On the other hand, the **existing financing models** used in urban transformation applications can be summarized as follows.

- Commitment provision loan model: a construction contract is signed between the contractor and the owners for a certain price. The contractor does not take any property from the construction. The guarantor limit is opened by the bank to the contractor up to the Urban Transformation Loan limit to be used for property owners. The Bank obtains the approval of the Ministry for the purpose of granting urban renewal loans within the scope of risky area or risky structure to be constructed. When the title deeds of the new building are issued, the loan is granted and the credit costs are transferred to the contractor's account. According to the building completion rate, the loan amounts are left to the free use of the company.
- Commitment/Floor compensation loan model: a construction contract is signed between the contractor and the owners for a partial floor. The reason for this is that the properties that will generally remain in the contractor do not cover the construction cost. In this framework, the owners accept additional payment to the contractor and some of the properties from the new project remain to the contractor. The guarantor limit is opened by the bank to the contractor as much as the Urban Transformation Credit limit to be used for the owners. The Bank obtains the approval of the Ministry for the purpose of granting urban renewal loans within the scope of risky area or risky structure to be constructed. With the release of the title deeds of the new building, the loan is granted and the credit costs are transferred to the contractor's account. According to the building completion rate, the loan amounts are left to the free use of the company. If the contractor wants to sell the remaining apartments with a loan during the project phase (with a notary approved sales contract or floor easement deed), housing loans are provided to the buyers. For both loans, a guarantee limit is allocated to the contractor by the bank.
- Floor compensation loan model: a construction contract is signed between the contractor and the owners for the apartments. In this context, the property owners do not pay any payment to the firm while accepting that some properties from the new project remain with the contractor. If the contractor wants to sell the remaining property with the loan at the project stage. The guarantor limit is opened by the bank to the contractor as much as the mortgage loan limits to be used to the buyers. With the issuance of the title deeds of the new building and the issuance of a notarized sales contract, the loan is granted and the credit costs are transferred to the contractor's account. According to the completion rate of the building, the loan amounts are allowed to be used free of the company.
- Revenue sharing loan model: a construction contract is signed between the relevant municipalities and the owners. For the construction of the building(s), the relevant municipality makes an agreement with the contractor. According to the contents of the agreement with the owners, payment is requested/or not from the owners. Additional properties are shared between the contractor and the related municipality. The guarantor limit is opened by the bank to the contractor as much as the Urban Transformation Credit limit to be used for the owners. The Bank receives the approval of the Ministry for the use of urban renewal loans within the scope of risky area or risky structure. With the release of the title deeds of the new building, the loan is extended and the credit costs are transferred to the contractor/ or related municipality's account. According to the completion rate of the building, the loan amounts are allowed to be used free of the company. If the contractor / or related municipality wants to sell the remaining flats with a loan at the project stage (with a notary approved sales contract or floor easement), housing loans are granted to the buyers. For both loans, a guarantee limit is allocated by the bank to the contractor /or municipality.

9.4.5 Main needs and priorities identified from the analysis of the existing city plans

Kadıköy Municipality Energy Action Plan has identified many targets and activities that will support our efforts to reduce the amount of greenhouse gases emissions by 40% until 2030. Headings of mitigation measures to achieve the targets are calculated as “Urban Development and Built Environment, Transportation, Renewable Energy, Awareness Campaigns, Others (Wastewater and Industry) and Natural Energy Efficiency (it is assumed that natural emission reduction by 7% with national policies and technological developments)”.

Within the scope of these headings, it is aimed to switch to energy systems with lower carbon emissions and energy efficiency in our region. Our most important needs and priorities are:

- Organizing awareness campaigns that will increase energy efficiency in transportation and buildings and supporting them with sample projects.
- Choosing the right region for design of a Positive Energy District.
- Ensuring of public participation and selection of innovative energy transition systems.

In addition, increase in temperature caused by the use of concrete in the city is rising up the urban heat island effect. With the heat island effect, the vulnerable population that is sick, elderly, child in the city is more affected by climate change. In this context, establishing greenway and green hubs by ensuring the balance of green and blue in the city is another priority for Kadıköy, which is more resistant to the effects of climate change.

10 City Diagnosis: Trenčín

10.1 General overview of the city



Trenčín is a city in western Slovakia lying in the valley of the river Vah about 120 kilometres north of the Slovak capital city Bratislava. Trenčín is an old historical city with a population about 54,916 (31-12-2018). Trenčín is an administrative and business centre of The Self-Governing Region of Trenčín. Trenčín consists of 10 cadastral areas: Hanzlíková, Istebník, Kubra, Kubrica, Orechové, Opatová, Trenčianske Biskupice, Záblatie and Zlatovce.

The city of Trenčín is now one of the most important towns of Slovakia with varied cultural and social life and university. Among the events that attract visitors to Trenčín is the summer pop-music festival Pohoda and various international exhibitions.

Trenčín with 81.99 km² and a density of 669 inhabitants/km² could be characterized as the city with middle level of urban density because of large areas of greenery (forest park Brezina, River Vah banks), historical monument (area of the castle) located in the city centre and rural character of some parts of the city.



Figure 62: What Trenčín is

Trenčín belongs together with Nitra and Bratislava, the three oldest cities in Slovakia, which chronicles mentioned already in the XXI century. Its key strategic location near three Carpathian Mountain passes at the crossroads of trade routes it always did a significant foothold and administrative centre.

At the turn of our era, the Celts pushed Germanic tribes arriving in the territory of Western Slovakia in the north and west. The most famous of them were Quadi, who along with Marcomanni, inhabit the neighbouring southern Moravia, often led the fight against legions of the Roman Empire. The most significant clash of two opponents at the time was called Marcomanni wars when the victorious II. Auxiliary legion was given up in Trenčín, wherein the turn of 179-80 wintered. Symbol of this era is the text written to the castle rock celebrating the victory of the Roman soldiers.

The main highlight of the city and surrounding region is Trenčín Castle, a dominant feature of the city of Trenčín and the entire region of Považie. Together with Spiš Castle and Devín Castle, Trenčín Castle belongs to the most extensive castles in Europe.

Since ancient times, the castle has guarded trade routes connecting the region of Northern Ugría and mining towns of Central Slovakia with Bohemia, Moravia, Silesia and Poland. History of the castle dates back to the XXI century when it consisted of residential tower and rotunda, remains of which can be seen in the upper courtyard.



Figure 63: Trenčín Castle

Greenery and nature-based surrounding of the city is one of the main features of genius loci of the city. In the city centre, there is one of the biggest forest parks in central Europe called Forest park Brezina. Now, the forest park has an area of 212.68 hectares. Tree species composition consists of beech, hornbeam, maple, elm, spruce, pine and larch. Forest complex in close proximity to the town centre is rare, in particular by providing the people of the city ideal conditions for mental and physical relaxation.

Significant highlight forming the structure of the city is River Váh streaming directly through the central part of the city. River Váh is the longest river in the country and is important not only for quality of the life in the city but the system of dams with hydropower plans is crucial infrastructure for production clear electricity for the water. One of these hydropower plans is located in the city.

Trenčín is not only administrative and business centre of the region but also the centre of music, because Pohoda takes place in Trenčín during the summer. The Pohoda fest is one of the most famous open-air fest in Central Europe and in TOP 10 fest in Europe, with more than 30,000 visitors/per day. Pohoda is a music and arts festival with international acclaim, where alternative, indie, electronica, world music & punk meet classical; alongside literature, dance, visual art, film and theatre.



Figure 64: Trenčín's highlights

Area of the city is located at level 204-210 meters above sea. Trenčín is located in the western part of Slovakia. Trenčianska plane basin, which bends down along the river Vah, concluded in the east mountain ranges Považský Inovec and Strážovské hills to the west foothills of the White Carpathians.

Table 87: Trenčín climate characterisation

CLIMATE CHARACTERISATION	European Continental climate
Average annual temperature	6 – 8 °C
Total annual precipitation	388 mm
Winter average temperature	-2 °C
Summer average temperature	16 – 18 °C

10.2 City characterisation

10.2.1 Energy & Environment characterization

Energy characteristic of the city is strongly affected by the lack of data at local and also regional level. There is no validated source of information about energy consumption in the city, the energy sources, GHG emissions etc. The city of Trenčín hasn't got any official data sets providing this kind of information.

Only relevant and validated source of data is data sets from state agency the Slovak innovation and energy agency covering only national level. So, we are not able to catch local specifics and setups via exact data about energy. Final energy consumption per capita in Trenčín can be only derived from national data. The last update of data was made in 2016, so we applied annual increase of consumption in average ratio 2% per year. So, based on this approach final energy consumption per capita in the city in the year 2018 is **19.25 MWh** with respective division according to the sources in next [Figure 65](#).

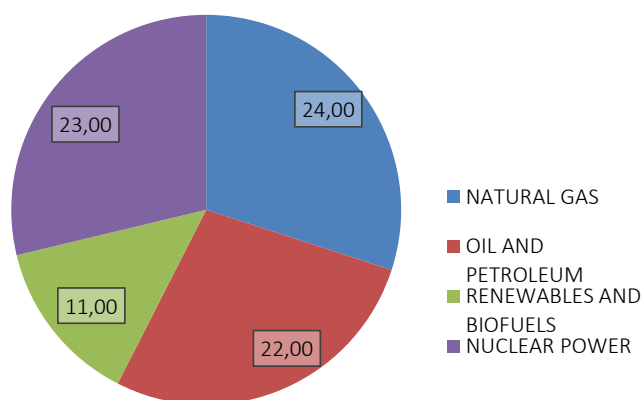


Figure 65: Trenčín sources division on energy consumption

According to the national regulation, local energy sources provided energy only for specific territory are not installed. Also, the indented local energy grid doesn't exist, so all sources of energy (without small solar and heating systems providing energy for specific building) are connected to the main distribution system.

Heating of private houses in the city are mainly provided by heating systems using natural gas, renewable sources (biomass, heat pumps) are using in were low scale. In the 2 main housing neighbourhoods in Trenčín (*Sihot'* and *Juh*) the central heating system is used using natural gas or biomass as primary sources of the energy. But there is a trend of disconnecting separate flats or whole buildings from the central heating system and installation own heating system in flats or entire buildings.

Waste management in the city is focused on increasing of recycling rate in the city. The trend from last 3 years is positive and the recycling rate was 40% from whole amount of solid waste in the year of 2018. But there is a big gap and also potential in using the waste as a commodity for heating systems. The capacity of the city using waste energy source is limited by finance but mainly by state regulation. There is no appropriate legislation and supporting mechanism to increase using the waste of commodity for energy production.

The ambitions of the city of Trenčín in energy field are framed by the ambitions and implementation of respective strategies at the state level. In this context, no building will be newly introduced into the use without fulfilling the parameters of energy passive house (A0) by 2030.

The city of Trenčín has got only indirect goals related to the energy transition, right now. Also, there is a lack of strategic planning documents dealing with the topic of energy/energy consumption.

In topics related to the energy the strongest attention is taking on climate change adaption of the city through activities dealing with development and quality increasing of green and blue infrastructure in urban area. A new strategy for climate change adaptation at the local level is in the process of

development. The final draft of strategy will be finalized in October 2019. In November 2019 will be strategy reviewed by municipal Committee of environmental affairs, transportation, investments and spatial planning. The strategy will be related to local specifics of city of Trenčín and also will be linked to the national strategy: Strategy of climate change adaptation of Slovak republic (last update 2018).

10.2.2 Mobility characterization

Mobility in the city of Trenčín could be reflected through the following specifics:

- The compact urban structure of the city providing an advantage for sustainable forms of mobility: walk, bicycle.
- Competence fragmentation in the development and maintenance of transport infrastructure (state/ regional municipality/ city).
- Absence of sectoral planning documents/strategies dealing with mobility in the city except for cyclist-mobility.

Mobility is an important aspect of the city in the planning of future development. All relevant forms of mobility are available within the area of the city and relevant infrastructure is well established including the infrastructure of TEN-T network. There is highway (D1) passing through cadastre of the city, the first-class road is cutting the city through the city centre together with high-speed railway corridor. This is on one side a high potential of the city (good connection to high-speed transport infrastructure in the city centre) on another side, the localization of transport infrastructure is the important limit for further development in the central part of the city.

The civil airport is also available in the city but without regular connections and operator for the public transport services. The river Vah is potentially corridor for water transportation but in the current situation is used only for sport and leisure activities.

The city of Trenčín concentrates activities in the field of mobility in the last years to the following:

- Parking policy: regulation of parking in the whole area of the city. The City of Trenčín prepared and implementing new parking policy in the city. The main focus of the policy is on regulation of the cars amount passing and parking in the centre of the city and the residential neighbourhoods, on support of the change of mobility behaviour of inhabitants but also visitors of the city. The motivation tools for electro-mobility should be implemented as a part of the regulation. New parking regulation policy has been implemented in central parts of the city (downtown, historical centre, and some neighbourhood areas) in the year 2019. Next year, the regulation policy will be spreading to other neighbourhood areas to cover areas where majority of inhabitants are living.
- Cyclist-infrastructure development: supporting activities leading to change in community behaviour – using bicycles instead of cars. Plan for cyclist-mobility development (*cyklogenerel*) was created in 2016, where main cycle routes were defined. Based on this, city started building the main cycle routes within the core area of the city and interconnections to areas with the highest density of inhabitants. Currently, there are more than 30km of cyclist-routes newly built or marked on existing route network within the city.
- Sectoral planning documents/strategies: New plan of sustainable mobility. The city is preparing crucial mobility strategy document – new plan of sustainable mobility covering the whole aspect of mobility within the city. Currently, we are in the process of elaboration and expected time of finalisation is year 2021.

Because of the absence of sectoral planning documents there is a lack of validated data about transport flows and shares of different forms of transportation in the city. There is only data derived at the state level (Ministry of transportation, 2016), where shares of transportation forms are as followed in Figure 66.

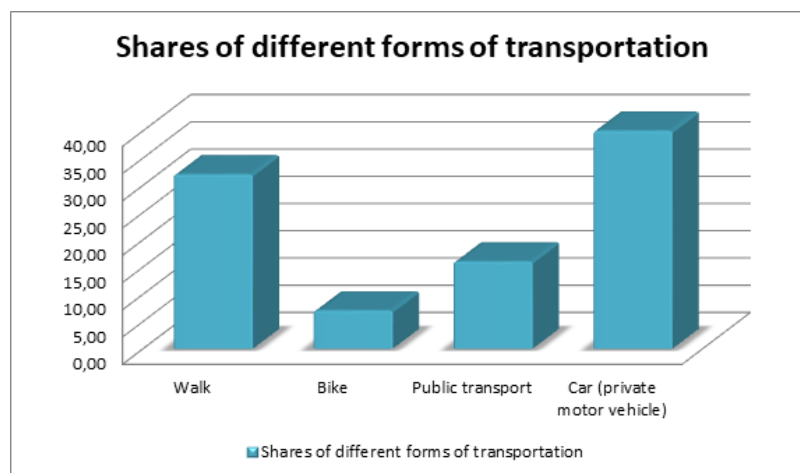


Figure 66: Trenčín shares of the different transport modes

10.2.3 Governance characterization

The city of Trenčín is a regional centre covering business, culture, sport and services. Region of the Trenčín is one of the most developed regions in Slovakia, close to the average of the EU. The previous industry activities in the city are continuously changed by services and industry with higher added value. The economic growth of the region and especially of the city is reflected in the rate of unemployment that is one of the lowest in SR. Currently, rate is approx. 2%. But this situation is jeopardised by the structure of job position which are in high risks because of sensibility on automatization in industry activities. The regions lying in the Western part of Slovakia (including Trenčín) are the riskiest regions in whole EU potentially affected by continuous automatization especially in automotive industry.

Governance of the city could be characterized as open and participative. The city of Trenčín has got an existing vision of the city development up to 2040: “City of Trenčín the leader in the region and the most attractive regional centre based on the quality of life, knowledge-based economy, housing, tourism and opportunities for young and seniors”. The main quality of the vision is included in the integrative cross-sectoral character of development processes as well as activities of different stakeholders, not only public sector. The vision of the city of Trenčín should be lighthouse for the whole region and should be a clear vision not only for the city but also for stakeholders which are an important part in development processes.

Integrative participative planning approach is a crucial aspect leading to reach the vision of the city and is one of the Smart City principles which are implemented in the city governance. The city of Trenčín is one of the lighthouse cities in Slovakia covering smart city not only as the implementation of the newest technologies but also through smart, participative planning approach to the development of the city. Currently, there are 22 external experts preparing a Smart Concept for the city as a base for an upgrade of the main socio-economic strategy of the city. The concept is covering 10 main areas of interest:

1. Smart city and Smart region
2. Smart Innovative Management
3. Smart Economy
4. Smart health and social services
5. Smart energy and smart buildings

6. Smart Public Infrastructure and Transport
7. Smart solutions in the area of population supply, circular economy and environmental infrastructure
8. Smart education
9. Data availability and use for smart decision-making and management
10. Smart financing concepts.

The governance structure of the City of Trenčín includes the self-governmental structure and city administration. The self-governmental structure is more integrative the mayor, the city parliament have got the decision making power and is focused more on strategic decisions. The self-governmental mechanism consists of a mayor and 25 council members. All of them are voted directly by citizens. The current election term is November 2018 - November 2022. The city council has 7 committees: financial, mobility zoning and environment, schools, youth and sports, social and public safety, cultural and tourism. The self-governing body has the most important role of voting over the budget, voting on local laws and zoning core, buying and selling of land and buildings. Moreover, it has oversight power over the executive branch which consists of the mayor and the city hall administration. Since the council people are politicians they take on political stands in long term decisions and leadership.

10.2.4 Society & Citizens characterization

Society characterization is strongly affected through main socio-demographic trends in the city which are:

- The total number of inhabitants is continuously decreasing to current number: 54,916 and this trend without intensive intervention should continuous.
- The main reason for decreasing of inhabitants is strong process of suburbanisation in the city, where inhabitants moving to surround villages but still using the services in the city. This negatively affects the economy of the city and it's one of the most urgent threats.
- The average age of the population is around 4.,5 year and the trend is negative.
- Inhabitants of the city are well identified with genius loci of the city and participation of inhabitants on development planning is higher than in the surrounding region.

Citizens of the city are very sensitive on topics dealing with green infrastructure, natural environment in the city, quality of the greenery and topics of environmental protection.

The city of Trenčín is a pioneer in using a broad participatory approach in all strategic or conceptual documents development processes. It's something like standard that wide range of relevant stakeholders are involved in specific phases of strategy preparation and also in the implementation of relevant actions related to the strategy of concept. Also, participation processes are secured through strategic environmental assessment or environmental impact assessment (later SEA, EIA) which is binding according to the law.

The city of Trenčín was a leader in the biggest and longest participatory project in Slovakia: Trenčín is you. The main objective of the initiative was active involvement of the public for the final shape design of the embankment in Trenčín and initiating the dialogue with the public through opened communication. A first significant stage of transformation and development of the embankment was a planned ideological urbanistic competition in 2014, whose goal was to show possible forms and ideas of central city zone development in connection with historic city zone. The initiative was aimed at this step with clear objective to create competition assignment which would reflect public requirements

on this space. The initial discussion on impact of the railway on connection of the city centre and the embankment took place in January 2012 counting about 200 citizens involved. The whole effort culminated in May 2014 by evaluation of international idealistic urbanistic competition, Trenčín city on the river and following presentation of the results in October 2014. The results of the completion are the background for creation of new zonal land use plan for riverside area, which can be now defined as brownfield area.



10.3 City indexes calculation

10.3.1 Indicators Normalised

As explained in section [Error! No se encuentra el origen de la referencia.](#), the indicators of Trenčín have been normalised according to the ranking of indicators method, and the results of this normalisation are gathered in the table below (Table 88Table 42). The calculation of the indicators is included in deliverable D5.1 as well as in the annexes of this document (Annex F: Trenčín, [F.1](#)).

Table 88: Trenčín Indicators Normalised

ENERGY & ENVIRONMENT		
Application field	Indicator	SCORE
City Energy Profile	Final energy consumption per capita	8.70
	Primary energy consumption per capita	10.00
	Primary energy sources (shares)	7.39
	Building connected to the DH-network	10.00
GHG Emissions	GHG emissions per capita	7.26
Waste Management	Recycling rate	6.59
MOBILITY		
Application field	Indicator	SCORE
City Mobility Profile	Modal split	7.00
	Fuel mix in mobility	2.30
	Energy use for transportation	8.95
	Access to public transport	8.60
	Public infrastructure promoting low-carbon mobility	2.56
GOVERNANCE		
Application field	Indicator	SCORE
Economy	Unemployment rate	9.63
	GDP (Gross Domestic Product)	6.49
Initiatives and Strategies of the Public Administration	Smart city factor in a city development strategy	5.00
Public ICT/ Data	Quality of open data	5.00
SOCIETY & CITIZENS		
Application field	Indicator	SCORE
Affordable Housing	Development of housing prices	6.37
	Housing cost overburden rate	8.67
Citizen Engagement and Empowerment	Citizen engagement to climate conscious actions	5.00
	Encouraging a healthy lifestyle	2.50
Urban Structure	Inhabitants in dense areas	1.39

10.3.2 Categories, application fields and indicators prioritised

As explained in section 3.2.3 Step III: Prioritisation of categories, application fields and indicators, the indicators of Trenčín have been prioritised according to the city needs and targets, through the AHP method, and the results of this prioritisation are gathered within Table 89 below.

Table 89: Trenčín Indicators Weighting per Category and per Application field

ENERGY & ENVIRONMENT					
Application field	Indicator	WEIGHT per Category		WEIGHT per App Field	
City Energy Profile	Final energy consumption per capita	1.42%	100%	6.51%	100%
	Primary energy consumption per capita	8.65%		39.68%	
	Primary energy sources (shares)	5.54%		25.39%	
	Building connected to the DH-network	6.20%		28.43%	
GHG Emissions	GHG emissions per capita	34.83%		100%	100%
Waste Management	Recycling rate	43.37%		100%	100%
MOBILITY					
Application field	Indicator	WEIGHT per Category		WEIGHT per App Field	
City Mobility Profile	Modal Split	33.50%	100%	33.50%	100%
	Fuel mix in mobility	20.05%		20.05%	
	Energy use for transportation	8.43%		8.43%	
	Access to public transport	16.24%		16.24%	
	Public infrastructure promoting low-carbon mobility	21.78%		21.78%	
ENERGY & ENVIRONMENT					
Application field	Indicator	WEIGHT per Category		WEIGHT per App Field	
Economy	Unemployment rate	8.62%	100%	75.00%	100%
	GDP (Gross Domestic Product)	2.87%		25.00%	
Initiatives and Strategies of the PA	Smart city factor in a city development strategy	47.96%		100%	100%
Public ICT / Data	Quality of open data	40.55%			100%
SOCIETY & CITIZENS					
Application field	Indicator	WEIGHT per Category		WEIGHT per App Field	
Affordable Housing	Development of housing prices	46.45%	100%	75.00%	100%
	Housing cost overburden rate	15.48%		25.00%	
Citizen Engagement and Empowerment	Citizen engagement/ empowerment to climate conscious actions	23.69%		83.33%	100%
	Encouraging a healthy lifestyle	4.74%		16.67%	
Urban Structure	Inhabitants in dense areas	9.64%		100%	100%

10.3.3 Aggregation and calculation of the city indexes

As explained in section 3.2.4 [Step IV: Aggregation to calculate the city indexes](#), the indicators of Trenčín have been aggregated according to the Linear aggregation method, and the results are city indexes per category and per application fields, collected within the following tables [Table 90](#) and [Table 91](#) below.

Table 90: Trenčín Indexes per Category

CATEGORIES INDEXES	
Category	City Index
Energy & Environment	7.41
Mobility	5.52
Governance	5.44
Society & Citizens	5.74

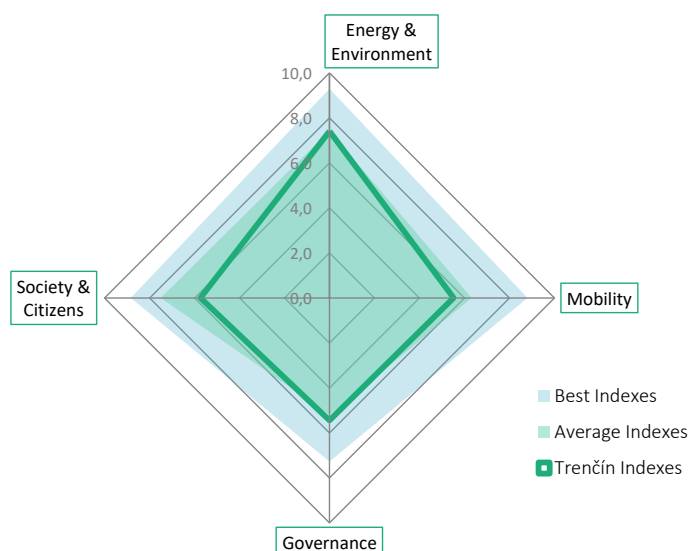


Figure 67: Radar view of Trenčín Indexes per Category

The results of the categories indexes for the city of Trenčín stand out that in all of them, the city indexes are above 5, which means that there is none especially worrying.

In terms of **Energy & Environment** category, the index is the best one among the categories of Trenčín, which means that although the city is meeting some of the European targets and it is on the right way and not very far to meet the rest of them in general terms. Best scores are given to building connected to the DH-network or renewable energy grid and primary energy consumption, followed by final energy consumption. But also the rest of indicators are not far from the best score. Main priorities for the city are focused on recycling rate and GHG emissions per capita, which coincides with the lower Trenčín scores (especially the recycling rate), meaning that the city is aware of where the greatest efforts should be devoted.

Regarding **Mobility**, the index of Trenčín is over 5 but not too much. This means that there is some room for improvement in almost all indicators, especially in fuel mix in mobility and public infrastructure promoting low-carbon mobility, which are the lowest ones and mean, in turn, the need of increase electric or low-emissions mobility and public infrastructure for cycling mobility. Best scores in mobility are for the energy used for transport and access to public transport. Highest priorities for the city are quite balanced, being the most important modal split, followed by public infrastructure for cycling and fuel mix in mobility, which shows concordance when compared with the scored and gives an idea of where the efforts will have to focus in the next years.

In **Governance** category, the city index is above 5, but not especially high. Indicator scores within this category are well balanced, being the best one unemployment rate. Main priority for the city is smart city factor in a city development strategy, followed by quality of open data that, consistently, receive the lowest scores in the indicators normalisation.

Within **Society & Citizens** category, Trenčín index is over 5, with indicators scores quite low for encouraging a healthy lifestyle and inhabitants in dense areas, which points out the weakest aspects in this regards; the last one meaning that there are not too much suitable areas for develop PED due to a

low density. Apart from this, city's main priority is focused on the development of housing prices, and lowest priorities are given to the indicators with lowest scores, so this reflects the current thinking of the city but it will have to change in the future in order to focus primarily on the city's weaknesses.

In view of the indexes of the categories of Trenčín, they are all quite similar, without any category stands out for better or for worse. This leads on the one hand to continue improving all in general, and on the other, to study more specifically the strengths and weaknesses within each one.

Table 91: Trenčín Indexes per Application Field

APPLICATION FIELDS INDEXES		
Category	Application Field	City Index
ENERGY & ENVIRONMENT	City Energy Profile	9.25
	GHG Emissions	7.26
	Waste Management	6.59
MOBILITY	City Mobility Profile	5.52
GOVERNANCE	Economy	8.85
	Initiatives and Strategies of the PA	5.00
	Public ICT / Data	5.00
SOCIETY & CITIZENS	Affordable Housing	6.95
	Citizen Engagement and Empowerment	4.58
	Urban Structure	1.39

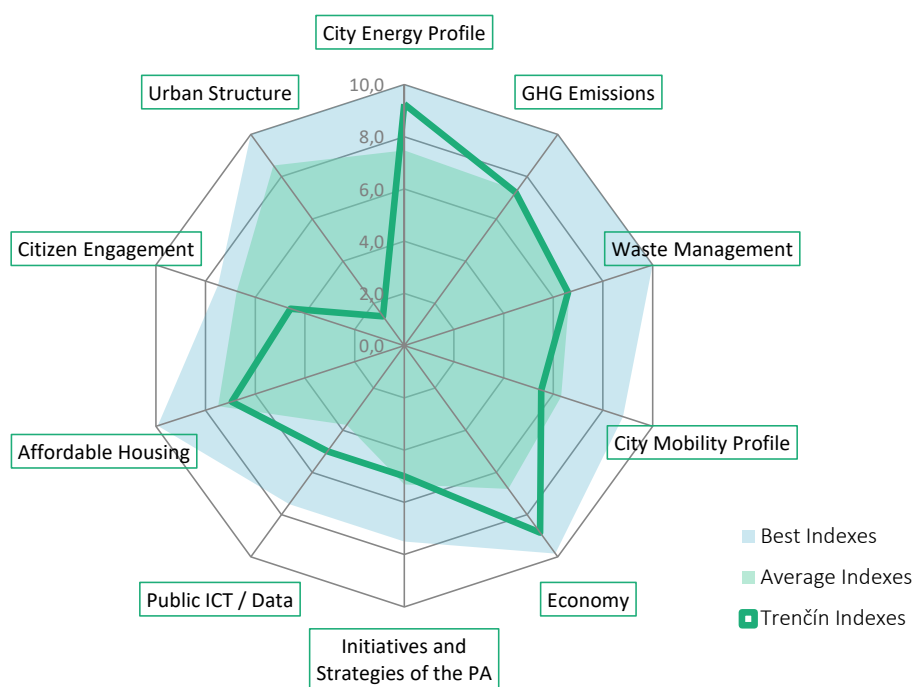


Figure 68: Radar view of Trenčín Indexes per Application Field

Regarding the indexes resulting for the city, almost all application fields are above 5, which means that there are no major weaknesses in the city. But in the view of the differences between some indexes, it gives an idea of which application fields are the stronger than others. Best application field in Trenčín is city energy profile, followed by economy and GHG emissions; while the lowest indexes in the application fields of the city lie on urban structure and citizen engagement and empowerment.

10.4 Analysis of the existing city plans

10.4.1 Main City plans identified

Within this section, the main information of the existing plans that Trenčín has identified is included, following the process explained in the section [4.2 Methodology for the analysis of the existing city plans](#), of the present document. The whole information gathered for each of these plans is collected in the annexes of this document (Annex F: Trenčín, [F.2](#)).

Table 92: Trenčín Short Term plans

Main city plans identified – Short Term			
Plan	Scope	Description	Topics covered
Programme of Social and Economic development of the city of Trenčín (with a vision to 2040)	Local	The plan is the main strategic socio-economic development plan of the city. It covered a wide portfolio of the topics related to urban development in the city. The program provides framework for further implementation action plans in respective sectors (transportation, energy, social services etc.).	Mobility Social Energy
Programme of Social and Economic development of the Self-Governing Region of Trenčín	Regional	The plan is the main strategic socio-economic development plan of the region. It covered a wide portfolio of the topics related to urban development in the region with special focus on competencies related to the region (secondary education, healthcare, social insurance, mobility (roads of 2nd and 3rd class).	Energy Social Mobility
Sustainable Energy Action Plan (SEAP) – The Self-Governing Region of Trenčín	Regional	SEAP is the key document defining the energy policies of the self-governing region for the next 7 years in order to increase energy efficiency in properties owned by the region (high schools, social services, self-governing region offices, health services, hospitals, etc.). The Sustainable Energy Action Plan (SEAP) developed in 2013 and updated in 2015, is the key document defining the energy policies of the self-governing region for the next 7 years in order to reduce CO ₂ emissions. This plan includes a number of measures in the short aimed to increase the energy efficiency of public buildings and rational use and management of energy.	Energy
Energy Policy of the Slovak Republic	National	The Energy Policy of the Slovak Republic (Energy Policy) is the strategic document defining the energy sector's primary objectives and priorities to 2035 with a view to 2050. The Energy Policy is a component of Slovakia's national economic strategy given that ensuring sustainable economic growth is conditioned by the reliable supply of affordable energy. The Ministry of Economy of the Slovak Republic (Ministry of Economy) is responsible for completing the Energy Policy for a minimum period of 20 years and updating it on a five-year cycle. The Policy defines more principles and possible approaches to the topic than specific actions.	Energy

Table 93: Trenčín Medium Term plans

Main city plans identified – Medium Term			
Plan	Scope	Description	Topics covered
Strategy for climate change adaption (in progress)	Local	The city is preparing crucial climate change adaptation strategy – Strategy for Climate Change Adaptation at the local level defining approaches, measures and tools using for facing of challenges resulting from climate change in the city of Trenčín. Currently, we are in the process of elaboration and expected time of finalisation is next year (2020).	Energy Social

10.4.2 Main targets defined in the city plans

As mentioned in Section 4.1.4, the Europe 2020 strategy aimed to become sustainable, smart and economy inclusive. Following Table 94 shows the relation between the main European targets with the targets on the city of Trenčín planning.

Table 94: Trenčín targets aligned with the European ones

TRENČÍN targets aligned with the European 2020 targets			
EU target	Plan in which is included	Is the target achieved?	Is there a more ambitious one?
75% population aged 20-64 employed	Programme of Social and Economic development of the city of Trenčín	YES	
3% of GDP invested in R&D sector	Programme of Social and Economic development of the city of Trenčín	NO	
Reduction 20% of GHG emissions	Programme of Social and Economic development of the city of Trenčín	NO	
Increasing 20% of share of RES	Programme of Social and Economic development of the city of Trenčín	NO	
Improved 20% energy efficiency	Programme of Social and Economic development of the city of Trenčín	NO	
Early school leavers' share reduced under 10%	Programme of Social and Economic development of the city of Trenčín	YES	
40% of 30-40 years old with tertiary education			

The main targets for future development of the city are formulated in the main socio-economic strategy "Program of social and economic development of the city of Trenčín for years 2016-2022 with a vision to 2040". The vision of the city is defined as: City of Trenčín the leader in the region. The main goal going through all sectors of urban development is increasing number of inhabitants from approx. 55,000 to 80,000 in the year of 2040. The crucial quality following by the implementation of the strategy is quality of life of inhabitants of the city.

The strategy and the targets included are linked to main strategic planning documents related to the socio-economic development at the regional and national level. Thank to this linkage, most of the EU targets defined at European level are covered by the “Programme of Social and Economic development of the city of Trenčín for years 2016 - 2022 with a vision to 2040”. Through the implementation of the strategy, Trenčín is supporting (more indirect) the fulfilling of the EU targets.

Sub-targets defined in the “Programme of Social and Economic development of the city of Trenčín for years 2016 - 2022 with a vision to 2040” can be cumulated to the following main targets:

- Increasing the number of inhabitants.
- Sustainable mobility transition: Sustainable mobility transition plan in the city of Trenčín is focused on changing the mobility flows within the city via increasing of cycle mobility instead of individual car mobility. Sustainable mobility should support decreasing of CO₂ emissions from transport, decreasing of other emissions (main focus is on PM emissions), decreasing of fossil fuel use for mobility purpose.
- Climate change adaptation: The city is aware of challenges resulting from climate change, so quantitative and qualitative developments of green and blue infrastructure in the organism of the city are important tasks for the development of the city. It's crucial for reaching a higher quality of life, but also for fulfilling goals under energy transition of the city. Green infrastructure represents an important element in puzzle of energy transition path. But based on prepared project and action we could define also another target, which is not included in current version of the strategy.
- Smart energy: Trenčín has got a strong motivation to change their own energy consumption mix following the goals to increase the use of local renewable energy sources, starting with CO₂ emissions decline to CO₂ positive solutions in the city. Currently, city focuses activities to the real estate owned by the city. Activities covering this approach are energy audit of buildings owned by the city, refurbishment of building through GES (guarantee energy services), smart energy metering and management.

10.4.3 Main actions identified to achieve the defined goals

Actions related to defined targets are mainly included in Programme of Social and Economic development of the city of Trenčín (with a vision to 2040).

1. Increasing the number of inhabitants.
 - **New development area in the city centre – Central city zone at the river bank:** After the construction of new high-speed railway corridor, there is a new development area in the city centre. The city is preparing the new zonal Master plan defining the functional regulation of the area which should be presented in 2020, after incorporating outcomes of new Sustainable mobility plan. The aim is to prepare conditions for the development of new central zone area with wide mix of functions including housing. High energy standards of building are expected in this area, with goal to reach CO₂ neutral zone with energy-positive approach.
 - Status: Land-use planning – zonal master plan preparation
 - Time scope: long term (2040)
2. Sustainable mobility transition.
 - **New plan of sustainable mobility:** City is preparing crucial mobility strategy document, new plan of sustainable mobility covering whole aspect of mobility within the city. Currently, we are in the process of elaboration and expected time of finalisation is next year (2021).
 - Status: the preparation phase

- Time scope: short term (2021)
- **Plan for cycling mobility development:** Plan for cycling mobility development was elaborated by the city in 2016 and further development of cycle infrastructure has been following this plan. The main focus of the plan is on identification of crucial corridors for cycle routes within the city. It also defines supportive activities leading to the increase of cycling mobility as alternative to individual car mobility of citizens.
 - Status: plan is established
 - Time scope: continuous
- **Parking policy regulation:** The City of Trenčín prepared and implementing new parking policy in the city. The main focus of the policy is on regulation of the cars amount passing and parking in the centre of the city and the residential neighbourhoods, on support of the change of mobility behaviour of inhabitants but also visitors of the city. The motivation tools for electro-mobility should be implemented as a part of the regulation.
 - Status: in progress
 - Time scope: short term, 2-3 years
- 3. Climate change adaptation.
 - **Strategy for climate change adaptation at the local level:** The city is preparing crucial climate change adaptation strategy – Strategy for Climate Change Adaptation at the local level defining approaches, measures and tools using for facing of challenges resulting from climate change in the city of Trenčín. Currently, we are in the process of elaboration and expected time of finalisation is next year (2020).
 - Status: the preparation phase
 - Time scope: short term (2020)
 - **The new quality of neighbourhoods –revitalisation of courtyards:** City decided to realised investments to specifics public spaces (green courtyards) in biggest neighbourhoods in the city to increase the quality of environment with special focus on green infrastructure elements in the areas. At least, 4 revitalisation projects will be done under this programme and one of the locations is within our PED area.
 - Status: realisation in progress
 - Time scope: mid-term (2019 – 2021)
 - Actions not included in the strategy.
- 4. Smart energy.
 - **Energy audits of municipal buildings:** Before starting the investment activities leading to the energy transition in buildings owned by the city, the audit of energy consumption, flows and technical and technological status of the buildings is necessary. City already starts this activity and continuously prepares audit of crucial buildings. Based on the results further approach will be defined. The buildings are mainly kindergartens, primary schools, administrative buildings, sporting venues, cultural centres.
 - Status: the preparation phase
 - Time scope: mid tern (5 years)
 - **Refurbishment of municipal buildings:** Based on the results of energy audits, city will start the process of refurbishment of each specific building, mainly using GES approach (guaranty

energy service), where investment costs are covered from energy savings and the effects are guaranteed by the provider of the service.

- Status: the preparation phase, linked to the energy audits action
- Time scope: mid term (5 years)
- **Refurbishment of kindergarten buildings:** In the recent years three large kindergarten buildings have been refurbished and another one is in preparation to do so as well. The works include total building insulation, changing the windows, fixing roofs, changing climate control and heating systems, changing lighting, in one kindergarten including small photovoltaics array.
- **Preparation of plans for energetically improvements in the ice skating rink:** The current ice skating rink is about 50 years old. The city-owned building is in the selected PED area in the city. Trenčín has recently changed all the cooling systems in the stadium, decreasing energy consumption by about 70%, but the state of the outer shell of the building is in an abysmal state, mainly façade, windows and glass roof. These steps are highly replicable.
- **Hydropower dams:** Trenčín has multiple privately owned hydro power plants in its close proximity. The combined power outcome is not known to the city administration.

10.4.4 Actuation areas identified and financial schemes



Figure 69: Actuation areas of Trenčín planning

Actuation areas could be divided into 4 groups according to action which are or will be realised:

- Area 1: New central city zone at the river bank: New development area in the city centre. After the construction of new high-speed railway corridor, there is a new development area in the city centre. The city is preparing the new zonal Master plan defining the functional regulation of the area which should be presented in 2020.
- Areas 2: Central Park M. R. Stefanika, no. 5; courtyard Sihot', no. 6; courtyard Juh, no.8; Park Uspech: The city decided to realised investments to specifics public spaces (green courtyards and parks) to increase the quality of environment with special focus on green infrastructure elements in the areas.
- Area 3: Hydro-power plant: Hydro-power plant is a potential source of zero-carbon renewable energy for the city. The plant is own by the state company a is an element of the state energy network.
- Areas 7: Kindergarten Kubrá, Považská and J. Halašu, no.4; Ice skating rink: Refurbishment of kindergarten buildings: In recent years three large kindergarten buildings we have been refurbished 3 large kindergarten buildings.

Preparation of energy improvements plans on the ice skating rink. The current ice skating rink is about 50 years old. Trenčín recently changed all the cooling systems in the stadium, decreasing energy consumption by about 70%, but the state of the outer shell of the building is in an abysmal state, manly façade, windows and glass roof.

There is no special financial scheme of business for implementation of proposed actions. Most of the actions are or will be financed from EU funds through national operational programmes (OP). Trenčín has 9 national operational programmes in the current implementation period 2014 - 2020 (OP Research and Innovation, OP Integrated Infrastructure, OP Human Resources, OP Quality of Environment, Integrated Regional OP, OP Efficient Public Administration, OP Technical Assistance, Rural Development Programme, OP Fisheries) but for proposed actions only 2 are suitable for financing: OP Quality of Environment and Integrated Regional OP.

10.4.5 Main needs and priorities identified from the analysis of the existing city plans

Trenčín has identified many targets and priorities to meet the European ones. Main ones are described below:

- Upgrade of existing main socio-economic strategy reflecting the need to increase actions of the city in energy transformation topics.
- Preparation of sectoral strategical document dealing with energy transition in the city including key actions identification.
- Institutional innovation in local governance framework supports integrative approach to planning, implementation and managing energy topics.
- Organizing awareness campaigns that will increase awareness of local communities about energy efficiency of housing infrastructure and presentation of potential usage of housing infrastructure for installing local independent sources of the energy.
- Preparation of business model to support increasing of private or private-public investments to energy transformation of the city.
- Preparation of support tools/schemes for development of low-carbon forms of transportation in the city.

11City Diagnosis: Vidin

11.1 General overview of the city



Vidin is a regional and municipal town in north-western Bulgaria, located on the bank of the Danube River. It is the administrative and economic centre of the municipality of Vidin and the district of Vidin.

The National Statistical Institute determines the city's population of 41,583 inhabitants in 2018. The area of the town is 63.218 km².

Vidin is a port town on the southern bank of the Danube in North-Western Bulgaria. It is close to the borders with Romania and Serbia. Vidin is the 20th town by population in Bulgaria, but serious demographic problems have been experienced in the area during the last two decades. The number of residents of the city reached its peak between 1988 and 1991 when the population exceeded 65,000. As of 2011, the town had a population of 48,071 inhabitants.



Figure 70: What Vidin is

The geographical location of the area determines temperate continental climate with relatively cold winters and hot summer with insufficient rainfall. The average annual temperature is 11.4 °C, with the warmest month being July with an average temperature of 23.1 °C and the coldest being January -1.7 °C. The average monthly humidity is 74%.

Climate data for Vidin, Bulgaria													
Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Average high °C (°F)	4.1 (39.4)	6.3 (43.3)	13.4 (56.1)	19.3 (66.7)	24.6 (76.3)	28.8 (83.8)	31.3 (88.3)	30.8 (87.4)	25.2 (77.4)	18.0 (64.4)	11.2 (52.2)	4.5 (40.1)	18.1 (64.6)
Daily mean °C (°F)	0.2 (32.4)	1.8 (35.2)	7.3 (45.1)	12.7 (54.9)	18.0 (64.4)	22.0 (71.6)	24.0 (75.2)	23.5 (74.3)	18.5 (65.3)	12.3 (54.1)	7.1 (44.8)	1.0 (33.8)	12.5 (54.5)
Average low °C (°F)	-3.6 (25.5)	-2.5 (27.5)	2.1 (35.8)	6.3 (43.3)	11.5 (52.7)	15.1 (59.2)	16.8 (62.2)	16.5 (61.7)	12.3 (54.1)	6.6 (43.9)	3.0 (37.4)	-2.6 (27.3)	7.0 (44.6)
Average rainfall mm (inches)	41 (1.6)	37 (1.5)	40 (1.6)	51 (2.0)	64 (2.5)	69 (2.7)	47 (1.9)	38 (1.5)	36 (1.4)	49 (1.9)	56 (2.2)	53 (2.1)	581 (22.9)

Source: Stringmeteo.com^[6]

Figure 71: Climate data for Vidin

For the territory of the region the total annual solar radiation is about 5,500 MJ/m². Sunshine duration varies from season to season and depends on two main factors, cloud mode and day length. The average annual sunshine is about 2,200 hours. Cloudiness is maximum during the winter months (average score 7.1), which reduces about 72% of the heat flow to the earth's surface.

The territory of Vidin Municipality is in the area of low wind energy potential.

Low wind potential zone includes the plain parts of the relief of the country (the Danube plain and Thrace), the valleys of the Struma and Mesta rivers and the high fields of western Bulgaria. The characteristics of this zone are: Annual average wind speed: 2-3 m/s; Energy Potential: 100 W/m²; (i.e. less than 1.500 kWh/m² per year); The average annual interval of speeds $\Sigma \tau$ 5-25 m/s in this zone is 900 h, which represents about 10% of the number of hours per year (8,760 h).

Table 95: Vidin climate characterisation

CLIMATE CHARACTERISATION	Continental climate
Average annual temperature	11.4 °C
Total annual precipitation	581 mm
Winter average temperature	-1.7 °C
Summer average temperature	23.1 °C

Vidin municipality, which is the largest in area and population in the district, has a leading role in the region's economy. Among the most developed economic sectors in the municipality are manufacturing and trade. Agriculture is an important sector, with agricultural areas accounting for about 75% of its entire territory. In the service sector, there is a well-established network of businesses with diverse activities.

The three main entrances of Vidin are divided into three industrial zones: South, West and North.

The region has a long tradition in agriculture and wine production. The fruitful soil and favourable climatic conditions are suitable for growing wheat, corn, sunflower, grapes, fruits and vegetables. The geographical location of Vidin municipality, the existing natural resources, the rich cultural and historical heritage, as well as the diverse cultural calendar are prerequisites for the development of tourism.

Vidin emerged at the place of an old Celtic settlement known as *Dunonia*. The settlement evolved into a Roman fortified town called *Bononia*. The town grew into one of the important centres of the province of Upper Moesia, encompassing the territory of modern north-western Bulgaria and eastern Serbia.

When Slavs settled in the area, they called the town Badin or Bdin, where the modern name comes from. Similarly, Anna Komnene refers to it as *Vidynē* (Βιδύνη) in the Alexiad.

Vidin's main landmark, the Baba Vida fortress, was built in the period from the X to the XIV century. In the Middle Ages Vidin used to be an important Bulgarian city, a bishop seat and capital of a large province. Between the years 971 and 976 the town was the centre of Samuil's possessions while his brothers ruled to the south. In 1003 Vidin was seized by Basil II after an eight-month siege because of the betrayal of the local bishop.



Figure 72: Baba Vida, the only fully preserved fortress in Vidin area⁶⁵

Its importance once again rose during the Second Bulgarian Empire (1185 - 1422) and its despots were influential figures in the Empire and were on several occasions chosen for Emperors. From the mid XIII century it was ruled by the *Shishman* family.

Among the most popular sights in Vidin municipality are: the medieval Baba Vida Fortress; the *Konaka* Museums and the Cross Barracks, the Osman Pazvantoglu Mosque and the Library; The synagogue (which was donated to the Municipality in 2017 by the Regional Association of the Jewish Organization of Bulgaria *Shalom* and is about to be restored under the project), the cathedral *St. Dimitar Thessaloniki*, the churches of *St. Pantaleimon*, *St. Petka*, *St. Nikolai* and others.

The numerous cultural events on the territory of the municipality, such as holidays, festivals, competitions, etc., create favourable conditions for the development of cultural tourism events.

Various sports events held throughout the year create conditions for development of sports tourism in Vidin municipality. Among the most important sporting events, the following stand out: international Danube regatta: TID (Tour International Danube), rally *Vida*, cycling along the cycle route Atlantic-Black Sea (passing through the territory of the municipality).

The following mountain biking routes passing through the Vidin region have been developed through the project Bulgarian Bike Route: Vidin - Belogradchik - Lom, Vidin - Scrap. A part of the Danube cycle route developed along the Cross-border Co-operation Programme Romania - Bulgaria 2007 - 2013. Bicycle routes passing through the Vidin Municipality create excellent prerequisites for the development of cycling / including organizing bicycle crossings, including settlements outside municipality and district of Vidin and abroad.

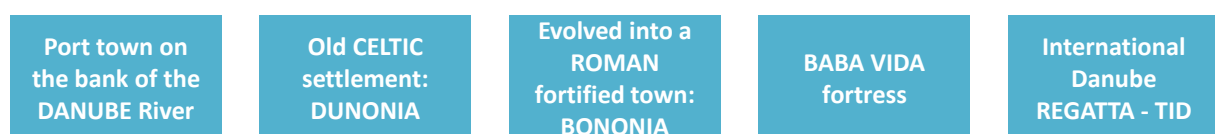


Figure 73: Vidin's highlights

⁶⁵ Source: <https://bulgarianhistory.org/baba-vida/>

11.2 City characterisation

11.2.1 Energy & Environment characterization

In Vidin Municipality, energy consumption shows a high share of electricity (38%), coal (23.5%) and raw wood (20.2%). The use of fuel oil and gas oil is also high (10.1%).

In 2016, the final energy consumption of Vidin was 297 GWh. The largest share of it is in the housing sector with 223 GWh or 75%, followed by Industry with 51 GWh or 17%. The share of the Municipal Buildings and Facilities sector (3%) and Municipal Lighting (1%) is relatively small. Transport in Vidin represents 3.8% of the final energy consumption.

In the absence of central district heating in Vidin, most of the residential buildings are heated by local boiler installations and wood stoves. Due to poor thermal performance of buildings and inefficient heating installations, the consumption of liquid and solid fuel for heating, which has a negative impact on the environment and climate, is increasing.

The existing building stock (administrative, school, hospital) is physically depreciated. Most of the buildings, with some exceptions, were mostly built in the 1950s and 1960s, when electricity prices were low. In most buildings the enclosure structures are without thermal insulation, the used joinery is outdated and without thermal insulation qualities. Heating and electrical installations are morally outdated and energy intensive. During the period of operation, partial repairs have been carried out which have no energy saving focus. The microclimate in the buildings is not good and often below regulatory requirements, which leads to morbidity and reduced work capacity.

There is no natural gas supply infrastructure in the municipality. The use of renewable energy sources is also lacking. No deviations of the Republican gas pipeline pass through the district. There are no public, residential or other buildings that are gas supplied. There is no specific gasification project for the territory.

The main difficulties and barriers to the implementation of energy efficiency actions are:

- Lack of gasification in Vidin District;
- Lack of district heating in the settlements of the district;
- Insufficient consumer awareness of existing new technologies and opportunities to reduce consumption.

There are some social factors that determine the final energy consumption and they are related to energy poverty. It is a common phenomenon for Bulgarian households to be unable to keep adequate temperature and internal comfort in their homes due to low incomes and relatively high energy costs.

In the following graphics (figures [Figure 74](#) to [Figure 76](#)) are presented some indicators of Energy poverty at EU level. It can be seen that Bulgaria is characterised by the worst values for these indicators. In Vidin Municipality, over 45% of the district's population lives below the national poverty line.

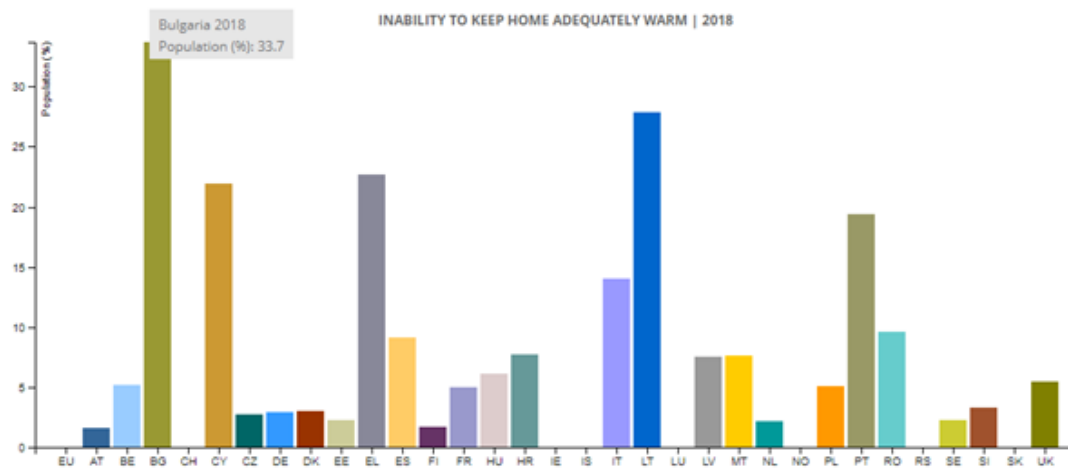


Figure 74: Inability to keep home adequately warm, 2018 (source: Energy Poverty Observatory⁶⁶)

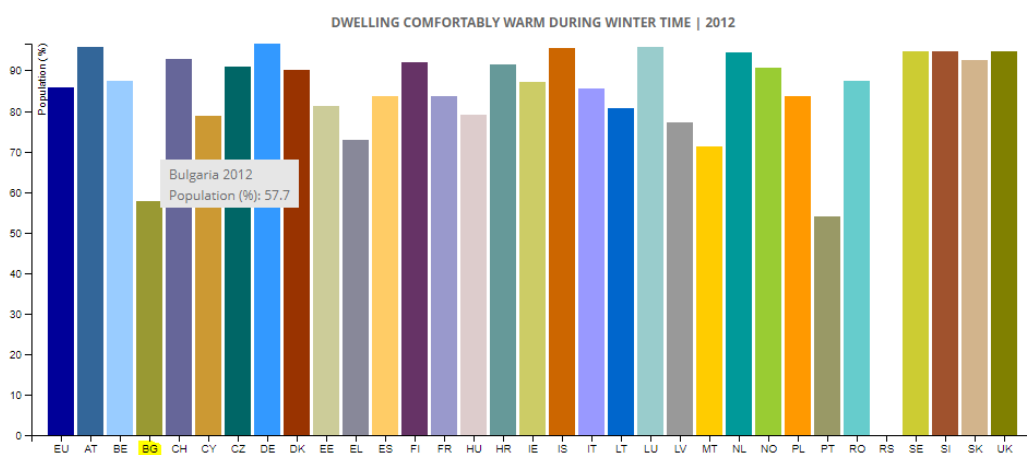


Figure 75: Dwelling comfortably warm during winter time, 2012 (source: Energy Poverty Observatory⁶⁶)

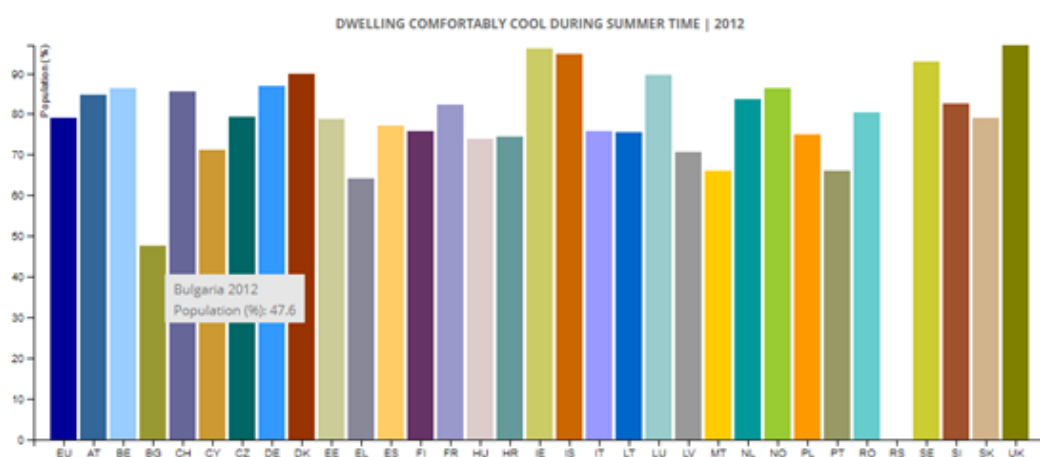


Figure 76: Dwelling comfortably cool during summer time, 2012 (source: Energy Poverty Observatory⁶⁶)

⁶⁶ Energy Poverty Observatory website: <https://www.energypoverty.eu/>

City of Vidin has an EE and RES Strategy and Action Plan, which define its baseline year energy consumption and CO₂ emissions and projects its aims beyond 2025. In 2016, the total energy consumption of the city was 316 GWh of which 71% were due to residential sector, 17% to industry and 4% to the public buildings and facilities, and 8% for the transport sector. The CO₂ emissions are 130 tonnes of CO₂ in 2016, distributed to 74% for the residential sector, 19% for the industry and 7% for the public buildings and facilities.

The energy consumption by sectors and fuels and energy reveals the structure and the carbon emissions produced in the territory of Vidin. The Housing and Industry sectors account for a total of 92% of energy consumption. From the point of view of fuel consumption, the most emissions are electricity consumption, 49%.

According to the National Environmental Monitoring System, the municipality of Vidin is not among the territories that are environmentally threatened by air pollution. The leading air pollutants in the area are industry, road transport and domestic heating.

The adverse effect of road transport is mainly due to air pollution by fine particulate matter (PM). The size of the town of Vidin (the city falls into the category of medium-sized cities, with a population of between 30 and 100 thousand inhabitants) influences the traffic intensity.

Household air pollutants include the heating of households by coal, briquettes, firewood and other low quality fuels. The negative environmental effect of domestic pollution on the ambient air is manifested mainly in certain meteorological conditions (light wind, temperature inversions, fogs). The observed negative environmental effects are the exceedance of limit values for sulphur dioxide and particulates in the ambient air.

For Vidin Municipality, the value of the generated waste per capita (represented as the amount of municipal waste generated per year and per capita) for 2016 is 317 kg/g/year. This value is less than the values for settlements with a population of 50,000 to 150,000 inhabitants, which corresponds to 349.6 kg/g/year.

Lifestyles due to the growth of the population welfare generate an increasingly household solid waste. The lack of collecting and treating waste generated in the last decade has created a bad image in aesthetic and environmental pollution. The waste management has not yet been reached to cover the whole country. The lack of waste management system, in Bulgaria, is estimated as a result of a number of factors:

- the lack of network management,
- lack of technical and financial means,
- low rate payment,
- lack of waste law implementation.

The municipality of Vidin does not have a unified information system for waste management. Given the major challenges facing municipalities in waste management and meeting the quantitative targets for waste, it is appropriate for the Municipality to develop a single waste information system that integrates data and information on all aspects of waste management.

For the purpose of environmentally friendly collection and recovery of packaging waste, Vidin Municipality has a contract with a recovery organization and has organized a system for the separate collection of recyclable fractions (paper and cardboard, glass, plastic).

Major target for the city is to reduce the energy demands in the public buildings through energy renovation and RES integration -most buildings need in-depth renovation, self-sufficient production capacities or presuming capacities, intelligent energy monitoring and management. Some of the supporting documents to the strategic energy planning are the Urban Master Spatial Planning Plan, Integrated Urban Development Plan, the Environmental Actions Plans (covering water resources, air

quality, biodiversity, etc.), and the City Investment Plan. The departments that could be involved are Investment Department, Land Use Department, Ecology, infrastructure and Engineering Department, Financial Department, Municipal Property Department. Vidin intends to join to the CoM during the deployment of MAKING-CITY Project.

11.2.2 Mobility characterization

The transportation system in the Vidin District is represented by a well-developed road network, water, rail network and potential for air transport development. Two trans-European corridors pass through the area, No. 4: Dresden / Nuremberg - Prague - Vienna / Bratislava - Budapest - Craiova (Romania) - Vidin - Sofia - Thessaloniki / Plovdiv - Istanbul and No. 7: Danube River (Rhine - Main - Danube).

The road network on the territory of Vidin District is 615 km of national roads, of which 74 km - first class, 91.0 km - second class, 450 km - third class. With asphalt flooring are 599 km, paved 1 km, with crushed stone flooring 15 km. The density of the Republican road network in the district is 0.202 km/km² with the national average of 0.174 km/ km². The project for reconstruction and completion of street water supply and sewerage network project "Water Cycle of Vidin" was completed and a large part of the streets in the city were excavated for replacement of water supply pipes, without laying flooring on all segments with replaced pipes.

Traffic and congestion are factors that negatively affect air quality. In Vidin municipality there is congestion mainly in the central areas and in peak hours of the day: in the morning around 8 AM and in the evening after 5 PM. It lasts an average of 6 minutes. The closure of major thoroughfares connecting the central city part to the residential neighbourhoods has taken place due to the project for the Water Cycle of Vidin, the number of congestion increases in 2014.

The density of the railway network in the district is in line with the national average levels, and that of the road network (20.3 km/ 100 km²) exceeds the average of 17.9 km/ 100 km². Although through the districts do not cross highways, and the share of first-class roads is 12% (compared to 19% in the country), the quality of the road surface is almost similar to the national average levels, which are 38% of it is in good condition.

The energy consumption in the transport sector equals 11,208 MWh and represents almost 4% of the final energy consumption. The transport is responsible for 2,809 kg of CO₂ or 2% of the carbon emissions.

Private vehicles accounted for the largest share of the transport, 4,925 MWh or 44%, followed by public transport, with 4,212 MWh or 38%, and municipal transport, 2,071 MWh or 18.5%.

Table 96: Vidin transport energy consumption by type of transport

Sector	Fossil fuels				Total [MWh/y]
	Diesel [MWh/y]	Gasoline [MWh/y]	Natural gas [MWh/y]	Liquid gas (methane) [MWh/y]	
Municipal fleet	697	35	0	9	741
Public transport	574	20	0	0	594
Private and commercial transport	40,908	16,991	521	4136	62,556
Subtotal	42,179	17,046	521	4145	63,891

11.2.3 Governance characterization

Municipality is the main administrative-territorial unit in which local self-government is exercised. Mayoralities and district governments are constituent administrative-territorial units in the municipalities. They are created under the conditions and in the order determined by law. The citizens of the municipality elect municipal councils and mayors of municipalities.

There is a lack of sufficient financial capacity of Vidin Municipality to independently implement the implementation of publicly significant projects. There is insufficient degree of coordination and cooperation between the management structures at different territorial levels.

Currently Municipality of Vidin is participating in project related to actively involving the citizens in the city development and management. The project aims to involve citizens, businesses and their organizations in the stages of municipal policy development and implementation concerning financial, health and social aspects of the present and future development of Vidin Municipality. The implementation of legislation shows need for more effective stakeholders' involvement in the process of amending, improving and implementing policies as they are directly impacted by policy measures, but their participation is not in place. Interested parties can generate successful, innovative business ideas and community projects, work in partnership with local government and organizations to achieve them. Some citizen associations have extensive in-depth expertise on important issues at local level and have capacity to attract funding needed by municipal authorities for environmental and energy analyses, feasibility studies, information campaigns, etc.

Stakeholders can give feedback on applicability of the measures set out in the municipal programs and action plans by applying the bottom-up approach. This will improve the economic effect of implementation of the measures set out in the plans and programmes, and will create bridges and partnerships with companies providing green services and generating green energy. Public-civil interaction for policy formulation and implementation will go through three main processes: information, consultation, active participation.

The project foresees development of:

- Mechanism for citizens' participation; specific tools to facilitate the process of acquiring information, discussing and formulating proposals.
- Specific measures to be taken together from administration and citizens, as to improve the socio-economic environment.
- Model for integrated municipal policies in the field of Air Quality, Energy Efficiency, RES, Waste Management, as to facilitate citizen participation in developing, adopting and monitoring of the policy documents.
- Trainings.

11.2.4 Society & Citizens characterization

Vidin is located in northwestern Bulgaria in an area with serious demographic, social and economic problems. The demographic picture of the city and the municipality over the last 20 years can be described as complicated by unfavorable trends. In terms of key demographics, trends in depopulation, demographic aging, low reproductive attitudes and social insecurity are worrying. They are part of the negative demographic development of Bulgaria during this period, but for a set of reasons - economic, social, political in the municipality and the town of Vidin, the situation is among the most complicated. Overcoming the demographic downturn requires careful study of both the causes that led to it and the conditions and environment currently that will determine the state of the

population in 2014 - 2020. For the town of Vidin, the ratio between the main age categories is as follows: 14.1% under the working age, 71.2% at the active age and 14.7% at the working age. The number of citizens in city of Vidin for 2016 is 46,777.

Vidin is one of the districts with the worst social and economic status in the country, with lower GDP per capita registered only in two other cities. The labor market continues to experience difficulties, and Vidin is among the few areas in which unemployment rises in 2017. Despite the relatively low local taxes and fees, the non-transparent administration and the lagging quality of services hinder the improvement of the business environment. Infrastructural development is in line with trends in most other areas.

The demographic situation in the district continues to worsen, with the district being the record holder for the negative natural population growth. The quality of school education is unsatisfactory, but in 2017 a branch of the University of Ruse was opened in the town of Vidin. In 2016, Vidin remains the only area without a sewage treatment plant. Indicators in the areas of health, order and security, as well as in the field of culture, are better.

The high percentage of the population with secondary education leaves a negative impact on the state of human resources in the municipality. It is almost 35% in total, which hinders its employment and makes difficult the various employment and retraining programs. The share of university graduates is relatively high 16.9%, compared to the national average of 19.6%, given that there is no higher education institution functioning on the territory of the municipality. Its growth is remarkable compared to 2005, when it was 6.5%⁶⁷

The structure of household incomes is unfavorable, the high share of pension income and the relatively slower growth of pensions compared to wages mean that opportunities for improving the well-being of households are limited. Over 45% of the district's population lives below the national poverty line⁶⁸.

⁶⁷ Source: Integrated City Reconstruction and Development Plan of Vidin

⁶⁸ Source: <https://www.regionalprofiles.bg>

11.3 City indexes calculation

11.3.1 Indicators Normalised

As explained in section [\[Error! No se encuentra el origen de la referencia. \[Error! No se encuentra el origen de la referencia.\],](#) the indicators of Vidin have been normalised according to the ranking of indicators method, and the results of this normalisation are gathered in the table below (Table 97). The calculation of the indicators is included in deliverable D5.1 as well as in the annexes of this document (Annex G: Vidin, [G.1](#)).

Table 97: Vidin Indicators Normalised

ENERGY & ENVIRONMENT		
Application field	Indicator	SCORE
City Energy Profile	Final energy consumption per capita	10.00
	Primary energy consumption per capita	10.00
	Primary energy sources (shares)	6.89
	Building connected to the DH-network	0.00
GHG Emissions	GHG emissions per capita	10.00
Waste Management	Recycling rate	6.59
MOBILITY		
Application field	Indicator	SCORE
City Mobility Profile	Modal split	9.25
	Fuel mix in mobility	0.00
	Energy use for transportation	10.00
	Access to public transport	10.00
	Public infrastructure promoting low-carbon mobility	5.16
GOVERNANCE		
Application field	Indicator	SCORE
Economy	Unemployment rate	5.38
	GDP (Gross Domestic Product)	1.89
Initiatives and Strategies of the Public Administration	Smart city factor in a city development strategy	2.50
Public ICT/ Data	Quality of open data	2.50
SOCIETY & CITIZENS		
Application field	Indicator	SCORE
Affordable Housing	Development of housing prices	7.97
	Housing cost overburden rate	0.34
Citizen Engagement and Empowerment	Citizen engagement to climate conscious actions	7.50
	Encouraging a healthy lifestyle	5.00
Urban Structure	Inhabitants in dense areas	10.00

11.3.2 Categories, application fields and indicators prioritised

As explained in section 3.2.3 Step III: Prioritisation of categories, application fields and indicators, the indicators of Vidin have been prioritised according to the city needs and targets, through the AHP method, and the results of this prioritisation are gathered within Table 98 below.

Table 98: Vidin Indicators Weighting per Category and per Application field

ENERGY & ENVIRONMENT					
Application field	Indicator	WEIGHT per Category		WEIGHT per App Field	
City Energy Profile	Final energy consumption per capita	32.75%	100%	51.45%	100%
	Primary energy consumption per capita	14.33%		22.51%	
	Primary energy sources (shares)	14.33%		22.51%	
	Building connected to the DH-network	2.26%		3.54%	
GHG Emissions	GHG emissions per capita	30.25%		100%	100%
Waste Management	Recycling rate	6.09%		100%	100%
MOBILITY					
Application field	Indicator	WEIGHT per Category		WEIGHT per App Field	
City Mobility Profile	Modal Split	10.91%	100%	10.91%	100%
	Fuel mix in mobility	4.63%		4.63%	
	Energy use for transportation	5.69%		5.69%	
	Access to public transport	41.56%		41.56%	
	Public infrastructure promoting low-carbon mobility	37.21%		37.21%	
ENERGY & ENVIRONMENT					
Application field	Indicator	WEIGHT per Category		WEIGHT per App Field	
Economy	Unemployment rate	20.05%	100%	87.50%	100%
	GDP (Gross Domestic Product)	2.86%		12.50%	
Initiatives and Strategies of the PA	Smart city factor in a city development strategy	70.80%		100%	100%
Public ICT / Data	Quality of open data	6.29%		100%	100%
SOCIETY & CITIZENS					
Application field	Indicator	WEIGHT per Category		WEIGHT per App Field	
Affordable Housing	Development of housing prices	58.45%	100%	83.33%	100%
	Housing cost overburden rate	11.69%		16.67%	
Citizen Engagement and Empowerment	Citizen engagement/ empowerment to climate conscious actions	4.88%		75.00%	100%
	Encouraging a healthy lifestyle	1.63%		25.00%	
Urban Structure	Inhabitants in dense areas	23.35%		100%	100%

11.3.3 Aggregation and calculation of the city indexes

As explained in section 3.2.4 Step IV: Aggregation to calculate the city indexes, the indicators of Vidin have been aggregated according to the Linear aggregation method, and the results are city indexes per category and per application fields, collected within the following tables Table 99 and Table 100 below.

Table 99: Vidin Indexes per Category

CATEGORIES INDEXES	
Category	City Index
Energy & Environment	9.12
Mobility	7.65
Governance	3.06
Society & Citizens	7.48

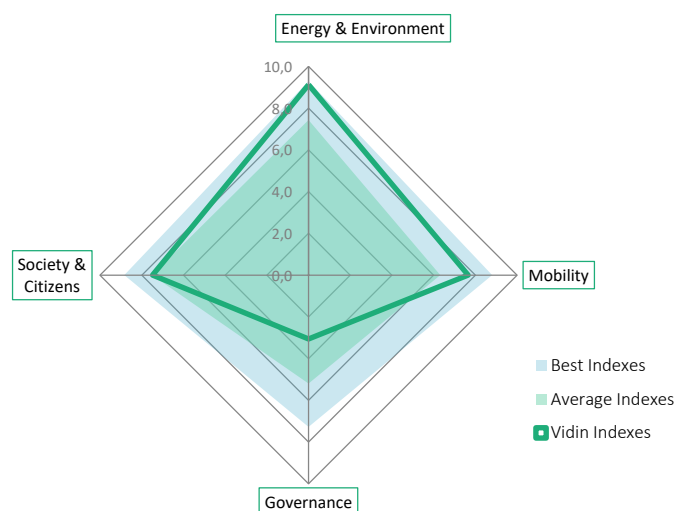


Figure 77: Radar view of Vidin Indexes per Category

In view of the indexes for the categories of Vidin, it has a very good index within Energy & Environment category, being almost the best; although in Governance category it is below 5 and this should be where the city focuses for the next few years.

In terms of **Energy & Environment**, the index is very close to the best one, but this doesn't mean good performance in terms of energy efficiency. Analysing the final energy consumption in the municipality, it can be seen that housing sector presents the largest share (about 70%) of the final energy consumption. Still, the energy consumption in the residential sector is relatively low, because of the fact that many people are unable to maintain optimal comfort in their home because of the low incomes. Actually, Bulgaria is at first place (in EU level) by this indicator, which represents one of the most indicative factors for energy poverty.

Highest scores are given to final and primary energy consumption and to GHG emissions, while the lowest score goes for the Building connected to the DH-network, as there is no DH in Vidin. The main priorities of the city are the final energy consumption and the GHG emissions. Lower priority has been given to DH and recycling rate, which may be an indication of where the city should focus their efforts, since with a temperate climate and many heating degree-days, it is recommended for Vidin to install it.

Regarding **Mobility** category, Vidin index is quite good one. Best scores are for the indicators modal split, energy use for transport and access to public transport, which are very important ones. Worst score is for fuel mix in mobility, which is very far from European goals. Regarding the priorities of Vidin, they are focus in the access to public transport and in public infrastructure for cycling, which in turn is aligned with their scores. A low weight has been given to fuel mix, which is not very adequate, since given the low score in this indicator, electric mobility should be a priority in the city.

Governance is a category where Vidin has a quite low index, which can be due to the low scores of the indicators of GDP, smart city factor and quality of open data. Regarding the weights given by the city, its main priority is the smart city factor what makes sense in the view of the results. Given this index, it is almost clear where Vidin has to focus the next efforts and investments.

In terms of **Society & Citizens** category, Vidin has a really good index, with almost all indicators scores above 5. The worst score is given to housing cost overburden rate, where the city will have to focus in the following years. Main priority for the city in this regard is the development of housing prices, which in turn is related to the aforementioned low score indicator.

In view of the results of the categories indexes for Vidin city, almost all categories are acceptable, only Governance is worse valued and will be the one that should be prioritised in the coming years to bring it to the level of the rest of them.

Table 100: Vidin Indexes per Application Field

APPLICATION FIELDS INDEXES		
Category	Application Field	City Index
ENERGY & ENVIRONMENT	City Energy Profile	8.95
	GHG Emissions	10.00
	Waste Management	6.59
MOBILITY	City Mobility Profile	7.65
GOVERNANCE	Economy	4.95
	Initiatives and Strategies of the PA	2.50
	Public ICT / Data	2.50
SOCIETY & CITIZENS	Affordable Housing	6.70
	Citizen Engagement and Empowerment	6.88
	Urban Structure	10.00

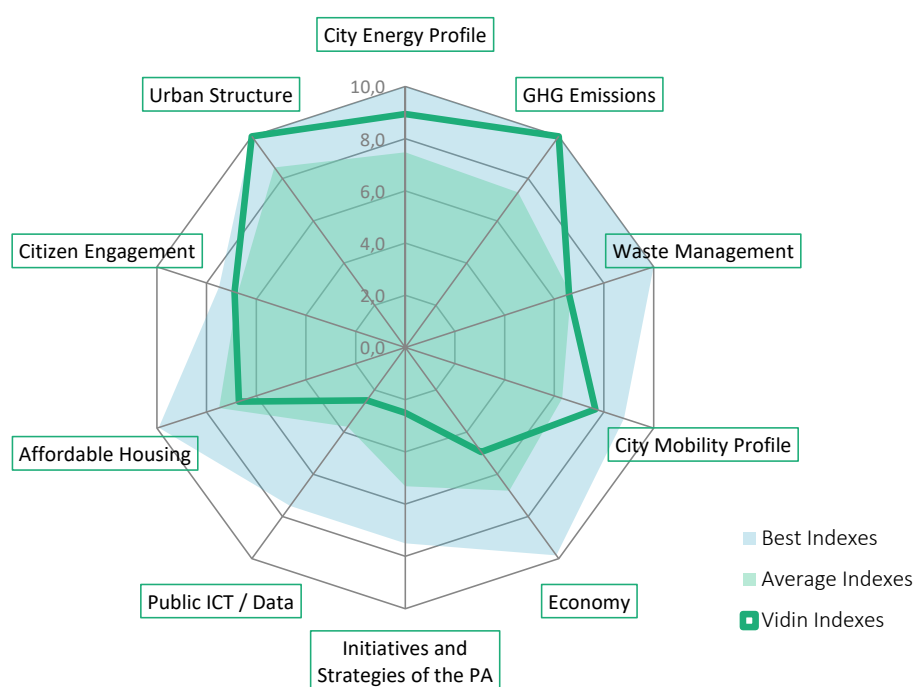


Figure 78: Radar view of Vidin Indexes per Application Field

Regarding the indexes resulting for the city of Vidin in the different application fields, it can be stated that the city is quite good, because most of the indexes are above 5, which indicate that there are no major weaknesses in the city. Best indexes lie in application fields of GHG emissions, urban structure, city energy profile and city mobility profile, which are relevant ones; while lowest indexes are given to Initiatives and strategies of the public administration and public ICT and data; as well as a not good one in economy application field, as explained before.

11.4 Analysis of the existing city plans

11.4.1 Main City plans identified

Within this section, the main information of the existing plans that Vidin has identified is included, following the process explained in the section [4.2 Methodology for the analysis of the existing city plans](#), of the present document. The whole information gathered for each of these plans is collected in the annexes of this document (Annex G: Vidin, [G.2](#)).

Table 101: Vidin Short Term plans

Main city plans identified – Short Term			
Plan	Scope	Description	Topics covered
Municipal Development Plan for Vidin Municipality	Local	The main objective of Vidin Municipality Development Plan for the period 2014 - 2020 is achieving integrated local and social development towards sustainable economy growth, quality standard of life and social security of the population, stored environment and realized potential for territorial cooperation of local, regional and international level.	Energy Mobility Social ICT
Municipal Programme and Action Plan for Energy Efficiency	Local	The Plan is prepared every 10 years based on the energy Efficiency Law and annual monitoring reports are sent to the national Sustainable Energy Development Agency. The programme focuses on the energy efficiency measures in all sectors that the municipality needs to implement to achieve its energy targets. The annual monitoring reports provide energy data of the renovated buildings.	Energy Mobility Social
Municipal Programme for integration of RES and use of biofuels	Local	The Plan is prepared every 10 years based on the Energy Efficiency Law and there are annual monitoring reports sent to the national Sustainable Energy Development Agency. The programme focuses on the deployment of RES installations in public and private buildings aimed at achieving energy independence and the municipal energy targets. Energy audits and technical documentation for realised public RES installations is available.	Energy Social
Programme and Action Plan for reducing levels of PM₁₀ and reaching the established norms for their content in the ambient air in Vidin municipality	Local	The purpose of the program is to reduce the levels of air pollutants on the territory of Vidin municipality and to reach the PM ₁₀ standards in period 2015 - 2020, to reduce the health risk, to control the pollution reduction measures from sanding and hygiene, household heating, transport and construction activities. , activities, formulating measures to improve the quality of the ambient air. It includes an action plan pursuant specifying the measures to be taken in the short term with a view to reducing the risk and limiting the duration of exceeding the established standards, including in adverse weather conditions. The program and action plan are a dynamic document that is open to additions when new information is available, as well as when corrections are made to major municipal databases.	Energy Social Mobility

Waste Management Programme	Local	The programme aims at reflecting the current state and planning of waste activities on the territory of the Municipality of Vidin, in accordance with the regulatory requirements. Waste management is carried out in order to prevent, reduce and limit their harmful effects on human health and the environment. The objectives formulated are consistent with the elements of the National Waste Management Programme and the Programme for the implementation of Directive 99/31 / EU on the landfill of waste.	Energy Social
Plan for Energy Efficiency for Vidin District	Regional	The Regional Energy Efficiency Plan was developed on the basis of Article 11 of the Energy Efficiency Act and in accordance with the National Energy Efficiency Strategy. The main goals of the regional energy efficiency policy are set and derive from the national legislation. In the proposed Energy Efficiency Plan, a set of mechanisms and measures to improve end-user energy efficiency, actions to optimize final energy consumption, as well as the financial mechanisms for their implementation, and identification of opportunities and barriers to implementing energy efficiency policies are developed in Vidin Region.	Energy Mobility Social
National Energy Efficiency Action Plan	National	The National Energy Efficiency Action Plan is developed in accordance with the EED requirements on the basis of a template which ensures the inclusion of all obligations. The requirements of Directive 2010/31/EU on the energy performance of buildings are also taken into account. The energy policy of the Republic of Bulgaria is fully aligned with that of the European Union in terms of energy security, competitiveness and sustainable development. The Energy Strategy of the Republic of Bulgaria for the period to 2020 confirms that "energy efficiency has the highest priority in the country's energy policy". This has served as a basis for setting ambitious energy-efficiency improvement targets.	Energy Mobility Social
National Nearly Zero-Energy Building Plan 2015 - 2020	National	The objective of the NPSBNPE 2015–2020 is to apply the NZEB concept in practice as an alternative for constructing new buildings in Bulgaria after 2018 and, subject to demonstration of cost efficiency, for renovating various subcategories of existing buildings. The plan addresses the increasing need for using energy resources efficiently, improving living standards through energy efficiency and reducing the adverse environmental impacts of the use of fossil fuels.	Energy
National Renewable Energy Action Plan	National	This plan (NREAP) is the main instrument developed to ensure the achievement of the national renewable energy targets. The national indicative target for 2010, set in the Treaty concerning the accession of the Republic of Bulgaria to the European Union and Directive 2001/77/EC, is an 11% share of electricity from renewable sources in the gross domestic consumption of electricity. The National Long-term	Energy Mobility Social

		Programme for the Promotion of the Use of Biofuels for Transport sets a national indicative target of a 5.75% share of biofuels in the consumption of petrol and diesel fuels in the transport sector, which is fully consistent with the Community target as set out in Directive 2003/30/EC. Under Directive 2009/28/EC, Bulgaria's mandatory national target for 2020 is a 16% share of energy from renewable sources in the gross final consumption of energy, including a 10% share of energy from renewable sources in the consumption of energy in the transport sector. In 2005, the respective shares were 9.27% and 0%.	

No plans were identified at Medium Term for the city of Vidin, not even at regional or national level.

11.4.2 Main targets defined in the city plans

As mentioned in Section 4.1.4, the Europe 2020 strategy aimed to become sustainable, smart and economy inclusive. Following Table 102 shows the relation between the main European targets with the targets on the city of Vidin planning.

Table 102: Vidin targets aligned with the European ones

VIDIN targets aligned with the European 2020 targets			
EU target	Plan in which is included	Is the target achieved?	Is there a more ambitious one?
75% population aged 20-64 employed	Municipal Development Plan for Vidin Municipality	YES (75%)	
3% of GDP invested in R&D sector	Municipal Development Plan for Vidin Municipality	NO (1.5%)	
Reduction 20% of GHG emissions	Municipal Programme and Action Plan for Energy Efficiency	YES (20%)	
Increasing 20% of share of RES	Municipal Programme for integration of RES and use of biofuels	NO (16%)	
Improved 20% energy efficiency	Municipal Programme and Action Plan for Energy Efficiency	YES (25%)	
Early school leavers' share reduced under 10%	Municipal Development Plan for Vidin Municipality	YES (11%)	
40% of 30-40 years old with tertiary education	Municipal Development Plan for Vidin Municipality	NO (10%)	

The vision of the development of Municipality of Vidin is to become environment of sustainable growth and renewed urban infrastructure providing socially equal access to services quality and standard of living and social security or population, stored and utilized heritage and the environment developed at tourism, intermodal transport potential, realized at the cross-border level.

The main objective of Municipality of Vidin is achieving an integrated local socio-economic development aimed at sustainable economic growth, improving the quality, standard of living and

social security of the population; safeguard the environment and realizing potential of territorial cooperation at local, regional and international levels.

The specific objectives for development of Municipality of Vidin are the following:

- To achieve local economic growth, based on its own potential for the development of the territory
- Quality and standard of life improvement, personal and public security of the population
- Improvement of technical infrastructure parameters and protection of environment
- Realizing initiatives for territorial cooperation and cohesion

In the Municipal Programme and Action Plan for Energy Efficiency a roadmap for 2025 with a vision for 2030 was developed to achieve the energy savings targets for all sectors in Vidin Municipality. The estimated final energy consumption for 2030 is based on an estimate of a 10-20% reduction in consumption in all sectors compared to the 2016 baseline. The Residential Buildings sector is most relevant to final energy consumption, and the forecast for its reduction in energy consumption is based on the implementation of the National Programme for the Redevelopment of Housing, replacement of inefficient heating systems, and the implementation of behavioural measures and replacement of old appliances.

The main objectives of the RES program of the Municipality of Vidin are the following:

- Reduction of CO₂ emissions in Vidin Municipality: 11% by 2025 (116 thousand tonnes of CO₂) with a view to developing vision, EE targets and achieving them by 2030
- Reduction of energy consumption in Vidin Municipality: 11% by 2025 (342 GWh)
- Reduction of energy consumption in Vidin Municipality: 20% by 2030
- Reduction of CO₂ emissions in Vidin Municipality: 20% by 2030

Vidin has implemented Programme and action plan for reducing the levels of PM₁₀ and reaching the established norms for their content in the ambient air in Vidin municipality. The purpose of the programme is to reduce the levels of air pollutants on the territory of Vidin municipality and to achieve the PM₁₀ standards in the period 2015-2020, to reduce the health risk, to control the pollution reduction measures from sanding and hygiene, household heating, transport and construction activities, formulating measures to improve the quality of the ambient air. Section 9 presents an action plan, specifying the measures to be taken in the short term with a view to reducing the risk and limiting the duration of exceeding the established standards, including in adverse weather conditions. The program and action plan are a dynamic document that is open to additions when new information is available, as well as when corrections are made to major municipal databases.

The Waste Management programme aims at reflecting the current state and planning of waste activities on the territory of the Municipality of Vidin, in accordance with the regulatory requirements. Waste management is carried out in order to prevent, reduce and limit their harmful effects on human health and the environment. The objectives formulated are consistent with the elements of the National Waste Management Programme and the Programme for the implementation of Directive 99/31/EU on the landfill of waste. The main objective for waste is: "By 2020, waste should be managed as a resource. Generate the amount of waste generated per capita in a state of absolute decline and recycle more materials and raw materials of paramount importance. Energy recovery will be restricted to non-recyclable materials only, and landfill will be virtually eliminated".

Based on the analysis of existing waste management practices and the identified problems and non-conformities, as well as taking into account the requirements of national legislation and policy and the specific conditions and needs of the area, the main objectives of the program have been identified:

- Prevention and reduction of waste generation

- Increasing the amount of recycled and recovered waste
- Improvement of the organisation of separation, temporary storage, collection and transportation of waste
- Eco-friendly waste disposal
- Prevention and reduction of the risk of old waste pollution
- Regulation of the waste management and speeding up the implementation of legislation and policy in the area.

11.4.3 Main actions identified to achieve the defined goals

The Municipal Development Plan of Vidin Municipality for 2014-2020 is aimed to achieve local economic growth. The Municipality of Vidin will consider support for activities aimed at stimulating the development of small and medium enterprises (SMEs) in Vidin Municipality in their role of the backbone of local economic development. Among other actions, it is mainly aimed to:

- Providing support to small and medium -sized businesses which should be seen as an irreplaceable element in the process of raising the competitiveness of the economy, based on the local potential for territorial development.
- Support for projects aimed at conservation and sustainable use of the cultural and historical heritage.
- Supporting initiatives that encourage the development of environmentally friendly tourism and promoting the territory of Vidin as a tourist destination.
- Implement projects aimed at recovering existing and construction of new tourist infrastructure and communications to all major tourist sites.
- Supporting activities and projects aimed at improving access to information about the opportunities for development of different types of tourism in the municipality of Vidin.
- Support projects and activities aimed at improving the possibilities for marketing of the produced agricultural production.
- Supporting initiatives for the construction of processing complexes and agricultural exchanges.

To guarantee high quality and standard of life improvement, personal and public security of the population, Municipality of Vidin will consider realization of social projects, aiming renovation and upgrading the energy efficiency of schools and public institutions ownership; it will support the implementation of projects aimed at optimization and modernization of the transport of the traveling students on the territory of the municipality. The Municipality will support the implementation of projects aimed at youth development activities and raising awareness the capacity of educational institutions to work with children and students from socially vulnerable public groups.

As regards to more technical aspects for regional development, the Municipality will work for improvement of technical infrastructure parameters and protection of environment: realization of projects for renovation and/or construction of new roads, sidewalks, alleys, green areas and contiguous infrastructure in the populated areas of Vidin Municipality.

The local governance is considering realization of projects for improving the energy efficiency in building stock; construction of a gas transmission network, construction of a new one water infrastructure and telecommunication networks in the settlements of the municipality.

Within the Municipal Programme and Action Plan for Energy Efficiency, the Municipality of Vidin is aiming to improve the energy efficiency in municipal infrastructure. There will be established two pilot energy-positive zones in the city. This pilot implementation of energy monitoring systems will be placed in the municipal buildings in zone 1 and 2. A system of energy requirements efficiency in the construction of new buildings of municipal property will be developed. Design and construction of public buildings with almost zero energy consumption will be with priority.

A roadmap for 2025 with a vision for 2030 for the achievement of energy savings targets for all sectors in Vidin municipality was developed within the Programme. The estimated final energy consumption for 2030 is based on an estimate of 10-20% reduction in consumption in all sectors compared to the 2016 baseline. The Residential Buildings sector is the most significant for final energy consumption and the forecast for its reduction in energy consumption is based on the implementation of the National Programme for the Renovation of Housing, replacement of inefficient heating systems, as well as implementation of measures related to behaviour change and replacement of old appliances. The main measures in the EE Programme are focused on reducing energy consumption in the housing sector.

Specific measures within this Programme complementing the above one would be:

- Improving energy efficiency in the existing residential buildings on the territory of the municipality, which will be implemented through execution of surveys and energy audits, with recommendations for implementation of measures for energy efficiency of multifamily residential buildings will be implemented.
- It will be established Municipal Fund for Supporting households in energy poverty.
- Social engagement campaigns for promoting energy behaviour change will be organized, as well as campaigns for encouraging high quality heating fuels.
- Improving the energy efficiency of public transport, by the preparation of feasibility analysis and development of a system of incentives for the purchase and use of environmentally friendly transport technologies such as electric vehicles, hybrid buses, etc.
- Implementation of effective traffic management and alternative modes of transport and a new culture of urban mobility, such as the introduction of the Bicycle Knowledge Programme to provide bicycle safety training for children between 5 and 7 years; introducing bicycle training in schools; conducting a "Car Free Day".
- Purchase of electrical cars; and design and installation of electric vehicle charging stations will be considered.
- Increasing the capacity in education of teachers and students is also priority in the local city plans, with measures such as organizing and conducting EE and climate training in primary education; creation of educational materials (a teacher's handbook and a notebook for the student); organizing and conducting planning and training courses management of municipal energy policies for experts by municipal administration.
- Increasing the capacity of the municipal administration for planning, implementation and monitoring of energy efficiency measures will also be considered.

The main actions planned in the Municipal Programme for RES integration are:

- Changing the fuel heating source of residential buildings: Switching from primitive biomass and coal heating to low-efficiency boilers with RES with automatic biofuel supply; and pilot introduction of low efficiency high efficiency heaters.
- Awareness campaigns for the use of high quality fuels for heating in the residential buildings.

Within the Programme and Action Plan for reducing the levels of PM₁₀ and reaching the established norms for their content in the ambient air in Vidin municipality, the main actions to be implemented are related to upgrading and maintaining air quality to reduce total PM₁₀ emissions by 8 ug/ m³, such as:

- A comprehensive methodology will be developed for the use of anti-fogging agents, including the calibration of machines for use in winter conditions and their integration into the winter maintenance plan.
- Training of municipal employees and service companies.
- Development of project proposals for applications for the purchase of modern cleaning equipment, including for washing and anti-icing treatment.
- The governance will concern options for replacing liquid fuel (gas oil) heating in municipal buildings with gas, pellets or chips (where possible).

11.4.4 Actuation areas identified and financial schemes

Although Vidin has no identified actuation areas within the different city plans (among other reasons, because it is a small city to which all actions are directed as a whole), PED zones in Vidin have been identified, as shown in figures [Figure 79](#) to [Figure 81](#) below.



Figure 79: PED zones identified in Vidin

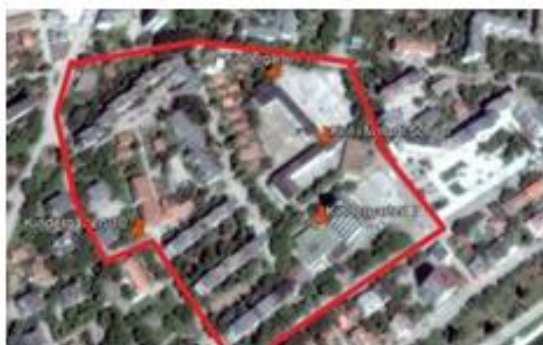


Figure 80: PED zone identified in Vidin: GK Saedinenie and GK Himik

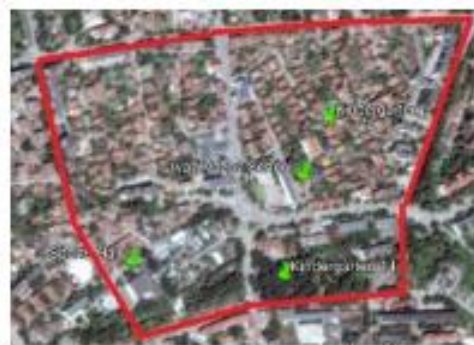


Figure 81: PED zone identified in Vidin: Vida 2

The main financial instruments for implementation of the Action plans of the Municipality are mainly:

- Operational Programme "Regions in Growth" 2014-2020⁶⁹: it is a single operational programme for the whole territory of Bulgaria and is aimed at achieving growth and employment in the Bulgarian regions. The Programme was developed in line with the EU strategy for smart, sustainable and inclusive growth (Europe 2020). OP Regions in Growth 2014-2020 is aimed at meeting the following main thematic objectives under General Regulation No 1303/2013:
 - Supporting the transition to a low carbon economy in all sectors.
 - Preserving and protecting the environment and promoting resource efficiency.
 - Promoting sustainable transport and eliminating insufficient capacity in all key areas network infrastructures.
 - Promoting social inclusion, combating poverty and any form of discrimination.
 - Investing in education, training, including vocational skills training and lifelong learning.

The grant procedure aims to support implementation of integrated plans for urban regeneration and development for sustainable and long-lasting resolution of the high concentration of economic, environmental and social problems in 39 cities of hierarchical level 1, 2 and 3 in accordance with the National concept for spatial development of Bulgaria 2013 - 2025. In accordance with the scheme's objectives and the amounts allocated to the participating Bulgarian municipalities, local administrations can plan projects for the construction or renovation of public or commercial buildings in urban areas, including compliance with the NZEB criteria.

- Operational Programme Environment 2014-2020 (OPE): is designed to support the development of a more competitive low carbon economy with efficient and sustainable use of resources, environmental protection, emission reductions and the prevention of biodiversity loss. The overall objective of the programme is to improve, preserve and restore the natural environment and develop the ecological infrastructure by protecting and improving the water status, the quality of the ambient air and the protection of the soil. Other programme interventions are aimed at reducing noise pollution, improving waste management, protecting

⁶⁹ Operational Programme Regions in Growth 2014 – 2020 website: <http://www.bgregio.eu/>

biodiversity and protecting nature. Priority sectors of the programme are Water, Waste, Biodiversity and NATURA 2000 and climate change policies.

Main beneficiaries of the programme are: municipal administrations, municipal companies, regional associations, associations of municipalities and others.

- Energy Efficiency of Multi-Family Residential Buildings National Programme⁷⁰: it has been oriented to the renovation of multi-family residential buildings with a main objective to secure better living conditions for the residents in the multi-family residential buildings, heat comfort and higher quality of living environment through implementation of energy efficiency measures. The implementation of energy efficiency measures in multi-family residential buildings will contribute to:
 - Higher level of the energy efficiency of multi-family residential buildings and energy costs decrease.
 - Improving the exploitation features for extending the life cycle of the buildings.
 - Providing conditions of living environment in line with the sustainable development criteria.

Implementation Model: municipalities carry out acceptance of applications, evaluation, approval, provide funding, monitoring of the implementation of the measures for energy efficiency of buildings. A mayor of each municipality is responsible for carrying out the whole process on the renovation of residential buildings, located on their area and for the selection of contractors under the public procurement act for implementing the separate activities on buildings.

Eligible activities: activities on structural reconstruction (strengthening), overhaul depending on damages that occurred during the exploitation of multi-family residential buildings, that have been prescribed as obligatory for the building in the technical audit; renovation of common areas of multi-family residential buildings (roof, facade, staircase, etc.); implementation of energy efficiency measures, prescribed as required for the building in the energy efficiency audit.

- Energy Efficiency and Renewable Sources Fund: this Fund was established on the basis of the Energy Efficiency Act (adopted by the Bulgarian Parliament in February 2004) as a legal entity independent from state institutions. The fund operates in accordance with the provisions of the Energy Efficiency Act, the RES Act and the agreements concluded with its donors, and is not included in the national budget. The initial capital of the Fund was raised entirely from grant contributions. The Fund operates as a financing institution by providing loans or loan guarantees and as a consultation centre. It assists Bulgarian companies, municipalities and private individuals developing energy efficiency investment projects. The Fund provides financing, co-financing or guarantees to other financial institutions.

The main principle in the management of the Fund is public-private partnership. The Fund operates in accordance with arrangements and rules developed with the technical assistance of the World Bank, and approved by the Bulgarian government. Users of the Fund are central and local authorities, enterprises, institutions (including educational institutions and health facilities), non-government organisations and individuals.

⁷⁰ <https://www.mrrb.bg/en/energy-efficiency/energy-efficiency-of-multi-family-residential-buildings-national-programme/>

A specific feature is that the Fund develops and manages a wide range of financial products designed to support its clients: investment grants, loans, bridge financing, loan guarantees, capital investment and so on. Favourable terms for the various financing instruments are achieved by cooperation with and involvement of other financial institutions (banks).

- “Danube” 2014-2020 Transnational Cooperation Programme: it is a financial instrument to promote and initiate project ideas related to overcoming common challenges and needs in specific areas to achieve real benefit for the people and build effective relationships between authorities and organisations in the Danube region. The regions covered by the Programme are on the territory of 9 Member States: Austria, Bulgaria, Czech Republic, Germany (federal states of Bavaria and Baden-Württemberg), Croatia, Hungary, Romania, Slovenia and Slovakia and the 3 candidate countries: Bosnia and Herzegovina, Serbia and Montenegro. The Programme has 4 priority axes:
 - Innovative and socially responsible Danube region.
 - Environment and culture responsible Danube region.
 - Better connected and energy responsible Danube region.
 - Well-governed Danube region.

Beneficiaries of the Programme are national, regional and local authorities and non-governmental and private organisations.

- Operational Programme “Good Governance” (OPGG): the vision of this Programme is based on the understanding that strong, effective and transparent state institutions and judiciary have a direct horizontal impact on achieving all goals defined in the Europe 2020 strategy, as they are interrelated. The specific objectives of the programme are aimed at modernizing the management for delivering high quality public services for citizens and business and increasing the efficiency of the administration and the judicial system. The measures should lead to better governance for the benefit of society and the improvement of the business environment in Bulgaria. The main priorities are:
 - Increasing the institutional capacity, effectiveness and efficacy of public administration and judicial system.
 - Providing quality services to citizens and business and development of the e-government and justice.
 - Effective and efficient utilization of EU funds.

11.4.5 Main needs and priorities identified from the analysis of the existing city plans

In the process of developing the strategic framework of the Municipal Development Plan of the Municipality of Vidin 2014-2020, the common European goals of the cohesion policy for economic, social and territorial cohesion have been taken into account. These objectives are defined in the founding document of the EU Regional Development Policy for the period after 2013: Europe 2020 Strategy. The strategy sets out the key objectives of Community cohesion policy in terms of employment, innovation, global threats of climate change and energy dependency, education and poverty. The strategic documents of the Municipality are comprehensive and thoroughly developed. They have been prepared in accordance with the current national legislation.

The Vision for the development of Municipality of Vidin for the period is the environment of sustainable growth and renewed urban infrastructure providing socially access to services high quality and standard of living and social security of population, stored and utilized heritage and the environment; development of tourism; realized intermodal transport potential at the cross-border level.

The defined vision for the development of Vidin Municipality for the period 2014-2020 takes into account the medium- and long-term goals and priorities of regional policy, set out in the strategic documents at different territorial levels in the country: regional, regional, national.

The efforts of the administration should be directed to improvement of the following main aspects:

- Energy and Environment
- Mobility
- Social awareness and engagement
- Building administration capacity

As regards to energy, Vidin Municipality should consider more focused actions to achieve its energy goals. Priority should be given to the residential and public buildings, which are physically depreciated, and most of them without thermal insulation. Heating and electrical installations are morally outdated and energy intensive. Most of the residential buildings are heated by local boiler installations and wood stoves.

In the Municipal Action Plan for Energy efficiency are identified the following difficulties and barriers to the implementation of energy efficiency actions: lack of gasification in Vidin District, insufficient consumer awareness of existing new technologies, and opportunities to reduce consumption.

The main needs for improvement should be focused on reducing energy consumption in the housing sector. The envisaged measures to reduce energy consumption in the Residential Buildings sector are mainly linked to:

- Energy renovation of the buildings
- Promotion of individual RES installations
- Conducting campaigns to reduce energy poverty
- Promoting behaviour change and higher awareness
- Replacement of old home appliances

12City Diagnosis: Lublin

12.1 General overview of the city



Lublin, with a population of 339.7 thousand inhabitants⁷¹, is the largest economic and academic centre in Eastern Poland, as well as the capital of the Lublin province. Occupying an area of 14,747 ha, it is on the 9th place in terms of area in the country. Lublin is the only city in the macro-region with a metropolitan profile, covering the Lublin Metropolitan Area. According to the division of urban centres included in the National Spatial Development Concept 2030 Lublin was included in the group of centres of primary importance for the settlement system of the country and its economy.

According to the division of urban centres included in the National Spatial Development Concept 2030⁷² Lublin was included in the group of centres of primary importance for the settlement system of the country and its economy. In addition to regional functions, Lublin also has a number of functions of national importance and has strong aspirations in the scope of concentration of some metropolitan functions of international importance.

Lublin is located in eastern Poland in the geographical macro-region Wyżyna Lubelska, which is characterized by a varied landform. The valley of the Bystrzyca River, running from SW to NE, divides Lublin into a left-bank part (crossed by deep, dry valleys and ravines) and a right-bank part (in the form of a rather flat denudation plain⁷³).

POLAND	147 km ²	339,700 inhabitants	2,303 people/km ²	OCEANIC / CONTINENTAL CLIMATE

Figure 82: What Lublin is

The city is the central centre of the Lublin Functional Area (FUA), which has 16 municipalities and approximately 546.5 thousand of residents⁷⁴. Lublin is currently perceived as a key business location in Eastern Poland, an excellent location for investment in the services and industry sector and one of

⁷¹ Central Statistical Office, Local Data Bank, Population by age and gender groups, data as at 31st of December 2018.

⁷² National Spatial Development Concept 2030. Ministry of Regional Development, Warsaw 2012. http://www.espon-usespon.eu/dane/web_usespon_library_files/682/national_spatial_development_concept_2030.pdf

⁷³ Solon J., Borzyszkowski J. (ed.), 2018, Physico-geographical mesoregions of Poland: Verification and adjustment of boundaries on the basis of contemporary spatial data, Geographia Polonica (2018) vol. 91, iss. 2.

⁷⁴ Central Statistical Office, Local Data Bank, Population by age and gender groups, data as at 31st of December 2018.

the six largest IT ecosystems in the country. The city from other centres in this part of Poland is distinguished by a very high level of investment outlays, both in the private and public sectors. Lublin is also a thriving academic city. In the city, there are 9 universities that educate over 61 thousand students, what puts Lublin in the forefront of national academic centres, among which it is distinguished by the highest, almost 10% level of university internationalization.



Figure 83: Lublin's highlights

The image of Lublin is shaped by four strategic development areas: openness, friendliness, entrepreneurship and academic. As a city of science and knowledge, Lublin has a high location potential of shared business services centres with a financial-accounting, medical and legal profile. The city also cultivates long-standing traditions of the machine and automotive industries as well as food processing. The priority sectors also include IT services and biotechnology, health care and pharmacy.

According to the division of the world into climatic zones⁷⁵, the city is located in a temperate climate zone between the oceanic and continental climate. At the same time, the Lublin Upland is characterized by a greater influence of the continental climate. This is reflected in the large number of sunny days in the summer, the relatively early date of frost, long spring, high frequency of frosty weather and the large difference between summer and winter rainfall.

Climate changes are reflected in the occurrence of increasingly high temperatures in the summer and mild and humid winters. The most dangerous phenomena for the City of Lublin, which are a consequence of climate change, and which were indicated in the draft Plan for adaptation to climate change in Lublin by 2030⁷⁶ include, among others, heat waves – at least three-day periods with a maximum temperature above 30 °C. In the years 1981 - 2015 in Lublin they occurred 20 times and show a slight upward trend in their duration. Similarly, the number of freezing waves decreases slightly, which means at least three days with a minimum temperature below -10 °C. Other threats to the city and its residents include drought, intense rainfall, winds and storms, for which a slight upward trend has been recorded in recent years.

Table 103: Lublin climate characterisation⁷⁷

CLIMATE CHARACTERISATION	Oceanic / Continental climate
Average annual temperature	8.7 °C
Total annual precipitation	698 mm
Winter average temperature	-0.5 °C (January, February, December)
Summer average temperature	18.3 °C (June, July, August)

⁷⁵ Okołowicz W., 1990, Strefy klimatyczne [in:] Atlas Geograficzny, ed. Henryk Górski, Jędrzejewska W., maps ed. Cukierska Z. et al., PPWK Warsaw, Wrocław (1990), iss 23.

⁷⁶ Plan adaptacji do zmian klimatu dla Miasta Lublin do roku 2030. Project. Lublin, Warsaw 2018.

⁷⁷ Data for 2016.

12.2 City characterisation

12.2.1 Energy & Environment characterization

The energy economy of Lublin is based on electricity, natural gas and heat energy. For supplying the city with electricity, PGE *Dystrybucja Spółka Akcyjna*, Lublin Branch is mainly responsible. The second company conducting distribution operations in Lublin is *Towarzystwo Inwestycyjne Elektrownia Wschód Spółka Akcyjna*. Electricity consumption in Lublin is constantly increasing. In 2008, it was 760,541.67 MWh, and in 2018 already 977,705.38 MWh. The largest group of customers is the industry sector, whose share in the total electricity consumption in 2018 amounted to over 42%. Other sectors – i.e. EU ETS plants, trade and services, and households.

The distribution of natural gas in the city of Lublin is carried out by *Polska Spółka Gazownictwa sp. z o.o.* The largest recipients of natural gas in Lublin are households, the number of which increases every year. The share of households in the total number of recipients ranges from 50 - 60% of the total consumption. The consumption of natural gas in the years 2000-2016 fluctuated from 47,541.3 m³ to 56,689.3 m³. In 2016 (the last year for which data is available) it reached level of 50,723 m³.

The heating system in Lublin consists of a heating network managed by the municipal company *Lubelskie Przedsiębiorstwo Energetyki Ciepłej S.A.* and two heat and power plants: *PGE Energia Ciepła S.A. Oddział Elektrociepłownia w Lublinie Wrotków* and *Elektrociepłownia MEGATEM EC-Lublin Sp. z o.o.* Heat transmission, distribution and heat trading in the Lublin commune are carried out by *Lubelskie Przedsiębiorstwo Energetyki Ciepłej S.A. (LPEC S.A.)*. LPEC in 2018 delivers heat to almost 75% of households in Lublin, heating nearly 250,000 of its inhabitants. LPEC S.A. purchases 100% of heat in combined heat and power plants and then sends them to its customers in the form of hot water with own heating networks. The heat supplied is used for central heating, domestic hot water preparation and ventilation. A strategic group of recipients has been housing construction for years. The housing market covers about 68% of heat deliveries realized by LPEC. This group is dominated by multi-family buildings belonging to housing cooperatives and communities. They consume over 99% of heat directed to the housing sector.

Among renewable sources, solar energy is the most important. The Lubelskie Voivodeship belongs to the regions that have one of the best conditions for using solar energy in the country. This potential is determined by the annual solar power density and ranges from about 1050 to about 1150 kWh/m². The commune of Lublin used solar energy in public buildings and lighting, as well as in public transport.

In the Hajdów sewage treatment plant since 2000, renewable energy has been produced in generating sets fed with biogas produced in the process of anaerobic fermentation of sewage sludge. In 2010, two new generating sets with an electric power of 850 kW were commissioned, each fed with biogas obtained in the sewage sludge fermentation process. Biogas produced in the fermentation process is used to produce electricity and heat used for the own treatment plant's needs. The Lublin region also has untapped potential for the development of energy based on geothermal energy.

The assessment of the environmental condition of the Lublin Province (including Lublin) is carried out by the Lubelskie Voivodeship Inspector for Environmental Protection based on the results of measurements of the State Environmental Monitoring in Lublin. Air quality measurements are conducted in two measuring stations (at *ul. Obywatelska 13* and at *ul. Śliwiński 5*), based inter alia on automatic measurements of continuous pollution SO₂, NO₂, NO_x, CO, C₆H₆, O₃, PM₁₀ and PM_{2.5}. The level of CO₂ pollution is measured annually for the largest Polish cities⁷⁸. However, level of CO₂ pollution is measured only for particularly burdensome plants.

⁷⁸ Central Statistical Office, Local Data Bank, Emissions of gaseous pollutants, data as at 31st of December 2018.

On July 1, 2013, a waste management system was implemented in Poland, which obligatorily covers all property owners. The aim of the system is to achieve by the end of 2020 at least 50% (by weight) of the recycling level in the case of paper, metals, plastics and glass and at least 70% (by weight) the level of recycling in the case of demolition construction waste constituting municipal waste⁷⁹. Detailed data on waste management can be found in the annual "Analysis of the municipal waste management status of the city of Lublin".

12.2.2 Mobility characterization

The priority activity of the Lublin Commune is a permanent investment in the public transport fleet. From 2013, measures have been taken to create a modern transport system that is characterized by the use of modern technologies that limit the emission of pollutants emitted by traditional buses. Starting from the use of photovoltaic panels on the roofs of buses, whose task was to reduce the vehicle's demand for energy obtained from the gasoline combustion process, purchase of modern buses meeting the EURO 5 and EEV emission standard, expansion of the trolley fleet and infrastructure, and purchase of an electric bus. In 2018, the zero-emission transport indicator in Lublin was over 30%. In subsequent years, Lublin plans to further increase zero-emission rolling stock, both the purchase of new trolleybuses and electric buses in order to achieve a zero-emissivity ratio above 50%. In order to promote the use of public transport in Lublin, a number of concessions for its users were introduced. Some of them were imposed on the cities by law, however, some of them result from the initiative of the city. Free public transport is available to children up to the age of 7, pupils of public primary schools from the Lublin commune and people aged 65 or over.

Since 2014, a city bike system has been operating in Lublin. According to data from 2018, 1011 city bikes were located at 101 rental stations, including tandems and children's bicycles. In order to develop a new urban mobility, commercial solutions were also introduced in the city consisting of borrowing electric scooters (Blinkee.city⁸⁰) and hybrid cars (PANEK Car-sharing⁸¹) for minutes.

In 2015, pursuant to a resolution of the City Council, Paid Parking Zone was created to shape the flow of city traffic in the city centre and limit the use of traditional cars and the promotion of other alternative forms of transport. Holders of motor vehicles with electric or hybrid drive with emissions below 100 g/km specified in the certificate of conformity or certificate of conformity of the European Communities for complete vehicles may apply for the issuance of an ID entitling to free use of the paid parking zone in Lublin. In Lublin there are 6 generally accessible electric vehicle charging stations.

In connection with the entry into force of the Act of January 11, 2018 on electro-mobility and alternative fuels⁸² many responsibilities for the development of new urban mobility and low and zero-emission transport were imposed on Polish cities. These obligations relate, inter alia, to the need to ensure at least 30% share of electric vehicles in the fleet of vehicles of the Lublin City Hall. However, the most important obligation concerns the preparation of infrastructure in the form of vehicle charging stations, the number of which depends on the number of inhabitants.

⁷⁹ The Act of 1 July 2011 amending the act on maintaining cleanliness and order in municipalities and certain other acts, Journal of Laws 2011 No. 152, item 897.

⁸⁰ Blinkee website: <https://blinkee.city/pl>

⁸¹ PANEK car-sharing website: <https://www.panekcs.pl/>

⁸² Act of January 11, 2018 on electro mobility and alternative fuels, Journal of Laws 2018, item 317.

12.2.3 Governance characterization

The idea of smart city and the process of raising the city's intelligence began with the Lublin Development Strategy 2013 - 2020, which gave foundations for creating its own intelligent model of city development. In the city of Lublin, the smart city concept is implemented in line with the smart city 3.0 generation, in which residents co-create the city and have a real influence on decision-making thanks to the participatory management model supported by modern technology. The city of Lublin focuses on the implementation of such solutions that are justified both in terms of their usefulness and from an economic point of view.

An essential element of the Smart City strategy implementation is Open Data, which is a solid foundation for the functioning of each city. The main purpose of data sharing by self-governments is to increase the potential of their economy, develop innovation, and thus generate new jobs. In addition, data opening has many tangible benefits for both citizens and the administration. Open Data means richer e-government services that respond to the real needs of residents, reduce the costs of updating and publishing data, increase the efficiency of operations, openness and transparency of the decision-making process and improve the operation of offices and enterprises.

Lublin as a city with aspirations for being smart must meet the expectations of its residents and other stakeholders, as well as current global trends defined by the so-called the idea of Human Smart Cities. It consists in opening up to an active attitude of residents in creating further development. The role of local authorities is to create space to exploit the potential of citizens. This applies to both encouraging residents to use modern technologies (e.g. through educational projects for people excluded digitally), as well as enabling them to create their own technological solutions (e.g. through open data). In order to preserve the current dynamics of Lublin's development, and perhaps also to intensify it, opening and sharing urban data is a necessity. The development of such an Open Data model in Lublin is still an issue to be solved. It will be efficient for urban institutions and accessible to recipients, first of all urban data characterized by a high degree of usefulness and an attractive form for stakeholders.

12.2.4 Society & Citizens characterization

In 2018 Lublin had 339,700 residents. It should be noted that this number has been gradually decreasing since 1999, when it reached 359.2 thousand residents. This is undoubtedly connected with the population movement on the suburban areas. A city can be considered aging in terms of demographics. There is a growing share of population in the post-working age⁸³. Lublin is an academic city, where in 2018, over 61,000 students studied at 9 universities students, of which over 6,000 are foreigners from 94 countries⁸⁴. There are 188 students per 1000 inhabitants, which places Lublin in the fifth place in this respect in the country⁸⁵.

The retention of young and educated graduates of higher schools is important for the city as well as attracting human capital from outside. One of the factors facilitating the growth of Lublin's attractiveness is the maintenance of a high level of housing availability at moderate prices. Lublin's housing market is in recent years one of the most promising in the country – competitive in terms of prices compared to other Polish metropolises (Warsaw, Kraków, Wrocław, Poznań and Gdańsk). This is due to the good availability of construction land, market demand stimulated by the government program "Apartment for the Young" and good situation on the labour market: low unemployment rate

⁸³ Central Statistical Office, Local Data Bank, Population by functional age and gender groups divided into city and village, data as at 31st of December 2018.

⁸⁴ Study in Poland. Studenci zagraniczni w Polsce 2018, Fundacja Edukacyjna „Perspektywy”, September 2018.

⁸⁵ Akademieskość polskich miast, Polski Instytut Ekonomiczny, Warsaw 2019.

http://pie.net.pl/wp-content/uploads/2019/06/PIE-Raport_Akademicko%C5%9B%C4%87.pdf

and an increase in wages. In comparison with 2013, the price availability of flats, both new and used, increases each year. However, it is not possible to avoid price increases on the Lublin housing market, which is associated with increases in construction materials and labour costs⁸⁶.

The specificity of the Lublin management model is a strong socialization of the decision-making process. Over the past few years, more and more important issues from the point of view of residents have been consulted socially using a variety of participative tools. The compromise, developed thanks to their use, is the basis for making decisions of a strategic nature for the administration. The main tools used in the process of including residents in co-deciding about Lublin are the Citizens 'Budget, the green budget or the citizens' panel, which are the axis of the Smart City 3.0 concept. This model also creates the latest strategy of Lublin 2030, whose main assumptions will be worked out with the participation of residents in the participatory process planned for two years.

⁸⁶ Rynek mieszkaniowy w Lublinie. Analiza, RynekPierwotny.pl, Warsaw 2018.

12.3 City indexes calculation

12.3.1 Indicators Normalised

As explained in section [Error! No se encuentra el origen de la referencia. Error! No se encuentra el origen de la referencia.](#), the indicators of Lublin have been normalised according to the ranking of indicators method, and the results of this normalisation are gathered in the table below (Table 104Table 42). The calculation of the indicators is included in deliverable D5.1 as well as in the annexes of this document (Annex H: Lublin, [H.1](#)).

Table 104: Lublin Indicators Normalised

ENERGY & ENVIRONMENT		
Application field	Indicator	SCORE
City Energy Profile	Final energy consumption per capita	10.00
	Primary energy consumption per capita	10.00
	Primary energy sources (shares)	10.00
	Building connected to the DH-network	10.00
GHG Emissions	GHG emissions per capita	2.12
Waste Management	Recycling rate	10.00
MOBILITY		
Application field	Indicator	SCORE
City Mobility Profile	Modal split	8.84
	Fuel mix in mobility	0.00
	Energy use for transportation	7.63
	Access to public transport	4.39
	Public infrastructure promoting low-carbon mobility	2.36
GOVERNANCE		
Application field	Indicator	SCORE
Economy	Unemployment rate	10.00
	GDP (Gross Domestic Product)	3.73
Initiatives and Strategies of the Public Administration	Smart city factor in a city development strategy	7.50
Public ICT/ Data	Quality of open data	5.00
SOCIETY & CITIZENS		
Application field	Indicator	SCORE
Affordable Housing	Development of housing prices	6.28
	Housing cost overburden rate	9.93
Citizen Engagement and Empowerment	Citizen engagement to climate conscious actions	7.50
	Encouraging a healthy lifestyle	7.50
Urban Structure	Inhabitants in dense areas	10.00

12.3.2 Categories, application fields and indicators prioritised

As explained in section 3.2.3 Step III: Prioritisation of categories, application fields and indicators, the indicators of Lublin have been prioritised according to the city needs and targets, through the AHP method, and the results of this prioritisation are gathered within Table 105 below.

Table 105: Lublin Indicators Weighting per Category and per Application field

ENERGY & ENVIRONMENT					
Application field	Indicator	WEIGHT per Category		WEIGHT per App Field	
City Energy Profile	Final energy consumption per capita	3.81%	100%	11.74%	100%
	Primary energy consumption per capita	6.09%		18.77%	
	Primary energy sources (shares)	13.89%		42.80%	
	Building connected to the DH-network	8.66%		26.69%	
GHG Emissions	GHG emissions per capita	23.52%		100%	100%
Waste Management	Recycling rate	44.03%		100%	100%
MOBILITY					
Application field	Indicator	WEIGHT per Category		WEIGHT per App Field	
City Mobility Profile	Modal Split	4.59%	100%	4.59%	100%
	Fuel mix in mobility	10.11%		10.11%	
	Energy use for transportation	5.99%		5.99%	
	Access to public transport	49.01%		49.01%	
	Public infrastructure promoting low-carbon mobility	30.30%		30.30%	
ENERGY & ENVIRONMENT					
Application field	Indicator	WEIGHT per Category		WEIGHT per App Field	
Economy	Unemployment rate	18.41%	100%	50.00%	100%
	GDP (Gross Domestic Product)	18.41%		50.00%	
Initiatives and Strategies of the PA	Smart city factor in a city development strategy	33.26%		100%	100%
Public ICT / Data	Quality of open data	29.93%			100%
SOCIETY & CITIZENS					
Application field	Indicator	WEIGHT per Category		WEIGHT per App Field	
Affordable Housing	Development of housing prices	8.33%	100%	25.00%	100%
	Housing cost overburden rate	25.00%		75.00%	
Citizen Engagement and Empowerment	Citizen engagement/ empowerment to climate conscious actions	16.67%		50.00%	100%
	Encouraging a healthy lifestyle	16.67%		50.00%	
Urban Structure	Inhabitants in dense areas	33.33%		100%	100%

12.3.3 Aggregation and calculation of the city indexes

As explained in section 3.2.4 Step IV: Aggregation to calculate the city indexes, the indicators of Lublin have been aggregated according to the Linear aggregation method, and the results are city indexes per category and per application fields, collected within the following tables Table 106 and Table 107 below.

Table 106: Lublin Indexes per Category

CATEGORIES INDEXES	
Category	City Index
Energy & Environment	8.15
Mobility	3.73
Governance	6.52
Society & Citizens	8.84

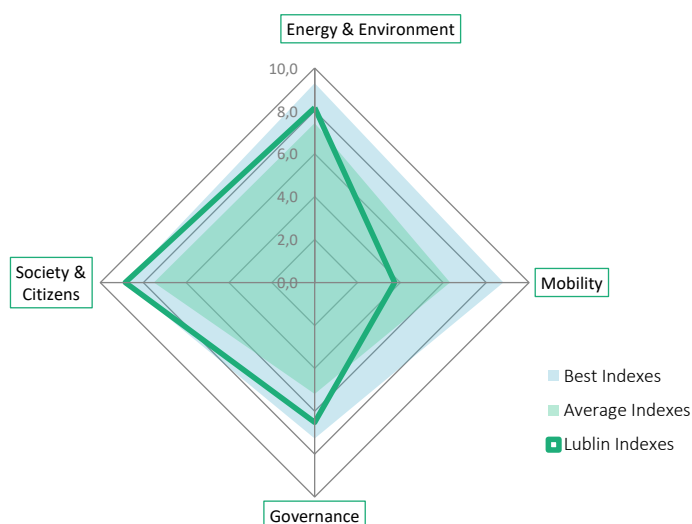


Figure 84: Radar view of Lublin Indexes per Category

In relation to the indexes obtained by Lublin in the different categories, it has a very good index within Energy & Environment category, and the best of the project cities in Society & Citizens. However, the index of Mobility is below 5, so this stands out where the city will have to focus on the coming years.

Regarding **Energy & Environment** category, the index is quite high, with the European targets achieved in all indicators except in GHG emissions, which is very low. In the case of Lublin it is clear the part of energy and environment that needs to be improved. City's highest priority is focused on recycling rate, followed by GHG emissions per capita, to which they will have to dedicate greater efforts in the following years (since the rest of indicators have little room of improvement for now).

Within **Mobility** category, Lublin has an index below 5, which points out the need to improve this sector. Best score is for modal split, meaning that there is a good percentage of non-private motor vehicle travels; followed by energy use for transport; both are relevant indicators. Lowest scores are given to fuel mix in mobility, which highlights the need of the city to invest and encourage electric or low-emissions mobility, and for public infrastructure promoting low-carbon mobility, which is referred to public infrastructures for cycling mobility. City's priorities are mainly focused on the access to public transport first, and then on public infrastructure for cycling mobility, which is aligned with the score results.

In **Governance** category, Lublin has a good index, with adequate scores in almost all indicators except in the GDP one. This is an indication that the income in the city is low, which can lead to a certain level of energy poverty, which would explain to some extent the low energy consumption of the city (too good values in all indicators within energy and environment category), but it is not justified as good practices or exemplary case if the low energy consumption is due to the fact that the inhabitants are not able to maintain their homes at an adequate temperature. Priorities of the city are fairly distributed among all the indicators within this category, being the main priority the smart city factor in a city development strategy, where the city has already a good score.

In terms of **Society & Citizens**, Lublin has the best index within this category among the project cities, which means that the city is doing a good job in this regard and more to improve, what it should do is

continue with the same line. All indicators scores are above 5, and quite well valued in most of the cases. Highest priority of the city is urban structure, which indicates the suitability of the areas of the city to develop PED, and in which Lublin has its best score; followed by housing cost overburden rate, in which the city has also a good value, pointing out where the current priorities of the city has been focused.

Lublin has all in all quite acceptable values in the categories, it only falter in Mobility, where the city has to focus their next efforts and priorities. It has remarkable good values both in Energy & Environment and in Society & Citizens, which indicates that a good job is being done in those categories.

Table 107: Lublin Indexes per Application Field

APPLICATION FIELDS INDEXES		
Category	Application Field	City Index
ENERGY & ENVIRONMENT	City Energy Profile	10.00
	GHG Emissions	2.12
	Waste Management	10.00
MOBILITY	City Mobility Profile	3.73
GOVERNANCE	Economy	6.87
	Initiatives and Strategies of the PA	7.50
	Public ICT / Data	5.00
SOCIETY & CITIZENS	Affordable Housing	9.01
	Citizen Engagement and Empowerment	7.50
	Urban Structure	10.00

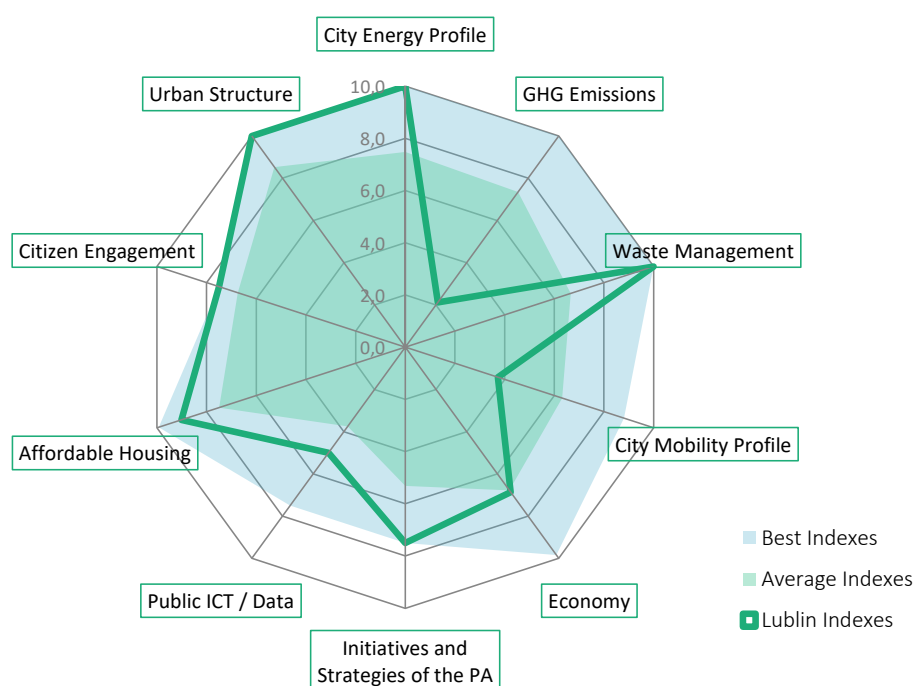


Figure 85: Radar view of Lublin Indexes per Application Field

In view of the indexes on application fields for the city of Lublin, there are some of them with really good indexes, such as city energy profile, waste management, urban structure and even affordable housing. And there are others application fields that the city will have to improve and make investments, such as GHG emissions and city mobility profile.

12.4 Analysis of the existing city plans

12.4.1 Main City plans identified

Within this section, the main information of the existing plans that Lublin has identified is included, following the process explained in the section [4.2 Methodology for the analysis of the existing city plans](#), of the present document. The whole information gathered for each of these plans is collected in the annexes of this document (Annex G: Lublin, [H.2](#)).

Table 108: Lublin Short Term plans

Main city plans identified – Short Term			
Plan	Scope	Description	Topics covered
Development Strategy for the City of Lublin	Local	The 2020 Lublin Development Strategy goes beyond patterns adopted for this type of documents in terms of the concept, structure and method of publication. The strategy for developing the "city of inspiration" was drawn up as evolutionary and inspiring. It defines priority areas for the major changes desirable for Lublin's development, perceived as being of key importance in the prospect of more than just eight years. Strategic objectives, stressing their complementary character, and at the same time complementing it with aspects significant for the city's development, determining balancing the development and providing for its innovation have been pointed out in the form of four Areas for Development: Openness, Friendliness, Entrepreneurship and Academic spirit.	Social Mobility
Low Carbon Economy Plan	Local	The low-emission economy plan for the city of Lublin is a document in which activities and measures are planned to increase energy efficiency, increase the amount of energy produced in renewable energy sources and reduce greenhouse gas emissions in the city. The plan includes a database on energy consumption, emissions of CO ₂ and the amount of energy obtained from RES in Lublin. Main goal of the plan is the improvement of the level and quality of life of the Lublin community, implementation of the European Union's energy and climate policy and improvement of air quality in the city. Detailed objectives are the reduction of energy consumption in the Commune of Lublin by 9.5% compared to the base year 2008; the reduction of carbon dioxide emissions by 23% compared to the base year 2008; increasing the use of energy from RES from 2.8% to 16.92% compared to the base year 2008; and the reduction of dust emission to the air.	Energy
Sustainable Mobility Plan (I STAGE)	Local	The Sustainable Mobility Plan covers issues related to spatial development of the city; influencing the demand for travel; the role of pedestrian and bicycle traffic; the role of public transport; the role of the car; parking; cargo transport; fiscal impact; transport education. The plan complements and	Mobility ICT

		develops existing planning and strategic documents with issues related to demand management for transport. The spatial and transport policy of Lublin applies the principles of traffic zoning, understood as the differentiation of the principles of communication service in specific areas of the city.	
The Revitalization Programme for Lublin	Local	The Revitalization Programme is a continuation of the previous programme from 2009 and is the basic document of a strategic and operational nature serving the process of revitalization, i.e. defining goals, directions of activities and revitalization projects, as well as defining principles of coordination and management as well as mechanisms for monitoring and evaluating the program. The essence of revitalization is to make these activities have a well-thought-out, comprehensive and integrated character (and thus they are more effective than before), and above all, to focus on the human being, and thus on the quality of life of the residents in the city.	Social

Table 109: Lublin Medium Term plans

Main city plans identified – Medium Term			
Plan	Scope	Description	Topics covered
Sustainable Mobility Plan (II STAGE)	Local	(Same as the STAGE I description)	Mobility ICT
Plan for the sustainable development of public mass transport for the commune of Lublin and Neighbouring municipalities	Regional	The main objective of this Plan is to ensure the functioning of public transport in accordance with the principles of sustainable development, the main manifestation of which is the share of public transport in all transport at the level of not less than 50%. The supplementary objectives are such as ensuring the rules of access to public transport services, operation of public transport to create a viable alternative to the implementation of passenger car travel, integration of public transport, reduction of the negative impact of transport of the environment, maintaining the assumed economic and financial efficiency of public transport within a given framework transport policy.	Mobility ICT

12.4.2 Main targets defined in the city plans

As mentioned in Section 4.1.4, the Europe 2020 strategy aimed to become sustainable, smart and economy inclusive. Following Table 110 shows the relation between the main European targets with the targets on the city of Lublin planning, including a somewhat broader spectrum of plans than those addressed in the previous section.

Table 110: Lublin targets aligned with the European ones

LUBLIN targets aligned with the European 2020 targets			
EU target	Plan in which is included	Is the target achieved?	Is there a more ambitious one?
75% population aged 20-64 employed	Strategy for Solving Social Problems of the City of Lublin for the years 2014 - 2020	NO	
3% of GDP invested in R&D sector	Strategy for increasing expenditure on R&D in order to achieve the assumptions of the Lisbon Strategy (National Level)	NO	
Reduction 20% of GHG emissions	Targets that have been lowered ⁸⁷ to be realistic with the current situation of the city and set attainable goals, included in: - Low Carbon Economy Plan	NO	YES: reduction by 23% compared to 2008
Increasing 20% of share of RES		NO (16.92%)	
Improved 20% energy efficiency		NO	
Early school leavers' share reduced under 10%	(not a target of Lublin since is currently accomplished) ⁸⁸	YES	
40% of 30-40 years old with tertiary education	Similar target included in: - Development Strategy for the City of Lublin for the years 2013 – 2020 [Academic Spirit chapter]		

The most important document describing the actions desirable for development that should be implemented by the local government is the Lublin Development Strategy 2013 - 2020⁸⁹. In the Lublin 2020 Strategy, four main development areas of the city were distinguished: Openness, Friendliness, Entrepreneurship and Academic Spirit. The need to focus on these areas is a consequence of the conducted analyses and development of the goals of the previous development strategy of the city of Lublin. This strategy is not a list of all activities carried out by the local government, but describes the scope of essential changes desired for the development of Lublin. The strategy does not assign the implementation of these priorities to specific structures, but puts them as tasks for all, within the limits of the competences assigned to them, along with the need for their integral cooperation. Equally, this document is also an offer of self-government cooperation addressed to institutions and entities that recognize the objectives set as common. It can be an inspiration for their own plans and initiatives, guaranteeing the favour of the local government. The strategy assumes voluntary involvement in its implementation and forms the basis for building multiple partnerships for the implementation of its tasks. To facilitate this, great importance in the document was attached to social participation, as well as to imagination and value, because they help define common goals. The principle of optimization of the goal network in connection with the "too short quilt" effect favours the integration of forces that help implement the Strategy. The Lublin 2020 Strategy is a guide for other

⁸⁷ Reduction of energy consumption in the Lublin commune by 9.5% compared to the base year 2008.

Reduction of carbon dioxide emissions by 23% compared to the base year 2008.

Increasing the use of renewable energy from 2.8% to 16.92% compared to the base year 2008.

⁸⁸ In Poland in 2017, the early school leavers share was 5%. Source:

https://ec.europa.eu/education/sites/education/files/document-library-docs/et-monitor-report-2018-poland_pl.pdf

⁸⁹ 2020 Lublin Development Strategy:

https://lublin.eu/gfx/lublin/userfiles/public/pliki_do_pobrania/strategia_rozwoju_lublina_na_lat/lublin_development_strategy_2013-2020.pdf

sectoral plans and strategies emerging in the city, which, as part of its assumptions, are at the same time complementing it. This means that all goals defined in the sector plans and strategies of Lublin serve to achieve the goals of the Lublin 2020 Strategy.

After analysing the main objectives set in urban plans, they can be divided into issues concerning urban mobility, energy and environment as well as society (concerning sustainable development, culture, health, education). However, attention should be paid to the permeability of these groups among themselves. Each of the objectives touches the social aspect, because its achievement serves to increase the quality of life of residents, just as the environmental aspect links the goals formulated in the framework of mobility and energy.

The main area in which Lublin is developing in recent years is urban mobility. The goal is still to improve the city's accessibility, as well as the development of transport infrastructure inside. Along with the development of the city, both in terms of urban mobility and technical infrastructure, it is necessary to ensure its energy efficiency and low emissivity. The priority for the city is to provide conditions for the development of low-emission multimodal transport, as well as to improve the energy efficiency of buildings and to reduce CO₂ emissions.

The priority for Lublin in the social field is to improve the quality of life of its residents by access to a high level of education at its every stage. The key is to attract and retain young talents by supporting entrepreneurship, including creative industries. It is also necessary to achieve an increase in civic activity and inclusion of residents in co-deciding about the city. The specificity of the city also implies the need to build the openness of residents to other cultures and nationalities. The city must also take care of people who are worse in life for various reasons. The city's goal is professional activation as well as prevention of social exclusion. Due to the historical character of the city, it is important to ensure the protection of the cultural heritage on which city tourism is built. This is also related to the provision of well-designed public spaces (including green areas and public facilities that will be a place of integration).

The future of Lublin, providing the city with sustainable development opportunities and, above all, the use of development opportunities offered by the European Union financial perspective for the 2014 - 2020 programming period are the key reasons for the creation of the Lublin 2020 Strategy and the sectoral strategies that complement it. This is also the reason to start work on the development of the current strategy: the Lublin Development Strategy for 2021 - 2030. The challenges facing us result not only from equalizing disproportions in the development of the largest Polish and European cities. They also apply to integrated management and increasingly rely on entering the city into international cooperation networks, by fostering the situations in which Lublin will prove to be an important and even necessary link of economic connections, scientific and cultural contacts. It is therefore important that Lublin's goals are compatible with the goals set by current and future partners not only at the national level but also at the European and global level.

12.4.3 Main actions identified to achieve the defined goals

The implementation of the Lublin plans is based on the "management by objectives" method, which is complementary, but also superior to "management through procedures". Management by objectives concentrates the causative potential around the task without determining predetermined ways of doing it. As part of each of the objectives, a set of actions, both soft and investment ones, was selected to achieve specific results. These tasks can be divided into investment and non-investment projects.

Investment activities in the field of urban mobility usually result from the tasks of the local government and concern the development of technical infrastructure. The most important actions are summarized in the list below:

- Construction of access roads to transport hubs built in recent years in the Lublin bypass
- Construction of the Lublin Airport
- Traffic Management System
- Development of trolleybus traction and rolling stock development of low-emission city buses
- Creation of bus lanes
- Development of Lublin City Bike
- Construction of the Park & Ride car park
- Modernization and extension of the water and sewerage network, extension of the landfill and development of environmentally friendly waste management system, extension and modernization of the rainwater sewerage system.

The activities carried out by private partners that are part of the city's strategic objectives in the area of the development of new urban mobility include, among others, the development of car sharing by the company PANEK S.A.⁹⁰ or scooter sharing by blinker.pl⁹¹. In Lublin there are also many social organizations that show high activity in, among others, promotion and education regarding walking and cycling. These activities are reflected in improving the quality of life of residents and the comfort of moving around the city in the same way as they improve the quality of the environment.

Increasing the city's energy efficiency was accomplished, in addition to tasks related to mobility, through the Low Emission Reduction Programme. Lublin as one of the first cities in Poland has started activities aimed at improving air quality and reducing low emissions through financial support for residents who have decided to replace old furnaces and boilers for solid fuels.

Actions to improve the quality of life of residents (their activation and various forms of support) are appreciated by both residents and non-governmental organizations. Participative activities include, among others, the Civic Budget, the Green Civic Budget, the Youth Civic Budget as well as The Civic Panel. In the field of health protection, the city implements many preventive programs whose aim is to improve the health of residents. In Lublin, Residential Service Centres (hereinafter: BOM) were established where residents receive information on how to handle official matters. Free legal advice is also offered in the city. The inhabitants in a difficult life situation are supported as part of social assistance operating on the basis of the Social Problem Solving Strategies of the City of Lublin 2014 - 2020. Special attention is also given to seniors and people with disabilities. In the city, the Social Support and Social Activation Programme in the City of Lublin is also implemented.

Strengthening cultural values takes place through the active protection and renovation of cultural heritage objects, as well as through the introduction of temporary art to the streets and squares. The Breakthrough moment was the discussion with Lublin entrepreneurs regarding the cleaning up of the city centre from unsanitary advertising. More and more signs and advertisements refer to the style of the historic urban space and do not disfigure. This attractiveness is also influenced by many completed investments, including the completion of the Centre for Meeting of Cultures, refurbishment of the promenade, extension of the hotel base and numerous modernizations of the Old Town tenement houses.

It is also the responsibility of the city to take care of the free time of its inhabitants (the development of Lublin's recreational offer and the promotion of outdoor activities). To this end, more and more recreational areas and sports facilities are being built in the city (Arena Lublin city stadium, Aqua Lublin swimming pool complex, indoor swimming with gymnasium, rugby courts and athletics stadium). Thanks to the appropriate infrastructure that meets the highest standards, Lublin had the

⁹⁰ PANEK car-sharing website: <https://www.panekcs.pl/>

⁹¹ Blinker website: <https://blinker.city/pl>

opportunity to host sports events such as European U-21 Championships (2017), Polish Swimming Championships (2017), 94th PZLA Polish Athletics Championships (2018), U-23 World Championship 20 (2019).

Lublin, however, is primarily cultural events. Periodically, events are held in the city, which gather the masses from all over the world - the Night of Culture, the Festival of the East of Culture, Other Sounds of Art'n'Music, Carnaval Sztukmistrzow (Mountebanks Carnaval) and the Jagiellonian Fair.

The inextricable sphere of life in Lublin is academic. Science is present not only in lecture halls, but is felt throughout the city in virtually all its dimensions: business, culture, physical culture, environment, etc. Lublin is building stronger and stronger partnerships between the city and universities. The city implements many activities aimed at improving the quality of education, as well as increasing the safety and improving the health situation of students in Lublin.

Supporting the creation of an entrepreneurial ecosystem, based on local enterprises and creative entrepreneurship is a prerequisite for the development of positive entrepreneurial attitudes in the city. Entrepreneurs from the city have the option of applying for a real estate tax exemption for creating new jobs, exemption from income tax from natural and legal persons, as well as using a variety of support and advisory programs. Lublin is involved in the promotion of the creative industries sector. Strengthening the potential of this sector has been used since 2013 by the Creative project. It is a film and photo story about Lublin's creative class, in which there are entrepreneurs operating at the interface between art, handicrafts and technology.

Not all of these activities have been recorded in strategies and plans. These lists are not closed due to the fact that the implementers of the Strategy are not only the structures of city administration, but all entities active in the city that want to pursue any of the objectives contained in it. All activities that are in line with the strategic objectives set out in urban documents, and are implemented by private entities, are supported as much as possible by the city authorities, who try to combine them with other implemented activities or with partners with similar goals.

The duration of strategic urban documents was in the years from 2013 to 2023, so the majority of the tasks included in them were successfully completed. However, some of them have been postponed due to financial or legal and organizational reasons. One of the main investments of this type is the construction of a metropolitan station, which is to start in mid-2020. There are also tasks, these are, in particular, socio-economic and cultural tasks (which are cyclical and are repeated annually). The tasks related to the development of low-emission transport as well as environmental protection will also be continued (including low emission limitations). Actions in the field of circular economy are also planned.

12.4.4 Actuation areas identified and financial schemes

The strategic documents in Lublin are prepared with great care. All activities that are entered there result from the analyses carried out both in terms of goals to be achieved and economic viability. Usually these tasks are assigned to a specific and justified location. The exceptions are non-investment tasks, which are implemented as needed throughout the city (social projects or those of an economic nature). This approach is to serve the city's uniform development and prevent the growing divergence between its various districts.

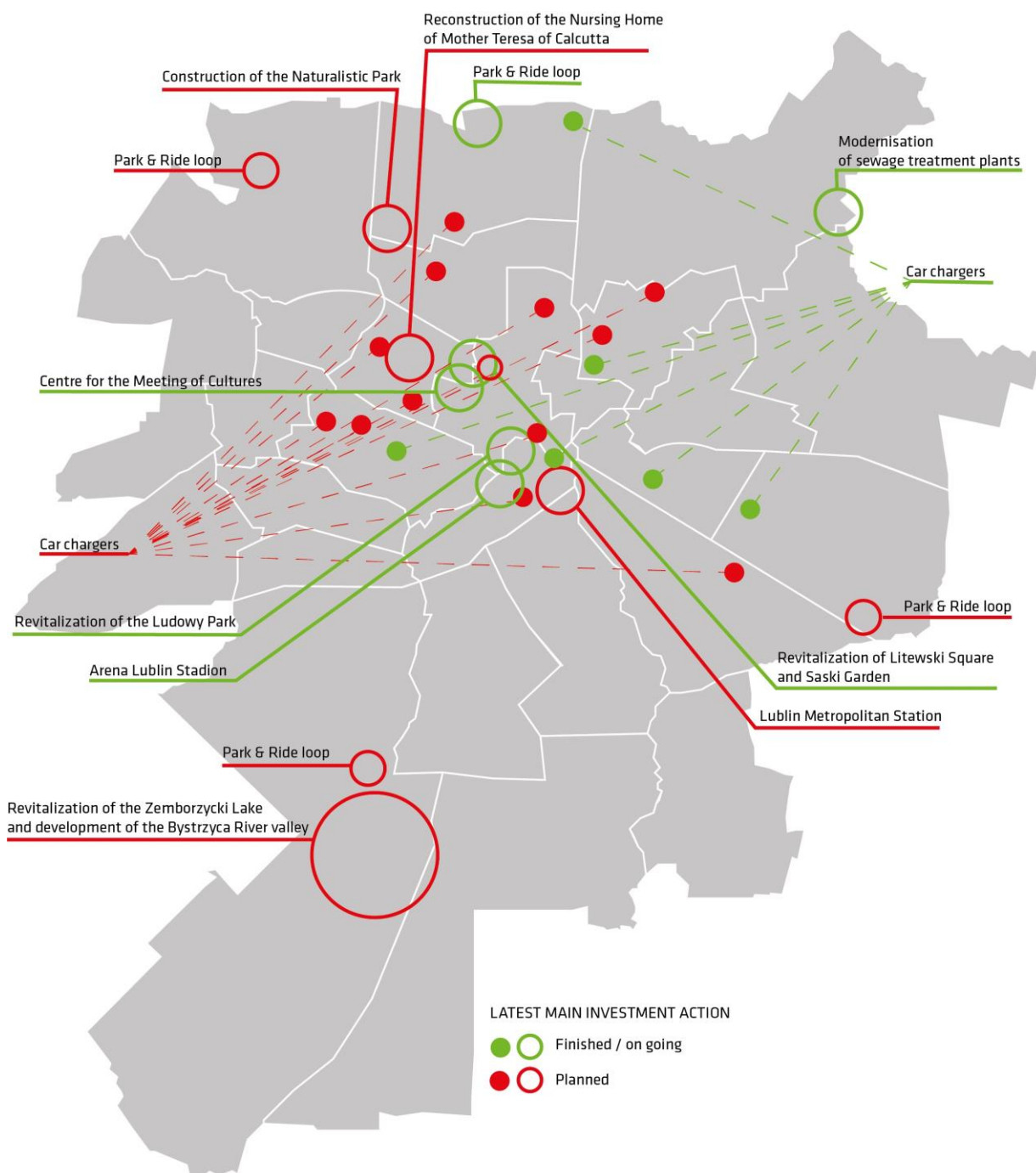


Figure 86 below shows a map of the latest main actions taken in Lublin, already finished and on-going areas are in green colour and planned action areas with the new budget 2020 are in red colour. Road constructions or ITS are not included as there are no specific areas of the city (these actions somehow cover the entire city).

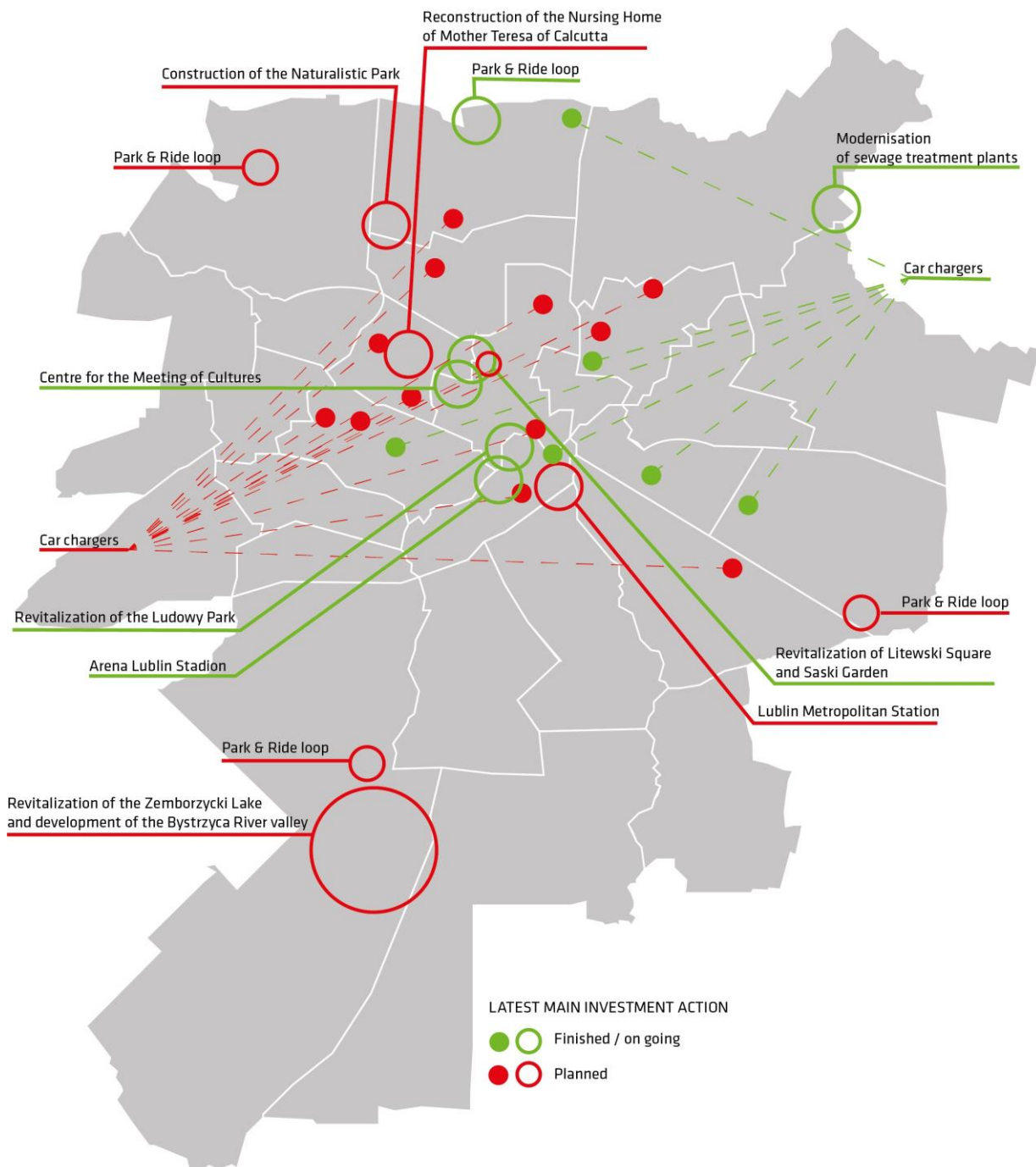


Figure 86: Actuation areas of Lublin planning

Every action planned in urban strategies requires adequate financial outlays. Some of the tasks listed in them are financed by the city, some of the costs are incurred by the partners who jointly implement joint projects (universities, enterprises, local government institutions, NGOs, etc.) using their own budgets and external subsidies. An additional, but extremely important, source of financing is EU funds from the financial perspective 2014 - 2020.

12.4.5 Main needs and priorities identified from the analysis of the existing city plans

Improving air quality in the city will be a priority for Lublin in the coming years. It is a long term and interdisciplinary task that will be implemented through a number of activities in various areas, especially in the context of new mobility, energy and heating.

The city will have to meet the requirements of the national level. The problem for Lublin is the implementation of ambitious projects and plans and turning them into effective actions in the real space of the city. This implementation requires qualified staff and the use of new business models as well as large financial outlays and the active involvement of all stakeholders; the last two seem to be the most difficult.

Another important issue regards the availability and accumulation of hard and reliable data, which will form the base for possible action. With the rudimentary data, we will never get an overall picture that will show us the actual needs and results.

Lublin may indicate as the main needs and priorities:

- understanding and implementation of national regulations;
- obtaining favourable financing for these purposes and using new business models to achieve better results;
- improving staff qualifications;
- improving the quality of city's cooperation with private entities to implement interdisciplinary projects,
- improving efficiency in data collection and analysis;
- finding the right tools to involve residents and other stakeholders in working together to improve air quality and energy transformation.

13 Conclusions

The work presented in this document has a twofold scope. On the one hand, a methodology is developed both to calculate a city indexes characterising the cities, and to analyse the existing city plans. On the other hand, city diagnosis for each of the project cities is carried out, analysing the city characteristics following the previous methodology, reaching city indexes; and the existing city plans, with a view to advanced long-term planning.

The methodology for the calculation of the city indexes is based on the calculation of the City Level Indicators, which are an input from WP5. The method is developed through four steps:

1. Calculation of the indicators values.
2. Normalisation of the indicators with a method based on European targets and scoring the indicators from 0 to 10, being 0 the worst value and 10 the best one.
3. Prioritisation of indicators, application fields and categories in which are grouped the indicators, in order to have the vision of the cities about their needs and priorities in the obtaining of the indexes.
4. Aggregation of the normalised indicators and the weights from the prioritisation, getting final indexes by categories and application fields for each city.

This obtaining of several city indexes is put in context for the circumstances of each city thanks to the characterisation carried out by each city in each of the aspects for which the indexes are obtained, since the objective is not to make a ranking of cities or obtain a global index as a city score, but to analyse each one in context to serve as the city diagnosis in the realization of a new 2050 city vision approach, which is the main aim of the WP1.

In this line, the analysis of the existing city plans is done in the same way by all cities to get to know the needs and priorities in the city planning in order to establish the future developments of the WP1 based on this analysis. The selected plans are mainly focused on energy and mobility topics, regardless of urban strategic planning in most cities. Although there is a tendency to separate Energy topic from the Spatial Planning [20], there is a direct relationship between them (energy related planning and strategies in the spatial planning), and the lower integration of these issues decreases the capacity to develop low-carbon cities in the long-term. For the future task within WP1, the role of the land use planning will be taken into account for long-term strategic urban planning because of the relationship with the energy planning in cities.

From the analysis contained in this deliverable, several points can be drawn in common for the different cities in terms of the analysis and diagnosis based on the City Level Indicators. First, the two Lighthouse cities of MAKING-CITY project are in general terms those that obtain better indexes in the different categories and application fields (as a result of better values in the indicators). As for the categories indexes, Lighthouse cities are the only two cities that have the index of the four categories above the average of the cities.

Focusing on the results of each particular category, the common points of cities in **Energy & Environment** are the low scores in building connected to the DH-network indicator, which although some cities have a really good percentage, they mostly do not reach the proposed target value according to their type of climate (many do not have any DH-network at all). Priorities of the cities in this category coincide quite a bit, with GHG emissions per capita indicator being the highest priority, followed by recycling rate.

Within **Mobility** category, it can be highlighted that all cities are very far from the European target in electric mobility (10% of the fuel mix). They also generally have poor public infrastructure promoting

low-carbon mobility (cycling mobility infrastructure). Cities have good access to public transport stops, as well as an acceptable percentage of non-private motor vehicle transport.

In the **Governance** category, there are substantial imbalances between cities that make a difference in terms of GDP, which may have an influence on other categories such as energy due to energy poverty. Regarding priorities, almost all cities coincide giving the most weight to the Smart city factor in a city development strategy.

As for **Society & Citizens**, there are good indexes in general, being the best for most of the project cities inhabitants in dense areas indicator, which shows the suitability of most areas in the city to develop PED areas. Priorities are very diverse depending on the needs and context of each city.

In the pathway to develop a City Vision 2050, both the analysis of the existing city plans and the city diagnosis through the city level indicators will guide the cities by knowing their needs and priorities towards the definition of the Long-Term vision.

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Annex A: Groningen

A.1 City Level Indicators

Table 111: Groningen City Level Indicators calculation

ENERGY & ENVIRONMENT				
Application field	Indicator		VALUE	UNIT
City Energy Profile	Final energy consumption per capita		24.60	MWh/cap
	Primary energy consumption per capita		30.60	MWh/cap
	Primary energy sources	Solid fossil fuels	0.00%	%
		Natural gas	51.80%	
		Oil and petroleum	24.00%	
		Renewables and biofuels	4.30%	
		Electricity from the grid	19.90%	
		Solid fossil fuels	0.00	MWh/cap
		Natural gas	15.85	
		Oil and petroleum	7.34	
		Renewables and biofuels	1.32	
		Electricity from the grid	6.09	
	Building connected to the DH-network or renewable energy grid		1%	% of buildings/city
GHG Emissions	GHG emissions per capita		5.40	Tonnes of CO ₂ /cap
Waste Management	Recycling rate		78%	% of tonnes
MOBILITY				
Application field	Indicator		VALUE	UNIT
City Mobility Profile	Modal split	Walk	15%	%
		Bike	55%	
		Public transport	3%	
		Non-car transport	73%	
		Car (private motor vehicle)	27%	
	Fuel mix in mobility	Gas oil and diesel oil	43.20%	%
		Gasoline	54.50%	
		Liquefied Petroleum Gases	2.10%	
		Electricity	0.20%	
		Other fuels	0.00%	
	Energy use for transportation		6.20	MWh/cap
	Access to public transport		98%	% of people

	Public infrastructure promoting low-carbon mobility	275.00	Km/100,000 people
GOVERNANCE			
Application field	Indicator	VALUE	UNIT
Economy	Unemployment rate	7.20%	% of active population
	GDP (Gross Domestic Product)	44,800	€/cap
Initiatives and Strategies of the Public Administration	Smart city factor in a city development strategy	4	Likert scale
Public ICT/ Data	Quality of open data	3	Likert scale
SOCIETY & CITIZENS			
Application field	Indicator	VALUE	UNIT
Affordable Housing	Development of housing prices	-4.00%	% of change or % of €/m ²
	Housing cost overburden rate	9.40% ⁹²	%
Citizen Engagement and Empowerment	Citizen engagement to climate conscious actions	4	Likert scale
	Encouraging a healthy lifestyle	4	Likert scale
Urban Structure	Inhabitants in dense areas	95.30%	% of people

⁹² Data at country level since Groningen data are not available

A.2 Existing City Plans



ANALYSIS OF THE EXISTING CITY PLANS

City	GRONINGEN			
PLAN #1				
Title	The Next City; the Groningen living quality first			
Description of the Plan	Strategic vision for the city of Groningen, integral vision for urban development (housing, work, mobility, energy, social).			
Implementation Period	2018 - 2030			
Scope of the Plan	Local			
Topics covered	Energy	Mobility	Social	
Defined Targets				
Target #1				
Target	Facilitate growth to 250,000 inhabitants			
Related actions	Build 20.000 homes			
Actuation areas	2/3 of those 20.000 are built inside the city in redevelopment areas, such as Suikerfabriek and Stadshavens.			
Implementation status	Just getting started			
Execution period	2020 - 2030			
Financial scheme	Mixed: land is partly owned by municipalities, partly by project developers.			
Target #2				
Target	15,000 new jobs			
Related actions	Redevelopment of former industrial sites			
Actuation areas	Inner City Redevelopment, redevelopment of former industrial sites, new regulations.			
Implementation status	On-going			
Execution period	2015 - 2030			
Financial scheme	Mostly private development, except for the public space.			
Target #3				
Target	Accelerate energy transition			
Related actions	Energy-neutral 2035. All new homes energy neutral. Stop using natural gas in homes within 15-20 years. Stimulate emission free traffic in city enter. Smart-grid development. Promote solar.			
Actuation areas	City center on emission free transport. North-west of city for DH-network. Several energy-neutral zones identified (Eemskanaal-zone, Meerstad, Suikeunie terrain, Europapark, Oosterhamrikzone, Rivierenbuurt).			

Implementation status	On-going
Execution period	2018 - 2035
Financial scheme	Varied: earmarked municipal budgets and connections to many sectoral policies.
Target #4	
Target	Improve quality of living
Related actions	Less space for parking cars. More public space. More biking lanes. New neighbourhoods must have mix of functions.
Actuation areas	Diverse areas, both inner city and in the other neighbourhoods.
Implementation status	On-going
Execution period	2015 - 2030
Financial scheme	Municipal funds.
Target #5	
Target	Improve social welfare
Related actions	Urban renewal with aspects of education, welfare and health. Also improve the neighbourhood shopping centres as places to meet.
Actuation areas	Four urban renewal zones: Selwerd, Indische Buurt, Beijum and De Wijert.
Implementation status	Just getting started
Execution period	2020 - 2030
Financial scheme	Public and private.

 ANALYSIS OF THE EXISTING CITY PLANS				
City		GRONINGEN		
PLAN #2				
Tittle		Groningen CO ₂ -Neutral 2035 and Routemap 2023 - 2035		
Description of the Plan		Plan to become a CO ₂ neutral city. The routemap is a more specific program for the period until 2023 and then 2035. The goals mentioned are the ones for 2035. In 2023 there are intermediate goals.		
Implementation Period		2018 - 2023 / 2018 - 2035		
Scope of the Plan		Local		
Topics covered		Energy		
Defined Targets				
Target #1				
Target		Energy-neutral municipality		
Related actions		34% energy savings. 31% production within city limits. 35% import of renewable energy.		
Actuation areas		-		
Implementation status		On-going		
Execution period		2018 - 2035, focus on 2023		
Financial scheme		There are about 2 million of annual budget linked specifically to the Roadmap. Budget is typically assigned, however, within existing sectoral plans in which many of the measures mentioned in the Roadmap are either included or need to be included when new plans and programmes are developed.		
Target #2				
Target		Housing (2023 targets)		
Related actions		7.5% saving on heat by isolation. 50 MWp solar PV on roofs. 10 MWp solar boilers on roof. 5% housing on heat grid (6000 homes). 5000 heat pumps (3000 air and 2000 solar).		
Actuation areas		Construction of heat grids in several areas (Europapark, Northwest, Grunobuurt, Ebbingekwartier, Sugarfactory area, station area).		
Implementation status		On-going		
Execution period		2019 - 2023		
Financial scheme		Notably linked to sector housing (see Plan #3).		
Target #3				
Target		Offices and light industrial buildings (2023 targets)		
Related actions		7% savings on heat demand by isolation. 30 MWp solar PV on roofs. 5% of companies on district heating grid. 5% with ground heat pump. 5% on biomass. 100% offices at least energy label C (20% at least label A).		
Actuation areas		-		

Implementation status	On-going
Execution period	2019 - 2023
Financial scheme	-
Target #4	
Target	Industry (targets 2023)
Related actions	Prepare for 2035 goals of 50% electric heat production and 25% biomass. 1% efficiency improvements per year.
Actuation areas	-
Implementation status	Just getting started
Execution period	2019 - 2023
Financial scheme	-
Target #5	
Target	Mobility (targets 2023)
Related actions	15% CO ₂ reduction in personal traffic. 25% bus traffic without emissions. 20% CO ₂ reduction in car freight.
Actuation areas	-
Implementation status	On-going
Execution period	2019 - 2022
Financial scheme	-
Target #6	
Target	Energy production (targets 2023)
Related actions	150 MWp solar PV in parks. 10.6 MWp installed capacity wind. Biofuels (road: 5% / network: 5%). Prepare geothermal options.
Actuation areas	Meerstad-Noord as priority zone to pursue the development of a new energy neutral/positive neighbourhood (solar park + wind turbines).
Implementation status	On-going
Execution period	2019 - 2022
Financial scheme	-
Target #7	
Target	Neighbourhood energy approach
Related actions	Develop Energy transition plans for every neighbourhood (and village). Link energy challenges to other spatial and socio-economic challenges in neighbourhoods.
Actuation areas	Each neighbourhood will get its own plan. This plan is based on (1) develop a neighbourhood energy vision: through an analysis done with an energy transition model translated in a first proposal, (2) develop a neighbourhood energy plan: active participation by citizens to identify preferred options, (3) implementation programme: actual budgeting, milestones and interventions.
Implementation status	Just getting started
Execution period	2019 - 2023 and beyond
Financial scheme	-



ANALYSIS OF THE EXISTING CITY PLANS

City	GRONINGEN			
PLAN #3				
Title	Housing Strategy			
Description of the Plan	Strategic vision on housing in Groningen. Describes the needed quantity and quality of the housing in Groningen, both for the owner-occupied homes and the rental sector (both commercial and social). Also describes on which households to focus in the policy.			
Implementation Period	2014 - 2020			
Scope of the Plan	Local			
Topics covered	Energy	Social		
Defined Targets				
Target #1				
Target	Affordable and good quality			
Related actions	Limit the selling of single family houses by housing cooperations to the private market. Improve energy efficiency of existing housing stock. Collaborate with student organisations for housnig for youth. Prioritize low income households. Maintain social housing stock.			
Actuation areas	-			
Implementation status	On-going			
Execution period	Up until 2030			
Financial scheme	Action Plan Social Rent: 500,000€ per year. Youth, elderly and poverty: 430,000€ per year. Additional (cheap) housing & sustainability: 456,000 € per year.			
Target #2				
Target	Sustainability: energy neutral in 2035			
Related actions	All new houses as of 2017 energy neutral. Individual house owners are accommodated to join in with actions housing associations. District Heating in North West of city. Energy portal for citizens. Smart city pilots. 1000 social rent houses energy neutral. Promote collective WKO.			
Actuation areas	Area North West for heating network (Paddepoel, Selwerd). Hoogkerk for Smart pilots.			
Implementation status	On-going			
Execution period	Up until 2030			
Financial scheme	Additional (cheap) housing & sustainability: 456,000€ per year.			

Target #3	
Target	Housing and (health) care
Related actions	Modernize housing for elderly. Improve information and campaigns. Care-taker get priority in getting social housing. Obstacle free routes between elderly housing and services. Improve collaboration with social work. Health care.
Actuation areas	-
Implementation status	On-going
Execution period	Up until 2030
Financial scheme	Youth, elderly and poverty: 430,000€ per year.
Target #4	
Target	Improving housing for youth
Related actions	Activate investors. Creation of investment fund. Project financing. Improve existing youth housing. Permit system for all projects deducting available rooms with 3 or more and splitting up single family homes. Removal of 'no more than 15% students in an area rule' in some places.
Actuation areas	Selwerd and Innercity are allowed to have more than 15% of students.
Implementation status	On-going
Execution period	Up until 2030
Financial scheme	Youth, elderly and poverty: 430,000€ per year.



ANALYSIS OF THE EXISTING CITY PLANS

City	GRONINGEN			
PLAN #4				
Title	Programme Living Quality			
Description of the Plan	Promotion of an integrated approach to ensure sectoral action helps create liveable environments where people want to live; targeting both existing inhabitants and the increase of possibilities to attract skilled talents.			
Implementation Period	2019 - 2022			
Scope of the Plan	Local			
Topics covered	Social	Mobility		
Defined Targets				
Target #1				
Target	Promote robust and resilient areas			
Related actions	Climate adaptation action (make a specific plan and continue with opening up more space for water and inundation). More public green, nature, landscape and biodiversity.			
Actuation areas	Specific areas are targeted for more green and nature development.			
Implementation status	On-going			
Execution period	2019 - 2022			
Financial scheme	5,500,000€ overall for four years, not split in targets.			
Target #2				
Target	Healthy Safe & Sustainable Living			
Related actions	Healthy use of public space (e.g. walking, biking, sports in parks). Eating and participating in urban green (urban farming, sustainable food). Reduce and fix air quality, noise nuisance and soil pollution.			
Actuation areas	Some places are targeted for projects.			
Implementation status	On-going			
Execution period	2019 - 2022			
Financial scheme	5,500,000€ overall for four years, not split in targets.			
Target #3				
Target	Promote quality of places			
Related actions	Design meaning full public spaces. Regain public spaces. Improved bike parking.			
Actuation areas	Only on a project base.			
Implementation status	On-going			
Execution period	2019 - 2022			
Financial scheme	5,500,000€ overall for four years, not split in targets.			

 ANALYSIS OF THE EXISTING CITY PLANS				
City	GRONINGEN			
PLAN #5				
Tittle	Programme on Traffic and Transport			
Description of the Plan	Programme aiming for further reduction of car traffic by promoting notably biking and walking and a further greening of public transport and car-mobility. Essence is to maintain accessibility while promoting energy efficiency and liveability.			
Implementation Period	2019 - 2022			
Scope of the Plan	Local			
Topics covered	Mobility			
Defined Targets				
Target #1				
Target	Promotion sustainable transport			
Related actions	Roll-out electric charging stations. No emission zones. Tenders for emission free public transport. Electrify own cars.			
Actuation areas	-			
Implementation status	On-going			
Execution period	2019 - 2022			
Financial scheme	Not specified			
Target #2				
Target	Promotion smart mobility			
Related actions	Creation of Mobility Innovation Centre			
Actuation areas	-			
Implementation status	Finalished			
Execution period	-			
Financial scheme	Total: 140,000€ (four years)			
Target #3				
Target	Greening of urban logistics			
Related actions	Promote CO ₂ free logistics. Bundling delivery services. Cargo bikes.			
Actuation areas	-			
Implementation status	On-going			
Execution period	2019 - 2022			
Financial scheme	Total: 1,500,000€ (four years)			

Target #4	
Target	Promote traffic safety
Related actions	Prioritize problem areas. Target behavioural tools. Prevention.
Actuation areas	The prime areas where accidents occur are priority.
Implementation status	On-going
Execution period	2019 - 2022
Financial scheme	Total: 3,100,000€ (four years)
Target #5	
Target	Maintain and promote biking
Related actions	New biking routes. More bike parking.
Actuation areas	Specific routes and areas for parking.
Implementation status	On-going
Execution period	2019 - 2022
Financial scheme	Total: 2,300,000€ (four years)



ANALYSIS OF THE EXISTING CITY PLANS

City	GRONINGEN			
PLAN #6				
Tittle	Economic Agenda 2015 - 2019			
Description of the Plan	Pursue becoming an international knowledge city, an attractive city and entrepreneurial city through intensive cooperation with strategic partners.			
Implementation Period	2015 - 2019			
Scope of the Plan	Local			
Topics covered	Social	Energy	ICT	
Defined Targets				
Target #1				
Target	International knowledge city			
Related actions	Improved profiling (national and international). Improved collaboration (e.g. strengthen collaboration with universities and university hospital). Innovate (e.g. on Zernike campus, ICT). Overall focus areas: energy and healthy aging.			
Actuation areas	Zernike Campus is a key location due to mix of Hanze Hogeschool, various University of Groningen Faculties and a growing group of companies. Notably issues related to energy - including the Energy Academy Europe and Entrace - are key vehicles for growth.			
Implementation status	On-going			
Execution period	2015 - 2019			
Financial scheme	-			
Target #2				
Target	Attractive City			
Related actions	Increase visitors to inner city. Be attractive for attracting talent (international and national). Profile as a liveable/attractive city. Improved accessibility.			
Actuation areas	Targets the Innercity mostly.			
Implementation status	On-going			
Execution period	2015 - 2019			
Financial scheme	-			
Target #3				
Target	Entrepreeurial City			
Related actions	Create covenant with companies.			
Actuation areas	-			
Implementation status	On-going			
Execution period	2015 - 2022			
Financial scheme	-			



ANALYSIS OF THE EXISTING CITY PLANS

City	GRONINGEN			
PLAN #7				
Tittle	Regional Housing Document Groningen-Assen Region			
Description of the Plan	The document has references regarding urban energy initiatives, with an overview of agreements and policies regarding residential areas.			
Implementation Period	2017 - 2030			
Scope of the Plan	Regional			
Topics covered	Energy			
Defined Targets				
Target #1				
Target	Energy developments in a village north of the city			
Related actions	A new residential area is developed as energy-neutral.			
Target #2				
Target	New residential areas in Groningen developed in a sustainable way (<i>ladder duurzame verstedelijking</i>)			
Related actions	Relevant context provided regarding the expected further growth of the city of Groningen.			

 ANALYSIS OF THE EXISTING CITY PLANS				
City		GRONINGEN		
PLAN #8				
Tittle		Heat Plan Province of Groningen, 2016-3		
Description of the Plan		Plan of relevance for developments in the city of Groningen. Although most of the sustainable heating efforts will take place in the industry, residential neighbourhoods are mentioned as well. Energy conservation is stressed as a relevant for this challenge, but still, the plan is focusing on large scale, central heating projects.		
Implementation Period		2016 - 2020		
Scope of the Plan		Regional		
Topics covered		Energy		
Defined Targets				
Target #1				
Target		Energy conservation		
Related actions		Existing building stock needs to be developed in such a way, that every dwelling has an improved energy performance in the near future. The remaining demand for heat can be provided with a mix of sources that is area-specific, or tailor-made.		
Target #2				
Target		Central heating projects at large scale		
Related actions		-		

 ANALYSIS OF THE EXISTING CITY PLANS				
City	GRONINGEN			
PLAN #9				
Tittle	Climate Agreement			
Description of the Plan	Joinment of forces between the Dutch government and more than 100 stakeholders, including large businesses, NGOs, and other governmental levels, to come up with a climate plan covering the themes of: Buildings, Electricity, Industry, Mobility and Agriculture.			
Implementation Period	2030			
Scope of the Plan	National			
Topics covered	Energy	Mobility		
Defined Targets				
Target #1				
Target	Reduce greenhouse gas emissions in the Netherlands in 2030 by 49% compared to 1990 levels			
Related actions	Enhancing the energy efficiency of 1.5 million homes and 1 million utility buildings. New buildings will no longer be heated with natural gas, existing buildings need to be improved to enable fossil-free heating as well. Municipalities take the lead in a local, participative approach, to make housing emission free. All new passenger cars to be emission-free by 2030. Incentives for electric vehicles through several taxation measures, including in support of the used car market; 1.8 million charging points by 2030. Modal shift from car to bicycle/public transport. Smart solutions will enable logistics to organize more efficient and sustainable transport.			

Annex B: Oulu

B.1 City Level Indicators

Table 112: Oulu City Level Indicators calculation

ENERGY & ENVIRONMENT				
Application field	Indicator		VALUE	UNIT
City Energy Profile	Final energy consumption per capita		23.00	MWh/cap
	Primary energy consumption per capita		26.00	MWh/cap
	Primary energy sources	Solid fossil fuels	27.00%	%
		Natural gas	0.00%	
		Oil and petroleum	30.00%	
		Renewables and biofuels	35.00%	
		Electricity from the grid	9.00%	
		Solid fossil fuels	6.67	MWh/cap
		Natural gas	0.00	
		Oil and petroleum	7.19	
		Renewables and biofuels	8.56	
		Electricity from the grid	2.11	
	Building connected to the DH-network or renewable energy grid		61%	% of buildings/city
GHG Emissions	GHG emissions per capita		5.50	Tonnes of CO ₂ /cap
Waste Management	Recycling rate		99%	% of tonnes
MOBILITY				
Application field	Indicator		VALUE	UNIT
City Mobility Profile	Modal split	Walk	22%	%
		Bike	21%	
		Public transport	4%	
		Non-car transport	47%	
		Car (private motor vehicle)	54%	
	Fuel mix in mobility	Gas oil and diesel oil	52.00%	%
		Gasoline	32.00%	
		Liquefied Petroleum Gases	0.00%	
		Electricity	2.00%	
		Other fuels	14.00%	
	Energy use for transportation		7.00	MWh/cap
	Access to public transport		70%	% of people

	Public infrastructure promoting low-carbon mobility	1,000.00	Km/100,000 people
GOVERNANCE			
Application field	Indicator	VALUE	UNIT
Economy	Unemployment rate	9.60%	% of active population
	GDP (Gross Domestic Product)	31,300	€/cap
Initiatives and Strategies of the Public Administration	Smart city factor in a city development strategy	4	Likert scale
Public ICT/ Data	Quality of open data	4	Likert scale
SOCIETY & CITIZENS			
Application field	Indicator	VALUE	UNIT
Affordable Housing	Development of housing prices	1.90%	% of change or % of €/m ²
	Housing cost overburden rate	6.60%	%
Citizen Engagement and Empowerment	Citizen engagement to climate conscious actions	4	Likert scale
	Encouraging a healthy lifestyle	4	Likert scale
Urban Structure	Inhabitants in dense areas	56.80%	% of people

B.2 Existing City Plans



ANALYSIS OF THE EXISTING CITY PLANS

City		OULU		
PLAN #1				
Tittle		Sustainable Energy and Climate Action Plan (SECAP)		
Description of the Plan		The GHG emissions inventory in SECAP covers all energy-related emissions from municipal buildings equipment and facilities, tertiary buildings, residential buildings and public lighting. Furthermore, emissions from road transport and waste management are included. Emissions from the industrial sector are excluded. Oulu has committed to a 40% GHG reduction by 2030 (carbon neutral by 2040). The direct per capita emissions in Oulu in 1990 were 7.8 t CO₂ eq, so the target for 2030 is 4.7 t CO₂ eq.		
Implementation Period		2019 - 2030		
Scope of the Plan		Local		
Topics covered		Energy	Mobility	
Defined Targets				
Target #1				
Target		Reduction of GHG emissions in local heat and electricity production		
Related actions		Carbon neutral production of Oulu Energy, mainly CHP (this is by a large marginal the most important of all actions for now). Landfill gas recovery and its use for energy at Rusko waste management center. Solar electicity generation at Rusko waste management center. Solar electricity generation by Oulu Waterworks. Solar electricity generation by Port of Oulu.		
Actuation areas		Oulu Energy, Oulu Waste Management, Oulu Waterworks and Port of Oulu.		
Implementation status		On-going		
Execution period		2010 - 2050		
Financial scheme		City budget, National Funds and Programmes, EU Funds and Programmes.		
Target #2				
Target		Reduction of GHG emissions in municipal buildings and equipment/facilities		
Related actions		ESCO projects in municipal buildings. Monitoring energy consumption. Energy audits. E-lighthouse project. Eco-support activity. Energy efficiency measures at Taskila wastewater treatment plant. LED lighting in Port of Oulu. LED lighting in Rusko waste management center. Replacement of oil with other heating modes.		
Actuation areas		Oulu Facilities Centre, Oulu Waterworks, Port of Oulu, Oulu Waste Management.		
Implementation status		On-going		
Execution period		2014 - 2025		
Financial scheme		City budget, National Funds and Programmes, EU Funds and Programmes.		

Target #3	
Target	Reduction of GHG emissions in tertiary buildings and equipments/ facilities
Related actions	Proactive quality control of construction, replacement of oil with other heating modes.
Actuation areas	Building Supervision Office, Oulu Facilities Centre.
Implementation status	On-going
Execution period	2005 - 2050
Financial scheme	City budget, National Funds and Programmes, EU Funds and Programmes.
Target #4	
Target	Reduction of GHG emissions in residential buildings
Related actions	Proactive quality control of construction, E-lighthouse project, Replacement of oil with other heating modes.
Actuation areas	Building Supervision Office, Oulu Facilities Centre.
Implementation status	On-going
Execution period	2005 - 2050
Financial scheme	City budget, National Funds and Programmes, EU Funds and Programmes.
Target #5	
Target	Reduction of GHG emissions in public lighting
Related actions	Energy efficiency improvements in public lighting.
Actuation areas	Urban and Environmental Services.
Implementation status	On-going
Execution period	2014 - 2019
Financial scheme	City budget, National Funds and Programmes, EU Funds and Programmes.
Target #6	
Target	Reduction of GHG emissions in other activities
Related actions	Waste prevention and enabling sustainable circular economy. Making-City and Energy Wise Cities projects. Ensuring non-scattered urban structure, preventing urban sprawl. Climate education in schools and kindergartens.
Actuation areas	Oulu Waste Management, Urban and Environmental Services, Educational and Cultural Services.
Implementation status	On-going
Execution period	2010 - 2050
Financial scheme	City budget, National Funds and Programmes, EU Funds and Programmes.



ANALYSIS OF THE EXISTING CITY PLANS

City	OULU			
PLAN #2				
Title	Environment Programme of the City of Oulu: towards a carbon-neutral Oulu			
Description of the Plan	Programme is one of the implementation programmes of the Oulu city strategy 2026. The programme ensures that the guidelines set out in the city strategy are followed and that the environmental objectives are reached. The carbon-neutral Oulu 2040 guideline is the most central one as regards steering the environment programme. The environment programme creates the basis for setting joint environmental objectives for services, public utilities, and municipal enterprises and for developing courses of action. The environment programme covers the city’s activities in their totality, strengthens the possibilities to develop business life, and provides guidance for the decision-makers, the staff, the residents, and the enterprises of the city in the field of environmentally responsible action.			
Implementation Period	2019 - 2026 (vision to 2040)			
Scope of the Plan	Local			
Topics covered	Energy	Mobility		
Defined Targets				
Target #1				
Target	We grow sustainably: a sustainable habitat			
Related actions	The zones will be planned and built sustainably to provide diversity in the lots, modes of living, functionalities, and services on offer. The share of complementary building will be increased while acknowledging the values of the cultural environment and developing green environments. Complementary building and new zoning areas will be planned in such a way that their density and location sustain public transport, walking, and cycling. Building outside zoning areas will be directed by way of zoning to the areas best suited to it. Public indoor and outdoor spaces in the city will be developed to be used by city residents and in various urban events.			
Actuation areas	Urban and Environmental Services			
Implementation status	On-going			
Execution period	-			
Financial scheme	City budget, National Funds and Programmes, EU Funds and Programmes.			

Target #2	
Target	We grow sustainably: a lively city centre and hubs with varied characteristics
Related actions	The centres will be developed to provide many-sided functionalities based on their characteristics. The services will be directed into hubs that are accessible by public transport and by other sustainable modes of mobility. The city centre will be developed as a living environment with many types and sizes of dwelling, as a lively business hub, and as a year-round site of events.
Actuation areas	Urban and Environmental Services
Implementation status	On-going
Execution period	-
Financial scheme	City budget, National Funds and Programmes, EU Funds and Programmes.
Target #3	
Target	We grow sustainably: environment-friendly mobility
Related actions	A plan for sustainable urban mobility will be made by the end of 2022. The offer and service level of public transport will be developed especially in the areas of best user potential. The pedestrian and cycling route network and cycling-related services will be developed to increase their year-round use. Sustainable mobility will be promoted by the means of traffic control. Public transport into new areas will begin operating at an early phase of construction already. Linked trip making use of various modes of mobility will be enabled. Development of rail and tramway traffic is enabled. The prerequisites for low-emission public transport, for carsharing, and for the use of low-emission cars will be created.
Actuation areas	Urban and Environmental Services
Implementation status	On-going
Execution period	-
Financial scheme	City budget, National Funds and Programmes, EU Funds and Programmes.
Target #4	
Target	We act resource-wisely: effective use of energy
Related actions	The city's own energy consumption will be reduced by a least 10.5% by 2025 from the 2014 level in accordance with the Municipal Energy Efficiency Agreement. Use of waste energy will be increased and possibilities to make use of it will be acknowledged in urban planning already. The specific consumption of the city's real estate will be reduced and the realization of investments in energy efficiency will be ensured. Digital solutions will be used to reduce energy consumption in real estate and in rented apartments. Municipal citizens and companies will be provided with counselling and guidance regarding energy efficiency in building and in the use, maintenance, and lifespan sustainability of buildings.
Actuation areas	Oulu Energy, Urban and Environmental Services, Oulu Facilities Centre, Building Supervision Office, Oulu Waterworks, Oulu Waste Management.
Implementation status	On-going
Execution period	-
Financial scheme	-

Target #5	
Target	We act resource-wisely: carbon-neutral energy production
Related actions	Greenhouse gas emissions will be reduced by increasing the share of renewable energy sources and by enhancing new forms of energy production. Use of peat will be reduced as planned while acknowledging security of supply. A separate plan for renouncing use of peat will be made in 2020. Possibilities for distributed energy production will be increased. Small-scale energy production will be encouraged and bidirectional energy production will be promoted. The biogas resulting from waste management functionalities will be fully used. The share of using renewable energy in the city's own real estate will be increased.
Actuation areas	Oulu Energy, Urban and Environmental Services, Oulu Facilities Centre, Building Supervision Office, Oulu Waterworks, Oulu Waste Management.
Implementation status	On-going
Execution period	-
Financial scheme	-
Target #6	
Target	We act resource-wisely: fully functional circular economy
Related actions	A Circular Economy Roadmap will be made out by the end of 2020. Prerequisites for the use of surplus masses and recycled materials will be created by zoning. Planning will take place on the basis of a comparison of alternatives based on mass economy-related observations and calculating emissions. The material efficiency of building and maintenance activities will be improved. Use of surplus masses and recycling of demolition materials will be enhanced. Control of land masses will be responsabilized and mass coordination between projects will be developed. Participation in co-operation projects will be launched to create business and networks promoting circular economy.
Actuation areas	Oulu Energy, Urban and Environmental Services, Oulu Facilities Centre, Building Supervision Office, Oulu Waterworks, Oulu Waste Management.
Implementation status	On-going
Execution period	-
Financial scheme	-
Target #7	
Target	Nature is our resource: nature within everybody's research
Related actions	The coverage of green networks and the preservation of main green connections will be ensured. Green areas, parks, and possibilities to use waterways for recreational purposes will be developed. The reachability of hiking routes via sustainable modes of mobility will be improved and the sufficiency of accessible routes will be taken care of.
Actuation areas	Urban and Environmental Services, Oulu Facilities Centre, Building Supervision Office, Oulu Waterworks.
Implementation status	On-going
Execution period	-
Financial scheme	City budget, National Funds and Programmes, EU Funds and Programmes.

Target #8	
Target	Nature is our resource: adapting the climate change
Related actions	Control of surface-water drainage will be developed with an emphasis on natural solutions. An account on carbon sinks will be made by the end of 2020. Further measures are determined on the basis of the account. Thinning of forests will be seen to on a timely basis and growing stocks will be maintained in a form that enables growth. The newest methods of forestry based on national research results will be put to use. Regarding extreme weather phenomena, the up-to-dateness of risk-mappings and of contingency plans will be seen to. The awareness of municipal citizens about the risks caused by extreme weather phenomena and about survival under exceptional weather conditions will be increased. Climate change education will be increased and the northern dimension of climate change will be acknowledged in it. The implementation of climate-friendly modes of agriculture will be promoted.
Actuation areas	Urban and Environmental Services, Oulu Facilities Centre, Building Supervision Office, Oulu Waterworks.
Implementation status	On-going
Execution period	-
Financial scheme	City budget, National Funds and Programmes, EU Funds and Programmes.
Target #9	
Target	Nature is our resource: a safe, healthy and cosy habitat
Related actions	-
Actuation areas	Urban and Environmental Services, Oulu Facilities Centre, Building Supervision Office, Oulu Waterworks.
Implementation status	On-going
Execution period	-
Financial scheme	City budget, National Funds and Programmes, EU Funds and Programmes.
Target #10	
Target	Nature is our resource: biodiversity and the ecologically sound state of waterways
Related actions	-
Actuation areas	Urban and Environmental Services, Oulu Facilities Centre, Building Supervision Office, Oulu Waterworks.
Implementation status	On-going
Execution period	-
Financial scheme	City budget, National Funds and Programmes, EU Funds and Programmes.

Target #11	
Target	We promote environmental responsibility: environmentally responsible Oulu citizens
Related actions	Municipal citizens and companies will be encouraged to engage in environmental responsibility and the city will set an example with its own action. Waste sorting and recycling will be enhanced with waste management orders. The environmental know-how of supervisors, workers, and people in positions of trust and their understanding of the environmental effects of their work will be enhanced. The assessment of environmental effects and lifespan costs will be introduced in the planning and decision-making stages of major projects. Learning environments will be developed in a way to enable practising skills of sustainable development in them. The Oulu sustainable development learning path action model will enable memorable learning experiences for children and young people. Outdoor teaching will be increased and developed to strengthen their relationship with nature. The quality guidance of newbuilding will be increased in zoning and in plot conveyance. Guidance aimed at improving the level of quality as compared with the current level of provision will be developed for repair building and living.
Actuation areas	Oulu Waste Management, Urban and Environmental Services, Educational and Cultural Services, Well-Being Services, Central Administration.
Implementation status	On-going
Execution period	-
Financial scheme	City budget, National Funds and Programmes, EU Funds and Programmes.
Target #12	
Target	We promote environmental responsibility: sustainable practices of the - City of Group
Related actions	Eco support activities will be pursued and their contents will be developed on a branch-specific basis. The need for travel will be reduced by favouring remote work and remote negotiations. The emissions from travel will be reduced by using sustainable modes of transport. Service and freight traffic will be enhanced and combined. The share of renewable fuels in the city's own transports will be increased. The share of local ingredients in the meals produced or ordered by the Group will be increased. Food loss will be reduced. Facilities will be designed for many uses and their use is enhanced.
Actuation areas	Oulu Waste Management, Urban and Environmental Services, Educational and Cultural Services, Well-Being Services, Central Administration.
Implementation status	On-going
Execution period	-
Financial scheme	City budget, National Funds and Programmes, EU Funds and Programmes.
Target #13	
Target	We promote environmental responsibility: sustainable procurement
Related actions	The need for items to procure, their environmental effects, and their lifespan costs will be taken into account in procurement. A set of environmental criteria and a demand for them to be fulfilled will be added in the tenders and contracts. A minimum demand or a comparison criterion with a significant weight will need to be used as environmental criteria. Incentives may be used to promote environmentally friendly procurement during a contract period.
Actuation areas	Oulu Waste Management, Urban and Environmental Services, Educational and Cultural Services, Well-Being Services, Central Administration.
Implementation status	On-going
Execution period	-
Financial scheme	City budget, National Funds and Programmes, EU Funds and Programmes.



ANALYSIS OF THE EXISTING CITY PLANS

City	OULU			
PLAN #3				
Title	Primary energy source changes in Oulu Energy			
Description of the Plan	Peat, which represents now nearly half of the primary energy sources in local CHP plants, is gradually and quite quickly replaced by wood, wind, nuclear and ambient heat. The reduction of CO ₂ emissions can be even over 100%, since using wood ash as a fertiliser in peatland forests increases the forest growth as a whole.			
Implementation Period	2030 (and vision 2050)			
Scope of the Plan	Regional			
Topics covered	Energy			
Defined Targets				
Target #1				
Target	Replacing most of the peat energy use in Oulu by wood by about 2040			
Related actions	New bio-CHP plant in Laanila, Oulu (215 MW fuel effect, 200 M€, commissioning 2020).			

Target #4	
Target	Phase out the use of fossil oil in heating
Related actions	We will phase out the use of fossil fuel oil in heating by the start of the 2030s. Oil heating will no longer be used in properties owned by the central and local governments by 2024. We will adopt a separate action plan to encourage properties using oil heating to switch to other forms of heating during the 2020s.
Target #5	
Target	Increasing electrification in society and connecting energy systems
Related actions	Increasing electrification in society and connecting energy systems (electricity, heat and transport) to one another will require significant growth in renewable electricity production. We will increase the proportion of energy produced using wind power in Finland. We estimate that the amount of wind power produced on land will rise according to market conditions. We will improve the conditions for the construction of offshore wind power plants. We will remove the administrative, zoning-related and other barriers to wind power construction. We will explore the possibilities to loosen the restrictions on wind power due to radars.
Target #6	
Target	Creation of a sector-specific low-carbon roadmaps
Related actions	In cooperation with industry operators, we will create sector-specific low-carbon roadmaps that will be brought in line with our new climate actions.
Target #7	
Target	Development of the electricity market and integration of energy systems
Related actions	We will develop the Nordic electricity market and the integration of energy systems, and joint research activities to support these through EU research programmes.
Target #8	
Target	Draw up of a sustainable taxation roadmap to serve the Government's climate goal
Related actions	The first stage of this roadmap will be completed in time for the 2020 government discussion on spending limits. The preparations will seek solutions that promote the Government's climate objectives in the most economically effective way, accelerating the shift away from fossil fuels while meeting the requirements of social justice. The Government will also promote the realisation of climate targets in tax reforms at EU level. Emissions guidance in energy production will be increased by abolishing the industrial energy tax rebate system and reducing category II electricity tax towards the minimum rate allowed by the European Union. The overhaul will be carried out with cost neutrality over a transition period. Heat pumps and data centres generating heat for district heating networks will be transferred to category II electricity tax. Reduced tax subsidies for combined heat and power production and higher heating fuel taxation will increase tax revenues by a total of EUR 100 million over the electoral term. Demand flexibility incentives will be promoted, for example through dynamic electricity taxation. Double taxation on electricity storage for pumped storage facilities and smaller batteries will be removed.



ANALYSIS OF THE EXISTING CITY PLANS

City		OULU		
PLAN #5				
Title	Reducing the carbon footprint of construction and housing			
Description of the Plan	A set of measures will be implemented to decrease the carbon footprint of housing, improve the energy efficiency of the existing building stock and support the transition to emissions-free heat generation.			
Implementation Period	2019 -			
Scope of the Plan	National			
Topics covered	Energy	Mobility		
Defined Targets				
Target #1				
Target	Energy subsidy scheme			
Related actions	Adoption of an energy subsidy scheme designed specially for housing companies with the goal of supporting improvements in energy efficiency and measures aiming toward smart, flexible energy consumption. The principle of subsidy scheme is that the assistance will be paid in proportion to the energy efficiency benefits achieved. The projects must be cost-effective and appropriately designed.			
Target #2				
Target	Subsidies for building charging infrastructure			
Related actions	Continue to offer subsidies for building charging infrastructure for electric cars and increase the amount of the subsidies granted.			
Target #3				
Target	Costs of planning energy renovations under the scope of the domestic help credit			
Related actions	Explore the possibility of bringing the costs of planning energy renovations under the scope of the domestic help credit, making the credit available to shareholders in housing companies and applying a higher credit percentage for renovation work that aims to increase the energy efficiency of buildings or to transition away from fossil fuel based heating systems.			
Target #4				
Target	Promote wood construction			
Related actions	Promote wood construction, as wooden buildings also function as carbon stores. We will develop material neutrality in fire regulations to reduce the need for double fire protection (technical and structural) of wood buildings. We will also investigate whether to ease the fire regulations on wood construction.			
Target #5				
Target	Set minimum requirements for charging infrastructure for e-vehicles			
Related actions	Set minimum requirements for building charging infrastructure for electric vehicles at properties in connection with major renovations. We will remove administrative barriers to building charging infrastructure for electric vehicles, particularly in housing companies.			



ANALYSIS OF THE EXISTING CITY PLANS

City	OULU			
PLAN #6				
Tittle	Building a carbon neutral society and improving the quality of construction			
Description of the Plan	We will finalise the reform of the Land Use and Building Act in the parliamentary preparations. The main objectives of the reform are to create a carbon neutral society, strengthen biodiversity, improve the quality of construction and advance digitalisation. It is also important to take into account the economic and social sustainability of community structures.			
Implementation Period	2019 -			
Scope of the Plan	National			
Topics covered	Energy	Social	ICT	
Defined Targets				
Target #1				
Target	Preserve municipalities' monopoly on land use and land use planning hierarchy			
Related actions	We will preserve municipalities' monopoly on land use and the land use planning hierarchy, advance the simplification of the land use planning process and strengthen municipalities' land policies. Land use planning must be based on comprehensive impact assessments. The oversight of the legality of land use will continue to be carried out by authorities and at least at the current level.			
Target #2				
Target	Mitigation of climate change in land use planning			
Related actions	We will take the mitigation of climate change into account in land use planning, construction and the maintenance of the building stock. Community structures must support adaptation to climate change and motivate people to choose walking, cycling or public transport, particularly in urban areas.			
Target #3				
Target	Safeguard cultural environments and strenghten biodiversity			
Related actions	We will safeguard cultural environments and strengthen biodiversity, including in urban environments.			
Target #4				
Target	People participation			
Related actions	We will improve people's opportunities to participate in society.			
Target #5				
Target	National digital register and data platform			
Related actions	We will establish a national digital register and data platform for the built environment to be utilised in the decision-making and processes related to land use and building.			
Target #6				
Target	Using electronic services for municipal buildings permits			
Related actions	We will promote the use of electronic services for municipal building permits and notifications according to the one-stop-shop principle.			



ANALYSIS OF THE EXISTING CITY PLANS

City	OULU			
PLAN #7				
Tittle	Low-emission transport			
Description of the Plan	The targets for reducing emissions from transport must be in line with Finland's carbon neutrality targets. By 2030, Finland will reduce transport emissions by at least 50% compared to the 2005 level. This is a step towards carbon-free transport. In order to reduce transport emissions, measures will be taken to reduce transport performances, to promote the transition towards more sustainable mobility and to phase out fossil fuels.			
Implementation Period	2030			
Scope of the Plan	National			
Topics covered	Mobility	Energy	ICT	Social
Defined Targets				
Target #1				
Target	Programme for promoting walking and cycling			
Related actions	A programme for promoting walking and cycling will be implemented. In 2020–2022, 41 million € will be reserved for the planning work and project promotion related to walking and cycling.			
Target #2				
Target	Common quality standards for cycling paths			
Related actions	E.g. a book for guidelines in designing cycling paths, published by the Finnish transportation authority.			
Target #3				
Target	Climate-based overall increase			
Related actions	A climate-based overall increase will be provided to public transport subsidies and purchases, annually EUR 20 million.			
Target #4				
Target	Low-emission fleet in public transport			
Related actions	The introduction of a low-emission fleet in public transport will be accelerated (EU requirements: in service procurements, the amount of clean vehicles will be 41% by 2025 and 59% by 2030).			
Target #5				
Target	Passenger and freight transport services			
Related actions	The introduction of passenger and freight transport services on low-volume or discarded rail sections will be facilitated.			

Target #6	
Target	Mobility service innovations
Related actions	In sparsely populated rural areas, mobility service innovations will be sought by investing in cross-administrative service pilots.
Target #7	
Target	Sustainably produced biogas in the distribution obligation
Related actions	Sustainably produced biogas will be included in the scope of the distribution obligation.
Target #8	
Target	Promotion of commuter cycling
Related actions	Several projects and continuous actions
Target #9	
Target	Coverseion subsidies
Related actions	Conversion subsidies will continue at the current level. It will be ensured that conversions of vehicle propulsion technologies allowing low-emission mobility will be considered in car, vehicle and propulsion technology taxation.
Target #10	
Target	National obligation in the Energy Performance of Buildings Directive
Related actions	In order to promote the charging infrastructure, a national obligation will be set in accordance with the Energy Performance of Buildings Directive to build a charging infrastructure for electric cars whenever a large-scale renovation is completed in a housing company or on business premises.
Target #11	
Target	Charging points obligation
Related actions	An obligation will be set for petrol station chains to provide a certain number of charging points for electric cars.
Target #12	
Target	Tractors with biogas
Related actions	Tractors converted to biogas can be registered for road traffic use.
Target #13	
Target	Carbon neutral synthetic fuels
Related actions	Piloting of carbon neutral synthetic fuels and launching of their production in Finland will be promoted.
Target #14	
Target	Digitalisation and automation of transport and logistics
Related actions	The Government will promote the digitalisation and automation of transport and logistics by allocating funding for experiments and by influencing international and EU regulations in the sector.
Target #15	
Target	Data platform for scrap vehicles
Related actions	To meet the objectives of the End-of-life Vehicles Directive, a data platform for vehicles to be scrapped should be set up on the basis of the existing register of the Transport and Communications Agency.

Target #16	
Target	Air transport sustainable biofuels
Related actions	In air transport, the objective is to reach, with the help of the blending obligation, a level of 30% in sustainable biofuels by 2030.
Target #17	
Target	Reduce air transport and maritime emissions
Related actions	Finland will continue to play an active role in the EU-level and international organisations in promoting measures to reduce air transport and maritime emissions.
Target #18	
Target	Extension of the charging infrastructure and the biogas network
Related actions	Measures to extend the charging infrastructure and the distribution network for biogas by making use of the EU funding potential will be supported.

Annex C: Bassano del Grappa

C.1 City Level Indicators

Table 113: Bassano del Grappa City Level Indicators calculation

ENERGY & ENVIRONMENT				
Application field	Indicator		VALUE	UNIT
City Energy Profile	Final energy consumption per capita		18.54	MWh/cap
	Primary energy consumption per capita		29.62	MWh/cap
	Primary energy sources	Solid fossil fuels	8.00%	%
		Natural gas	38.50%	
		Oil and petroleum	22.10%	
		Renewables and biofuels	12.00%	
		Electricity from the grid	19.40%	
		Solid fossil fuels	1.52	MWh/cap
		Natural gas	7.35	
		Oil and petroleum	4.22	
		Renewables and biofuels	2.29	
		Electricity from the grid	3.70	
	Building connected to the DH-network or renewable energy grid		17%	% of buildings/city
GHG Emissions	GHG emissions per capita		4.90	Tonnes of CO ₂ /cap
Waste Management	Recycling rate		76%	% of tonnes
MOBILITY				
Application field	Indicator		VALUE	UNIT
City Mobility Profile	Modal split	Walk	12%	%
		Bike	10%	
		Public transport	6%	
		Non-car transport	28%	
		Car (private motor vehicle)	72%	
	Fuel mix in mobility	Gas oil and diesel oil	71.00%	%
		Gasoline	20.00%	
		Liquefied Petroleum Gases	8.00%	
		Electricity	0.00%	
		Other fuels	1.00%	
	Energy use for transportation		7.32	MWh/cap
	Access to public transport		97%	% of people

	Public infrastructure promoting low-carbon mobility	112.00	Km/100,000 people
GOVERNANCE			
Application field	Indicator	VALUE	UNIT
Economy	Unemployment rate	6.30%	% of active population
	GDP (Gross Domestic Product)	30,800	€/cap
Initiatives and Strategies of the Public Administration	Smart city factor in a city development strategy	2	Likert scale
Public ICT/ Data	Quality of open data	2	Likert scale
SOCIETY & CITIZENS			
Application field	Indicator	VALUE	UNIT
Affordable Housing	Development of housing prices	-9.00%	% of change or % of €/m ²
	Housing cost overburden rate	8.20%	%
Citizen Engagement and Empowerment	Citizen engagement to climate conscious actions	4	Likert scale
	Encouraging a healthy lifestyle	4	Likert scale
Urban Structure	Inhabitants in dense areas	94.00%	% of people

C.2 Existing City Plans



ANALYSIS OF THE EXISTING CITY PLANS

City	BASSANO DEL GRAPPA			
PLAN #1				
Title	PAES (Action Plan for Sustainable Energy)			
Description of the Plan	The scope of the plan is to fix objectives in the reduction of the use of energy and in the implementation of renewable source of energy.			
Implementation Period	2014 - 2020			
Scope of the Plan	Local			
Topics covered	Energy			
Defined Targets				
Target #1				
Target	To reduce total emissions by 2020			
Related actions	To reduce total emissions by 2020 (tonnes of CO ₂ eq), with the target - 44,253.			
Actuation areas	-			
Implementation status				
Execution period	-			
Financial scheme	-			
Target #2				
Target	Efficiency improvement of thermal systems of the building of the Municipality			
Related actions	Generate a demonstration model which can then be applied to many contexts to the Bassanese building heritage, and will be reserved in the first instance to the most buildings energy-intensive.			
Actuation areas	Buildings: primary school "Canova", Vittorelli middle school in Via Basso, "Mazzini" primary school. And buildings affected by future maintenance operations: "Gen. Giardino" primary school in San Vito, Vittorelli middle school in via Marchesane.			
Implementation status	On-going			
Execution period	2014 - 2020			
Financial scheme	Public funding			

Target #3	
Target	Efficiency improvement of electrical uses of the building heritage of the Municipality
Related actions	Electric uses within public buildings represent at least 40% of the total energy consumption. With simple management and requalification measures of the plants (even without modifying the current ceiling lights) it is possible to reduce by at least 35% power consumptions).
Actuation areas	-
Implementation status	
Execution period	2014 - 2020
Financial scheme	-
Target #4	
Target	Purchase of green electricity for the Public Administration
Related actions	Evaluation of the purchase of green electricity for their own supplies. This will be carried out after an important action of redevelopment of the uses of electricity in its utilities in order to compensate for the likely increase in purchase costs per kWh renewable compared with traditional supply (energy from fossil sources).
Actuation areas	-
Implementation status	
Execution period	-
Financial scheme	-
Target #5	
Target	Photovoltaic systems to be installed in the building heritage of the Municipality
Related actions	A feasibility study has been approved for the construction of photovoltaic plants on public buildings owned by the municipality in buildings to install a total of 336 kW.
Actuation areas	Scuola Primaria "Q.re XXV aprile". Scuola Primaria "S.Francesco D'assisi " - Rondò Brenta. Scuola Secondaria di 1° "G.Bellavitis" in via Colombare. Scuola Primaria "Gen. G. Giardino". Scuola Primaria "A.Campesano". Scuola Secondaria di 1° "J. Vittorelli" in P.Ile Trento. Scuola Secondaria di 1° "J.Vittorelli". Scuola d'infanzia "cà Baroncello". Scuola Primaria " Papa Giovanni XXIII".
Implementation status	On-going
Execution period	2014 - 2020
Financial scheme	Public funding

Target #6	
Target	Energy efficiency of public lighting systems
Related actions	Reduction of light and optical pollution. Safety of people and vehicles through correct and rational. Lighting and prevention of visual glare. Energy savings through the use of high luminaires and lamps efficiency, such as to favor lower power installed per kilometer and high interaxes between the individual light points, and control and regulation devices of the luminous flux. Economy of plant management through the rationalization of the costs of exercise, even with the use of energy from renewable sources, and maintenance. Implementation of technologically integrated management models for the purposes of energy containment, the differentiated enhancement of places and one maintenance management economy. Better use of urban centers and external meeting places, of goods landscape and environmental, monumental and architectural cultural heritage. Adaptation of lighting to architectural and environmental needs, taking care of the appropriate color choices. Preserve the ecological balance both inside and outside the areas protected urban and suburban natural areas. Protection, in the areas of protection of astronomical observatories, of the activity of scientific and popular research; preserve the possibility for the population to enjoy the starry sky, primary cultural heritage.
Actuation areas	-
Implementation status	On-going
Execution period	2014 - 2020
Financial scheme	Public funding



ANALYSIS OF THE EXISTING CITY PLANS

City	BASSANO DEL GRAPPA			
PLAN #2				
Title	P.E.B.A. Programme for architectonic barriers elimination			
Description of the Plan	Improvement of the urban accessibilities to the historical city centre.			
Implementation Period	2019 - update every year for 30 years			
Scope of the Plan	Local			
Topics covered	Mobility	Social		
Defined Targets				
Target #1				
Target	Preliminar investigation of the realities of territory			
Related actions	Knowing the user concerns, the main directions of mobility, the places of public interest and its primary needs, the places of commercial, administrative, recreational and social interest, the state of maintenance, the intensity of traffic, etc.			
Actuation areas	Historical city centre			
Implementation status	Just getting started			
Execution period	2019			
Financial scheme	Public funding			
Target #2				
Target	Analysis of pathways by highlighting situations of discomfort			
Related actions	Pedestrian traffic survey phase through a detailed census of the architectural barriers identified on the territory.			
Actuation areas	Historical city centre			
Implementation status	Just getting started			
Execution period	2019			
Financial scheme	Public funding			
Target #3				
Target	Proposals aimed at eliminating barriers and improving environmental comfort. Data processing in descriptive graphic format			
Related actions	The proposals are defined through numerical codes shown on the path in digitized and geo-referenced cartography; a legend describes each place concerned and the single intervention to be carried out by means of short reports and illustrative drawings. The set of data collected in the area are appropriately stored and organized according to data relational management criteria.			

Actuation areas	Historical city centre
Implementation status	Just getting started
Execution period	2019
Financial scheme	Public funding
Target #4	
Target	Computer program design
Related actions	Program developed by professionals through a classification system managed by a database.
Actuation areas	Historical city centre
Implementation status	Just getting started
Execution period	2019
Financial scheme	Public funding
Target #5	
Target	Drafting of the final report for the approval of the P.E.B.A.
Related actions	It is the document that highlights the problems of typological nature that have emerged in the area, as well as the subdivision of the interventions for various costs.
Actuation areas	Historical city centre
Implementation status	Just getting started
Execution period	2019
Financial scheme	Public funding
Target #6	
Target	Training of the technicians in charge of the use and updating of the software that manages the P.E.B.A.
Related actions	Training of a technician assigned to use the IT tool.
Actuation areas	Historical city centre
Implementation status	Just getting started
Execution period	2019
Financial scheme	Public funding



ANALYSIS OF THE EXISTING CITY PLANS

City	BASSANO DEL GRAPPA			
PLAN #3				
Title	PERFER: Regional Energy Plan and Strategic Environment Evaluation			
Description of the Plan	Increase in the burden sharing of renewable source of electricity for households and transports, renewables must cover 10.3% of the total energy consumption.			
Implementation Period	2013 - 2020			
Scope of the Plan	Regional			
Topics covered	Energy	Mobility		
Defined Targets				
Target #1				
Target	Burden sharing			
Related actions	Increase in the ratio between electricity from renewable sources and electricity from fossil fuels by increasing energy production from renewable sources and reducing energy consumption. The best scenario goes beyond the 10.3% ratio of renewable energy consumption and plans to achieve the 20% by 2020.			
Target #2				
Target	Efficiency and saving			
Related actions	Reduction in the use of energy thanks to innovative technologies to increase efficiency and energy recovery in production processes and commercial buildings. For example, energy efficiency actions of production processes, support highly efficient private and public lighting, energy recovery from production processes, supplying companies with energy self-diagnosis tools, introducing obligation of interventions on energy efficiency, dissemination of virtuous models of energy management and use of environmental certification systems, premium energy taxation for green companies, encouragement of the energy qualification of public buildings (consumption monitoring, development of renewable sources such as biomass, biogas and heat pumps), incentives in research and development, realization of microgrids, information and training activities for citizens.			

Target #3	
Target	Transports
Related actions	Reduction in the use of fossil fuels for transports by: Replacement of public transport vehicles with low environmental impact vehicles (hybrids, LPG or CNG) or with 0 (electric) emissions. Interventions for mobility (car pooling, car sharing, etc.) and intermodality. Interventions to upgrade the cycle and pedestrian and bike sharing modes. Promotion of measures aimed at the diffusion of electric vehicles or vehicles powered by renewable sources from a smart city perspective (construction of recharging columns for electric vehicles and bio-fuel distributors; interoperability of infrastructure for vehicle recharging and refueling).

 ANALYSIS OF THE EXISTING CITY PLANS				
City	BASSANO DEL GRAPPA			
PLAN #4				
Title	P.R.T.: Regional Plan for Transportation			
Description of the Plan	Promoting a sustainable mobility system from a social, economic and environmental point of view.			
Implementation Period	2020 - 2030			
Scope of the Plan	Regional			
Topics covered	Mobility	Energy	Social	ICT
Defined Targets				
Target #1				
Target	Improve the connection of the Veneto Region to national and international markets, for a sustainable growth of the regional economy			
Related actions	Further develop high-speed railway lines (e.g. Venice to Milan; Venice to Trieste; Padua to Bologna); carry out interventions that, in addition to relieving road and rail networks, favor greater use of different modes of transport (by sea in combination with rail and rubber for the same semi-trailer container loading unit); Complete and improve the efficiency of the regional road network.			
Target #2				
Target	Strengthen regional mobility for a Veneto of equally connected citizens			
Related actions	Develop infrastructures and services for an integrated, intermodal, efficient regional public transport; Complete and improve the efficiency of the regional road network.			

Target #3	
Target	Promote mobility for the consolidation and development of tourism in Veneto
Related actions	Complete and improve the efficiency of the regional road network; Improve the accessibility of tourist areas.
Target #4	
Target	Develop an environment-friendly transport system
Related actions	Develop infrastructures and services for an integrated, intermodal, efficient regional public transport; Support the energy transition of transport towards sustainable mobility; Development of government, planning and control strategies.
Target #5	
Target	Increase functionality and security of transport infrastructures and services
Related actions	Complete and improve the efficiency of the regional road network. Development of government, planning and control strategies.
Target #6	
Target	Promote Veneto as a laboratory for new technologies and mobility paradigms
Related actions	Develop infrastructures and services for an integrated, intermodal, efficient regional public transport; promote and support the development of new mobility technologies.
Target #7	
Target	Efficient public spending on transport and mobilize private capital
Related actions	Develop infrastructures and services for an integrated, intermodal, efficient regional public transport. Complete and improve the efficiency of the regional road network.
Target #8	
Target	Develop a new integrated governance of regional mobility
Related actions	Development of government, planning and control strategies.



ANALYSIS OF THE EXISTING CITY PLANS

City		BASSANO DEL GRAPPA			
PLAN #5					
Title		Regional Strategy for Sustainable Development (SRSvS) - Extract from the Regional Document on Economics and Finance 2020 - 2022			
Description of the Plan		SRSvS is the regional adaptation of the National Strategy for Sustainable Development (SNSvS) masterplan. The SNSvS is in turn the Italian transposition of EU's 2030 Agenda.			
Implementation Period		2018 - 2030 (current action implementation period: 2020 - 2022)			
Scope of the Plan		Regional			
Topics covered		Mobility	Energy	Social	ICT
Defined Targets					
Target #1					
Target		Improve access to education policies			
Related actions		To carry out a strategic planning of the interventions in the field of education starting from the innovations introduced with the L.R. n. 8/2017 on the Veneto educational system. Promote the implementation of post-university research projects. Strengthen the regional model of technical-professional centers.			
Target #2					
Target		Protection and enhancement of cultural assets and activities			
Related actions		Promote the tangible and intangible cultural heritage of Veneto also through the management of European projects. To favor the redefinition of the development system of the various areas of culture. Increase the knowledge of the material, immaterial and landscape cultural heritage of Veneto through the production of new routes, including those of tourist value.			
Target #3					
Target		Improve youth policies, sports and leisure			
Related actions		Support sports practice. Integrate the plant equipment, improve accessibility and relaunch ski sport at the Alpine Ski World Championships, scheduled in Cortina for 2021. Participate in activities related to the Organization phase of the Olympic Games, through the implementation of all interventions aimed at the best performance of the Games themselves.			

Target #4	
Target	Develop sustainable policies for tourism
Related actions	Diversify and innovate tourism products. Promote the qualitative "regeneration" of the tourism offer. Implement the governance of tourist destinations, increasing the quality of reception. Develop digital tourism. To promote and enhance the Veneto tourism offer both in Italy and abroad. Develop cross-border cooperation initiatives and the implementation of European projects.
Target #5	
Target	Regulate spatial planning and housing construction
Related actions	Promote a more rational planning of land use to improve the quality of life, by limiting the consumption of land and favoring regeneration and redevelopment processes of buildings and the environment and re-naturalization of the Veneto territory. Develop the guidelines of the Regional Territorial Coordination Plan (PTRC) for the social, economic and environmental sustainability of territorial transformations. Increase the availability of housing for the weak social categories and contribute to the recovery of territorial areas characterized by social, building, environmental and urban degradation.
Target #6	
Target	Sustainable development and protection of the territory and the environment
Related actions	To secure the territories of western Veneto, proceeding with the identification of new sources of supply for the distribution of good quality water in place of those with high contamination from drinking water sources contaminated by perfluorinated substances (PFAS). Realize infrastructure works for safety from hydraulic risk (rolling basins, Padua-Venice waterway, etc.). Continue and reinforce the structural and non-structural actions that allow the combination of environmental protection and socio-economic development of the area, paying particular attention to promoting an industrially sustainable model for Porto Marghera and the rebalancing of the Fusina Integrated Project. Continue to implement the actions/ measures envisaged by the Regional Plan for the Protection and Rehabilitation of the Atmosphere, promoting coordination with the activities of the other Regions of the Padano Basin. Improve the seismic safety of the regional building stock with interventions aimed at buildings of strategic interest and buildings classified as relevant (eg kindergartens and public schools of all levels). Activate, through the review and updating of the "regional environmental planning", specific integrated projects of environmental protection, sustainable development and protection of biodiversity. Implement projects for the quantification and preventive assessment of environmental effects and for the integration of data banks on pressures and biodiversity. Support the development of infrastructure works aimed at the distribution of good quality drinking water, the extension and modernization of the collection and purification system and the protection of water bodies, with particular reference to Lake Garda. Promote initiatives aimed at increasing the knowledge and attention on the behavior to be adopted in the population in order to reduce the risk of forest fires.

Target #7	
Target	Improve transport infrastructure and access to mobility
Related actions	Complete the construction of the Pedemontana Veneta expressway and put it into operation. Realize the railway AV/ AC in the Brescia-Padua section. Modernize the vehicle fleet used in local public transport services. Approve the new 2020-2030 Regional Transport Plan. To ensure greater coordination between regional road and motorway operators. Define the project of the Dolomites Train and verify its economic sustainability.
Target #8	
Target	Protecting social rights, social policies and the families
Related actions	Review the chain of services for people with disabilities with particular reference to services for the residential sector, in line with the indications of the UNI 11010 2016 standard concerning services for the living of people with disabilities. Guaranteeing routes for active aging. Coordinate the redevelopment processes of the public assistance and charity system (IPAB). Promote actions to combat poverty and promote social inclusion. Support the management of structures and support services for women victims of violence.
Target #9	
Target	Protection of health and well-being
Related actions	Realize the new Padua hospital center. Develop the care model for care intensity. Plan inter-sectoral interventions to develop safe and healthy environments. Give preference to interventions in favor of the permanence in their own life context of elderly people who are not self-sufficient.
Target #10	
Target	Sustainable economic development and competitiveness
Related actions	Increase the competitiveness of Veneto SMEs by intervening in particular on the financial front, in terms of guarantees and innovation. Encourage the development of RIRs, Industrial Districts and business combinations as new growth tools for the regional economic system, especially in the research, innovation and internationalization sectors. Promote the development of craftsmanship. Promote commercial activities in the new business and city districts. Raise awareness among consumer citizens on the issues of fraud and counterfeiting. Innovate companies' production processes by supporting actions and investments aimed at applying the "Impresa 4.0" model. Promote the development of commercial activities through the enhancement of business combinations. Promote Veneto export through the participation of SMEs in international fairs, entrepreneurial missions and other regional marketing initiatives, including those aimed at attracting foreign investments in Veneto. Promote quality certified brand food production in Italy and abroad, also through coordination and synergy with promotional actions integrated with the territory and tourist and cultural excellence. Extend and develop ultra-wideband internet. Implement advanced e-Government services.

Target #11	
Target	Support policies for employment and vocational training
Related actions	Promote the implementation of the L.R. n. 8/2017. Ensuring an offer of services aimed at developing skills aimed at encouraging insertion into the labor market and supporting companies in the work of requalification or enhancement of their human capital in a logic of innovation for the competitive development of the economic system of the regional territory. Implement multi-professional interventions aimed at job inclusion. Strengthen public employment services. Encouraging the occupational integration of young people into the labor market.
Target #12	
Target	Support agriculture and sustainable agri-food and fishing policies
Related actions	Protect and enhance quality regional food production. Promote sustainable agricultural production, including through a regional program to improve the environmental sustainability of the wine sector. Ensure the effective and efficient implementation of the 2014-2020 Rural Development Programme. Continue along the path to enhance the cultural landscape of the Colline del Prosecco di Conegliano Valdobbiadene, also by applying for a UNESCO site. Enhance the activity of mitigation from the use of nitrates of agricultural origin. Increase the competitiveness and employment of the fish supply chain by promoting the marketing and promotion of local fish products and favoring sustainable fishing and aquaculture activities.
Target #13	
Target	Energy policies and diversification of energy sources
Related actions	Strengthen and make safer the distribution networks in the regional territory in an overall logic of sustainability and territorial comparison. Increase sustainable energy production from renewable sources. Reduce energy consumption. Dematerialize the economy, improving the efficiency of resource use and promoting circular economy mechanisms.

Annex D: León

D.1 City Level Indicators

Table 114: León City Level Indicators calculation

ENERGY & ENVIRONMENT				
Application field	Indicator		VALUE	UNIT
City Energy Profile	Final energy consumption per capita		25.66	MWh/cap
	Primary energy consumption per capita		36.62	MWh/cap
	Primary energy sources	Solid fossil fuels	0.00%	%
		Natural gas	28.18%	
		Oil and petroleum	51.29%	
		Renewables and biofuels	0.19%	
		Electricity from the grid	20.34%	
		Solid fossil fuels	0.00	MWh/cap
		Natural gas	7.23	
		Oil and petroleum	13.16	
		Renewables and biofuels	0.05	
		Electricity from the grid	5.22	
	Building connected to the DH-network or renewable energy grid		0%	% of buildings/city
GHG Emissions	GHG emissions per capita		6.62	Tonnes of CO ₂ /cap
Waste Management	Recycling rate		21%	% of tonnes
MOBILITY				
Application field	Indicator		VALUE	UNIT
City Mobility Profile	Modal split	Walk	64%	%
		Bike	1%	
		Public transport	6%	
		Non-car transport	71%	
		Car (private motor vehicle)	29%	
	Fuel mix in mobility	Gas oil and diesel oil	85.45%	%
		Gasoline	14.43%	
		Liquefied Petroleum Gases	0.10%	
		Electricity	0.02%	
		Other fuels	0.00%	
	Energy use for transportation		7.69%	MWh/cap
Access to public transport		100%	% of people	

	Public infrastructure promoting low-carbon mobility	24.86	Km/100,000 people
GOVERNANCE			
Application field	Indicator	VALUE	UNIT
Economy	Unemployment rate	14.10%	% of active population
	GDP (Gross Domestic Product)	21,700	€/cap
Initiatives and Strategies of the Public Administration	Smart city factor in a city development strategy	4	Likert scale
Public ICT/ Data	Quality of open data	1	Likert scale
SOCIETY & CITIZENS			
Application field	Indicator	VALUE	UNIT
Affordable Housing	Development of housing prices	5.32%	% of change or % of €/m ²
	Housing cost overburden rate	8.90%	%
Citizen Engagement and Empowerment	Citizen engagement to climate conscious actions	3	Likert scale
	Encouraging a healthy lifestyle	3	Likert scale
Urban Structure	Inhabitants in dense areas	87.52%	% of people

D.2 Existing City Plans

ANALYSIS OF THE EXISTING CITY PLANS					
City		LEÓN			
PLAN #1					
Title		Integrated Sustainable Urban Development Strategy of León 2017 - 2023, North of Leon ISUDS			
Description of the Plan		Strategic paper formulated in the context of second public call of the State to co-finance under ERDF the implementation of Integrated Sustainable Urban Development Strategies for cities. North of Leon ISUDS is a sectoral and detailed strategy for the north area of the city comprising six neighbourhoods, and composed of 14 lines of action covering 4 thematic objectives prescribed by the EDRF call. The Strategy in turn establishes 4 strategic goals specifically designed facing city level challenges. These strategic objectives are the pillars to achieve a positive transformation of the north area.			
Implementation Period		2017 - 2023			
Scope of the Plan		Local			
Topics covered		Energy	ICT	Social	Mobility
Defined Targets					
Target #1					
Target		Enhancing access to, use and quality of information and communication technologies (ICT) / Make the neighbourhoods a connected environment, with a high inclusion of new technologies and improvement in the management of public services			
Related actions		Optimization of the e-administration and strategy for open government and transparency. Leon, smart city: Pilot project for north neighborhoods. Unified program of digital transformation for citizens and entrepreneurs.			
Actuation areas		City level or nothern neighbourhoods			
Implementation status		On-going			
Execution period		2017 - 2023			
Financial scheme		Co-financed by ERDF and City Council			

Target #2	
Target	Supporting the shift towards a low-carbon economy in all sectors / Transform the neighbourhoods in a pilot project of energy efficiency and smart mobility, as a reference to the interior of the city
Related actions	Increasing energy efficiency of public facilities: schools and sport facilities. Increasing energy efficiency of residential sector. Promotion of pedestrian and cycling mobility and universal accessibility. Mobility desk and impulse of alternative means of transport. Implementation of an ecological footprint reduction Plan.
Actuation areas	Within boundaries of north area of the city
Implementation status	On-going
Execution period	2017 - 2023
Financial scheme	Co-financed by ERDF and City Council
Target #3	
Target	Preserving and protecting the environment and promoting resource efficiency / Highlight and promote cultural heritage and also natural one, enhancing its accessibility through a green network
Related actions	Lift program for historic and cultural heritage. Efficient green network at northern areas of Leon.
Actuation areas	Within boundaries of north area of the city
Implementation status	On-going
Execution period	2017 - 2023
Financial scheme	Co-financed by ERDF and City Council
Target #4	
Target	Promoting social inclusion, combating poverty and any discrimination / Integral regeneration of between tracks neighborhoods thus breaking down social inequalities
Related actions	Urban regeneration of the operational area: "making / creating city " in deprived neighborhoods. Social Inclusion Program for vulnerable groups. Competitiveness fostering and support to economic structures. New dynamic poles at the north area of the city.
Actuation areas	Within boundaries of north area of the city
Implementation status	On-going
Execution period	2017 - 2023
Financial scheme	Co-financed by ERDF and City Council



ANALYSIS OF THE EXISTING CITY PLANS

City		LEÓN		
PLAN #2				
Tittle		Strategic Plan of León 2018 - 2027		
Description of the Plan		Strategic document drawn up to define a medium-long term vision for future León. It includes a diagnosis of León, a future city model and the catalogue of projects to be developed to achieve it, as well as the road map, and its control and monitoring method. The Strategic Plan establishes as its main mission to improve the positioning of León in each of the five areas or levers of competitiveness detected (quality of life, economic development, tourism and city brand, infrastructure and connectivity and government and participation). The city vision to achieve is multiple; León seeks to be a city for its inhabitants, a city for innovation, opportunities, attractive, green and accessible, and a reference city as a logistic hub in the Atlantic arch.		
Implementation Period		2018 - 2027		
Scope of the Plan		Local		
Topics covered		Social	ICT	Mobility
Defined Targets				
Target #1				
Target		Quality of life: Population attraction and retention, and Optimization of social services management		
Related actions		Boosting job opportunities to attract and retain people (collaborative framework between university, private company and City Council for develop professional skills; mentoring programme for professional development; alumni programme; training programme). Promotion of quality of life (promotion of sport, leisure and free time and biosphere natural spaces). People as the main value of the city of León (Senior Volunteer Program, prevention plan of new technologies addiction, co-housing programme). Services as substantial elements to the city of León (promotion of León as a clean point, app of socio-health alerts).		
Actuation areas		-		
Implementation status		On-going		
Execution period		2018 - 2027		
Financial scheme		Public financing (León City Council, University of León and training centres, ERDF funds) and private (companies).		

Target #2	
Target	Economic development: Promote quality employment and generation of work opportunities, and Generate business dynamism to boost the economy
Related actions	Boosting job creation (strengthen the role of the Social Dialogue Council, create a shared services centre, training in occupations with future potential). Strengthening the revitalization of the local economy (promote the digitalisation of local private companies, Circular Economy Plan and Low Carbon advice). Support for the attraction and creation of enterprises (centre of excellence and business development, promotion and stimulation of industrial land, promotion of León as a business destination /location, business support programme). Stimulation, support and development of an innovation ecosystem (investment platform, programme to boost innovative culture).
Actuation areas	-
Implementation status	On-going
Execution period	2018 - 2027
Financial scheme	Public financing (León City Council, University of León and training centres, ERDF funds) and private (companies).
Target #3	
Target	Tourism and city brand: Improve the sustainable tourist attraction of León, and Promote the city's brand as asset and representation of its attributes
Related actions	Promotion of León's unique assets and characteristics (promoting heritage and history, consolidation of León's cuisine for the local tourist offer, promoting richness and diversity of local culture). External orientation of tourism with a triple focus: provincial, national and international (creation of the an axis from a green approach, take advantage of the sport as an asset attracting visitors, improve the infrastructure for attracting and receiving tourists). Strength the Camino de Santiago and boosting its management and conservation. Definition of a global city strategy (global city brand strategy). Development and deployment of the new city brand.
Actuation areas	-
Implementation status	On-going
Execution period	2018 - 2027
Financial scheme	Public financing (EAFRD, ERDF, Castilla y León Government, Provincial Council, City Council, Association municipalities of Camino de Santiago, Aena, RENFE, Sports Federation, Ministry of Education, Culture and Sport, University of León). Private financing (sponsors and companies, cultural and art centres, hotel and tourism associations, cathedral canons).

Target #4	
Target	Infrastructure and connectivity: León as green city and mobility and connectivity reference, and Boost public infrastructure
Related actions	Promote public transport and sustainable mobility (implement the SUMP adaptation, create a single public transport authority). Infrastructure development to improve connectivity (put urban train service into operation and improve the offer of commuter services, improve road connectivity between León and its rural areas, improve regional and national road connectivity, position León as a logistic node of the Northwest and strengthen freight transport and logistics). Boost public infrastructure available in the city (revitalization of the León Congress and Exhibition Centre).
Actuation areas	-
Implementation status	On-going
Execution period	2018 - 2027
Financial scheme	Public-private partnership (private initiative, transport and logistics operators, Castilla y León Government, Ministry of Public Works, SEPES, ADIF, RENFE, IDEA, European funds and Town Council of Leon and its rural
Target #5	
Target	Governance and participation: modernize and improve municipal management and citizen care
Related actions	Promote the digital transformation of the municipal Administration (progressive digitalization of the municipal Administration, bureaucracy reduction). Excellence and rigour in municipal management, aimed at continuous improvement. Design a future City with a Sustainable and Inclusive approach to society (establish a project management office, promote citizen participation and social and associative fabric in decision making, promote public-public and public-private collaboration / partnerships).
Actuation areas	-
Implementation status	On-going
Execution period	2018 - 2027
Financial scheme	Public financing (León City Council, ERDF funds, Ministry of Energy, Tourism and Digital Agenda).



ANALYSIS OF THE EXISTING CITY PLANS

City		LEÓN			
PLAN #3					
Title	General Urban Development Plan / León Master Plan of Urban Development				
Description of the Plan	The Master Plan of León establishes a long-term territorial model for León without a specific time horizon. It is the urban planning instrument and sets up the urban planning for the entire extension of the municipality and classification of land, the detailed urban planning in urban units, the general regulations for the different land uses and building, for the protection of the resources and the regime of the different categories of land. In addition, the general systems are designed, which includes road and transport infrastructure, public open spaces, facilities, and basic infrastructure and urban services.				
Implementation Period	2004 - not defined				
Scope of the Plan	Local				
Topics covered	Energy	Mobility	Social		
Defined Targets					
Target #1					
Target	Solve connectivity issues in core areas and solve accessibility to different areas, through a restructuration of people and goods mobility				
Related actions	Rail integration / underground. Finalize the main road infrastructure (rings and structuring roads). Design and execute a hierarchical road net. Obligation to include cycling lanes in new developments. Create new deterrent parking lots.				
Actuation areas	The entire road network				
Implementation status	On-going				
Execution period	-				
Financial scheme	Total cost of 530.41 M€ shared between Public Administration (local, regional, national) and private owners of land.				
Target #2					
Target	More accessible, affordable and efficient housing				
Related actions	Build more than 40,000 new homes, which could absorb population increases of more than 60%. Offer a larger stock of social housing, to prescribe at least 50% of this kind of residential buildings. Develop 1750 new social homes in five areas. A more flexible regulation of the parameters in building envelopes (roofs and façades), establishing volume tolerances allowing measures at improving energy efficiency.				
Actuation areas	Five sectors strategically distributed in the territory of the municipality.				

Implementation status	On-going
Execution period	-
Financial scheme	Total cost of 530.41 M€ shared between Public Administration (local, regional, national) and private owners of land.
Target #3	
Target	Improve connectivity between urban centres: recovery obsolete areas and redistribute facilities through the generation of central new areas
Related actions	Restructure the mobility system of people and goods to facilitate internal and external relations. Create an intermodal station. Develop an Exhibition and conference Centre. Sports facilities in new developments. Retrofit traditional urban areas.
Actuation areas	-
Implementation status	On-going
Execution period	-
Financial scheme	Total cost of 530.41 M€ shared between Public Administration (local, regional, national) and private owners of land.
Target #4	
Target	Improve municipality's environment, protect the existing natural resources and generate a connected and balanced system of green spaces
Related actions	Create a network of connected green spaces, promote the banks of the Bernesga and Torío rivers. Conservation of heritage elements and traditional urban areas by building protection. Designation and protection as rustic land of non-urbanized areas with a high environmental value (Mont San Isidro and Candamia Area), transition elements with the rural world, and natural risk areas (Cantamilanos, Barranco de la Fontanilla).
Actuation areas	The grounds destined to be part of public space system. All rustic land. All buildings with some type of protection due to their historical heritage value and areas of typological conservation.
Implementation status	On-going
Execution period	-
Financial scheme	Total cost of 530.41 M€ shared between Public Administration (local, regional, national) and private owners of land.

ANALYSIS OF THE EXISTING CITY PLANS				
City		LEÓN		
PLAN #4				
Title		Strategic Plan to Control the Air Quality of León		
Description of the Plan		The "Air Quality Control Strategy" was approved in 2003 and the "Air Quality Improvement and Action Plan of Leon" in 2006. Additionally, in 2012 a Municipal Atmosphere Protection Ordinance is approved . These three documents involve the adoption of a series of measures to achieve the improvement and regulation of the municipality's air quality, avoiding, preventing and reducing the harmful effects on health and environment caused by pollutants (sulphur dioxide, nitrogen dioxide, suspended particles, carbon monoxide and ozone).		
Implementation Period		Approved in 2003 and 2006, it is updated based on the obligations of the regional plans.		
Scope of the Plan		Local		
Topics covered		Energy	Mobility	
Defined Targets				
Target #1				
Target		Inform the population of the harmful effects of pollutants. Specifically regulate facilities and activites that likely produce emissions of harmful gases, dust, vapors or particles. Protect the health of citizens, ecosystems and vegetation of the municipality		
Related actions		Regulatory measures: classified industrial activities catalog and requirements to monitor and control air pollutants emissions. Collaborate with the regional administration in periodic controls of industrial emissions. Inclusion of requirements in new construction projects in relation to dust environments. Citizen information and training campaigns about atmospheric environment improvement. Advertising actions about renewable energy advantages. Promotion of solar energy use. Construction of new solar energy installations in municipal buildings. Monitor the application of European requirements about large combustion plant emissions. Generation and maintenance of large masses of trees as GHG sinks. Periodic information to the population in web site (concentrations of main pollutants and air quality). Campaign to promote the replacement of coal and diesel heating with gas heating.		
Actuation areas		-		
Implementation status		On-going		
Execution period		-		
Financial scheme		Financial scheme was not included in the Plan. Actions financed with public funds (from City Council and regional and state administration).		

Target #2	
Target	Achieve a lower-emission mobility in the city
Related actions	Link the city road belts. Campaign to control Motor Vehicle Inspection, especially in relation to pollutant emissions. Promotion of public transport: bus lines restructuration, fleet renewal and information campaign. Replace traditional petroleum-powered municipal vehicles with electric or hybrid ones. Mobility campaigns and road traffic suppression measures in downtown arteries of the city. Development of the Bike Lane Plan. Development of a Bus Lane Plan in higher traffic density arterial roads.
Actuation areas	-
Implementation status	On-going
Execution period	2006 - 2019
Financial scheme	Financial scheme was not included in the Plan. Actions financed with public funds (from City Council and regional and state administration).



ANALYSIS OF THE EXISTING CITY PLANS

City		LEÓN			
PLAN #5					
Tittle		Sustainable Urban Mobility Integrated Plan			
Description of the Plan		The SUMP is structured through five fields: public transport, parking, road network and transport, bicycle and pedestrian mobility. Specific targets and measures necessary to achieve them are established in each of the sectoral plans. It also drafts several intervention plans and global improvement covering all mobility scopes in the municipality: Cross Intermodal transport Special Plan, Traffic Safety Special Plan, Awareness, education and promotion of sustainable mobility Special Plan, Special mobility plan for attractor centres, Accessibility for all Special Plan.			
Implementation Period		2014 - 2021			
Scope of the Plan		Local			
Topics covered		Mobility			
Defined Targets					
Target #1					
Target		Public Transport: increase the percentage of public transport journeys, upgrade effectiveness and efficiency of the main system indicators, coordinate public transport measures with other means of transport measures to reduce emissions and total energy consumption			
Related actions		Development of a tramway system. Reorganization of the Urban Bus System. Implementation of bus lanes. Actions in relation to FEVE (narrow-gauge regional railway). Urban integration of the new High Speed railway station in relation with other SUMP measurements. Actions at bus stops and complementary installations. Actions about prioritization of public transport. Reinforce public transport programs for specific groups of interest. Measurements for public inter-cities transport coordination. Develop a transport by taxi Special Plan.			
Actuation areas		Maps of tram lines and bus lines reorganisation			
Implementation status		On-going			
Execution period		2011 - 2015			
Financial scheme		Financiation was not included in the Plan. Implemented actions has been financed by municipality of Leon and other public financing sources.			

Target #2	
Target	Road Network and Private Transport: reduce the use of car, achieve a responsible use of private vehicle, buildup an articulated and herarchical network, guarantee safety of pedestrians and cyclists
Related actions	Zones-30 (30 km/h speed limit areas). Traffic calming measures. Reinforcement of the Old City road signalling. Proposals to support improvements in public transport and pedestrians (traffic restrictions, improvements in road sections and intersections). Promotion of supramunicipal actions (ring roads linkage and improving access to the airport). Road signalling Plan.
Actuation areas	Delimitation of several 30 km/h zones and location of various road actions distributed throughout the city.
Implementation status	On-going
Execution period	2009 - 2015
Financial scheme	Financiation was not included in the Plan. Implemented actions has been financed by municipality of Leon and other public financing sources (European, State and Regional administration funds).
Target #3	
Target	Parking: make modal transport more flexible, reduce illegality, free up road space, parking space for residents, facilitate temporary parking in city centre, reduce parking space used for pendulum movements, guarantee pedestrian safety
Related actions	Extensive definition of parking regulation zone, reconfiguring the systems, rates and monitoring. Transformation of pay-parking spaces in parking spaces for residents. Introduction of parking fees in attractor places or travel destinations. Redefinition of loading and unloading parking policy. Redefinition of the cross section of appointed streets and avenues. Creation of a parking net linked to a high-capacity public transport mode or to external areas of the city. Introduction of a live-data parking information system.
Actuation areas	Three rings and parking areas
Implementation status	On-going
Execution period	2011 - 2015
Financial scheme	Financiation was not included in the Plan. Implemented actions has been financed by municipality of Leon and other public financing sources.
Target #4	
Target	Pedestrian mobility: connect attraction points and residential neighbourhoods through pedestrian network, promote the use and security of walkways network
Related actions	Pedestrian guidance signalling Plan. Specific pedestrian signalling for diferent collectives. Traffic coexistence actions. Make more permeable the axes that are working as barriers. Increase the number of crosswalks. Move crosswalks to natural paths of pedestrians. Streets of uniform platform (match the level of sidewalk and driveway). Reduce vehicle speed. Review traffic lights and signal timing.
Actuation areas	Streets that compound several of the itineraries

Implementation status	Finalised
Execution period	2009 - 2015
Financial scheme	Financiación was not included in the Plan. Implemented actions has been financed by municipality of Leon and other public financing sources.
Target #5	
Target	Bicycle transportation: adapt and value the pre-existing network, give continuity to the cycling infrastructure, develop a good cycling network
Related actions	Integrate the bicycle in the new urban planning designs, creating urban regulations for inclusion of the bicycle as a means of transportation. Incorporation in current regulations of mandatory parking reservation for bicycles. Allowance of bicycle traffic in certain pedestrian streets, favoring coexistence. Traffic calming measures (20km/h and 30km/h zones). Measures for improvement, coordination and overlapping with public collective transport. Measures to integrate the cycling net in the urban road network, signaling and regulations. Expansion and improvement of bike parking network. Enlargement of "Leon shares you the Bike" System.
Actuation areas	Group of roads that will constitute the main cycling network.
Implementation status	Finalised
Execution period	2009 - 2015
Financial scheme	Financiación was not included in the Plan. Implemented actions has been financed by municipality of Leon and other public financing sources.



ANALYSIS OF THE EXISTING CITY PLANS

City	LEÓN			
PLAN #6				
Title	Carbon footprint improvement of León City Council			
Description of the Plan	The document identifies the main sources of GHG emissions at city level, calculating the carbon footprint of the years 2013, 2014, 2015 and 2016, and the parameters on which the calculations are made. The Plan establishes a 30% reduction in carbon emissions from 2015 to 2030, and year-to-year reduction targets between 1.5-2%. The reduction is for the City Council as an entity, which means that the actions are only for buildings, facilities and workers from the municipality, and not for the entire city (for citywide emissions, targets will soon be established in the Covenant of Mayors).			
Implementation Period	2017 - 2030			
Scope of the Plan	Local			
Topics covered	Energy	Mobility		
Defined Targets				
Target #1				
Target	Improvement of the buildings envelope			
Related actions	Replacement of carpentry. Reduction of infiltration (thermal losses). Installation of air curtains on exterior doors.			
Actuation areas	City Council			
Implementation status	Just getting started			
Execution period	-			
Financial scheme	Municipal financing. Supramunicipal grants and subsidies			
Target #2				
Target	Illumination			
Related actions	Use of natural light. Replacing lamps with low energy lamps. Installation of presence detectors in areas of sporadic use. Complementary awareness campaigns.			
Actuation areas	City Council			
Implementation status	Just getting started			
Execution period	-			
Financial scheme	Municipal financing. Supramunicipal grants and subsidies			

Target #3	
Target	Air conditioning
Related actions	Solar thermal panels installation/repair. Regulation of the temperature. Installation of thermostatic valves in radiators. Replacement of inefficient boilers. Use of free cooling. Zoning of the areas to be climatized.
Actuation areas	City Council
Implementation status	Just getting started
Execution period	-
Financial scheme	Municipal financing. Supramunicipal grants and subsidies
Target #4	
Target	Equipment
Related actions	Optimization of consumption of computer equipment. Use of computer tools for monitoring consumption.
Actuation areas	City Council
Implementation status	Just getting started
Execution period	-
Financial scheme	Municipal financing. Supramunicipal grants and subsidies
Target #5	
Target	Other energy-related measured
Related actions	Energy audits in consumption centres. Incorporation of renewable energy sources in municipal installations and facilities (biomass, solar energy and geothermal).
Actuation areas	City Council
Implementation status	Just getting started
Execution period	-
Financial scheme	Municipal financing. Supramunicipal grants and subsidies
Target #6	
Target	Transport
Related actions	Use of biofuels. Increasing accessibility and reducing travel needs (increasing remote /tele management). More efficient route management. Gradual conversion of the municipal vehicle fleet towards the use of less polluting vehicles. Development of an efficient driving guide for distribution. Conducting an efficient driving course. Proper maintenance of vehicles. Review of vehicle aerodynamics.
Actuation areas	City Council
Implementation status	Just getting started
Execution period	-
Financial scheme	Municipal financing. Supramunicipal grants and subsidies

Target #7	
Target	Generic measures
Related actions	Development of an Action Plan boost the production and use of biomass and biofuels. Proper maintenance of facilities. Design of courses and dissemination material to train workers on GHG emissions reduction. Incorporation of good practices among employees and policy-makers. Study of Green/Ecological Taxation measures to help to reduce GHG emissions.
Actuation areas	City Council
Implementation status	Just getting started
Execution period	-
Financial scheme	Municipal financing. Supramunicipal grants and subsidies
Target #8	
Target	Waste
Related actions	Awareness-raising campaigns on separate collection.
Actuation areas	City Council
Implementation status	Just getting started
Execution period	-
Financial scheme	Municipal financing. Supramunicipal grants and subsidies

 ANALYSIS OF THE EXISTING CITY PLANS				
City	LEÓN			
PLAN #7				
Title	Assessment of risks and climatic vulnerabilities of the municipality of León			
Description of the Plan	Assessment study of climate risks and vulnerabilities faced by the municipality of León, in order to establish appropriate mitigation and adaptation measures. The document collects information about relevant risks and dangers to the municipality; socioeconomic, physical and environmental vulnerabilities of the municipality; impacts foreseen by sectors; and adaptation actions to climate change, both integral and specific for a specific sector.			
Implementation Period	2019 - 2030			
Scope of the Plan	Local			
Topics covered	Energy	Mobility	Social	
Defined Targets				
Target #1				
Target	Buildings: public buildings needs to retrofit, achieve a lower energy demand of social housing			
Related actions	Cataloging and characterization of public buildings. Promote the retrofitting of buildings. Energy retrofitting of the public residential park. Promotion and awareness for the building retrofitting and their facilities.			
Actuation areas	-			
Implementation status	On-going			
Execution period	2003 - 2030			
Financial scheme	Investment of 664,000 €/year			
Target #2				
Target	Transport: define needs and priorities for action in the communication lanes of the municipality, get a communication lane system adapted to climate change			
Related actions	Cataloging and characterization of communication lanes. Improvement and adaptation of mobility infrastructure.			
Actuation areas	-			
Implementation status	On-going			
Execution period	To 2030			
Financial scheme	Investment of 1,145,000 €/year			

Target #3	
Target	Energy: define needs and priorities for action in the energy distribution lines, energy infrastructures adapted to climate change derivated risks, define needs and priorities for action on energy equipment
Related actions	Cataloging and characterization of municipal existing energy infrastructures. Improvement and adaptation of energy infrastructure. Cataloging and characterization of municipal energy equipment.
Actuation areas	-
Implementation status	On-going
Execution period	To 2030
Financial scheme	-
Target #4	
Target	Water: define areas with flood risks to prioritize actions, adaptation to possible flooding of sanitation infrastructure, prevention of polluting spills, more sustainable use of water, reduce water consumption per inhabitant and year
Related actions	Detailed inventory of municipality flood areas. Improvement of the municipal sanitation network. Development of early warning systems for possible water pollution. Water awareness campaigns.
Actuation areas	-
Implementation status	On-going
Execution period	To 2030
Financial scheme	Total investment of 1,062,000 €/year
Target #5	
Target	Waste: adapted collection systems and with rapid response to extreme weather events
Related actions	Review of municipal waste management plans.
Actuation areas	-
Implementation status	On-going
Execution period	To 2030
Financial scheme	Investment of 25,000€
Target #6	
Target	Agriculture and forestry: population trained in climate change, with a better response to climatic circumstances
Related actions	Training and awareness of users of the orchards de La Candamia on the impact of climate change on agriculture.
Actuation areas	-
Implementation status	Just getting started
Execution period	2020 - 2040
Financial scheme	Investment of 8,000 €/year

Target #7	
Target	Environment and biodiversity: reduction of the number of fires in lots, reduction of exotic species in public spaces, reduction of water consumption, reduction of the use of invasive species in green spaces, know the presence of pollutants
Related actions	Prepare regulations for fire prevention. Awareness campaigns on exotic and invasive species. Strategy for adapting the management of municipal parks and gardens to climate change. Municipal strategic plan for air quality control.
Actuation areas	-
Implementation status	On-going
Execution period	2015 - 2030
Financial scheme	-
Target #8	
Target	Health: less pollen impact to the city, early detection of pests and rapid action, lower mortality of the population as a result of adverse weather events
Related actions	Pollen levels action plan. Urban pest monitoring and control plan. Information and awareness campaigns on guidelines against extreme weather events.
Actuation areas	-
Implementation status	On-going
Execution period	To 2030
Financial scheme	-
Target #9	
Target	Civil protection and emergencies: improvement of emergency response, minimization of damages and impacts of extreme weather events
Related actions	Municipal emergency plans review.
Actuation areas	-
Implementation status	On-going
Execution period	To 2030
Financial scheme	Investment of 35,000 €
Target #10	
Target	Others: ensure the development of participatory strategies from a multiple point of view, evaluate the development of the Adaptation and Improvement Plan
Related actions	Creation of municipal working group on climate change. Monitoring the adaptation of municipality to climate change.
Actuation areas	-
Implementation status	Just getting started
Execution period	2019 - 2030
Financial scheme	Investment of 12,000 €/year

	
ANALYSIS OF THE EXISTING CITY PLANS	
City	LEÓN
PLAN #8	
Title	Energetic efficiency strategy of Castilla y León 2020
Description of the Plan	Strategy on energy efficiency, established in the program of actions to be carried out in the coming years, its financing, energy indicators, monitoring and who should do what, in order to meet the objectives marked by the EU. The Strategy establishes three main objectives, and then, sector by sector, the specific objectives and the derived measures. The sectors are industry, building, transport, public services and Castilla y Leon administration.
Implementation Period	2016 - 2020
Scope of the Plan	Regional
Topics covered	Energy
Defined Targets	
Target #1	
Target	Reduction of primary energy consumption in Castilla y León
Related actions	20% reduction of primary energy consumption by 2020 with respect the reference year 2007 has been achieved in 2014. New target of 10% saving in primary energy consumption with respect to 2014 by the year 2020 (which will suppose the reduction of 32.45% by 2020 with respect the first year reference 2007).
Target #2	
Target	Reduction of final energy consumption by sectors in Castilla y León
Related actions	Final energy saving in 2020 of 757.36 ktoe (10.58%) corresponding to the already established primary energy saving. The savings proposed for each sector are the result of adding the planned savings to a more detailed level for each of the lines of action proposed in this Strategy for each specific sector.
Target #3	
Target	Achieve a 20% reduction in greenhouse gas emissions by 2020
Related actions	The improvement of energy efficiency in the horizon of the year 2020 together with a structure of energy sources with a lower environmental impact will allow the reduction of CO ₂ emissions associated with the energy consumption by 30.24% compared to 1990.

 ANALYSIS OF THE EXISTING CITY PLANS				
City		LEÓN		
PLAN #9				
Tittle		Urban Regeneration Strategy in CyL (ERUCYL)		
Description of the Plan		This plan is an orientation guide in the processes of rehabilitation, regeneration and urban renewal that are developed in the region, whether promoted by private initiative or by different public administrations. Its main objective is to develop measures on rehabilitation, regeneration and urban renewal, and on sustainability, coordination and implementation in the area of urban planning in Castilla y León.		
Implementation Period		2014 - 2020		
Scope of the Plan		Regional		
Topics covered		Energy		
Defined Targets				
Target #1				
Target		Promote building retrofitting and urban regeneration and renovation, eliminating currently obstables and creating specific mecanisms to make it viable and possible		
Related actions		-		
Target #2				
Target		Offer a regulatory framework to allow the reconversion and reactivation of the construction sector, finding new areas of action, specifically, in building retrofitting and urban regeneration.		
Related actions		-		
Target #3				
Target		Encourage quality, sustainability and competitiveness, both in building and on the ground, bringing its regulatory framework closer to the European framework, especially in relation to the objectives of efficiency, energy saving and the fight against energy poverty		
Related actions		-		



ANALYSIS OF THE EXISTING CITY PLANS

City		LEÓN		
PLAN #10				
Tittle		Spanish Urban Agenda		
Description of the Plan		It is an Action Plan in favour of people, the planet and prosperity, which also intends to strengthen universal peace and access to justice. It is a strategic framework to guide the meaning of sustainable urban policies with social, environmental and economic objectives. It does not have a normative range, it is based on the voluntariness of the commitments of the Public Administrators and the rest of the stakeholders. The Urban Agenda should promote improvements, at least in the areas of: regulation and planning, financing, knowledge, governance and transparency and participation.		
Implementation Period		2015 - 2030		
Scope of the Plan		National		
Topics covered		Energy	Mobility	Social
Defined Targets				
Target #1				
Target		Make a rational use of the land, preserve it and protect it		
Related actions		Make a rational use of the land. Conserve and improve the natural and cultural heritage, and protect the landscape. Improve urban green infrastructures and link them with the natural context.		
Target #2				
Target		Avoid urban dispersion and revitalize the existing city		
Related actions		Define an urban model that promotes compactness, urban balance and the provision of basic services. Guarantee functional complexity and diversity of uses. Improve the quality and accessibility of public spaces. Improve the urban environment and reduce pollution. Promote urban regeneration. Improve the quality and sustainability of buildings.		
Target #3				
Target		Prevent and reduce the climate change impacts		
Related actions		Adapt the urban model to the climate change effects and advance in its prevention. Reduce greenhouse gas emissions.		
Target #4				
Target		Make a sustainable management of resources and favour the circular economy		
Related actions		Optimize and reduce energy consumption. Optimize and reduce water consumption. Promote the materials cycle. Reduce waste management and favour its recycling.		

Target #5	
Target	Favour proximity and sustainable mobility
Related actions	Favour the city of proximity. Enhance mobility and sustainable modes of transport.
Target #6	
Target	Promote social cohesion and seek equity
Related actions	Reduce the risk of poverty and social exclusion in disadvantaged urban environments. Seek equality of opportunities from a gender perspective, age and ability.
Target #7	
Target	Promote and favour the urban economy
Related actions	Search for local competitiveness, generation of employment and revitalization of economic activity. Promote sustainable tourism and key economic sectors of the city.
Target #8	
Target	Guarantee access to housing
Related actions	Promote the existence of a suitable housing park at an affordable price. Guarantee access to housing, especially those households and most vulnerable groups.
Target #9	
Target	Lead and promote digital innovation
Related actions	To favour the knowledge society and move towards the development of Smart Cities. Promote services and electronic administration and reduce the digital device.
Target #10	
Target	Improve the instruments of intervention and governance
Related actions	Achieve an updated, flexible and simplified regulatory and planning framework. Ensure citizen participation, transparency and favour municipal governance. Promote local training and improve financing. Design and launch training and awareness campaigns in urban areas.



ANALYSIS OF THE EXISTING CITY PLANS

City		LEÓN		
PLAN #11				
Tittle		Energy and Climate Integrated National Plan 2021-2030		
Description of the Plan		Plan to determine the degree of compliance with the objectives of the European Union as a whole. The Plan identifies the challenges and opportunities along the five dimensions of the Energy Union: discharge; renewable energies; energy efficiency; energy security; the internal market for energy and research, innovation and competitiveness. Within the measures contemplated in this Plan, the following results can be achieved in 2030: 21% reduction in GHG emissions compared to 1990, 42% renewables on the final use of energy, 39.6% improvement in energy efficiency, and 74% renewable energy in electricity generation.		
Implementation Period		2021 - 2030		
Scope of the Plan		National		
Topics covered		Energy	Mobility	
Defined Targets				
Target #1				
Target		Specific promotion measures of some renewable technology or in any of the three uses of energy		
Related actions		Development of new electric generation facilities with RES. Integration of renewable energy networks. Development of self-consumption with renewables and distributed generation. Support to the industrial sector. Framework for the development of thermal renewable energy. Advanced biofuels in transport. Promotion of renewable gases. Technological renewal plan in existing electricity generation projects with renewable energy. Promotion of bilateral contracting of renewable electricity. Specific programmes for the biomass use.		
Target #2				
Target		Measures with a transversal approach for all renewable source, technologies and uses		
Related actions		Review and simplification of administrative procedures. Generation of knowledge, dissemination, awareness and traning. Singular projects and strategy for sustainable energy in the islands.		
Target #3				
Target		Measures aimed at diffuse non-energy sectors		
Related actions		Reduction of GHG emissions in the agricultural and livestock sectors. Reduction of GHG emissions in waste management. Reduction of GHG emissions related to fluorinated gases.		

Target #4	
Target	Measures related to the land use sector, land use change and forestry
Related actions	Forest sinks. Agricultural sinks.
Target #5	
Target	Measure concerning the application of emissions trading
Related actions	European emission rights trading regime.
Target #6	
Target	Measure concerning taxation
Related actions	Taxation.
Target #7	
Target	Measures for compliance with the energy saving obligation: transport sector
Related actions	Modal change measures (promotion of the most efficient modes). Measures for more efficient use of means of transport. Car park renovation measures. Impulse measurements of the electric vehicle.
Target #8	
Target	Measures for compliance with the energy saving obligation: industrial sector
Related actions	Improvements in technology and industrial process management systems. Energy efficiency measures in existing residential buildings. Residential equipment renovation measures.
Target #9	
Target	Measures for compliance with the energy saving obligation: tertiary sector
Related actions	Energy efficiency measures in the construction of the tertiary sector. Energy efficiency measures in cold generating equipment and large air conditioning installations in the tertiary sector and public infrastructure.
Target #10	
Target	Measures for compliance with the energy saving obligation: agriculture and fishing sector
Related actions	Improvement of energy efficiency in farms, irrigation communities and agricultural machinery.
Target #11	
Target	Energy security measures
Related actions	Reduction of dependence on oil and coal in the islands. Recharge points for alternative fuels. Promotion of regional cooperation. Deepening contingency plans.

Target #12	
Target	Internal energy market measures
Related actions	Increase in electrical interconnection with France. Increase in electrical interconnection with Portugal. Electricity transport infrastructures other than the “Projects of Common Interest” (PCIs). Electricity Market Integration. Protección de consumidores de electricidad y mejora de competitividad. Gas Market Integration. Gas consumer protection. Improving the competitiveness of the retail gas sector. Gas demand management development plan. Fight against energy poverty.
Target #13	
Target	Research, innovation and competitiveness: policies and measures to achieve national objectives
Related actions	Strategic Action in Energy and Climate. SET-Plan implementation. Program for the development of a Network of Technological Centers and Institutes of Excellence “Cervera”. Increase, coordination, improvement and efficient use of scientific and technological infrastructures and equipment. Public purchase of Green Innovation to promote innovation from public demand. Re-launch the City of Energy Foundation, CIUDEN. Information System on Science, Technology and Innovation for financing monitoring. European innovation financing mechanisms. International cooperation.

Annex E: Kadıköy

E.1 City Level Indicators

Table 115: Kadıköy City Level Indicators calculation

ENERGY & ENVIRONMENT				
Application field	Indicator		VALUE	UNIT
City Energy Profile	Final energy consumption per capita		14.05	MWh/cap
	Primary energy consumption per capita		19.05	MWh/cap
	Primary energy sources ⁹³	Solid fossil fuels	0.00%	%
		Natural gas	20.00%	
		Oil and petroleum	0.00%	
		Renewables and biofuels	1.00%	
		Electricity from the grid	79.00%	
		Solid fossil fuels	0.00	MWh/cap
		Natural gas	0.67	
		Oil and petroleum	0.00	
		Renewables and biofuels	0.06	
		Electricity from the grid	2.68	
Building connected to the DH-network or renewable energy grid		0%	% of buildings/city	
GHG Emissions	GHG emissions per capita		3.34	Tonnes of CO ₂ /cap
Waste Management	Recycling rate		6%	% of tonnes
MOBILITY				
Application field	Indicator		VALUE	UNIT
City Mobility Profile	Modal split	Walk	49%	%
		Bike	1%	
		Public transport	24%	
		Non-car transport	74%	
		Car (private motor vehicle)	26%	
	Fuel mix in mobility	Gas oil and diesel oil	64.00%	%
		Gasoline	10.00%	
		Liquefied Petroleum Gases	25.00%	
		Electricity	1.00%	
		Other fuels	0.00%	

⁹³ Data at Istanbul level since Kadıköy is an Istanbul large district. Kadıköy data within this indicator would be 100% electricity from the grid (Istanbul grid).

	Energy use for transportation	3.57	MWh/cap
	Access to public transport	100%	% of people
	Public infrastructure promoting low-carbon mobility	3.31	Km/100,000 people

GOVERNANCE

Application field	Indicator	VALUE	UNIT
Economy	Unemployment rate	13.80%	% of active population
	GDP (Gross Domestic Product)	11,500	€/cap
Initiatives and Strategies of the Public Administration	Smart city factor in a city development strategy	2	Likert scale
Public ICT/ Data	Quality of open data	2	Likert scale

SOCIETY & CITIZENS

Application field	Indicator	VALUE	UNIT
Affordable Housing	Development of housing prices	-3.41%	% of change or % of €/m ²
	Housing cost overburden rate	9.50%	%
Citizen Engagement and Empowerment	Citizen engagement to climate conscious actions	4	Likert scale
	Encouraging a healthy lifestyle	4	Likert scale
Urban Structure	Inhabitants in dense areas	100.00%	% of people

E.2 Existing City Plans



ANALYSIS OF THE EXISTING CITY PLANS

City	KADIKÖY			
PLAN #1				
Title	Kadıköy Municipality Revised Strategic Plan			
Description of the Plan	It is an organisational plan, Strategic Plan of Kadıköy adopts the vision as "adopting participatory governance, to be a leading municipality in innovation".			
Implementation Period	2015 - 2019 (and revised for the period 2017 - 2019)			
Scope of the Plan	Local			
Topics covered	Energy	Social		
Defined Targets				
Target #1				
Target	Organisational Development			
Related actions	Improving quality and efficiency on services, institutional performance and knowledge of the staff. Digitalizing the organisational memory and improving mobile applications for municipal services throguh efficient and effective use of IT. Calculation of institutional GHG emissions and taking environmental measures related with institutional resource consumption. Improving cooperation at national and international scales. Improving participation of citizens to decision-making to improve local democracy. Renovating the historical buildings and transforming them in service centres for public needs.			
Actuation areas	The whole district of Kadıköy			
Implementation status	On-going			
Execution period	2015 - 2019			
Financial scheme	278,656,486 TL (about 44 M€) between 2017 - 2019			

Target #2	
Target	Social Development
Related actions	Needs assessment and provision of services for the vulnerable groups (women, elderly, disabled, children) according to their needs. Struggling with noise pollution, visual pollution and environmental pollution through efficient control. Increasing the number of sports facilities, sports trainings and events; and creating new physical activity and sports areas in green areas as parks and recreational areas.
Actuation areas	The whole district of Kadıköy
Implementation status	On-going
Execution period	2015 - 2019
Financial scheme	160,507,112 TL (about 25 M€) between 2017 - 2019
Target #3	
Target	Urban Development and Structure
Related actions	Participatory and innovative design to improve spatial and living quality of Kadıköy. Carrying out participatory, innovative and ecological studies to generate public open spaces (parks, public squares, parking lots, etc.) and buildings (culture centers, sports centers, etc.). Improving planning and urban design projects in urban transformation and renovation areas. Creating new axes by addressing existing pedestrian, bicycle and vehicle connection roads with an integrated and holistic approach. Protecting and increasing existing green areas in public and private areas concerning ecological environment themes.
Actuation areas	The whole district of Kadıköy
Implementation status	On-going
Execution period	2015 - 2019
Financial scheme	239,838,200 TL (about 38 M€) between 2017 - 2019
Target #4	
Target	Environment and Health Management
Related actions	Implementing projects to raise awareness on the preparation against disasters in order to minimize the risks. Preparing Disaster Emergency Response Plan of Kadıköy and improving the physical structure of the Emergency Response Team in accordance with international standards. Ensuring separate collection of waste at the source and increasing the collection amount of recyclable waste. Conducting awareness-raising activities on Environment, environmental pollution, waste management and climate change in collaboration with NGOs, universities and urban stakeholders. Improving green areas in terms of quality and quantity. Preparing informative documents and organising trainings and events on environmental and public health issues.
Actuation areas	The whole district of Kadıköy
Implementation status	On-going
Execution period	2015 - 2019
Financial scheme	324,690,020 TL (about 51 M€) between 2017 - 2019

Target #5	
Target	Cultural and Artistic Development
Related actions	Establishing urban memory center to transfer historical and cultural heritage to next generations. Improving the quality of culture and art activities and extending to the whole district. Supporting culture and art organisations and improving collaboration. Improving promotion to reveal the tourism potential of Kadıköy. Improving urban consciousness and ownership of cultural and historical values. Improving culture and art trainings for children.
Actuation areas	The whole district of Kadıköy
Implementation status	On-going
Execution period	2015 - 2019
Financial scheme	59,259,235 TL (about 9 M€) between 2017 - 2019

 ANALYSIS OF THE EXISTING CITY PLANS				
City	KADIKÖY			
PLAN #2				
Tittle	Kadıköy Municipality Energy Action Plan			
Description of the Plan	For the purposes of the Covenant of Mayors, signed by Kadıköy Municipality in 2012, the Municipality prepared the Sustainable Energy Action Plan with the intent to reduce GHG emissions across the district by 20% by 2020 and uploaded it to the Covenant of Mayors system and obtained approval in 2015.			
Implementation Period	2030			
Scope of the Plan	Local			
Topics covered	Energy			
Defined Targets				
Target #1				
Target	Heat insulation for existing residential buildings (EE restorations in existing residential buildings)			
Related actions	56% of existing urban buildings shall be transformed in accordance with regulations. 14% of existing buildings (other than 56%) are projected to complete exterior, roof and weather insulation. With this actions the related residential buildings will achieve 10% electricity saving and 40% energy saving from heating fuels.			
Actuation areas	-			
Implementation status	Just getting started			
Execution period	2018 - 2030			
Financial scheme	Finance institutions offers affordable financial facilities to the public with common financial solutions developed in tandem with various material manufacturers.			
Target #2				
Target	Renewable energy applications for existing residential buildings (EE restorations in existing residential buildings)			
Related actions	To install PV systems having a total of 105 MW installed power (to fulfill 15% of electricity consumed in buildings through renewable energy).			
Actuation areas	-			
Implementation status	Just getting started			
Execution period	2021 - 2030			
Financial scheme	Municipality as a guide to public members, connecting the network and manufacturers			

Target #3	
Target	Use of energy-efficient lighting system in existing residential buildings (EE restorations in existing residential buildings)
Related actions	Replacement of those lamps that are most commonly used in residential buildings and then of all lamps with LED lamps (15% saving will be achieved for electricity consumptions after primary replacement).
Actuation areas	-
Implementation status	Just getting started
Execution period	2018 - 2030
Financial scheme	Investor: landlords and tenants (Municipality as an informative and guiding party).
Target #4	
Target	Heating of minimum 25% of residential buildings through DH systems by using alternative system (Heating Pumps, Geothermal, Biomass systems)
Related actions	Feasibility studies should be carried tu first so that buildings are heated by alternative-fuel systems and DH systems. 25% of the residential buildings located in Kadiköy heated through the monocentric heating of several buildings and the potential switchover to renewable resources.
Actuation areas	-
Implementation status	Just getting started
Execution period	2024 - 2030
Financial scheme	Not by the Municipality
Target #5	
Target	Energy-efficient urban renewable for residential buildings renewal projects for areas under earthquake risk
Related actions	Further in-situ transformations were planned for neighbourhoods including old settlement locations such as Hasanpaşa, Caferağa, etc. The consideration is that 90% of the district's building stock (with 25% equivalence increase) will be renewed as a result of in-situ transformations in the upcoming 25 years.
Actuation areas	-
Implementation status	Just getting started
Execution period	2019 - 2030
Financial scheme	Municipality as a planning, guiding and uniting party.
Target #6	
Target	Energy-efficient restorations for existing tertiary buildings, heat insulation (EE restorations for existing tertiary buildings)
Related actions	Raise awareness among commercial building owners of the subject matter. Provide assistance in finding easy financial facilities. Demonstrate financial gain via simplified feasibility studies.
Actuation areas	-
Implementation status	Just getting started
Execution period	2018 - 2030
Financial scheme	Hard to make an estimation. Municipality as informant and coordinator.

Target #7	
Target	Energy-efficient lighting for existing tertiary buildings (EE restorations for existing tertiary buildings)
Related actions	-
Actuation areas	-
Implementation status	Just getting started
Execution period	2018 - 2030
Financial scheme	Hard to calculate a total budget, because the number of lighting systems is unknown. Municipality as informant and guide.
Target #8	
Target	Energy-efficient restorations for existing Municipal buildings (heat insulation + lighting)
Related actions	Provide 40% energy efficiency with energy efficiency applications (heat insulation, thermostatic valve use, energy management system, etc.) applicable to 50% of municipal buildings.
Actuation areas	-
Implementation status	Just getting started
Execution period	2018 - 2030
Financial scheme	Municipality acting as an implementer.
Target #9	
Target	Energy-efficient street lighting system
Related actions	All lighting systems across the city replaced with LED lighting systems by 2030 (which will provide 60% saving).
Actuation areas	-
Implementation status	Just getting started
Execution period	2018 - 2030
Financial scheme	Kadıköy Municipality, Metropolitan Municipality and other public bodies.
Target #10	
Target	Photovoltaic integration with street lighting systems
Related actions	Since the future saving achieved with the utility poles replaced with LED lighting systems deliver high level of energy efficiency (60-80%), the cost of subsequent PV integration becomes infeasible in terms of cost.
Actuation areas	-
Implementation status	Just getting started
Execution period	2018 - 2030
Financial scheme	Payback period for PV investment will be very long.



ANALYSIS OF THE EXISTING CITY PLANS

City	KADIKÖY			
PLAN #3				
Tittle	Kadıköy Spatial Strategic Plan			
Description of the Plan	Identifying disaster (lood, tsunami) risk areas and buildings in flood risk areas, and suitable areas for settlements within the district.			
Implementation Period	2019 - 2025			
Scope of the Plan	Local			
Topics covered	Energy	Mobility	Social	ICT
Defined Targets				
Target #1				
Target	Identify disaster (floods, tsunami) risk prone areas and suitable areas for settlements within the district			
Related actions	High risk area constitutes 14.86% of the district ground and the number of buildings that are carrying serious risk constitute 14.23% of the building stock.			
Actuation areas	Coastal zone and some Rasimpaşa, Caferağa, Hasanpaşa, Fenerbahçe, Osmanağa, Eğitim and Zühtüpaşa neighbourhoods (identified as risk areas).			
Implementation status				
Execution period	-			
Financial scheme	-			
Target #2				
Target	Identify buildings that are located in flood risk areas			
Related actions	Within the boundaries of the district, the number of buildings remaining in the first degree risk area is 773, in the second degree risk area is 1,344, and in the third degree risk area is 2.568.			
Actuation areas	Bostancı , Suadiye, Kozyatağı, Caferağa, Zühtüpaşa, Osmanağa, Hasanpaşa, Fikirtepe, Dumluınar, Merdivenköy, Rasimpaşa, Koşuyolu and Acıbadem neighbourhoods.			
Implementation status				
Execution period	-			
Financial scheme	-			



ANALYSIS OF THE EXISTING CITY PLANS

City	KADIKÖY			
PLAN #4				
Tittle	Kadıköy Urban Transformation Plan			
Description of the Plan	Plan to identify derelict buildings located in urban transformation zones, risk zones according to disaster and ground sustainability, and to prioritize zones for urban transformation actions.			
Implementation Period	2019 -			
Scope of the Plan	Local			
Topics covered	Energy	Social	ICT	
Defined Targets				
Target #1				
Target	Identify derelict (vacant) buildings that are located in urban transformation zones			
Related actions	Urban transformation actions will be taken into account within conservation principles.			
Actuation areas	Dumlupınar, Rasimpaşa, Osmanağa ve Caferağa Neighbourhoods.			
Implementation status	On-going			
Execution period	-			
Financial scheme	-			
Target #2				
Target	Identify risk zones according to disaster and ground sustainability			
Related actions	Identified risk types: flood, tsunami and risk due to ground sustainability. Number of buildings located in risk zones: 778. Number of inhabitants living in these buildings: 4696.			
Actuation areas	Three type of zones identified according to risk degree. Zone 1: Zühtüpaşa, Osmanağa and Hasanpaşa neighbourhoods. Zone 2: Bostancı neighbourhood. Zone 3: Rasimpaşa neighbourhood.			
Implementation status	Just getting started			
Execution period	-			
Financial scheme	-			

Target #3	
Target	Prioritized zones for urban transformation actions
Related actions	Prioritized zones are determined according to presence of buildings under disaster risk, conservation sites, listed buildings and derelict buildings.
Actuation areas	Identified areas in Hasanpaşa and Rasimpaşa, Osmanağa and Caferağa neighbourhoods (which are located in both district and metropolitan level historic city center).
Implementation status	
Execution period	-
Financial scheme	-



ANALYSIS OF THE EXISTING CITY PLANS

City	KADIKÖY			
PLAN #5				
Title	Istanbul Regional Plan			
Description of the Plan	Vision of the Plan: "Unique İstanbul; City of Innovation and Culture With Creative and Free Citizens". The Plan adopts a sustainable, holistic and multi-dimensional approach on local development to address a variety of topics ranging from industrial transformation and entrepreneurship to health and education, institutional capacity and governance, transport, energy and environment.			
Implementation Period	2014 - 2023			
Scope of the Plan	Regional			
Topics covered	Energy	Mobility	Social	ICT
Defined Targets				
Target #1				
Target	Globally Decisive, High Value-Added, Innovative and Creative Economy			
Related actions	A strategic actor in the global economy. Competitive position in the global value chain. Transformation in the industry. Ascending R&D and innovation. Qualified entrepreneurship. Transforming the workforce, developing and increasing employment. Urban image and effective publicity.			
Target #2				
Target	Fair Sharing, Inclusive and Learning Society			
Related actions	High standards and creative education for all ages. Social integration. Dynamic population. Healthy community, quality and accredited health services. Save city. Strong institutional capacity, good governance. Urban consciousness and belonging to Istanbul.			
Target #3				
Target	Joyful, Authentic Urban Spaces and Sustainable Environment			
Related actions	Sustainable urban development adn participatory planning. Spatial quality, authentic design. Holistic and inclusive urban transformation. Protected İstanbul memory and cultural heritage. Effective disaster management. Sustainable transport and accessibility. Sustainable and efficient logistics infrastructure. Quality and sustainable environment. Environment friendly energy.			



ANALYSIS OF THE EXISTING CITY PLANS

City		KADIKÖY		
PLAN #6				
Tittle		IMM Strategic Plan 2015 - 2019		
Description of the Plan		Local government of the brand city that makes life easier with sustainable and innovative solutions and generates global values for the urban development and the civilization. IMM has planned new projects together with the existing projects that were produced to present the right to “Live in a Healthy Environment” that complies with this goal and called as a fundamental right to Istanbul residents.		
Implementation Period		2015 - 2019		
Scope of the Plan		Regional		
Topics covered		Energy	Mobility	
Defined Targets				
Target #1				
Target		Improving Waste Management Practices		
Related actions		Generating energy from landfill gas in landfills. Electronic waste processing in electronic waste recycling facility. Arrangement of awareness raising in schools and public education centres in Istanbul. Sile Mechanical Biological Process and Waste Treatment at Recovery Facility.		
Target #2				
Target		Enabling and Extending Activities for Renewable Energy and Energy Efficiency		
Related actions		Outdoor lighting consultancy and design work. Energy supply from the free market. Energy efficiency project and application works for Istanbul Metropolitan Municipality Units.		
Target #3				
Target		Extending Green Zones		
Related actions		Construction of crossroads, coastal and district parks in district municipalities. Landscaping in public institutions and organizations. Construction of water tanks.		
Target #4				
Target		Extend smart transportation systems to all public transportation vehicles		
Related actions		Validator Installation. Taxi Management Center Activities.		

Target #5	
Target	Increasing the number of low emission public transportation vehicles
Related actions	Implementing incentive policies to increase the standards and changes of vehicles.
Target #6	
Target	Increasing the share of railway systems in transportation systems
Related actions	Anatolian Side Rail System Applications (Cumulative Activity). Dudullu-Kayisdagi-Icerenkoy-Bostanci Metro Line (14.2 km).

	
ANALYSIS OF THE EXISTING CITY PLANS	
City	KADIKÖY
PLAN #7	
Title	Istanbul Climate Change Action Plan
Description of the Plan	Istanbul aims to reduce the greenhouse gas emissions of the city by 20% in 2030 compared to the normal scenario by taking into account the national climate. The use of fossil fuels for energy purposes, cattle husbandry, intensive agricultural practices, loss of forest areas for economic activities and inadequate waste management practices cause greenhouse gas emissions. Making the ecosystem, social structure and economy of the city resistant to climate change and to reduce the greenhouse gases causing climate change, to observe the historical heritage and current mega cent dynamics of the city and to improve the city's charm and living conditions.
Implementation Period	2030
Scope of the Plan	Regional
Topics covered	Energy Mobility Social
Defined Targets	
Target #1	
Target	Zero-carbon waste management
Related actions	The carbon footprint of waste management activities is updated annually and compensated by Gold Standard certificates.
Target #2	
Target	Increasing parking and charging facilities of bicycles and electric vehicles
Related actions	Creating a sheltered, free and secure bicycle parking area with a total capacity of 700 bicycles, especially at public transport ports such as piers, metrobus, tram and metro stations with the "Park Et ve Devam Et" project.

Target #3	
Target	Encouraging cogeneration and renewable energy production in buildings
Related actions	Modeling of city furniture with charging station and use of solar panels on benches in parks to create awareness. Development of energy management systems in IMM.
Target #4	
Target	Encouraging measures to increase energy efficiency in buildings
Related actions	Reduction of incentives or development of incentives for low-energy construction projects at various fees (e.g. licenses, water, etc.) for permits and licenses for new constructions.
Target #5	
Target	Ensuring the municipality's transition to electric and hybrid vehicles and solar energy
Related actions	Placing an electric car charger in the leading 3 large and 1 small (e.g. Kartal) municipal utility buildings and, if possible, charging with solar panels in the building.
Target #6	
Target	Making existing roads suitable for bicycles
Related actions	Until 2023, 800 km of the road and street make urban bicycles suitable for transportation.



ANALYSIS OF THE EXISTING CITY PLANS

City	KADIKÖY			
PLAN #8				
Tittle	Istanbul 1/100,000 Scale Environment Regulation Master Plan			
Description of the Plan	With this plan, it is aimed to be a city that has been strengthened on a global scale by passing through a comprehensive structural transformation process. The vision of the plan consists on (1) identifying the historical, cultural and natural identity values of the city; (2) highlighting the advantages of the city in the fields of culture and tourism; (3) improving the quality of life by reflecting environmental, economic and social sustainability principles; (4) using institutional and spatial plans as an efficient tool in an effective and participatory urban management / governance structure.			
Implementation Period	2009 - 2023			
Scope of the Plan	Regional			
Topics covered	Energy	Mobility	Social	
Defined Targets				
Target #1				
Target	Ensuring Istanbul's Strengthening at Global Level			
Related actions	To gain the status of culture-oriented tourism city in the world scale which is compatible with Istanbul's identity. To provide sustainable economy with high economic competitiveness based on information and technology. To activate the potential of creating an authentic approach by using Istanbul's strengths and opportunities.			
Target #2				
Target	To Pioneer The Implementation Of Sustainable Development In The Region By Activating Local Potentials In The Marmara Region With A Holistic Approach			
Related actions	Strengthening the pioneering role of Istanbul in minimizing socio-economic development differences in the region. Strengthening the leading role of Istanbul in ensuring sustainable spatial development in the Marmara region.			

Target #3	
Target	Ensuring Urban Functional Integration in The Spatial Development of Istanbul in Accordance with Environmental, Economic and Social Sustainability
Related actions	To provide linear, multicenter and gradual development of the east and west axis of the city. Developing specialized centers with high value and efficiency potential in Istanbul province. Ensuring the structural transformation of the industry sector by rehabilitating the current city-wide structure. Ensuring sensitive development of settlements to life support systems and sensitive ecosystems. Ensuring responsive urban development against disasters. To ensure the development of settlements sensitive to historical-cultural values. Developing transport decisions in compliance with plan decisions. To make the spatial organization of distributed logistics functions in the city and to increase its effectiveness. Establishing relation of adaptation and damage issues to climate change with spatial plans by considering long term effects of climate change.
Target #4	
Target	Improve the Quality of Life
Related actions	Improving spatial quality in residential areas. Prevent environmental (water, air, noise, soil etc.) pollution.
Target #5	
Target	Strengthening Social Capital
Related actions	Providing the population to the higher education level and qualified labor force skills by effectively managing migration towards city. Providing urban integration and social justice.
Target #6	
Target	Ensuring the Restructuring of the Sustainable City Management System
Related actions	Reorganizing the city boundaries as a social and economic whole. Determining planning decisions in functional metropolitan region.



ANALYSIS OF THE EXISTING CITY PLANS

City	KADIKÖY			
PLAN #9				
Tittle	11th Development Plan (updated in 2019)			
Description of the Plan	The Plan aims at advancing the society to high prosperity levels, in line with the 2023 targets. In the energy sector, the focus will be on meeting the energy demand resulting from high growth in a manner that is timely, adequate, reliable and affordable. In addition, domestic and renewable resources will be utilized to the highest possible extent in order to ensure a reliable domestic energy supply. Macroeconomic stability in order to ensure stable prices.			
Implementation Period	2019 - 2023			
Scope of the Plan	National			
Topics covered	Energy	Social		
Defined Targets				
Target #1				
Target	Improve energy efficiency and forest presence to reduce carbon emissions			
Related actions	-			
Target #2				
Target	The electricity generation will be provided from renewable energy sources, and necessary planning and investments will be realized in order to ensure the safe integration of renewable energy production grid			
Related actions	-			
Target #3				
Target	The efficient and self-generating buildings and smart grid applications will be expanded for energy efficiency			
Related actions	-			
Target #4				
Target	The target of Electrical Installed Power (MW) will be incresed from 88,551 MW (2018) to 109,474 MW (2023)			
Related actions	-			



ANALYSIS OF THE EXISTING CITY PLANS

City	KADIKÖY			
PLAN #10				
Tittle	Energy Efficiency Action Plan			
Description of the Plan	Energy Efficiency strategies in buildings, industry and technology, energy, transportation, agricultural activities.			
Implementation Period	2017 - 2023			
Scope of the Plan	National			
Topics covered	Energy	Mobility		
Defined Targets				
Target #1				
Target	- 23.9 mtoe reduction in Turkey’s primary energy consumption cumulatively in the period of 2017 - 2023			
Related actions	-			
Target #2				
Target	Identify and share best practices on materials and technology in the construction sector (Building Sector Targets)			
Related actions	Energy-efficient new technologies and renewable energy technologies will be added into the unit price handbook of the Ministry of Environment and Urbanisation.Minimum energy performance criteria regarding devices, equipment and buildings will be included in the guide. An Internet portal will be created to publish the guide and post success stories and practices on buildings.			
Target #3				
Target	Set energy saving targets for public buildings (Building Sector Targets)			
Related actions	Savings targets for public buildings will be defined according to energy efficiency audits. A guide will be developed for energy savings measures. Work will be undertaken to raise awareness in public workers for energy savings. Appointment of energy managers will be made to obligated public buildings. Energy efficiency renovation and practices will be undertaken in the public buildings based on a programme. Results of energy savings will be monitored.			

Target #4	
Target	Improve energy efficiency municipal services (Buildings Sector Targets)
Related actions	The effectiveness will be enhanced of the financing mechanism provided by Ilbank to municipalities and the inclusion of international financing institutions will be promoted. Through the assistance of financing mechanisms, energy efficiency audits will be undertaken and measures implemented. Municipalities will be encouraged to obtain ISO 50001 Energy Management System certification. Energy efficiency units will be established in municipalities.
Target #5	
Target	Rehabilitate existing buildings and improve energy efficiency (Building Sector Targets)
Related actions	Based on the analyses, a mechanism will be developed which will involve the use of one or more of incentives, support, taxation or sanctions. The legislative framework will be developed and implementation plans defined. Awareness-raising work will be undertaken; guides on the mechanism will be prepared. A methodology will be developed for controlling and monitoring activities.
Target #6	
Target	Promote central and district heating&cooling systems (Building Sector Targets)
Related actions	In line with the outputs from the target #13 "Identify the potential of cogeneration and district heating&cooling systems and prepare a roadmap", obligation conditions will be explored for new buildings and settlement units, and incentive programmes for existing buildings. It will be mandatory to conduct economic feasibility studies for cogeneration systems supported by renewable energy and heating&cooling systems for the new built mass housing complexes with legislative amendmend. Direct or indirect incentives will be defined for mass housing complexes and large settlement areas identified as having high potential. For district heating systems, maximum use will be made of geothermal potential, if present in the region, and waste heat from industry and power plants.
Target #7	
Target	Promote sustainable green buildings and sustainable settlements (Building Sector Targets)
Related actions	Buildings and settlements with green certificates will be certified and promoted. Public buildings will be certified to set examples for the private sector. The Ministry of Environment and Urbanisation will engage in a field study annually to verify the results on the certificates. Target years will be defined for imposing the obligation of being "nearly zero energy building" on the public and private buildings to be newly built. The increase in the number of sustainable buildings will be monitored.
Target #8	
Target	Increase the energy performance certificate ownership ratio of existing buildings (Building Sector Targets)

Related actions	For the issuing of energy performance certificate, capacity will be built to enable the issuing of energy performance certificate by legal entities who employ engineers or architects with the certificate of authorisation and the certificate of “Independent Consulting Engineer” from chambers of professions. The energy performance certificates issued will be checked for accuracy through sampling every year. Necessary regulations will be developed to impose sanctions on the transactions of trade and lease of buildings without energy performance certificates. In the long term, after all buildings obtain their energy performance certificates, imposing of sanctions will be considered on inefficient buildings.
Target #9	
Target	Promote energy efficiency in new buildings (Building Sector Targets)
Related actions	Macroeconomic analyses will be conducted to encourage energy efficiency in new buildings; the scope and methodology of the measure will be defined. Minimum practices will be identified such as minimum energy performance criteria, renewable energy resources, use of cogeneration and heat pump to be incorporated in the new mass housing model. This will be updated based on energy consumption and implementation instructions for all areas other than heating. The action will be annually revised in order to optimize its implementation and assess the impact. Buildings in the scope of urban transformation and improvement to be made to mass housing will be included in the scope. It will be considered for new buildings to mandatorily have at least B class EPC.
Target #10	
Target	Improve energy performance of existing public buildings (Building Sector Targets)
Related actions	Standardised templates will be formulated for Energy Performance Contracts. Technical and financial capacities of ESCOs will be increased. A control and verification mechanism will be established.
Target #11	
Target	Scale up the use of renewable energy and cogeneration systems in buildings (Building Sector Targets)
Related actions	Minimum limits will be defined in the legislative framework on the basis of economic feasibility studies for new buildings of certain size to use renewable energy resources. Offsetting will be made easier for buildings using photovoltaic solar panels with the distribution grid operators. Direct or indirect support models will be defined for heat pump, cogeneration and renewable energy resources usage in the existing buildings. The legislative framework will be developed for the sale of on-site generated electricity and heat with minimum self-consumption limit. Control mechanisms for the efficient operation of cogeneration systems will be developed. Support mechanisms will be prioritised based on cost/benefit analyses. The impact of supporting mechanisms will be annually monitored and support amounts for the subsequent year will be optimised accordingly. The said actions will be supported by awareness-raising programmes on the benefits of renewable energy and cogeneration.

Target #12	
Target	Allocate funds to buildings of SME category for energy efficiency audit programmes and audits (Building Sector Targets)
Related actions	Energy efficiency audit support will be defined for buildings in SME category which are not under obligation to commission audits under the legislative framework. Criteria will be defined for commercial and service buildings that will be included in the scope of audit. A progressive support plan will be prepared for the buildings which fulfil the criteria. Audit templates will be updated, and a common methodology and format will be provided in order to increase the quality of audits.
Target #13	
Target	Identify the potential of cogeneration and district heating&cooling systems and prepare a roadmap (Energy Sector Targets)
Related actions	The demand for heating&cooling will be projected for 10 years into the future considering the regional planning. Heating&cooling supply points will be identified and the current situation and potential of cogeneration and trigeneration systems will be identified and their future role in the electricity and heating supply system will be determined. The legislative framework will be developed for auditing to implement cogeneration and trigeneration systems to the buildings. The waste heat potential will be identified of industry and electricity generation facilities. Plans for progressive utilisation/putting into economic use will be updated. Cogeneration potential relying on renewable resources will be identified. The necessary bases will be developed for heat sale and share of heat expenses. The legislative framework will be developed for measurement of heat and sales standards. The legislative framework will be developed to build a heat market that enables trading of heat. Best practices will be shared of cogeneration, trigeneration, heating&cooling systems based on results.
Target #14	
Target	Implement efficiency standards for natural gas infrastructure (Energy Sector Targets)
Related actions	A roadmap will be developed to increase energy efficiency and reduce the losses for natural gas transmission and distribution. Based on the roadmap, the natural gas transmission system will be evaluated in respect of energy efficiency, and necessary actions will be taken to implement cost effective energy efficiency measures. The road map will be implemented and monitored.
Target #15	
Target	Presenting customers with comparable and detailed bills; create an energy data platform for smart management of measurement data (Energy Sector Targets)
Related actions	Energy distribution and retail companies will create a common format and reporting system. While consumers' billing data for previous years are compared; easily intelligible data will be created considering such information as degree days. Basic statistics on consumption will be included in the bills, usage habits will be analysed and more efficient and effective alerts will be given.

Target #16	
Target	Harmonise legislative framework on electric metering with EU acquis (scale up Smart Metering) (Energy Sector Targets)
Related actions	A cost-benefit analysis will be conducted based on EU acquis. If the results of the cost-benefit analysis are positive, smart metering systems will be scaled up along targets similar to those set by EU acquis. Focus groups will be identified and prioritised (first industrial facilities, business places, hotels etc.). Infrastructure needs will be identified, and costs be calculated accordingly. The impact of smart meter cost on the tariff will be evaluated.
Target #17	
Target	Implement minimum performance standards for transformers (Energy Sector Targets)
Related actions	An inventory will be made of the existing transformers, failures be classified to prioritise those with higher rates of failure, and efficiency-focused work will be defined. Minimum efficiency values for transformers in Commission Regulation (EU) No 548/2014 of 21 May 2014 on implementing Directive 2009/125/EC of the European Parliament and of the Council with regard to small, medium and large power transformers will be transposed to Turkey. The legislative framework will be developed on the implementation of standards and transmission and distribution companies will start implementation in the fourth implementation period.
Target #18	
Target	Manage peak demand arising from heating&cooling (Energy Sector Targets)
Related actions	Work on legislative framework and impact analysis will be made, and according to the results of the analysis, relevant procedures will be integrated into the tariff structure. The instantaneous demand control and frequency control activities addressed in the “Regulation on Ancillary Services in Electricity System” will be addressed in this context. Activities will be undertaken to scale up thermal storage systems for those with high heating&cooling load through planning for the reduction of peak load. Renewable energy generation and peak demand will be planned and managed.
Target #19	
Target	Improve energy efficiency public lighting (Energy Sector Targets)
Related actions	Innovative technologies will be monitored and integrated into the legislative framework. Control and monitoring activities will be undertaken to maximise energy savings potential; the implementation of Energy Performance Contracts will be promoted associated with ESCOs. Plan actualisation and energy savings verification will be monitored. Development of competences for local design and production in efficient lighting systems will be promoted.

Target #20	
Target	Improve efficiency increase in electricity transmission and distribution (Energy Sector Targets)
Related actions	Actions will be explored to reduce grid congestions for the fourth implementation period of distribution companies. Performance criteria will be identified for distribution companies on extensiveness of distributed generation; and promotion opportunities will be evaluated. Regional targets will be set for distributed generation in the regions of distribution companies.
Target #21	
Target	Improve efficiency in existing power generation plants (Energy Sector Targets)
Related actions	Power plants to be studied will be identified and prioritised based on such criteria as age, technology, efficiency and internal consumption etc. Financial and technical feasibility studies will be conducted. Based on the overall planning, activities and investments will be planned in detail. The need for incentives will be evaluated, and if necessary, an incentive mechanism will be designed accordingly. Necessary resources will be allocated if economically and technically feasible. Monitoring, verification and awareness-raising activities will be carried out.
Target #22	
Target	Build a market infrastructure for demand-side response (Energy Sector Targets)
Related actions	A flexible consumption portfolio will be created consisting of large industrial consumers with flexible consumption (e.g. cement, iron and steel etc.). Assessments will be made to include other consumers including residential ones in the implementation. To that end, demo areas will be created in the scope of micro grids, smart city, smart grids by supporting the scaling up of smart meter and pilot schemes.
Target #23	
Target	Promote energy-efficient vehicles (Transport Sector Targets)
Related actions	The infrastructure will be developed in order to introduce differentiated taxation according to the fuel consumption and emission values (CO ₂ /km). Tax advantage will be provided to low emission vehicles by improving the current motor vehicle tax system. The imposition of higher taxes for older vehicles will be included in this system considering the balance of environmental impact and purchasing power. A database will be created where the CO ₂ emission figures of all vehicles on the market will be recorded. The tax system will be supported by this database. Standards and infrastructure will be established for the installation of charging stations for electric and hybrid vehicles. Awareness on electric and hybrid vehicles will be raised and low emission vehicle culture will be established. Vehicle manufacturers will play an active role in the introduction and promotion of electric and hybrid vehicles to the public.

Target #24	
Target	Develop benchmarking on alternative fuels and new technologies (Transport Sector Targets)
Related actions	Vehicles that use alternative fuels and/or new technologies will be analysed and compared for cost, energy consumption and environmental impact on the basis of benchmarks. Vehicles that use alternative fuels and/or new technologies will be analysed and benchmarked in terms of costs per ton-km or passenger-km, energy resources and consumption, and greenhouse gas emissions through lifecycles. Trainings and physical infrastructure needs will be assessed for repair and maintenance services of new technology vehicles. A benchmarking study will be made of vehicles that use traditional and alternative fuels, and energy efficiency policies will be determined in line with the results of this study.



ANALYSIS OF THE EXISTING CITY PLANS

City	KADIKÖY			
PLAN #11				
Title	Energy Efficiency Strategy Paper			
Description of the Plan	This ‘strategy paper’ is an executive policy annex to the 2007 Energy Efficiency Law. The Paper aims to detail a set of federal policies that decrease energy intensity (the amount of energy consumed per capita) by at least 20% by the year 2023. It also includes strategies which are aimed at providing supply security energy, decreasing energy costs, protecting environment.			
Implementation Period	2012 - 2023			
Scope of the Plan	National			
Topics covered	Energy			
Defined Targets				
Target #1				
Target	Decrease at least 20% of energy consumed per GDP of Turkey by 2023			
Related actions	Identify seven main strategies under this target that aims 20% reduction of energy consumption by 2023 which are focused on renewable energy sources, industry and services sector, public transport sector and buildings.			
Target #2				
Target	Increase energy efficiency in power production, transmission and distribution and to decrease energy losses and emissions			
Related actions	Target supported with two sub-strategies that aim decrease in energy losses and harmful environment emissions. (1) The total average cycle efficiency of the coal thermal power plants around the country including waste heat recovery will be increased over forty-five percent (45%) by the year 2023. (2) Some measures about the subject of demand side management will be developed for decreasing the electrical energy intensity at least 20% until the year 2023.			
Target #3				
Target	To provide Market Transformation of Energy Efficient Appliances			
Related actions	Accomplish the market transformation of lamps, refrigerators and electrical motors over the minimal energy efficiency class completed at the end of 2012 and however market transformation of heating/cooling systems and other energy efficient products in parallel to the EU implementations.			

Target #4	
Target	Strengthen institutional structure, capacity and cooperation, increase use of advanced technology and increase awareness activities, establish financial mechanism other than public sources.
Related actions	Sub-actions: (1) Strengthen the institutional structure, capacity and mutual cooperation of implementing organisations until the end of 2012. (2) Increase the number of certified energy managers up to at least 5,000 persons and increase the number of energy efficiency consultancy companies expertized in industry sector up to 50 companies in the country general by the end of 2015. At least 50 original design and/or product, which would be commenced to be manufactured based on domestic R&D results, by the year 2023 in areas of energy efficiency and renewable energy sources. (4) Promote the awareness and encouragement activities carried on as part of the "National Energy Efficiency Movement" with the collaboration of public sector, private sector and NGOs. (5) In the context of sustainable financing mechanisms except the public for the applications related to energy efficiency and renewable energy sources, complete the works of developing the infrastructure of carbon trading and carbon market within the 18 months of date of publication of the document.
Target #5	
Target	To reduce energy intensity and energy losses in industry and services sectors
Related actions	Decrease the reduced energy intensities in each industry sub-sector in the rates determined with the sector collaborations without being at least 10% for each sub sector. Sub-activities: (1) Defining applicable measures in energy efficiency with the savings potential in industry sub sectors. (2) Require the business enterprises, obliged to establish an energy management unit or nominate energy manager in the industry and services sectors, and the industrial zones to have ISO 50001 Energy Management Systems Standard paper in the relations of them with the public enterprises. (4) Prepare the action plans related to the application by determining the necessary measures, energy savings potential and their cost by making energy audits periodically in the business enterprises consuming 5,000 toe annually and in the buildings having a usage area more than 20,000 m ² used for commercial or service purposes.
Target #6	
Target	Decrease energy demand and carbon emissions of the buildings; to promote sustainable environment friendly buildings using renewable energy sources
Related actions	In year 2023 the heat insulation and energy efficient heating systems providing current standards will be in all commercial and service buildings having a total usage area of more than 10.000 m ² with the dwellings having group class 3 or more from the defined building groups in the Communiqué About Approximate Unit Costs of the Buildings.

Target #7	
Target	Reduce unit fossil fuel consumption of motorized vehicles, to increase share of public transportation in highway, sea road and railroad and to prevent unnecessary fuel consumption in urban transportation
Related actions	The small vehicles carrying passenger and load will meet the provisions of secondary legislation which would be produced in the direction of the EU legislation related to CO₂ emissions, the transport master plans in big cities will be prepared and put into force. Sub-activities are: (1) To encourage environment friendly vehicles having small size motor with low emission having fuel cell or hybrid vehicle with electricity and to withdraw from traffic the vehicles filled their economic life by progressive stages. (2) To enforce transport master plans at metropolis interested in public transportation and fuel wastage with priority and supporting transport systems one another by establishing bicycle and car parking areas in the public transportation stations. (3) To decrease the share of road transportation in the total transportation, to develop sufficiently the infrastructure of the types of transportation alternative to the road transportation, to increase the share of sea roads and railways in load and passenger transportation. (4) To promote smart transportation systems and smart traffic management applications, where information and communication technologies was used, for providing network efficiency and increasing energy efficiency in transportation. (5) To shift road transport load to railway or sea road in the case of long distance mass transportation by making arrangements especially in load transportation in the direction of “Combined Transportation Strategy”.
Target #8	
Target	Use energy effectively and efficiently in the public sector
Related actions	Strategy focus on energy consumption in the public enterprises buildings and facilities. 10% decrease in energy consumption by the year 2015 and as 20% by the year 2023. Activities: (1) To be activated efficiency improvement applications in the buildings and facilities of public enterprises. (2) Not to buy or not to make the ones that not providing minimum efficiency criteria, determined by the Ministry, in commodity and service procurements and construction works having energy use in public procurements. (3) The vehicles fulfilled their economic lives shall be clarified by gradually in the public enterprises. (4) To realize efficiency improvement applications in the buildings and facilities belong the public sector with Energy Performance Agreements.



ANALYSIS OF THE EXISTING CITY PLANS

City	KADIKÖY			
PLAN #12				
Tittle	National Climate Change Action Plan			
Description of the Plan	The Plan aims to integrate Turkey’s future development and environmental plans and to proceed seamlessly, and without losing pace. Turkey, to provide its people with welfare and high living standards with less carbon intensity, aims to promote energy efficiency, increase the use of clean and renewable energy resources and to integrate its development policies with climate change policies.			
Implementation Period	2011 - 2023			
Scope of the Plan	National			
Topics covered	Energy	Social		
Defined Targets				
Target #1				
Target	Reduce nationwide electricity distribution losses to 8% by 2023			
Related actions	It is aimed to improve the technical infrastructure and prevent illegal use. Taking necessary supportive measures to rehabilitate and strengthen distribution networks and move towards “Smart Grid” applications and increasing inspections to prevent illicit electricity use, and conducting activities on this issue.			
Target #2				
Target	Establish heat insulation and energy-efficient systems meeting standards in commercial and public buildings with usable areas larger than 10,000 m² and in at least 1 million residential buildings by 2023			
Related actions	It is aimed to determine energy efficiency potential and priorities in order to provide thermal insulation and energy efficient systems in buildings. Developing action plan to increase energy efficiency in existing buildings (2011-2014) and identifying short, medium and long-term targets for ensuring energy efficiency in buildings by comparing existing buildings against model buildings (2011-2018).			

Target #3	
Target	Decrease annual energy consumption in the buildings and premises of public institutions by 10% until 2015 and by 20% until 2023
Related actions	It is aimed to reduce the annual energy consumption of public institutions and buildings. Issuing a Prime Ministry Circular for determination of threshold values for EPC for old and new buildings, determination of an energy efficiency improvement strategy for public buildings based on such EPC threshold value and ensuring necessary allocation.
Target #4	
Target	Limit greenhouse gas emissions originating from settlements
Related actions	It is targeted that reduce greenhouse gas emissions in new settlements by at least 10% per settlement in comparison to existing settlements (which are selected as pilot and the greenhouse gas emissions of which are identified until 2015) until 2023. It describes the principles and procedures for energy-efficient, climate-sensitive, sustainable urban settlement planning, and using the results of pilot projects, transferring to outputs to the physical development planning legislation so as to put sustainable urban plans into practice.
Target #5	
Target	Decrease the CO₂ equivalent intensity per GDP produced in the industrial sector until 2023
Related actions	The plan aims to develop and use up to 2023 new technologies for the development of financial and technical infrastructure to limit greenhouse gas emissions and to limit greenhouse gas emissions in the industrial sector. In the industrial sector, it is planned to share good practice examples with low public greenhouse gas emission technologies.

Annex F: Trenčín

F.1 City Level Indicators

Table 116: Trenčín City Level Indicators calculation

ENERGY & ENVIRONMENT				
Application field	Indicator		VALUE	UNIT
City Energy Profile	Final energy consumption per capita		19.25	MWh/cap
	Primary energy consumption per capita		32.69	MWh/cap
	Primary energy sources	Solid fossil fuels	20.00%	%
		Natural gas	24.00%	
		Oil and petroleum	22.00%	
		Renewables and biofuels	11.00%	
		Electricity from the grid	23.00%	
		Solid fossil fuels	3.85	MWh/cap
		Natural gas	4.62	
		Oil and petroleum	4.24	
		Renewables and biofuels	2.12	
		Electricity from the grid	4.43	
Building connected to the DH-network or renewable energy grid		19% ⁹⁴	% of buildings/city	
GHG Emissions	GHG emissions per capita		5.66	Tonnes of CO ₂ /cap
Waste Management	Recycling rate		40%	% of tonnes
MOBILITY				
Application field	Indicator		VALUE	UNIT
City Mobility Profile	Modal split	Walk	34%	%
		Bike	7%	
		Public transport	17%	
		Non-car transport	58%	
		Car (private motor vehicle)	42%	
	Fuel mix in mobility	Gas oil and diesel oil	68.80%	%
		Gasoline	28.60%	
		Liquefied Petroleum Gases	0.30%	
		Electricity	2.30%	

⁹⁴ Data estimated by the average value of all project cities with the same range of heating degree-days specified in tables Table 18 and Table 19 in section 3.2.2. Estimated data has also been crossed with national data, which is approximately 35% according to Euroheat website (<http://www.euroheat.org/wp-content/uploads/2016/03/2015-Country-by-country-Statistics-Overview.pdf>). For the case of this diagnosis, the score (normalisation) for both values would be the same (10.00) according to the cluster in which Trenčín is by its heating degree-days specified in Table 14 and previous ones.

	Other fuels	0.00%	
	Energy use for transportation	5.78	MWh/cap
	Access to public transport	95%	% of people
	Public infrastructure promoting low-carbon mobility	55.61	Km/100,000 people
GOVERNANCE			
Application field	Indicator	VALUE	UNIT
Economy	Unemployment rate	5.50%	% of active population
	GDP (Gross Domestic Product)	13,400	€/cap
Initiatives and Strategies of the Public Administration	Smart city factor in a city development strategy	3	Likert scale
Public ICT/ Data	Quality of open data	3	Likert scale
SOCIETY & CITIZENS			
Application field	Indicator	VALUE	UNIT
Affordable Housing	Development of housing prices	7.86%	% of change or % of €/m ²
	Housing cost overburden rate	8.40%	%
Citizen Engagement and Empowerment	Citizen engagement to climate conscious actions	3	Likert scale
	Encouraging a healthy lifestyle	2	Likert scale
Urban Structure	Inhabitants in dense areas	20.00%	% of people

F.2 Existing City Plans



ANALYSIS OF THE EXISTING CITY PLANS

City	TRENČÍN			
PLAN #1				
Title	Programme of Social and Economic development of the city of Trenčín for years 2016 - 2022 with a vision to 2040			
Description of the Plan	The plan is the main strategic socio-economic development plan of the city. It covered a wide portfolio of the topics related to urban development in the city. The programme provides framework for further implementation action plans in respective sectors (transportation, energy, social services etc.).			
Implementation Period	2016 - 2022 (vision to 2040)			
Scope of the Plan	Local			
Topics covered	Mobility	Social	Energy	
Defined Targets				
Target #1				
Target	Increasing number of inhabitants (from 55,000 to 80,000): New central city zone at river bank			
Related actions	After the construction of new highspeed railway corridor, there is a new development area in the city centre. The city is preparing the new zonal Master plan defining the functional regulation of the area which should be presented in 2020.			
Actuation areas	There are several potential new development areas within the city, but the most important/ largest is there new central city zone at the river bank - part of potential PED area in Trenčín.			
Implementation status	On-going			
Execution period	2018 - 2020			
Financial scheme	The zonal Master plan preparation is covered from the city budget. Further development of the area expected 3 main financial schemes: a) EU structural funds (ecosystem services, smart actions, water and waste management, energy transition); b) public-private partnership (development of public services, housing); c) private funding (commercial development).			
Target #2				
Target	Increasing number of inhabitants (from 55,000 to 80,000): Starting/social flats			
Related actions	-			
Actuation areas	Whole area of the city			
Implementation status	On-going			
Execution period	2018 - 2020			
Financial scheme	It will be added			

Target #3	
Target	Sustainable mobility transition: development of the Plan of sustainable mobility
Related actions	City is preparing crucial mobility strategy document: new plan of sustainable mobility covering whole aspect of mobility within the city. Currently, we are in the process of elaboration and expected time of finalisation is next year (2021). Sustainable mobility transition in the city of Trenčín is focused on changing the mobility flows within the city via increasing of cyclo mobility instead of individual car mobility. Sustainable mobility should support decreasing of CO ₂ emissions from transport, decreasing of other emissions (main focus is on PM emissions), decreasing of fossil fuel use for mobility purpose.
Actuation areas	The whole city area
Implementation status	On-going
Execution period	2016 - 2021
Financial scheme	The realisation is covered from EU structural funds - ERDF (national Operational programme - Integrative regional operational programme IROP)
Target #4	
Target	Sustainable mobility transition: Plan for cyclo mobility development - General plan for cycling
Related actions	Plan for cyclo mobility development was elaborated by the city in 2016 and further development of cycle infrastructure has been following this plan. The main focus of the plan is on identification of crucial corridors for cycle routes within the city. It also defines supportive activities leading to the increase of cyclo mobility as alternative to individual car mobility of citizens.
Actuation areas	The whole city area
Implementation status	On-going
Execution period	2016 - 2021
Financial scheme	Own budget of the city
Target #5	
Target	Sustainable mobility transition: Parking policy regulation
Related actions	The City of Trenčín prepared and implementing new parking policy in the city. The main focus of the policy is on regulation of the cars amount passing and parking in the centre of the city and the residential neighbourhoods, on support of the change of mobility behaviour of inhabitants but also visitors of the city. The motivation tools for electromobility should be implemented as a part of the regulation.
Actuation areas	The whole city area
Implementation status	On-going
Execution period	2016 - 2021
Financial scheme	Own budget of the city

Target #6	
Target	Sustainable mobility transition: cyclo infrastructure development
Related actions	According to General plan for cycling the city of Trenčín started construction of crucial cycling infrastructure the backbone of network of bicycle communications in the city. There were build 2 parts of the network (Center - South – Phase 1 + Phase 2 and route Karpatska) until the year 2019. Other parts are under projecting and realisation depends on availability of funds, suitable call for funding (mainly EU funds) covering the investments.
Actuation areas	The whole city area
Implementation status	On-going
Execution period	2016 - 2021
Financial scheme	Engineering and investments are covered from EU structural funds - ERDF (national Operational programme - Integrative regional operational programme IROP) with cofinanciation by the city.
Target #7	
Target	Climate change adaptation: Strategy for climate change adaptation at the local level
Related actions	City is preparing crucial climate change adaptation strategy: Strategy for Climate Change Adaptation at the local level defining approaches, measures and tools using for facing of challenges resulting from climate change in the city of Trenčín. Currently, we are in the process of elaboration and expected time of finalisation is next year (2020).
Actuation areas	The whole city area
Implementation status	On-going
Execution period	2019 - 2021
Financial scheme	Preparation of the strategy is covered by EU structural funds (National Operational Programme Quality of Environment) with cofinance by the city.
Target #8	
Target	Climate change adaptation: The new quality of neighbourhoods - revitalisation of courtyards
Related actions	City decided to realised investments to specifics public spaces (green courtyards) in biggest neighbourhoods in the city to increase the quality of environment with special focus on green infrastructure elements in the areas. At least, 4 revitalisation projects will be done under this programme and one of the location is within our PED area.
Actuation areas	4 specific areas where defined, one is within potential PED in the city.
Implementation status	On-going
Execution period	2019 - 2021
Financial scheme	Engineering and investments are covered from EU structural funds - ERDF (National Operational Programme - Integrative Regional Operational Programme IROP) with cofinanciation by the city

Target #9	
Target	Smart energy: Refurbishment of the municipal building - reducing energy consumption
Related actions	Based on Energy audits of the building, the appropriate ones will be chosen and through scheme GES – guaranteed energy service (use the potential of future energy savings in building to finance necessary investments) to improve the technical and technological status of municipal buildings. GES scheme is based on the strong public-private partnership approach, where public sector is provider of GES and municipality is beneficiary from this scheme. Currently, the project is in the preparation phase, city is preparing project proposal for energy audits as precondition for GES assessment of building. Call for funds is open and funding is sourced from EU funds. After the successful finishing of the project, the relevant municipal building will reduce their energy consumption in significant way (theoretical reduction from 30% to 60%).
Actuation areas	Ice skate ring and hydropower dams are located in potential PED area of the city.
Implementation status	On-going
Execution period	2019 - 2025
Financial scheme	Action is in preparation phase - projecting of action for Call of funds from EU structural funds (National Operational Programme - Integrative Regional Operational Programme IROP) with cofinancing by the city.
Target #10	
Target	Smart energy: Refurbishment of kindergarten buildings
Related actions	In the recent years we have refurbished 3 large kindergarten buildings and are in preparation to do so in another 1 as well. The works include total building insulation, changing the windows, fixing roofs, changing climate control and heating systems, changing lighting, in one kindergarten including small photovoltaics array.
Actuation areas	Ice skate ring and hydropower dams are located in potential PED area of the city.
Implementation status	On-going
Execution period	2019 - 2025
Financial scheme	Engineering and investments are covered from EU structural funds - ERDF (National Operational Programme - Integrative Regional Operational Programme IROP) with cofinance by the city.
Target #11	
Target	Preparation of plans for energetical improvements in the ice skating rink
Related actions	The current ice skating rink is about 50 years old. The city-owned building is in the selected PED area in the city. We have recently changed all the cooling systems in the stadium, decreasing energy consumption by about 70%, but the state of the outer shell of the building is in an abysmal state – mainly façade, windows and glass roof. These steps are highly replicable.
Actuation areas	Ice skate ring and hydropower dams are located in potential PED area of the city.
Implementation status	On-going
Execution period	2019 - 2025
Financial scheme	-

Target #12	
Target	Smart energy: Hydropower dams
Related actions	Trenčín has multiple privately owned hydropower plants in its close proximity. The combined power outcome is not known to the city administration.
Actuation areas	Ice skate ring and hydropower dams are located in potential PED area of the city.
Implementation status	On-going
Execution period	2019 - 2025
Financial scheme	-

		ANALYSIS OF THE EXISTING CITY PLANS		
City	TRENČÍN			
PLAN #2				
Title	Programme of Social and Economic development of the Self-Governing Region of Trenčín for years 2013 - 2023			
Description of the Plan	The plan is the main strategic socio-economic development plan of the region. It covered a wide portfolio of the topics related to urban development in the region with special focus on competencies related to the region (secondary education, healthcare, social insurance, mobility (roads of 2nd and 3rd class)).			
Implementation Period	2013 - 2023			
Scope of the Plan	Regional			
Topics covered	Energy	Social	Mobility	
Defined Targets				
Target #1				
Target	Sustainable infrastructure			
Related actions	Support of sustainable forms of mobility - projecting, engineering, construction of new cyclo-routes in the region.			
Actuation areas	Whole region included the connections to infrastructure within the city of Trenčín (cyclo-routes)			
Implementation status	On-going			
Execution period	2014 - 2020			
Financial scheme	The realisation is covered from EU structural funds - ERDF (national Operational programme - Integrative regional operational programme IROP)			

Target #2	
Target	Environment and renewable resources
Related actions	Improving environmental quality in urban areas – development of infrastructure supporting e-mobility and obtaining e-vehicles for the Self-governing region office and related institutions.
Actuation areas	Whole region including construction of charging stations for e-vehicles within the city of Trenčín.
Implementation status	On-going
Execution period	2014 - 2020
Financial scheme	The realisation is covered from EU structural funds - ERDF (national Operational programme - Integrative regional operational programme IROP), and with own budget of the Region.
Target #3	
Target	The energy-efficient low-carbon economy in all industrial sectors
Related actions	Increasing of renewable resources rate on the total energy consumption of the region. Supporting of creation and implementation of low-carbon strategies. Increasing of energy efficiency, smart energy management, renewable resources of energy in public infrastructure and buildings.
Actuation areas	Whole region
Implementation status	On-going
Execution period	2014 - 2020
Financial scheme	The realisation is covered from EU structural funds - ERDF (national Operational programme - Integrative regional operational programme IROP and national Operational programme - Quality of Environment).



ANALYSIS OF THE EXISTING CITY PLANS

City		TRENČÍN			
PLAN #3					
Title		Sustainable Energy Action Plan (SEAP) - The Self-Governing Region of Trenčín			
Description of the Plan		SEAP is the key document defining the energy policies of the self-governing region for the next 7 years in order to increase energy efficiency in properties owned by the region (high schools, social services, self-governing region offices, health services, hospitals, etc.). The Sustainable Energy Action Plan (SEAP) developed in 2013 and updated in 2015, is the key document defining the energy policies of the self-governing region for the next 7 years in order to reduce CO ₂ emissions. This plan includes a number of measures in the short aimed to increase the energy efficiency of public buildings and rational use and management of energy.			
Implementation Period		2013 - 2020			
Scope of the Plan		Regional			
Topics covered		Energy			
Defined Targets					
Target #1					
Target		Energy audits of buidings			
Related actions		Actions related to this target covering energy efficiency audits of infrastructure/ buildings owned by the region (high schools, hospitals, social services providers and other offices) to prepare further investments to increase of energy efficiency of the building and decreasing of carbon footprint. Investments are realised under the Energy guarantee service approach.			
Actuation areas		Whole region including infrastructure/building located within the city of Trenčín			
Implementation status		On-going			
Execution period		2018 - 2020			
Financial scheme		GES - Energy guarantee service, public-private partnership. It's based on EC' approach Energy Performance Contracting (EPC). EPC is a form of creative financing for capital improvement which allows funding energy upgrades from cost reductions. Under an EPC arrangement, an external organisation (Energy Service Company - ESCO) implements a project to deliver energy efficiency, or a renewable energy project, and uses the stream of income from the cost savings or the renewable energy produced to repay the costs of the project (including the costs of the investment). The realisation is covered from EU structural funds - ERDF (national Operational programme - Integrative regional operational programme IROP). Own budget of the Region.			

Target #2	
Target	Energy consumption decreasing
Related actions	Based on the audits selected buildings owned by the region will be refurbished to reduce their energy consumption and to increase using of renewable sources of the energy. In this phase, one high school and 3 local hospitals were selected as suitable for implementation of GES approach and all buildings related to these institutions will be refurbished.
Actuation areas	Whole region. No one building realised in this phase is located in the city of Trenčín.
Implementation status	On-going
Execution period	2018 - 2020
Financial scheme	GES - Energy guarantee service, public-private partnership. It's based on EC' approach Energy Performance Contracting (EPC). EPC is a form of creative financing for capital improvement which allows funding energy upgrades from cost reductions. Under an EPC arrangement, an external organisation (Energy Service Company - ESCO) implements a project to deliver energy efficiency, or a renewable energy project, and uses the stream of income from the cost savings or the renewable energy produced to repay the costs of the project (including the costs of the investment).

	
ANALYSIS OF THE EXISTING CITY PLANS	
City	TRENČÍN
PLAN #4	
Title	Energy Policy of the Slovak Republic
Description of the Plan	The Energy Policy of the Slovak Republic (Energy Policy) is the strategic document defining the energy sector's primary objectives and priorities to 2035 with a view to 2050. The Energy Policy is a component of Slovakia's national economic strategy given that ensuring sustainable economic growth is conditioned by the reliable supply of affordable energy. The Ministry of Economy of the Slovak Republic (Ministry of Economy) is responsible for completing the Energy Policy for a minimum period of 20 years and updating it on a five-year cycle. The Policy defines more principles and possible approaches to the topic than specific actions.
Implementation Period	2014-2019 (primary objectives and priorities to 2035 with a view to 2050)
Scope of the Plan	National
Topics covered	Energy
Defined Targets	
Target #1	
Target	Energy security
Related actions	Diversify energy sources and transport routes. Utilise nuclear power plants and increase the level of nuclear safety and reliability. Optimise the share of domestic renewable energy sources for generating heat with respect to cost effectiveness. Utilise secondary energy sources. Support effective development of natural gas and oil storage capacities. Lower dependency on imported fossil fuels. Increase energy efficiency and decrease final energy consumption.

Target #2	
Target	Energy efficiency
Related actions	Achieve additional decreases in energy intensity at the level of the EU average. Define a national target and securing financing for individual measures. Fully transpose the Energy Efficiency Directive. Establish a scheme for financing energy efficiency. Secure high quality and thorough measurements, monitoring and evaluation in the area of energy efficiency. Provide high quality energy efficiency information and education. Introduce intelligent metering systems and creating intelligent networks to provide consumers with more information and the ability to make informed decisions. Effective demand-side management.
Target #3	
Target	Competitiveness
Related actions	Achieve competitive final energy prices; a well-functioning energy market. A stable and predictable legislative and regulatory framework. Greater independence and powers for the regulator in determining prices as well as in audit activities in order to restrict any possible unfair business practices preventing the development of competition and facilitating the discrimination of some parties on the market. Consistent application of the regulator's competencies through its independence and support when developing its material and human resources.
Target #4	
Target	Sustainable energy
Related actions	Increase the share of low carbon and zero carbon electricity generation. Utilise nuclear energy as the primary source of zero-carbon electricity. Optimise the share of RES especially in heat generation. Utilise natural gas as a "transitional fuel" in the transition to a low carbon economy. Support efficient centralised heat supply systems.

Annex G: Vidin

G.1 City Level Indicators

Table 117: Vidin City Level Indicators calculation

ENERGY & ENVIRONMENT				
Application field	Indicator		VALUE	UNIT
City Energy Profile	Final energy consumption per capita		7.50	MWh/cap
	Primary energy consumption per capita		13.20	MWh/cap
	Primary energy sources	Solid fossil fuels	14.00%	%
		Natural gas	1.00%	
		Oil and petroleum	16.00%	
		Renewables and biofuels	14.00%	
		Electricity from the grid	55.00%	
		Solid fossil fuels	1.51	MWh/cap
		Natural gas	0.10	
		Oil and petroleum	1.76	
		Renewables and biofuels	1.55	
		Electricity from the grid	6.08	
	Building connected to the DH-network or renewable energy grid		0%	% of buildings/city
GHG Emissions	GHG emissions per capita		3.07	Tonnes of CO ₂ /cap
Waste Management	Recycling rate		40%	% of tonnes
MOBILITY				
Application field	Indicator		VALUE	UNIT
City Mobility Profile	Modal split	Walk	40%	%
		Bike	10%	
		Public transport	20%	
		Non-car transport	70%	
		Car (private motor vehicle)	30%	
	Fuel mix in mobility	Gas oil and diesel oil	66.00%	%
		Gasoline	27.00%	
		Liquefied Petroleum Gases	6.00%	
		Electricity	0.00%	
		Other fuels	1.00%	
	Energy use for transportation		1.37	MWh/cap
	Access to public transport		100%	% of people

	Public infrastructure promoting low-carbon mobility	112.00 ⁹⁵	Km/100,000 people
GOVERNANCE			
Application field	Indicator	VALUE	UNIT
Economy	Unemployment rate	11.30%	% of active population
	GDP (Gross Domestic Product)	3,900	€/cap
Initiatives and Strategies of the Public Administration	Smart city factor in a city development strategy	2	Likert scale
Public ICT/ Data	Quality of open data	2	Likert scale
SOCIETY & CITIZENS			
Application field	Indicator	VALUE	UNIT
Affordable Housing	Development of housing prices	5.50%	% of change or % of €/m ²
	Housing cost overburden rate	19.70%	%
Citizen Engagement and Empowerment	Citizen engagement to climate conscious actions	4	Likert scale
	Encouraging a healthy lifestyle	3	Likert scale
Urban Structure	Inhabitants in dense areas	90.00%	% of people

⁹⁵ Estimated data taken from similar cities with the same cycling mobility and similar inhabitants and size.

G.2 Existing City Plans



ANALYSIS OF THE EXISTING CITY PLANS

City	VIDIN			
PLAN #1				
Title	Municipal Development Plan for Vidin Municipality for 2014 - 2020			
Description of the Plan	The main objective of Vidin Municipality Development Plan for the period 2014 - 2020 is achieving integrated local and social development towards sustainable economy growth, quality standard of life and social security of the population, stored environment and realized potential for territorial cooperation of local, regional and international level.			
Implementation Period	2014 - 2020			
Scope of the Plan	Local			
Topics covered	Energy	Social	Mobility	ICT
Defined Targets				
Target #1				
Target	Achieve local economic growth, based on its own potential for the development of the territory			
Related actions	Support for activities aimed at stimulating the development of SMEs in Vidin Municipality in its role as the backbone of local economic development. Support for projects aimed at conservation and sustainable use of cultural and historical heritage. Support for initiatives that encourage the development of environmentally friendly tourism and promote the territory of Vidin as a tourist destination. Support to projects and activities aimed at improving the marketing possibilities of the agricultural production.			
Actuation areas	-			
Implementation status	On-going			
Execution period	2014 - 2020			
Financial scheme	National/Municipal finance in 2014 - 2017: 640,480€			
Target #2				
Target	Quality and standard of life improvement, personal and public security of the population			
Related actions	Realization of projects for renovation and upgrading the energy efficiency of municipal buildings. Optimization and modernization of the transport. Supporting the implementation of projects aimed at bussiness and youth development. Implementation of projects related to social housing and services.			

Actuation areas	-
Implementation status	On-going
Execution period	2014 - 2020
Financial scheme	National/Municipal finance in 2014 - 2017: 5,549,474€
Target #3	
Target	Improvement of technical infrastructure parameters and protection of environment
Related actions	Realization of projects for renovation and/or construction of new transport, water and gas infrastructure. Support the implementation of projects to increase energy efficiency. Support the implementation of projects aimed at improving the waste collection and waste disposal in the villages of Vidin municipality (to improve air quality and waste management).
Actuation areas	-
Implementation status	On-going
Execution period	2014 - 2020
Financial scheme	National/Municipal finance in 2014 - 2017: 38,550,971€
Target #4	
Target	Realizing activities for territorial cooperation and cohesion
Related actions	Implementation of projects to improve territorial cooperation in the field of transport and logistics. Stimulating the development of alternative tourism and agriculture. Encouraging cross-border cooperation between the local and regional authorities in the region.
Actuation areas	-
Implementation status	On-going
Execution period	2014 - 2020
Financial scheme	n/a



ANALYSIS OF THE EXISTING CITY PLANS

City	VIDIN			
PLAN #2				
Tittle	Municipal Programme and Action Plan for Energy Efficiency			
Description of the Plan	The Plan is prepared every 5 years based on the energy Efficiency Law and annual monitoring reports are sent to the national Sustainable Energy Development Agency. The programme focuses on the energy efficiency measures in all sectors that the municipality needs to implement to achieve its energy targets. The annual monitoring reports provide energy data of the renovated buildings.			
Implementation Period	2015 - 2020 (every 5 years)			
Scope of the Plan	Local			
Topics covered	Energy	Mobility	Social	
Defined Targets				
Target #1				
Target	Energy Efficiency measures in public buildings			
Related actions	The municipal buildings are required to compliant with EE regulations described in the EE Law. They are also included in annual action plans to be renovated and/or refurbished to the relevant standards.			
Actuation areas	The list of public buildings to be renovated is updated annually based on the demand to be compliant with the regulatory requirements.			
Implementation status	On-going			
Execution period	2015 - 2020			
Financial scheme	Municipal and/or national funding. Norway Grants. Kozlodui National Fund.			
Target #2				
Target	Energy Efficiency measures in private buildings			
Related actions	Facilitation of the renovation of private buildings thanks to a national financing scheme.			
Actuation areas	Private buildings for the renovation are selected based on strict criteria and thus scattered across the city.			
Implementation status	On-going			
Execution period	2015 - 2020			
Financial scheme	National funding (100% grant)			

Target #3	
Target	Energy Efficiency measures in SMEs and industry
Related actions	Encouraging EE measures in SMEs and industries in the Municipality. Most of these measures are linked to change of fuel, introduction of high EE standards for renovation, ISO certification.
Actuation areas	-
Implementation status	On-going
Execution period	2015 - 2020
Financial scheme	Private funding, national grants.
Target #4	
Target	Raising awareness on Energy Efficiency in the private sector
Related actions	Realisation of raising awareness campaigns among the households for the benefits of renovation, refurbishment and change of old heating systems.
Actuation areas	-
Implementation status	On-going
Execution period	2015 - 2020
Financial scheme	Municipal funding, national grants for campaigning.



ANALYSIS OF THE EXISTING CITY PLANS

City	VIDIN			
PLAN #3				
Tittle	Municipal Programme for integration of RES and use of biofuels			
Description of the Plan	The Plan is prepared every 5 years based on the Energy Efficiency Law and there are annual monitoring reports sent to the national Sustainable Energy Development Agency. The programme focuses on the deployment of RES installations in public and private buildings aimed at achieving energy independence and the municipal energy targets. Energy audits and technical documentation for realised public RES installations is available.			
Implementation Period	2015 - 2020 (every 5 years)			
Scope of the Plan	Local			
Topics covered	Energy	Social		
Defined Targets				
Target #1				
Target	Introduction of RES installations in public buildings			
Related actions	Based in evaluation made within energy audits, the demand for integrating RES in certain public buildings is done.			
Actuation areas	-			
Implementation status	On-going			
Execution period	2015 - 2020			
Financial scheme	Municipal and/or national funding. Norway Grants. Kozlodui National Fund.			
Target #2				
Target	Introduction of solar-thermal installation in public kindergartens			
Related actions	The introduction of solar-thermal installations is aimed at the demand for hot water production that is currently based on electric or oil boilers.			
Actuation areas	-			
Implementation status	On-going			
Execution period	2015 - 2020			
Financial scheme	Municipal and/or national funding. Norway Grants. Kozlodui National Fund.			

Target #3	
Target	Encouraging small RES in the residential (households) sector
Related actions	It is based in the demand for energy independence from fossil fuels, especially with respect to the heating. The action is embedded in the National Renovation Programme in which the introduction of RES is eligible.
Actuation areas	-
Implementation status	On-going
Execution period	2015 - 2020
Financial scheme	National funding scheme, private investments.
Target #4	
Target	Replacement of old heating boilers with RES installations in public buildings
Related actions	The replacement is being done on rolling basis during overall renovation/ refurbishment of the targetted buildings. The new boilers are identified through the demand stated in the energy audits.
Actuation areas	-
Implementation status	On-going
Execution period	2015 - 2020
Financial scheme	Municipal and/or national funding. Norway Grants. Kozlodui National Fund.
Target #5	
Target	Information campaigns for encouraging small RES installations
Related actions	The implementation of small RES in residential bulidings is slowly being undertaken by households. Still, more raising awareness and information is needed to clarify the benefits of small RES, the financial savings and environmental impact, the technical aspects and regulatory requirements.
Actuation areas	-
Implementation status	On-going
Execution period	2015 - 2020
Financial scheme	Municipal funding, national grants for campaigning.



ANALYSIS OF THE EXISTING CITY PLANS

City		VIDIN			
PLAN #4					
Title	Programme and Action Plan for reducing levels of PM10 and reaching the established norms for their content in the ambient air in Vidin municipality for period 2015 - 2020				
Description of the Plan	The purpose of the program is to reduce the levels of air pollutants on the territory of Vidin municipality and to reach the PM10 standards in period 2015 - 2020, to reduce the health risk, to control the pollution reduction measures from sanding and hygiene, household heating, transport and construction activities. , activities, formulating measures to improve the quality of the ambient air. It includes an action plan pursuant specifying the measures to be taken in the short term with a view to reducing the risk and limiting the duration of exceeding the established standards, including in adverse weather conditions. The program and action plan are a dynamic document that is open to additions when new information is available, as well as when corrections are made to major municipal databases.				
Implementation Period	2015 - 2020				
Scope of the Plan	Local				
Topics covered	Energy	Social	Mobility		
Defined Targets					
Target #1					
Target	Upgrading and maintaining air quality - reduction total PM10 emissions by 8 ug/m³				
Related actions	Development of a comprehensive methodology for the use of anti-fogging agents, including the calibration of machines for use in winter conditions and their integration into the winter maintenance plan. Training of municipal employees and service companies. Development of projects proposals for applications for the purchase of modern cleaning equipment, including for washing and anti-icing treatment.				
Actuation areas	-				
Implementation status	On-going				
Execution period	-				
Financial scheme	-				

Target #2	
Target	Construction and unregulated activities - reduction total PM10 emissions by 8 ug/m³
Related actions	Control and sanctions for pollution and damage of territories during construction activities, in accordance with the Ordinance on waste management on the territory of Vidin Municipality, Ordinance on construction, management, protection of green areas and ornamental vegetation on the territory of Vidin Municipality. System control for the rehabilitation of the street network and pavement after repair of the underground infrastructure. Maintenance and expansion of green areas, ornamental vegetation and areas with compact tree vegetation.
Actuation areas	-
Implementation status	On-going
Execution period	-
Financial scheme	-
Target #3	
Target	Reduction of PM10 emissions by 2 ug/m³ from municipal, tourist, commercial and other sites
Related actions	Introducing requirements for improving the energy performance of municipal buildings when they are being renovated. Exploring options for effective solutions for biomass heating, including the construction of small pellet or chips heating plants. Investigation of the possibilities of implementation of biomass supply /supply contracts for municipal buildings.
Actuation areas	-
Implementation status	
Execution period	-
Financial scheme	-
Target #4	
Target	Ensure the use of low-emission fuels in stationary and mobile sources
Related actions	Discuss options for replacing liquid fuel (gas oil) heating in municipal buildings with gas, pellets or chips (where possible).
Actuation areas	-
Implementation status	On-going
Execution period	-
Financial scheme	-

Target #5	
Target	Housing heating - reduction PM10 emissions by at least 15 ug/m³
Related actions	Encouraging and supporting the implementation of energy efficiency measures in residential buildings in the municipality in order to reduce energy consumption and PM10 emissions. Introducing conditions (criteria for calorific value, moisture, dust content) for the sale of quality solid fuels in the permits for exercising the activity on municipal grounds, including sale of dried firewood. Preparation of an information campaign to limit the use of primitive solid fuel heating stoves with low thermal efficiency and the use of raw wood for heating.
Actuation areas	-
Implementation status	On-going
Execution period	-
Financial scheme	-
Target #6	
Target	Measures to limit emissions from mobile sources through the organization and regulation of vehicle traffic
Related actions	Integrating knowledge of sustainable transport and sustainable mobility in primary and vocational education. Technical design of alternative movements within the city, including the construction of bicycle lanes. Promoting the use of clean fuels, biofuels and eco-friendly vehicles for public transport. Translation of the public transport bus fleet in accordance with EURO 4 standard. Introducing school mobility plans. Each school sets its own goal for the use of LMS by the parents taking the children to school.
Actuation areas	-
Implementation status	
Execution period	-
Financial scheme	-



ANALYSIS OF THE EXISTING CITY PLANS

City	VIDIN			
PLAN #5				
Title	Waste Management Programme			
Description of the Plan	The programme aims at reflecting the current state and planning of waste activities on the territory of the Municipality of Vidin, in accordance with the regulatory requirements. Waste management is carried out in order to prevent, reduce and limit their harmful effects on human health and the environment. The objectives formulated are consistent with the elements of the National Waste Management Programme and the Programme for the implementation of Directive 99/31 / EU on the landfill of waste.			
Implementation Period	2017 - 2020			
Scope of the Plan	Local			
Topics covered	Energy	Social		
Defined Targets				
Target #1				
Target	Waste prevention and reduction			
Related actions	Carry out periodic information campaigns to prevent the formation of households items waste oriente mainly to reduction of waste generated, sustainable consumption, participation in separate colection (source separation). Training and improving the administrative capacity to manage and control waste activities. Provision of special containers for the collection of end-of-life batteries in public buildings, restaurants, offices, schools, municipal buildings and companies. Optimization of the system for collection and transportation of municipal waste on the territory of Vidin Municipality. Organizing discussions with food producers and traders to raise their awareness and encourage their willingness to participate in the information campaign undertaken by Vidin Municipality. Organize discussions with consumer organizations and responsible businesses about the place of advertising in our society, focus on the negative characteristics of consumer society and unnecessary purchases, promote reuse, and identify the most unnecessary products and set goals to limit their consumption. Exploring the possibilities for tightening control over the disposal of hazardous waste in mixed municipal waste.			
Actuation areas	-			
Implementation status	On-going			
Execution period	2017 - 2020			
Financial scheme	"Operational Programme Environment" - Municipality budget			

Target #2	
Target	Increase in the quantities of recycled and used waste
Related actions	Maintenance of a register of the sites for transfer of paper, cardboard, plastic and glass on the territory of the Municipality. Training and improving the administrative capacity to manage and control waste activities. Provision of special containers for the collection of end-of-life batteries with the logo of the Municipality in restaurants, offices, schools, municipal buildings and companies.
Actuation areas	-
Implementation status	On-going
Execution period	2018 - 2020
Financial scheme	Municipality budget
Target #3	
Target	Improvement of the distribution organization, temporary storage, collection and transportation of waste
Related actions	Optimization of the system for collection and transportation of municipal waste on the territory of Vidin Municipality. Carrying out monitoring to optimize the periodicity of municipal waste removal, compacting efficiency in vehicles and the volume of the composition of the container park. Assessment of required investments.
Actuation areas	-
Implementation status	
Execution period	-
Financial scheme	Municipality budget
Target #4	
Target	Pre-treatment, recovery and environmental disposal consideration
Related actions	Improvement of control and prevention of unauthorized waste disposal at unauthorized sites, incineration or other uncontrolled disposal of waste. Study the possibilities of using construction waste in backfill, reclamation of disturbed terrains, filling of negative forms, etc.
Actuation areas	-
Implementation status	On-going
Execution period	-
Financial scheme	Municipality budget
Target #5	
Target	Regulation of waste management and acceleration of the implementation of legislation and policy on waste management
Related actions	Update of the Municipal Ordinance on Waste Management of Vidin Municipality.
Actuation areas	-

Implementation status	On-going
Execution period	-
Financial scheme	-
Target #6	
Target	Provision of waste database
Related actions	Establishment of an information system for recording and reporting the quantities of recyclable waste and bio-waste in order to monitor the fulfillment of the municipal waste recycling targets and the bio-waste collection and recovery targets, the quantities of biodegradable waste diverted from landfills to which data are to be received: separate collection of recyclable waste for which the CMOs are not responsible, separately collected and bio-waste through the municipal system, recycling of packaging waste (by Recovery Organizations), separately collected and recycled waste through purchase at commercial outlets (by households and businesses) home composting, separately collected and pre-treated WEEE, separately assembled and disassembled ELVs, separately collected and recycled LNGs, separately collected waste from the municipality's green system, separately collected waste through municipal sites for free acceptance.
Actuation areas	-
Implementation status	On-going
Execution period	2017 - 2019
Financial scheme	-
Target #7	
Target	Strengthening the administrative capacity of the institutions responsible for waste management
Related actions	Improving the administrative capacity of the Municipality to control the management of waste activities by providing sufficient, appropriately qualified and motivated staff, including the appointment of additional staff and providing sufficient and appropriate technical resources (equipment, etc.).
Actuation areas	-
Implementation status	On-going
Execution period	-
Financial scheme	Municipality budget



ANALYSIS OF THE EXISTING CITY PLANS

City	VIDIN			
PLAN #6				
Tittle	Plan for Energy Efficiency for Vidin District			
Description of the Plan	The Regional Energy Efficiency Plan was developed on the basis of Article 11 of the Energy Efficiency Act and in accordance with the National Energy Efficiency Strategy. The main goals of the regional energy efficiency policy are set and derive from the national legislation. In the proposed Energy Efficiency Plan, a set of mechanisms and measures to improve end-user energy efficiency, actions to optimize final energy consumption, as well as the financial mechanisms for their implementation, and identification of opportunities and barriers to implementing energy efficiency policies are developed in Vidin Region.			
Implementation Period	2010 - 2020			
Scope of the Plan	Regional			
Topics covered	Energy	Mobility	Social	
Defined Targets				
Target #1				
Target	Optimize energy consumption through the implementation of energy efficency measures			
Related actions	The objective will be achieve by reducing household fuel and energy costs, consolidating and coordinating energy saving in the public sector (public buildings, education and health care buildings, and administrative management buildings).			
Target #2				
Target	Reducing the relative energy consumption for the production of a production unit by companies in Vidin District and increasing the competitiveness of produced products			
Related actions				
Target #3				
Target	Building a new energy infrastructure and expanding the existing one			
Related actions				
Target #4				
Target	Reducing environmental pollution and environment improvement			
Related actions				
Target #5				
Target	Raising the population standard of living			
Related actions				

 ANALYSIS OF THE EXISTING CITY PLANS				
City	VIDIN			
PLAN #7				
Tittle	National Energy Efficiency Action Plan			
Description of the Plan	The National Energy Efficiency Action Plan is developed in accordance with the EED requirements on the basis of a template which ensures the inclusion of all obligations. The requirements of Directive 2010/31/EU on the energy performance of buildings are also taken into account. The energy policy of the Republic of Bulgaria is fully aligned with that of the European Union in terms of energy security, competitiveness and sustainable development. The Energy Strategy of the Republic of Bulgaria for the period to 2020 confirms that "energy efficiency has the highest priority in the country's energy policy". This has served as a basis for setting ambitious energy-efficiency improvement targets.			
Implementation Period	2014 - 2020			
Scope of the Plan	National			
Topics covered	Energy	Mobility	Social	

 ANALYSIS OF THE EXISTING CITY PLANS				
City	VIDIN			
PLAN #8				
Title	National Nearly Zero-Energy Building Plan 2015 - 2020			
Description of the Plan	The objective of the NPSBNPE 2015–2020 is to apply the NZEB concept in practice as an alternative for constructing new buildings in Bulgaria after 2018 and, subject to demonstration of cost efficiency, for renovating various subcategories of existing buildings. The plan addresses the increasing need for using energy resources efficiently, improving living standards through energy efficiency and reducing the adverse environmental impacts of the use of fossil fuels.			
Implementation Period	2015 - 2020			
Scope of the Plan	National			
Topics covered	Energy			



ANALYSIS OF THE EXISTING CITY PLANS

City	VIDIN			
PLAN #9				
Tittle	National Renewable Energy Action Plan			
Description of the Plan	This plan (NREAP) is the main instrument developed to ensure the achievement of the national renewable energy targets. The national indicative target for 2010, set in the Treaty concerning the accession of the Republic of Bulgaria to the European Union and Directive 2001/77/EC, is an 11% share of electricity from renewable sources in the gross domestic consumption of electricity. The National Long-term Programme for the Promotion of the Use of Biofuels for Transport sets a national indicative target of a 5.75% share of biofuels in the consumption of petrol and diesel fuels in the transport sector, which is fully consistent with the Community target as set out in Directive 2003/30/EC. Under Directive 2009/28/EC, Bulgaria’s mandatory national target for 2020 is a 16% share of energy from renewable sources in the gross final consumption of energy, including a 10% share of energy from renewable sources in the consumption of energy in the transport sector. In 2005, the respective shares were 9.27% and 0%.			
Implementation Period	2010 - 2020			
Scope of the Plan	National			
Topics covered	Energy	Mobility	Social	

Annex H: Lublin

H.1 City Level Indicators

Table 118: Lublin City Level Indicators calculation

ENERGY & ENVIRONMENT				
Application field	Indicator		VALUE	UNIT
City Energy Profile	Final energy consumption per capita		9.50	MWh/cap
	Primary energy consumption per capita		11.78	MWh/cap
	Primary energy sources	Solid fossil fuels	4.52%	%
		Natural gas	31.17%	
		Oil and petroleum	0.19%	
		Renewables and biofuels	36.13%	
		Electricity from the grid	27.99%	
		Solid fossil fuels	0.53	MWh/cap
		Natural gas	3.67	
		Oil and petroleum	0.02	
		Renewables and biofuels	4.25	
		Electricity from the grid	3.30	
Building connected to the DH-network or renewable energy grid		75%	% of buildings/city	
GHG Emissions	GHG emissions per capita		8.56	Tonnes of CO ₂ /cap
Waste Management	Recycling rate		94% ⁹⁶	% of tonnes
MOBILITY				
Application field	Indicator		VALUE	UNIT
City Mobility Profile	Modal split ⁹⁷	Walk	24%	%
		Bike	11%	
		Public transport	33%	
		Non-car transport	68%	
		Car (private motor vehicle)	32%	
	Fuel mix in mobility	Gas oil and diesel oil	36.30%	%
		Gasoline	47.20%	
		Liquefied Petroleum Gases	14.30%	
		Electricity	0.00%	
		Others	2.20%	

⁹⁶ Estimated percentage from 99.09% of construction waste and demolition, and 88.20% of paper, metal, plastic and glass.

⁹⁷ Estimate based on data from a similar Polish city (Garisk, 2017) as there is no data for Lublin. Website: http://www.epomm.eu/tems/result_cities.phtml?new=1

	Energy use for transportation	6.56 ⁹⁸	MWh/cap
	Access to public transport	80%	% of people
	Public infrastructure promoting low-carbon mobility	51.20 ⁹⁹	Km/100,000 people
GOVERNANCE			
Application field	Indicator	VALUE	UNIT
Economy	Unemployment rate	3.70%	% of active population
	GDP (Gross Domestic Product)	7,700	€/cap
Initiatives and Strategies of the Public Administration	Smart city factor in a city development strategy	4	Likert scale
Public ICT/ Data	Quality of open data	3	Likert scale
SOCIETY & CITIZENS			
Application field	Indicator	VALUE	UNIT
Affordable Housing	Development of housing prices	8.00%	% of change or % of €/m ²
	Housing cost overburden rate	6.70%	%
Citizen Engagement and Empowerment	Citizen engagement to climate conscious actions	4	Likert scale
	Encouraging a healthy lifestyle	4	Likert scale
Urban Structure	Inhabitants in dense areas	81.00%	% of people

⁹⁸ Country data as there is no Lublin available data on this indicator

⁹⁹ Data without streets with speed limit <30 km/h because there are no measure, so the actual data would be higher than that.

H.2 Existing City Plans



ANALYSIS OF THE EXISTING CITY PLANS

City		LUBLIN		
PLAN #1				
Title	Development Strategy for the City of Lublin for the years 2013 - 2020			
Description of the Plan	The 2020 Lublin Development Strategy goes beyond patterns adopted for this type of documents in terms of the concept, structure and method of publication. The strategy for developing the "city of inspiration" was drawn up as evolutionary and inspiring. It defines priority areas for the major changes desirable for Lublin's development, perceived as being of key importance in the prospect of more than just eight years. Strategic objectives, stressing their complementary character, and at the same time complementing it with aspects significant for the city's development, determining balancing the development and providing for its innovation have been pointed out in the form of four Areas for Development: Openness, Friendliness, Entrepreneurship and Academic spirit.			
Implementation Period	2013 - 2020			
Scope of the Plan	Local			
Topics covered	Social	Mobility		
Defined Targets				
Target #1				
Target	Improving Lublin's accessibility (Openness)			
Related actions	Extension of services and flight connections with Lublin. Construction of connecting roads with the ring road and exit roads. Efforts aimed at the modernisation and enlargement of external entry networks for accessing Lublin by all means of transport (railway, cars and bikes). Enlargement and providing stakeholder access to the core broadband optical network.			
Actuation areas	Defined for each action			
Implementation status	On-going			
Execution period	2013 - 2020			
Financial scheme	Financed mainly from own resources, government subsidies, EU subsidies and partly from credit.			

Target #2	
Target	Expansion of external relations (Openess)
Related actions	Including Lublin in international networks of cooperation and creation of tourists offers. Creation of the Centre for Eastern Competencies. Development of an internet offer revealing assets of the city. Using the tourist attractiveness of Lublin. Promoting Lublin in Poland and abroad.
Actuation areas	The entire city
Implementation status	On-going
Execution period	2013 - 2020
Financial scheme	Financed mainly from own resources, government subsidies, EU subsidies and partly from credit.
Target #3	
Target	Strengthening of cultural openness (Openess)
Related actions	Developing approaches favourable for cooperation and toleration of diversity in all civic and institutional undertakings. Systemic development of international exchange programmes for school pupils.
Actuation areas	The entire city
Implementation status	On-going
Execution period	2013 - 2020
Financial scheme	Financed mainly from own resources, government subsidies, EU subsidies and partly from credit.
Target #4	
Target	Building regional and metropolitan bonds (Openess)
Related actions	Creation of a common communication system for the Lublin Metropolitan Area (LMA). Integration of information and public services in order to create a "friendly environment" in the Lublin Metropolitan Area. Developing a strategic programme for city-region cooperation.
Actuation areas	The entire city (or an specific actuation area for some actions)
Implementation status	On-going
Execution period	2013 - 2020
Financial scheme	Financed mainly from own resources, government subsidies, EU subsidies and partly from credit.
Target #5	
Target	Enhancement of the technical infrastructure (Friendliness)
Related actions	Continued development and modernisation of the municipal road network. Development of public transport system. Development of alternative forms of transport within the city. Development of infrastructure of key importance for the development of the urban environment.
Actuation areas	The entire city (or an specific actuation area for some actions)
Implementation status	On-going
Execution period	2013 - 2020
Financial scheme	Financed mainly from own resources, government subsidies, EU subsidies and partly from credit.

Target #6	
Target	Improving the comfort of life (Friendliness)
Related actions	Successive adjustment of the functional and spatial development system of Lublin in terms of resident's convenience and traffic optimisation, as well as other aspects of sustainable development of the spatial development system. Improving living standards. Development of a network of district centres ensuring availability of (public and commercial) services and local jobs. Improving quality of public services. Raising public safety. Conditional extension of city limits (in the case when demographic and economic analyses indicate such a necessity).
Actuation areas	The entire city
Implementation status	On-going
Execution period	2013 - 2020
Financial scheme	Financed mainly from own resources, government subsidies, EU subsidies and partly from credit.
Target #7	
Target	Caring for space culture (Friendliness)
Related actions	Implementation of the Lublin Revitalisation Plan. Reinforcing cultural values of the city space. Development of public areas of the city space. Development of public areas in all parts of the city. Building sensitivity and responsibility for the quality of space and natural environment. Drawing up of city spatial development plans with utmost care for the highest quality of planning and adjusting them to actual needs and possible development opportunities of the city. Development, reinforcement and effective protection of the urban natural system.
Actuation areas	The entire city (or an specific actuation area for some actions)
Implementation status	On-going
Execution period	2013 - 2020
Financial scheme	Financed mainly from own resources, government subsidies, EU subsidies and partly from credit.
Target #8	
Target	Supporting the development of leisure activities (Friendliness)
Related actions	Development of Lublin's sports and recreation offer and promotion of open-a activities. Development of a cultural space offer and striving to increase resident participation in cultural activities.
Actuation areas	The entire city
Implementation status	On-going
Execution period	2013 - 2020
Financial scheme	Financed mainly from own resources, government subsidies, EU subsidies and partly from credit.

Target #9	
Target	Improving the quality of education (Friendliness)
Related actions	Adjusting networks of kindergartens, schools and other educational institutions to the educational needs of children and young people (in consideration of changing demographic and urban conditions). Developing the teaching offer in the city.
Actuation areas	The entire city
Implementation status	On-going
Execution period	2013 - 2020
Financial scheme	Financed mainly from own resources, government subsidies, EU subsidies and partly from credit.
Target #10	
Target	Social participation (Friendliness)
Related actions	Elaboration and implementation of the "City in Dialogue" programme, referring to development of participatory democracy in Lublin. Construction of the "City Observatory", a system of collecting, processing and the provision of databases relevant for development purposes, generated in sizes corresponding to the size of their residential areas (districts, housing estates), enabling monitoring and coordination of cooperation and observation of results of implemented project.
Actuation areas	The entire city
Implementation status	On-going
Execution period	2013 - 2020
Financial scheme	Financed mainly from own resources, government subsidies, EU subsidies and partly from credit.
Target #11	
Target	Development of the services sector (Entrepreneurship)
Related actions	Creating institutional and spatial conditions enabling the development of the services sector. Supporting the establishment of an innovative services sector in Lublin.
Actuation areas	The entire city
Implementation status	On-going
Execution period	2013 - 2020
Financial scheme	Financed mainly from own resources, government subsidies, EU subsidies and partly from credit.
Target #12	
Target	Entrepreneurial culture (Entrepreneurship)
Related actions	Supporting the creation of an entrepreneurship ecosystem in Lublin, based on local enterprises and creative entrepreneurship. Supporting transfer of knowledge to the business sector. Promoting business potential of Lublin and the Lublin Metropolitan Area.

Actuation areas	The entire city
Implementation status	On-going
Execution period	2013 - 2020
Financial scheme	Financed mainly from own resources, government subsidies, EU subsidies and partly from credit.
Target #13	
Target	Supporting creative industries (Entrepreneurship)
Related actions	Supporting the development of a creative industry sector. Influencing the creation of procreative activity attitudes.
Actuation areas	The entire city
Implementation status	On-going
Execution period	2013 - 2020
Financial scheme	Financed mainly from own resources, government subsidies, EU subsidies and partly from credit.
Target #14	
Target	Internationalisation of universities (Academic spirit)
Related actions	Reinforcing Lublin's position as an attractive educational centre for foreign students. Collaboration with university authorities to the benefit of increasing share of scientists, teachers and student from Lublin in the European and international exchange programmes. Supporting Lublin universities in establishing and maintaining international contacts with universities around the world. Collaboration with universities for purposes of increasing students' foreign language competencies and offering other forms of supplementing one's education.
Actuation areas	The entire city
Implementation status	On-going
Execution period	2013 - 2020
Financial scheme	Financed mainly from own resources, government subsidies, EU subsidies and partly from credit.
Target #15	
Target	Symbiosis with the environment (Academic spirit)
Related actions	Building cooperation between universities and business. Building cooperation between universities and the city. Building cooperation between various universities.
Actuation areas	The entire city
Implementation status	On-going
Execution period	2013 - 2020
Financial scheme	Financed mainly from own resources, government subsidies, EU subsidies and partly from credit.

Target #16	
Target	Genious loci of the academy city (Academic spirit)
Related actions	Supporting student development using the existing cultural and educational potential. Supporting academic leaders (staff and students) willing to perform additional and extra-curriculum educational activities. Supporting student development using brand new cultural and educational potential.
Actuation areas	The entire city
Implementation status	On-going
Execution period	2013 - 2020
Financial scheme	Financed mainly from own resources, government subsidies, EU subsidies and partly from credit.
Target #17	
Target	Attracting and keeping talents in Lublin (Academic spirit)
Related actions	Discovering their "little homeland" by school pupils. Supporting lower and upper secondary schools in their efforts to keep talented pupils in Lublin. Developing contacts between Lublin schools and Lublin universities. Developing of an unique programme for supporting graduates at the start of their career.
Actuation areas	The entire city
Implementation status	On-going
Execution period	2013 - 2020
Financial scheme	Financed mainly from own resources, government subsidies, EU subsidies and partly from credit.



ANALYSIS OF THE EXISTING CITY PLANS

City		LUBLIN		
PLAN #2				
Tittle		Low Carbon Economy Plan		
Description of the Plan		The low-emission economy plan for the city of Lublin is a document in which activities and measures are planned to increase energy efficiency, increase the amount of energy produced in renewable energy sources and reduce greenhouse gas emissions in the city. The plan includes a database on energy consumption, emissions of CO₂ and the amount of energy obtained from RES in Lublin. Main goal of the plan is the improvement of the level and quality of life of the Lublin community, implementation of the European Union's energy and climate policy and improvement of air quality in the city. Detailed objectives are the reduction of energy consumption in the Commune of Lublin by 9.5% compared to the base year 2008; the reduction of carbon dioxide emissions by 23% compared to the base year 2008; increasing the use of energy from RES from 2.8% to 16.92% compared to the base year 2008; and the reduction of dust emission to the air.		
Implementation Period		2015 - 2023		
Scope of the Plan		Local		
Topics covered		Energy		
Defined Targets				
Target #1				
Target		Improving energy efficiency in buildings		
Related actions		Thermal modernization of buildings. Replacement of electrical networks. Replacement of lighting. Replacement of lifting devices in multi-family buildings. Replacement of heating systems, including the liquidation of coal-fired boilers.		
Actuation areas		-		
Implementation status		On-going		
Execution period		2015 - 2023		
Financial scheme		Financed mainly from own resources, government subsidies, EU subsidies and partly from credit.		

Target #2	
Target	The development of sustainable multimodal urban mobility and low-emission transport
Related actions	Development and wider use of public transport, including the purchase of low-emission rolling stock, electric or hybrid rolling stock, development of trolleybus traction, facilities in public transport (electronic ticket / passenger information). Improvement of road surface and modernization of road infrastructure and change of urban traffic organization in order to improve mobility in the city and fuel save. Ensuring intermodality of transport modes - integration of various transport modes. Development of non-motorized mobility - cycling, walking. Limiting the use of passenger cars in the city.
Actuation areas	-
Implementation status	On-going
Execution period	2015 - 2023
Financial scheme	Financed mainly from own resources, government subsidies, EU subsidies and partly from credit.
Target #3	
Target	Development of heat system in Lublin
Related actions	Modernization of the heating network in the city - replacement of canal pipelines with a modern pre-insulated network or through the use of more efficient insulation. Exchange of exchanger group nodes for individual heat substations along with the reconstruction of external reception systems on housing estates with multi-family housing. Development of an efficient heating system in the city of Lublin. Liquidation of gas stoves / water heating with system heat. Construction of the heat storage system.
Actuation areas	-
Implementation status	On-going
Execution period	2015 - 2023
Financial scheme	Financed mainly from own resources, government subsidies, EU subsidies and partly from credit.
Target #4	
Target	Production and distribution of energy from renewable / alternative energy sources
Related actions	Construction of photovoltaic installations. Assembly of devices for generating energy from renewable sources. Construction and extension of installations using biogas. Construction of installations using biomass for energy production.
Actuation areas	-
Implementation status	On-going
Execution period	2015 - 2023
Financial scheme	Financed mainly from own resources, government subsidies, EU subsidies and partly from credit.

Target #5	
Target	Increasing energy efficiency in enterprises and administration
Related actions	Increasing energy efficiency in devices used in plants. Energy recovery from devices. Modernization of the water pumping station. Pre-insulating cable networks supplying the water intake. Replacement of lighting for energy-efficient. Replacement and purchase of low-emission and electric vehicles.
Actuation areas	-
Implementation status	On-going
Execution period	2015 - 2023
Financial scheme	Financed mainly from own resources, government subsidies, EU subsidies and partly from credit.
Target #6	
Target	Information, educational and complementary activities
Related actions	Promotion of natural compensation in invested areas (green roofs, green walls). Educational activities promoting energy savings and sustainable consumption standards. Promotion of public transport and bicycles as an alternative means of transport for passenger cars.
Actuation areas	-
Implementation status	On-going
Execution period	2015 - 2023
Financial scheme	Financed mainly from own resources, government subsidies, EU subsidies and partly from credit.

 ANALYSIS OF THE EXISTING CITY PLANS				
City		LUBLIN		
PLAN #3				
Tittle		Sustainable Mobility Plan		
Description of the Plan		The Sustainable Mobility Plan covers issues related to spatial development of the city; influencing the demand for travel; the role of pedestrian and bicycle traffic; the role of public transport; the role of the car; parking; cargo transport; fiscal impact; transport education. The plan complements and develops existing planning and strategic documents with issues related to demand management for transport. The spatial and transport policy of Lublin applies the principles of traffic zoning, understood as the differentiation of the principles of communication service in specific areas of the city.		
Implementation Period		2015 - 2020 (I STAGE), 2020 - 2030 (II STAGE)		
Scope of the Plan		Local		
Topics covered		Mobility	ICT	
Defined Targets				
Target #1				
Target		Planned Lublin		
Related actions		Determination of communication service zones. Introduction of the principle of Transport Plan implementation to the procedure of creating local spatial development plans. Development and implementation of development programs for selected areas of the city. Introduction of the principle of Transport Plan execution for investment that may have a strong impact on the city's transport system.		
Actuation areas		The entire city area		
Implementation status		On-going		
Execution period		-		
Financial scheme		Acquisition of aid funds for purposes transport as part of programmes promoting low-carbon strategies.		
Target #2				
Target		Friendly Lublin		
Related actions		Programme of transformations of streets and squares (changes in the organization of traffic, increase of the space intended for pedestrians, limitation of communication functions of streets for socio-cultural reasons). Development of the paid parking zone. A programme for facilitating cycling (e.g. bike boxes). Launch of tourist lines with the possibility of transporting bicycles.		
Actuation areas		The entire city area		

Implementation status	On-going
Execution period	-
Financial scheme	Acquisition of aid funds for purposes transport as part of programmes promoting low-carbon strategies.
Target #3	
Target	Integrated Lublin
Related actions	Public transport privilege programme. Railway activation programme for sustainable mobility. Metropolitan transport improvement programme. Programme for the development of the travel system with interchanges. The cycle route development programme. Regional cycling strategies. Programmes to improve pedestrian traffic conditions. Counteracting the fencing of large building units.
Actuation areas	The entire city area
Implementation status	On-going
Execution period	-
Financial scheme	Acquisition of aid funds for purposes transport as part of programmes promoting low-carbon strategies.
Target #4	
Target	Safe Lublin
Related actions	Creation of a transport safety monitoring system together with a database on safety and tools for assessing the effects of implemented activities. Development of a detailed diagnosis of the safety state in transport and implementation of the action programme recovery. Separation of the municipal fund for transport safety. Introduction of a road safety audit procedure.
Actuation areas	The entire city area
Implementation status	On-going
Execution period	-
Financial scheme	Acquisition of aid funds for purposes transport as part of programmes promoting low-carbon strategies.
Target #5	
Target	Available Lublin
Related actions	Architectural barriers removal programme. Development of a set of standards. Strengthening bicycle infrastructure design standards. Introduction of a public passenger charter. Developing the cycling map of Lublin. Introduction of an accessibility audit procedure.
Actuation areas	The entire city area
Implementation status	On-going
Execution period	-
Financial scheme	Acquisition of aid funds for purposes transport as part of programmes promoting low-carbon strategies.

Target #6	
Target	Mobile Lublin
Related actions	Introduction and promotion of flexible working hours. Development of e-services. Creating mobility plans. Development of carpooling and car-sharing systems.
Actuation areas	The entire city area
Implementation status	On-going
Execution period	-
Financial scheme	Acquisition of aid funds for purposes transport as part of programmes promoting low-carbon strategies.
Target #7	
Target	Smart Lublin
Related actions	Development of traffic management system. Launching the Collective Transport Preference Management System. Development of the Collective Transport Management System. Launch of the Parking Management System. Launch of the Commercial Vehicle and Truck Traffic Management System. Starting the Infrastructure Management System. Launching the repository - information platform about the transport system.
Actuation areas	The entire city area
Implementation status	On-going
Execution period	-
Financial scheme	Acquisition of aid funds for purposes transport as part of programmes promoting low-carbon strategies.
Target #8	
Target	Effective Lublin
Related actions	Rationalization of the collective transport line system (route) and the use of rolling stock. Multifunctional use of infrastructure programme. Support programme for effective ways of traveling.
Actuation areas	The entire city area
Implementation status	On-going
Execution period	-
Financial scheme	Acquisition of aid funds for purposes transport as part of programmes promoting low-carbon strategies.
Target #9	
Target	Green Lublin
Related actions	Launching an urban public car system with an eco-friendly drive. Promotion of ecological taxis. Development of low-emission bus fleet. Promotion of cars with small dimensions and engines. Promotion of electric delivery vehicles and freight bikes. Introduction of restricted communication zones.
Actuation areas	The entire city area
Implementation status	On-going
Execution period	-
Financial scheme	Acquisition of aid funds for purposes transport as part of programmes promoting low-carbon strategies.

Target #10	
Target	Aware Lublin
Related actions	Education program on sustainable mobility. "Bike at school" campaign. "Good example at the City Office" programme. Sustainable mobility promotion programme. Collecting data on the condition of the transport system.
Actuation areas	The entire city area
Implementation status	On-going
Execution period	-
Financial scheme	Acquisition of aid funds for purposes transport as part of programmes promoting low-carbon strategies.
Target #11	
Target	Other priorities
Related actions	Maintaining the dominant role of the public transport. Improving the quality of public spaces. Improved transport safety. Development of bicycle traffic with a complementary role for collective transport.
Actuation areas	-
Implementation status	On-going
Execution period	-
Financial scheme	Acquisition of aid funds for purposes transport as part of programmes promoting low-carbon strategies.



ANALYSIS OF THE EXISTING CITY PLANS

City	LUBLIN			
PLAN #4				
Title	The Revitalization Programme for Lublin for 2017 - 2023			
Description of the Plan	The Revitalization Programme is a continuation of the previous programme from 2009 and is the basic document of a strategic and operational nature serving the process of revitalization, i.e. defining goals, directions of activities and revitalization projects, as well as defining principles of coordination and management as well as mechanisms for monitoring and evaluating the programme. The essence of revitalization is to make these activities have a well-thought-out, comprehensive and integrated character (and thus they are more effective than before), and above all, to focus on the human being, and thus on the quality of life of the residents in the city.			
Implementation Period	2017 - 2023			
Scope of the Plan	Local			
Topics covered	Social			
Defined Targets				
Target #1				
Target	Comprehensive action for limiting poverty			
Related actions	"Good start" increase in social integration and improvement of access to the labor market for 600 people excluded or at risk of poverty and social exclusion (including people from the area of revitalization). Lublin Seasonal Café. Lubelski Incubator of Social Economy.			
Actuation areas	Area of revitalization			
Implementation status	On-going			
Execution period	2017 - 2023			
Financial scheme	EU funds and the budget of the commune, public funds at the disposal of various institutions, as well as, to the extent possible, private resources.			
Target #2				
Target	Social inclusion of the residents of the revitalization area			
Related actions	The monastery in the heart of the city - adaptation of the western wing of the monastery of the OO. Dominicans in Lublin for the purposes of a self-help club. Centre for Social Revitalization. "Bank of environmental services".			
Actuation areas	Area of revitalization			
Implementation status	On-going			
Execution period	2017 - 2023			
Financial scheme	EU funds and the budget of the commune, public funds at the disposal of various institutions, as well as, to the extent possible, private resources.			

Target #3	
Target	Actions for families and persons requiring support
Related actions	Expansion of DPS Kalina in Lublin with new specialist branches and construction of two family social welfare homes. Special School and Educational Center for Children and Teenagers with Disabilities. Increase in the level of accessibility to high quality social services provided by the Polish Association for People with Intellectual Disability. Increase in the level of access to high quality social and health services addressed to children with disabilities or those at risk of disability and their families. Development of integrated services complementing and supporting the role of the family. "Active and Inclusive"- integration and support of disabled people from the area of revitalization under the Cooperation Program with NGOs. Family support and foster care system in the City of Lublin.
Actuation areas	Area of revitalization
Implementation status	On-going
Execution period	2017 - 2023
Financial scheme	EU funds and the budget of the commune, public funds at the disposal of various institutions, as well as, to the extent possible, private resources.
Target #4	
Target	Cultural, educational and sport initiatives for social integrations and the foundation of the revival area
Related actions	Restoration of cultural heritage objects in the area of the Monument of History of Lublin. Lublin Social Innovator as part of the Program of Cooperation with NGOs. Most Kultury - Center for Social and Cultural Animation. ARTGRÓD. "Culture Point" cultural and social project in the area threatened by social exclusion. Integration through recreation and sport - support of physical activity initiatives of the inhabitants of the revitalization area under the Cooperation Program with NGOs. Social animation through actions in the field of sport and urban culture under the Cooperation Programme with NGOs. Central Playground. Lublin Flower Festival. Art lessons for small and large OLD RUMIA I Location: area PI.
Actuation areas	Area of revitalization
Implementation status	On-going
Execution period	2017 - 2023
Financial scheme	EU funds and the budget of the commune, public funds at the disposal of various institutions, as well as, to the extent possible, private resources.
Target #5	
Target	Activation and support of different social groups
Related actions	Center for Activity and Integration - the heart of Lublin's revitalization. Increased sense of security among residents and people staying in the area of revitalization. Active senior - supporting the initiative of local neighborhood self-help and integration activities under the Program of Cooperation with NGOs. Neighboring Blogs.
Actuation areas	Area of revitalization
Implementation status	On-going

Execution period	2017 - 2023
Financial scheme	EU funds and the budget of the commune, public funds at the disposal of various institutions, as well as, to the extent possible, private resources.
Target #6	
Target	Creating new and improving the quality of existing public and semi public spaces
Related actions	Revitalization of the Śródmieście part of the City of Lublin. Revitalization of the Śródmieście part of the City of Lublin. Restoration of the Bronowicki Park in Lublin. Creation of a multi-functional public space in the People's Park in Lublin while protecting valuable natural areas. Construction of the Park near the Lublin Castle.
Actuation areas	Area of revitalization
Implementation status	On-going
Execution period	2017 - 2023
Financial scheme	EU funds and the budget of the commune, public funds at the disposal of various institutions, as well as, to the extent possible, private resources.
Target #7	
Target	Improvement of public services supporting activity and integration
Related actions	Comprehensive renovation of the School of Economics in Lublin. Arrangement and multimedia equipment for the concert hall at the Music School of the first and second degree. Reconstruction of the cellars of the Post-Confucius monastery for cultural purposes. Children's Art Centre. Adaptation of the building to a sports hall in the Tatary District. Development of degraded swimming pools in the Tatary District. Modernization of the area of the Municipal Headquarters of the State Fire Service at Szczerbowski Street.
Actuation areas	Area of revitalization
Implementation status	On-going
Execution period	2017 - 2023
Financial scheme	EU funds and the budget of the commune, public funds at the disposal of various institutions, as well as, to the extent possible, private resources.
Target #8	
Target	Development of sustainable urban mobility in the revitalization area
Related actions	Integrated Communication Center for the Lublin Area of Functional (in the area located in the area of revitalization). Expansion of the public transport network for the needs of the Integrated Communication Center for the Lublin Area of Function.
Actuation areas	Area of revitalization
Implementation status	On-going
Execution period	2017 - 2023
Financial scheme	EU funds and the budget of the commune, public funds at the disposal of various institutions, as well as, to the extent possible, private resources.

Target #9	
Target	Activities for increasing the attractiveness of economic activities in the area of revitalization and creation of work places
Related actions	Revitalization of an area in Lublin through the economic recovery of the area by means of integrated improvement of municipal resource management, social activities and improvement of historic buildings. Lublin Merchants. Lublin Creative District - revitalization of the historical center of Lublin through the development of artistic and creative industries. Creative Transformations. Supporting the initiative of local entrepreneurs, including entrepreneurs from the creative industry and traditional crafts under the Cooperation Program with NGOs.
Actuation areas	Area of revitalization
Implementation status	On-going
Execution period	2017 - 2023
Financial scheme	EU funds and the budget of the commune, public funds at the disposal of various institutions, as well as, to the extent possible, private resources.
Target #10	
Target	Memorial investment projects for the prestige, aesthetics and offer of the area of revitalization and attracting flats and guests
Related actions	Development of the former Podzamcze area. Establishment in Lublin (with particular emphasis on the area of revitalization) of regulations on the location of advertisements, small architecture and fences.
Actuation areas	Area of revitalization
Implementation status	On-going
Execution period	2017 - 2023
Financial scheme	EU funds and the budget of the commune, public funds at the disposal of various institutions, as well as, to the extent possible, private resources.
Target #11	
Target	Protection and popularization of the cultural heritage of the revitalization area for creating Lublin's image as an independent tourist objective
Related actions	Adaptation of cultural heritage objects in the area of the Monument of History of Lublin in order to expand the cultural and tourist offer. Monastery in the heart of the city - renovation of the Basilica of the Dominican Fathers in Lublin. Intercultural dialogue of the future with the past - conservation renovation, development and supplementing the social functions of the historic Evangelical Group in the city center of Lublin. Revalorisation of the historic church p.w. St. Nicholas in Lublin. Restoration of the historic complex of the Church of the Transfiguration in Lublin.
Actuation areas	Area of revitalization
Implementation status	On-going
Execution period	2017 - 2023
Financial scheme	EU funds and the budget of the commune, public funds at the disposal of various institutions, as well as, to the extent possible, private resources.

Target #12	
Target	Modernization of buildings in the revitalization area, including improvement of residence conditions
Related actions	To live a new life: a pilot program for the modernization and development of the Lublin housing stock. Live Better: a package of measures for a flexible and multifaceted housing policy in the center of Lublin. Renovation of the elevation of historic tenements located in Lublin at Kowalska street in the area of the Old Town together with the change of the heating system for central district heating. Renovation of the facade of three historic tenement houses together with the change of the heating systems for district central heating.
Actuation areas	Area of revitalization
Implementation status	On-going
Execution period	2017 - 2023
Financial scheme	EU funds and the budget of the commune, public funds at the disposal of various institutions, as well as, to the extent possible, private resources.



ANALYSIS OF THE EXISTING CITY PLANS

City		LUBLIN		
PLAN #5				
Title		Plan for the sustainable development of public mass transport for the commune of Lublin and Neighbouring municipalities		
Description of the Plan		The main objective of this Plan is to ensure the functioning of public transport in accordance with the principles of sustainable development, the main manifestation of which is the share of public transport in all transport at the level of not less than 50%. The supplementary objectives are such as ensuring the rules of access to public transport services, operation of public transport to create a viable alternative to the implementation of passenger car travel, integration of public transport, reduction of the negative impact of transport of the environment, maintaining the assumed economic and financial efficiency of public transport within a given framework transport policy.		
Implementation Period		2013 - 2030		
Scope of the Plan		Regional		
Topics covered		Mobility	ICT	
Defined Targets				
Target #1				
Target		Integration of public mass transport services		
Related actions		Introduction of an integrated periodic public and regional transport ticket. Establishment of transfer nodes and stops. Introduction of dynamic information at the 2015 stops. Integration (coordination) of timetables at interchanges - both within urban (internal) transport as well as urban and regional transport. Construction of a metropolitan bus station in the vicinity of the Lublin railway station, connected with the liquidation of the existing bus station in Podzamcze and the organization of a transfer station for public and suburban transport in its place. Construction of car parks integrating collective and individual transport in the area of junction stops. Launch of Internet information (and applications for mobile phones) on urban transport services along with a professional connection search engine. Replacement of bus and trolley bus fleet with a low-emission one.		
Target #2				
Target		High standard of transport services		
Related actions		Uniform urban colors. Low floor (without internal transversal thresholds) and passenger compartment air conditioning. A platform facilitating the entry of disabled people in wheelchairs. Kneeling system on the right side of the vehicle when opening the door at the bus stop. Ticket machines. Multifunctional tickers (adapted for time tickets and smart cards). Electronic passenger information system, also locating the vehicle on the dynamic information station. Video monitoring system along with image registration.		

Target #3	
Target	Modification of the mass transport network
Related actions	Construction of new sections of trolleybus traction and related changes in shape bus and trolley bus network (transitional and destination). Designation and launch of corridors for high-quality communication services. Introduction of trolley-bus traction or other vehicles with ecological propulsion to the Lublin city center in a wider scope. Integration (coordination) of the transport offer and urban mass transport infrastructure with the regional transport offer.
Target #4	
Target	Organization of the Passenger Information System
Related actions	Integrated information at stops, including timetables in the form of printouts or monitors with information about the route and subsequent departure times. Information on vehicles, including displays or internal monitors, presenting the entire route on a given route (with all stops) and current location of the vehicle on an interactive map of the area, with possible information on departure from the timetable. Integrated information on the Internet and mobile phones, including search engine connections, departure times and diagrams or maps of the communication network.
Target #5	
Target	Modernization of the existing railway system in Lublin and neighboring municipalities
Related actions	As part of the currently revitalized railway line n° 30 Lublin Northern - Łuków, it is planned to launch new (twelve) railway stops.