



IRIS

Integrated and Replicable Solutions
for Co-Creation in Sustainable Cities

Project Acronym:	IRIS
Project Full Name:	Integrated and Replicable Solutions for Co-Creation in Sustainable Cities
Grant Agreement:	No 774199
Project Duration:	5 years (starting 1 October 2017)

Deliverable 3.3

European cities and district market analysis

Work Package:	3
Task:	3.1
Lead Beneficiary:	IMCG: Ulrika Wahlström, Jonas Norrman
Due Date:	September 30 2018 (M12)
Submission Date:	September 30, 2018 (M12)
Deliverable Status:	Final
Deliverable Style:	R
Dissemination Level:	PU
File Name:	D3.3 European cities and district market analysis.pdf



This project has received funding from the European Union's Horizon 2020 research and innovation program under grant agreement No 774199

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Version History

Version	Date	Modifications made by
0.1	2018-08-24	Jonas Norrman, Ulrika Wahlström
0.2	2018-08-31	Jonas Norrman, Ulrika Wahlström
0.3	2018-09-12	Jonas Norrman, Ulrika Wahlström
0.4	2018-09-20	Jonas Norrman, Ulrika Wahlström
1.0	2018-09-28	Final version to be released to the EC

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Foreword

This report presents a first version of a European cities and district market analysis for IRIS solutions. It is a starting point for the work in WP3 which will lead to an identification of efficient pathways for replication and deployment of IRIS solutions, identified by trending and mapping legal, political, acceptance and financial conditions throughout Europe.

The work presented in this first version of the market analysis was conducted within the overall framework of IMCG's Smart Cities Innovation Capacity Index (SCICI), developed in LH project CELSIUS. The SCICI was an efficient way to match the two smart city solutions district heating and district cooling with relevant prospect cities and districts in CELSIUS. However, the initial workshops arranged in each IRIS Lighthouse City led to the conclusion that the city authorities are not the key actors to replicate implementation of IRIS Solution. The most important actors are private and public companies which practically act as solution managers, purchasing solutions from suppliers on the market and offering services to end-users, i.e. citizens. A city can also be the purchaser, but often plays an enabling part. This conclusion lead to an advancement of the SCICI methodology for the use of indicators to identify European cities and districts with high replication potential for integrated solutions demonstrated in IRIS. The two outcomes: an overview of European cities and districts willingness and possibility to implement and replicate smart IRIS solutions; a shortlist of Top potential FCs, were also influenced by the experience of other large-scale Smart City projects.

Over the next 12 project months the market analysis will be further developed based on state of practice from the Integrated Solutions that are actually going to be demonstrated in the lighthouse cities. The deliverables that are submitted in M12 will mainly be used for this: *D5.1 Report on baseline, ambition, activities & barriers for Utrecht lighthouse interventions*, *D6.2 Planning of Nice integration and demonstration activities* and *D7.1 Report on baseline, ambition, activities & barriers for Gothenburg lighthouse interventions*. Furthermore, during the first year of the IRIS project IRIS was introduced to the Business Modelling and & Financing Task Group within the SCC01 (Board of Coordinators). The task group together develop business models for integrated solutions. The method of developing business models is based on a concept called "packaging". The SCICI initially suggested for the Market analysis has an overlap with the packaging-concept. It is our ambition to align coming work in WP3 with SCC01 packaging concepts to achieve the best European light house cities synergies. The development of the market analysis will be presented as a section in deliverable *D3.7 Financing solutions for cities and city suppliers* which is due in PM24.

Main author of the report is the IRIS partner IMCG Sweden. IMCG works closely with several smart cities and has a large network of cities with profound competence within areas like energy efficiency, renewable energy and e-mobility as well as shared data services and platforms and co-creation. For example, the EU-project CELSIUS gathers almost 70 cities dedicated to district heating and cooling. IMCG is also engaged in the European Innovation Partnership on Smart Cities and Communities, EIP-SCC, gathers 12 Lighthouse projects with approximately 80 cities with the overall aim to test and demonstrate integrated solutions that can be replicated throughout the world. Based on the results presented in this report IMCG will give business modelling support to solution providers with the



ambition that the solutions rapidly can be replicated both within the specific district or city where they are being demonstrated and in other cities all over the world.

Executive Summary

This report contributes to the sixth objective of the IRIS: Strengthening the links and active cooperation between cities in a large number of member states. The aim is to support the Communication, Dissemination and Exploitation of results from IRIS demonstrations. The objective is to present a shortlist of top potential European follower cities and an overview of these cities and districts willingness and possibility to implement and replicate smart IRIS solutions.

This is the first step of the market analysis in IRIS which in the next step will be further developed based on information from demonstrators in the lighthouse cities. The final version of the market analysis includes identification of efficient pathways for replication and deployment of IRIS solutions, identified by trending and mapping legal, political, acceptance and financial conditions throughout Europe. The mapping will be coordinated with the work in SCC01- Board of Coordinators Task group on Business Modelling and Financing and reported in D3.7 Financing solutions for cities and city suppliers.

The scope of the task presented in this deliverable was to perform a desktop market analysis study based on an adapted version of the Smart Cities Innovation Capacity Index (SCICI). The adaption was included as a topic at the workshops in all three lighthouse cities participating in IRIS (Gothenburg, Nice and Utrecht), arranged initially in the work process.

The adaptation lead to an advancement of the SCICI methodology for the use of indicators to identify European cities and districts with high replication potential for integrated solutions of largest interests for partners in Lighthouse cities. The SCICI factors were evaluated using indicators: Lighthouse projects (Partnership); Focus areas (IRIS Transition tracks) and District marketing (focus on specific areas within the city). The context for the objective, present a shortlist of top potential European follower cities and an overview of these cities and districts willingness and possibility to implement and replicate smart IRIS solutions, remains but the content was tuned to fit the new audience presented below.

The initial workshops arranged in each IRIS lighthouse city led to the conclusion that the city authorities not are the key actors to replicate implementation of IRIS solution. The most important actors are private and public companies which practically act as solution managers, purchasing solutions from suppliers on the market and offering services to end-users, i.e. citizens. This conclusion led to a suggested division of audience into the following target groups similar to the value chains demonstrated in IRIS:

- **Solution Managers:** the actors that purchase solutions demonstrated in IRIS from suppliers and offer the solution service to their customers, or to the citizens if the manager is a city authority. The most common solution managers in IRIS are property developers and property managers. The recommendation to solution managers is to reach out to solution managers in other cities listed in this report, with interest of implementing similar solutions. Establish a communication to exchange knowledge and experience.
- **Solution Providers:** the private companies offering the solution demonstrated in IRIS or the technology necessary to set up a solution. The recommendation to solution providers is to study the list of cities in this report to evaluate the business potential for their offering in various



cities. Are the necessary conditions for a solution to be implemented fulfilled? What does the competition look like? Their own research will give input to their business plans and their strategies to expand business.

- City Authorities: the city authorities are mainly facilitators for the replication process of IRIS solutions. The recommendation to city authorities is to focus on passive and active support to innovation. E.g. the city authorities could contribute to replication by arranging study visits with matchmaking seminars for solution managers at property development companies and European solution suppliers acting in cities listed in this report.
- Users of the SCICI methodology: This can be any of the above or partners in other lighthouse projects. The general recommendation is to make sure to describe and identifying the solution manager before tuning the indicators. If the solution manager is a city authority, then political situations are important while if the solution managers are private and public companies, then market forces are more important.

The work has been very successful and resulted in important findings which will be integrated in the work in other IRIS work plan tasks.

The advancement in methodology and tuning in on the actual set up for IRIS solutions will be beneficial for work on task 3.4 (T3.4): Financing solutions for cities and city suppliers. Initially the objective was focused on large scale investments of new solutions. Investments which in the reference project CELSIUS were very dependent on a city authority as solution manager. As the city authorities are more of a transition facilitator, than solution managers and purchasers, their support to necessary conditions such as funding opportunities, citizen engagement, political climate, infrastructure and innovation climate will be very dependent on city district branding and marketing.

The city authority's role as transition facilitator will also have impact and tasks T3.5 IRIS Beyond Europe and T3.6 Beyond IRIS, as the relationship and cooperation with other cities should be built on this perspective. The city should together work to establish a local as well as European demand among the solutions managers for the solution demonstrated in IRIS.

The explicit understanding of the difference between solution managers and solution providers will have impact on the plan in task T3.6 where 20 companies representing IRIS solutions have had the opportunity to pitch to cities outside Europe. At this stage there are not 20 solution providers involved in the project. We need to scout for start-up companies at the three universities; University of Nice Sophia Antipolis, Chalmers University of Technology and Utrecht University.

This deliverable has produced relevant output to the coming deliverables: D3.7 Financing solutions for cities and city suppliers; D3.8 IRIS exploitation plan and operations; D3.9 IRIS Beyond business plan. The output could also be useful for deliverable D10.11 Second update of communication and dissemination plan.



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List of Abbreviations and Acronyms

Abbreviation	Definition
IRIS	Integrated and Replicable Solutions for Co-Creation in Sustainable Cities
EU	European Union
WP	Work Package (WP3 etc)
EIP-SCC	The European Innovation Partnership on Smart Cities and Communities network
e.g.	exempli gratia; for example
SCICI	Smart Cities Innovation Capacity Index
LH	Lighthouse City
PC	Pilot City
FC	Follower City
CIP	City Innovation Platform
ICT	Information and Communication Technologies
INEA	The Innovation and Networks Executive Agency
SCC01	Smart Cities and Communities lighthouse projects
sqm	Squared meters
ha	hectars
PV-systems	Photovoltaic systems
SEAP	Sustainable Energy Action Plan
V2G	Vehicle to grid
T	Task, (T3.1 etc)
D	Deliverable (D3.3 etc)
EV	Electric vehicle
RES	Renewable energy sources
LED-light	Light-emitting diode light
IoT	Internet of things

1 Introduction

The overall aim of the IRIS Smart Cities project, Integrated and Replicable Solutions for Co-Creation in Sustainable Cities, is to demonstrate integrated solutions for local energy systems at district scale, that is more secure, more stable and cost effective for the citizens. Together, the integrated solutions form an open multi-system ecosystem for durable energy-services that connect and integrate supply and demand, so that the cities will radically speed up the penetration of innovative solutions.

One of the IRIS objectives is to strengthen the links and active cooperation between a large number of cities, all with the ambition to speed up smart city development. IRIS hypothesis is that the fastest way for a city to get smarter is to replicate innovative solutions that other cities already have tested, demonstrated and proved sustainable and bankable. Smart cities collaborate with other cities, sharing knowledge and replicating each other's best practices.

Although this deliverable has a city focus, the report will show that collaboration is most efficient when it is established between solution managers from different cities. The solution managers are the actors which purchase solutions demonstrated in IRIS from suppliers and offer the solution service to their customers, or to the citizens, if the manager is a city authority. Solution managers are located on city, district or building level depending on the scope of the service.

From a city geographical perspective, development and transformation is achieved city district by city district. This is especially the case when development and transformation is executed by a partnership with private partners for property development and for infrastructure development. In this report a city district market analysis is presented for market uptake of integrated solutions demonstrated in the EU funded project IRIS Smart Cities.

The mapping of European smart cities with potential to replicate IRIS solutions presented in this report was in large based on the European Innovation Partnership on Smart Cities and Communities network (EIP-SCC). EIP-SCC brings together cities, industry and citizens to improve urban life through more sustainable integrated solutions. To this, cities listed in a selection of projects funded in EU framework programme 7 and cities recommended by IRIS project partners were also added.

The mapping resulted in some 100 smart cities which are presented in the report, including their ambition (regarding sustainable solutions), the district in focus and their focus areas regarding integrated solutions. This is to be considered a short list of potential follower cities since there are thousands of potential cities to be put on the list. However, an even shorter list of potential follower cities, containing only twelve cities, is also presented in the report.

1.1 Relation to the IRIS project and work package objectives

The IRIS Smart Cities project is a demonstration project and below a list of demonstration objectives is presented:

1. Demonstrate solutions at district scale integrating smart homes and buildings, smart renewables and closed-loop energy positive districts.



2. Demonstrate smart energy management and storage solutions targeting Grid flexibility.
3. Demonstrate integrated urban mobility solutions increasing the use of environmentally-friendly, alternative fuels, creating new opportunities for collective mobility and lead to a decreased environmental impact.
4. Demonstrate the integration of the latest generation ICT solutions with existing city platforms over open and standardized interfaces enabling the exchange of data for the development of new innovative services
5. Demonstrate active citizen engagement solutions providing an enabling environment for citizens to participate in co-creation, decision making, planning and problem solving within the Smart Cities.
6. **Strengthening the links and active cooperation between cities in a large number of Member States with a large coverage of cities with different size, geography, climatic zones and economical situations**

The last objective, no 6, is the most relevant to this report as collaboration is a key instrument for development funded by EU.

The IRIS project includes seven (7) different EU cities, covering most of the individual characteristics of each EU region in all its aspects as those of geography, climatic zones and economical situations. There are three lighthouse cities (LH) and four follower cities (FC) in the project. The four FCs participate in developing feasibility studies and business plans for the list of IRIS solutions interested in from the very early beginning of the project, up to its end. A strong key element of IRIS lies on a detailed communication, dissemination and exploitation planning, while the inclusion of horizontal partner, as that of ESCI, who already has a big network of cities collaborating with them, justifies the expected EU wide link of IRIS project with similar on-running ones.

1.1.1 Relevant Work Package objectives

Work package 3, (WP3), regards Development of Bankable Business Models and Exploitation Activities. This WP supports the two expected impacts of IRIS; put in practice bankable solutions of IRIS cities' transition tracks and reduce technical and financial risks in order to give confidence to investors for investing in large-scale replication. The specific objectives of WP3 are:

- Develop and exploit 30+ new business models
- Enhancing all existing business models
- **Increase replication potential**
- Increase innovation management performance of LHs and FCs
- **Efficiently support knowledge transfer, leading to 20+ official IRIS deployment agreements signed.**
- Adapting already established financial instruments and financing solutions for the cities and service providers
- Secure continuum of deployment of IRIS solutions knowledge transfer beyond project termination, efficiently handle Intellectual Assets

This report is one step towards increasing replication potential, as we here list European cities and districts with high replication potential.



1.2 Scope, objectives and expected impact of deliverable

The objective of this deliverable is to present a shortlist of top potential European follower cities and an overview of these cities' and districts' willingness and possibility to implement and replicate smart IRIS solutions. The scope for the work includes four activities:

- workshops arranged in each IRIS lighthouse city (Gothenburg, Nice and Utrecht)
- desktop research for smart cities and districts
- analysis of long list of cities and
- writing of this report to present first version of shortlist and market analysis.

This is the first deliverable from Task 3.1 *Adapting innovative business models to city district specific context*. The final outcomes of T3.1 (due in project month 52) are: a shortlist of Top potential FCs will be created b) an overview of European cities and districts willingness and possibility to implement and replicate smart IRIS solutions, c) advancements of methodology for the use of indicators to identify European cities and districts with high replication potential.

1.2.1 Objective

One of the IRIS project's objectives is to strengthen the links and active cooperation between a large number of cities, all with the ambition to speed up smart city development. The cities already participating in the IRIS project will share their experience and know-how regarding integrated solutions along the following transition tracks: Energy positive districts, Smart energy management, the Smart e-mobility sector, a City innovation platform and Citizen engagement and co-creation.

The objective with the workshops conducted in this task, was to understand strategies, roles and business models when implementing solutions along the different transition tracks. The examples of implementations will later on serve as models for replication in follower cities and other cities.

The other objective with this report is to present a European smart city overview in relation to the IRIS Smart City objectives and transition tracks. It serves a general purpose for actors involved in smart city development and a specific purpose for the partners in the IRIS Smarts Cities project to increase our knowledge of market development in Europe.

This report also introduces methods for mapping and identification of groups of cities which similar status and ambitions.

1.2.2 Scope for deliverable

IRIS hypothesis is that the fastest way for a city to get smarter is to replicate innovative solutions that other cities already have tested, demonstrated and proved sustainable and bankable. Smart cities collaborate with other cities, sharing knowledge and replicating each other's best practices.

The scope of the deliverable is to conduct individual workshops, on site in all three lighthouse cities with the local city partnership.

The scope of the project was to perform a desk top market analysis study using an adapted version of the Smart Cities Innovation Capacity Index (SCICI) that was used in a previous project, the EU funded light house project CELSIUS. The adaption was included as a topic at the workshops in all three



lighthouse cities participating in IRIS (Gothenburg, Nice and Utrecht), arranged initially in the work process.

The adaptation lead to an advancement of the SCICI methodology for the use of indicators to identify European cities and districts with high replication potential for integrated solutions of largest interests for partners in Lighthouse cities. The SCICI factors were evaluated using the following indicators: Lighthouse projects (Partnership); Focus areas (IRIS Transition tracks) and District marketing (focus on specific areas within the city). The context for the objective, present a shortlist of top potential European follower cities and an overview of these cities and districts willingness and possibility to implement and replicate smart IRIS solutions, remains but the content was tuned to fit the new audience.

The list of European cities with potential to replicate smart city solutions is immense. In this report we present a list of nearly 100 relevant cities, which is to be considered a short list. On top of that we present an even shorter list of twelve cities.

1.2.3 Expected impact

The expected impact is a joint understanding among IRIS partners about roles and relations in the new value chains serving the different IRIS integrated solutions. This mutual understanding will make it easier to establish long term relationships based on well-functioning business models.

The understanding will also clarify how indicators should be used. It is of essence that the indicators are important for the specific audience to this report.

The expected impact of the report is that partners in the IRIS Smart Cities project update their target groups for outreach activities. The report is a useful identification and analysis tool for solutions managers when searching for best practice as well as for solution providers expanding their market and businesses.

1.3 Contributions of partners

Several partners contributed to this deliverable by actively participating in workshops. Through workshops with our horizontal partner RISE and representatives of the nodes in Gothenburg, Nice and Utrecht, IMCG has drawn several conclusions regarding who is the buyer of the solutions that IRIS demonstrates. During the workshops:

Gothenburg was represented by the following actors; City of Gothenburg, Riksbyggen, Johanneberg Science Park

Utrecht was represented by the following actors; Utrecht University, City of Utrecht, Bo-Ex (housing cooperation), Stedin (grid operator), Lomboxnet (batteries, car sharing)

Nice was represented by the following actors; City of Nice, CSTB (construction), Vulog (car sharing), EDF (energy company)



1.4 Relation to other activities

D3.3 is directly linked to the outcomes of T3.1 Adapting innovative business models to city district specific context, where the following is stated to be created; a shortlist of Top potential follower cities, an overview of European cities and districts willingness and possibility to implement and replicate smart IRIS solutions, advancements of methodology for the use of indicators to identify European cities and districts with high replication potential.

This deliverable has produced relevant output to the coming deliverables: In task T3.4; D3.7 Financing solutions for cities and city suppliers; in task T3.5; D3.8 IRIS exploitation plan and operations; in task T3.6; D3.9 IRIS Beyond business plan. The output could also be useful for deliverable D10.11 Second update of communication and dissemination plan.

1.5 Structure of the deliverable

Here we provide an overview of the content of this report's three main chapters; IRIS Solution managers and advancements of market analysis, European smart city innovation climate analysis and European smart city funding opportunity and city district analysis.

1.5.1 IRIS Solution managers and advancements of market analysis

Chapter 3 describes the importance of understanding the actors and their different roles when an IRIS solution is to be implemented in a city. The initial workshops arranged in each IRIS Lighthouse City led to the conclusion that the city authorities are not the key actors to replicate implementation of IRIS solution. The most important actors are private and public companies which practically act as solution managers, purchasing solutions from suppliers on the market and offering services to end-users, i.e. citizens.

1.5.2 European smart city innovation climate analysis and top potential follower cities

Chapter 4 presents the result from our mapping of European cities with potential to replicate IRIS solutions. The scope of the project was to perform a desk top market analysis study using an adapted version of the Smart Cities Innovation Capacity Index (SCICI). The adaption was included as a topic at the workshops in all three lighthouse cities participating in IRIS (Gothenburg, Nice and Utrecht), arranged initially in the work process.

Approximately 100 cities have been identified having a potential to replicate IRIS solutions. The cities present innovation climate and focus areas similar to the transition tracks in IRIS. The cities are presented in this chapter with regards to:

- Name of EU project the city belongs to
- Type of city: Lighthouse city/Follower city/Pilot city
- City facts (mainly inhabitants and sometimes location or history worth knowing)
- Ambition (regarding sustainable solutions)
- Information and/or name of Demonstration district/Replication district
- Information about chosen focus areas (energy, ICT and/or mobility)



By looking at different types of innovation and smart city rankings and compared them to the list of nearly 100 cities we have also created an even shorter list of European cities with potential to replicate IRIS solutions.

1.5.3 European smart city and city district analysis

Chapter 5 presents an initial market analysis based on the smart city mapping and the methods described in the previous section. The market analysis should be seen as a first version of gathering cities and city districts into groups with similar situations and ambitions.

This analysis should give us all a better understanding of what to expect from the city authority, important actors carrying out what is needed by the city and solution providers. City representatives of IRIS will see that many other cities in Europe are trying to solve the same problems as they are. To keep the comparison simple, we have simplified IRIS transition tracks (Energy positive districts, Smart energy management, Smart e-mobility sector, A City innovation platform and Citizen engagement and co-creation) into the challenges areas of Energy, Mobility and ICT.

2 Methodology

In this study we have made desktop studies as well as used structured methods for identifying European cities and market districts that have potential for replicating the solutions of IRIS. The work was conducted within the overall framework of IMCG's Smart Cities Innovation Capacity Index (SCICI), developed in lighthouse project CELSIUS. The SCICI was an efficient way to match the two smart city solutions district heating and district cooling with relevant prospect cities and districts in CELSIUS.

The study started with workshops with our horizontal partner RISE and representatives of the nodes in Gothenburg, Nice and Utrecht. From these workshops, the SCICI tool was tuned compared with the set up in previous project CELSIUS regarding who is the buyer of the solutions that IRIS demonstrates. It became evident that the city authorities are not the key actors to replicate implementation of IRIS Solution. The most important actors are private and public companies which practically act as solution managers, purchasing solutions from suppliers on the market and offering services to end-users, i.e. citizens. This conclusion lead to an advancement of the SCICI methodology for the use of indicators to identify European cities and districts with high replication potential.

2.1 IRIS offers more than sustainable integrated solutions

The IRIS project evolves around five transition tracks; Energy positive districts, Smart energy management, Smart e-mobility, A digital city innovation platform and Citizen engagement and co-creation. These transition tracks represent challenges that cities are facing when there is a need to shift from traditional value generation for end-users (citizens) to new, smart and sustainable integrated solutions for end-users.

A replication documentation is necessary to guarantee a successful path from a demonstrated, integrated solution to a replicated and implemented solution. This documentation describes how the solution fits into the local context regarding technical aspects as well as different types of city administrations and business models for supply companies.

Solutions can be described on how dependent they are on having the right conditions, regarding legislation and infrastructure. Infrastructure can also mean access to suppliers on the local market. Which solutions that can be applied on building level is dependent on available structures on district level and on city level. However, there could be situations when structures are provided by international suppliers. This is typically the situation for some digital solutions related to connectivity and Internet of Things where the infrastructure is operated by private companies.

2.2 Horizontal Cross-Work Package Workshops

In order to learn more about how cities are preparing to handle innovations and be able to replicate, IMCG, together with IRIS project partner RISE, held workshops during the spring of 2018 with the lighthouse cities; Gothenburg (March 16), Nice (April 18) and Utrecht (April 19). In the workshops;

Gothenburg was represented by the following actors; City of Gothenburg, Riksborgen, Johanneberg Science Park



Utrecht was represented by the following actors; Utrecht University, City of Utrecht, Bo-Ex (housing cooperation), Stedin (grid operator), Lomboxnet (batteries, car sharing)

Nice was represented by the following actors: City of Nice, CSTB (construction), Vulog (car sharing), EDF (energy company)

IMCG's ambition with these workshops were to see how IMCG best fits in when we are to tune the solution providers' business models to match different cities' needs. IMCG is enabling a match-making process business-to-city as well as business-to-business, depending upon who the buyer is of integrated solution is.

The main objectives with the workshop was to get a greater understanding of the integrated solutions and to get a picture of what solutions are closest to replication. We also wanted to know if the solution providers had made any replication plans on their own and had preferences on other cities to replicate in. Did they have a clear picture of who would be the buyer of their solution? Furthermore, we wanted to discuss their business models and tune it to fit different cities' requirements.

Regarding the cities of Utrecht, Nice and Gothenburg, the objective was to get an insight to the city's innovation management process and see what the procedure would be if a city were to buy an integrated solution. What would the required steps be? Would it be implemented in the whole city or in a specific district? We also wanted to get information on which other smart cities that the lighthouse cities of IRIS are inspired by.

2.3 The Smart Cities Innovation Capacity Index

The challenges addressed by IRIS Smart Cities are relevant for all European cities but all cities have individual change management strategies and local capacity for change by implementing innovations. One of the objectives with this report is to establish a method for identification of groups of cities which similar status and ambitions. The expected impact would be a useful identification and analysis tool for solutions managers when searching for best practice as well as for solution providers expanding their market and businesses.

In this report we introduce the methods for mapping and identification of groups of cities which similar status and ambitions. The method suggested is called Smart Cities Innovation Capacity Index (SCICI), and was developed in the EU FP7 project CELSIUS. The SCICI has been proven to be an efficient way to match smart city solutions with relevant prospect cities and districts. It is a structured and objective way to analyse the capacity of cities' and districts' abilities to adapt and devour IRIS solutions as well as for the cities to identify which solutions that should be supported for their own city change and development

According to the SCICI method, the work on the market analysis integrates consideration of the following smart city factors:

1. Funding opportunities
2. Citizen engagement
3. Political Climate
4. Infrastructure and
5. Innovation climate



As stated in the beginning of this chapter, input from the workshops led to an advancement of the SCICI methodology for the use of indicators to identify European cities and districts with high replication potential of the main integrated solutions demonstrated in IRIS. The table below presents three examples of interpretation on the relationship between different integrated solutions demonstrated in the IRIS project and smart city factors.

Table 1 Presenting examples of SCICI indicator interpretations in relation to different integrated solutions demonstrated in IRIS.

City authority as Solution Manager - City services to citizens	City authority as Solution Manager - City infrastructure to business	City authority as Solution Facilitator – Promotion and regulation
Example: Smart Street Lights	Example: City Innovation Platform	Example: Positive Energy Buildings
Funding opportunities: The city authority has financial tools and instruments to fund implementation of new solutions. Citizen engagement: The City citizens are engaged in adapting new solutions. Political climate: Long term political stability for city transition to reduce environmental impact. Infrastructure: The city has the infrastructure to operate the solution. Innovation climate: The city authority has processes and resources to test new solutions and implement successful solutions.	Funding opportunities: The city authority has financial tools and instruments to fund implementation of new solutions. Citizen engagement: No need for citizen engagement. Political climate: Long term political stability for city transition to reduce environmental impact. Infrastructure: The city authority has the organization and resources to operate the solution. Innovation climate: The city authority has processes and resources to test new solutions and implement successful solutions.	Funding opportunities: The city authority promotes the district to make it interesting for private property investments. (<i>Indicator: District marketing</i>) Citizen engagement: No need for citizen engagement. Political climate: Political support for facilitation from city authorities. (<i>Indicator: Lighthouse projects</i>) Infrastructure: The city infrastructure has the infrastructure to operate the solution. (<i>Indicator: Focus areas</i>) Innovation climate: The city authority has processes and resources to participate in (<i>Indicator: Lighthouse projects</i>)

In the table above the right column, Example: Positive Energy Buildings, presents the indicator interpretation that was used for mapping out smart cities to the short list. Indicator interpretation is written in italic: *Lighthouse projects*, *Focus areas* and *District marketing*. The indicators were used on a yes or no basis. The number of indicators and the level of indicator detail was adapted to the resource available within the project budget.

It is important to point out that evaluations have a short life span. The indicators for a city district may change largely over just 6 months due to economic, political or social reasons. It is especially important to understand the city district brand in the local context.

2.4 Selection of European cities with potential of replicating IRIS solutions

The EU has compiled a list of all cities that are taking part in EU sustainability initiatives. It lists the cities participating in eight European initiatives, the country and number of residents and the level of their involvement:



- Smart cities and CONCERTO calls in EU Framework Programmes; FP6, FP7 and Horizon 2020: lighthouse and follower cities, as well as details of their participation (229 cities)
- EIP-SCC Market place: number of commitments (299 cities)
- Covenant of Mayors: status (7,779 cities)
- CIVITAS: number of projects (63 cities)
- Green Digital Charter: signatory status (53 cities)
- European Energy Award: status (1,444 cities)
- EU Capitals of the Year (18 cities)
- Sustainable Urban Mobility Plan (720 cities)

Many of the cities involved in the projects listed above would probably be qualified as having potential to replicate the IRIS solutions. We have gathered cities with potential for replication by:

- Looking at lighthouse projects – lighthouse cities and follower cities
- Looking at smart cities/FP7 mentioned by project partners

All in all we selected nearly 100 cities. The information we have found about the cities show that they are highly motivated to participate in the energy, ICT and mobility transition. The majority already has an ambitious climate policy for secure, sustainable, competitive and affordable energy. And they are focusing on one or several of the IRIS challenges (transition tracks):

Table 2 Common challenges (transition tracks) of many European smart cities:

Focus areas				
Energy positive districts	Smart energy management	Smart e-mobility sector	City innovation platform	Citizen engagement and co-creation

These cities are cities to be inspired by and to regard as potential partners when there are integrated solutions within areas like energy, mobility and ICT to be replicated.

Through desktop research data about the cities has been collected regarding:

- Name of EU project the city belongs to
- Type of city: Lighthouse city/Follower city/Pilot city
- City facts (mainly inhabitants and sometimes location or history worth knowing)
- Ambition (regarding sustainable solutions)
- Information and/or name of Demonstration district/Replication district
- Information about chosen focus areas (energy, ICT and/or mobility)

2.4.1 SCC01 – Board of coordinators

Around the “Lighthouse-projects” a community has been established in which the different projects can cooperate and share their experience. The European Commission represented by INEA strongly recommends this cooperation in order to enlarge the overall impact of all Lighthouse-projects together



that are supported by them. From the side of the Lighthouse-project this cooperation is supported by the Board of Coordinators in which the Coordinator of each Lighthouse project has a place.

The Board of Coordinators gathers a network of 12 lighthouse projects (IRIS Smart Cities being one of them). Each project brings together cities, industry and citizens to improve urban life through more sustainable integrated solutions. This includes applied innovation, better planning, a more participatory approach, higher energy efficiency, better transport solutions, intelligent use of Information and Communication Technologies (ICT), etc. The involved cities focus on what's common for cities and the concept of packaging the solutions ready for replication. The 12 lighthouse projects gathered in the network are:

- IRIS Smart Cities
- Match up
- Stardust
- Grow Smarter
- Triangulum
- Ruggedised
- MySmartLife
- Replicate
- SmartEnCity
- Smarter Together
- Sharing Cities
- Remourban

Each lighthouse project consists of three lighthouse cities demonstrating integrated solutions in a demonstration district and two to four follower cities with the ambition to replicate one or several of the solutions. With this cooperation a network of communities is created existing of 36 Lighthouse Cities and of 38 Follower/Fellow Cities.

The Board of Coordinators produces each year an Action Plan for their common activities and representation, with the aim to strengthen the exchange between the different projects and the impact of their projects outside the partnerships. The strategy is based on the SCC01 Collaboration Framework and the SCC01 Manifesto documents. The strategic targets for 2018 are several. The outcomes will be overseen by the Board of Coordinators and the outputs and tasks needed to achieve these outcomes will be carried out by a number of Task Groups.

IRIS is represented in all task group and for the Market analysis and the future work in IRIS WP3 the outcomes from the Business Modelling and & Financing Task Group will be relevant. For example, the task group participants will together develop joint business models on five areas for proven technology that are ready for adoption. These areas are public housing retrofit, e-buses, ev-charging, smart lampposts and data platforms.

The method of developing joint business models is based on a concept called “packaging”. The concept of ‘packaging’ seeks to focus on what is common in what cities do, rather than focus on differences. It captures in a consistent way, what a solution is and how to implement it. The analogy of ‘Lego’ is a simple way of explaining packaging:



- a clear and compelling proposition
- at an affordable price
- that is interoperable

and leaves room for swift standard application as well as locally tailored solutions.

Each solution must suit the specific local context of a city; and this can be characterized and captured.

The packaging concept describes solution in terms of the:

- societal proposition (through 'use cases'; and value delivered)
- technical specification (written to inform decision makers in the city; and to instruct industry suppliers)
- logical business model options, financing sources, business case, and indicators.

The SCICI approach is to investigate legal, political, acceptance and financial conditions for an solution. This approach has an overlap with the packaging-concept. It is our ambition to align coming work in WP3 with SCC01 packaging concepts to achieve the best European light house cities synergies.

Packaging concept will be used to evaluate the suggested business models for the integrated solutions in IRIS. Each solution will also be evaluated regarding the role for the city authorities. Will they be an solution managers engaged in procurement and administration of the solution, or will the city authorities act as a facilitator supporting a technology-led and industry driven innovation process in the city?

The Board of Coordinators is in close contact with INEA (the EC Executive Agency for the SCC01-projects), EIP-SCC (European Innovation Partnership for Smart Cities & Communities) and the Urban Agenda for the EU.

INEA

The Innovation and Networks Executive Agency (INEA) was created by the European Commission in 2014. Its' mission is to support the Commission, project promoters and stakeholders by providing expertise and high quality of programme management to infrastructure, research and innovation projects in the fields of transport, energy and telecommunications, and to promote synergies between these activities, to benefit economic growth and EU citizens.

Horizon 2020 is the EU's main program for the research area. It implements the Innovation Union, a Europe 2020 flagship initiative aimed at securing Europe's global competitiveness. The two objectives below which are managed by INEA fall under the "Societal Challenges" part of the program:

- Smart green and integrated transport
- Secure, clean and efficient energy

In total, it is expected that INEA will manage a budget of up to €33.6 billion for the H2020 2014-2020 Programs.

European Innovation Partnership on Smart Cities and Communities

The European Innovation Partnership on Smart Cities and Communities (EIP-SCC) is a major market changing undertaking supported by the European Commission bringing together cities, industries, SMEs, investors, researchers and other smart city actors.



The EIP-SCC Marketplace plays a distinctive and new role compared to other European Commission platforms. Engaging cities, industry and financiers in interest matching activities, leading to project design and delivery shall be the Marketplace's team objective. Building solutions and facilitation are the two main tasks of the Marketplace to help deliver investments. EIP-SCC is a market place and a European Commission platform.

Urban agenda for the EU

The Urban Agenda for the EU was launched in May 2016 with the Pact of Amsterdam. It represents a new multi-level working method promoting cooperation between Member States, cities, the European Commission and other stakeholders in order to stimulate growth, liveability and innovation in the cities of Europe and to identify and successfully tackle social challenges. The Urban Agenda for the EU focuses specifically on three pillars of EU policy-making and implementation:

- Better regulation: The Urban Agenda for the EU focuses on a more effective and coherent implementation of existing EU policies, legislation and instruments.
- Better funding: The Urban Agenda for the EU will contribute to identifying, supporting, integrating, and improving traditional, innovative and user-friendly sources of funding for urban areas at the relevant institutional level, including from European structural and investment funds (ESIF) (in accordance with the legal and institutional structures already in place) in view of achieving effective implementation of interventions in urban areas.

Better knowledge: The Urban Agenda for the EU will contribute to enhancing the knowledge base on urban issues and exchange of best practices and knowledge.

2.4.2 Smart city projects

During discussions with IRIS project partner RISE in April 2018, IMCG came to the conclusion that there are smart city projects that could be of interest to study and for this deliverable. In this report the cities from two smart city projects are presented. The reason for choosing these two is that RISE had much input on the participating cities and explained that they shared many of the challenges (transition tracks) of IRIS and also had a replication focus. The two selected projects are:

- Sinfonia
- EU-Gugle

2.4.3 EU research funding 2017-2013, 7th framework programme

When studying the EU-Gugle project, we found that two FP7-projects had claimed officially to be interested in being replication cities of the EU-Gugle project. The conclusion we draw from this was that the cities in these FP7 projects could very well be interested in replicating the solutions of IRIS. Therefore, in the list of cities with replication potential we have included cities from these two projects of the EU research funding 2017-2013, 7th framework programme. These two FP7 cities-projects are:

- ZenN
- R2Cities



2.4.4 IESE Smart Motion Index (CIMI), Global City Index, Global City Outlook and Juniper

Apparently, there are thousands of cities in Europe claiming to be and or working to become smart cities. In IMCG's perspective, the list of nearly 100 European cities that we present in this report is being a short list of potential follower cities, (FCs) of IRIS solutions. However, it's understandable that an even shorter list is easier to handle and focus on. In order to make such a list we have also looked at several city rankings focusing on innovation and smart cities. It turns out that the same cities tend to reappear in the different rankings.

We have studied the European cities ranked on the IESE Smart Motion Index 2018 (CIMI). It is prepared by the Center for Globalization and Strategy. CIMI lists smart cities from all over the world. Worth knowing, is that CIMI analyses the level of development of 165 cities from 80 countries in nine dimensions considered keys to progress: human capital, social cohesion, economy, environment, governance, urban planning, international outreach, technology, and mobility and transportation. The ranking aims to be a tool for mayors, city managers, companies and interest groups that want to improve the quality of life of city residents. Studying the most advanced cities in each category provides a source of inspiration to identify best practices for more innovation, sustainability, equity and connectedness.

Europe, with 12 cities ranking among the top 25, continues to be the top-performing geographical area. Among the top 50 cities in Europe that have advanced the most are Helsinki, Barcelona and Milan. In the table below, we present the European cities that are on the global top 50 list covering smart cities.

Table 3 The Smart European Cities on the top 50 list of Global Smart Cities (CIMI 2018)

Smart City Ranking Europe	Smart Cities in Europe (World ranking in parentheses)	Smart City Ranking Europe	Smart Cities in Europe (World ranking in parentheses)
1	London (2)	15	Dublin (30)
2	Paris (3)	16	Hamburg (31)
3	Reykjavik (5)	17	Geneva (32)
4	Amsterdam (10)	18	Göteborg (33)
5	Berlin (11)	19	Basel (34)
6	Copenhagen (13)	20	Munich (37)
7	Stockholm (16)	21	Prague (40)
8	Vienna (19)	22	Frankfurt (42)
9	Helsinki (22)	23	Rotterdam (43)
10	Oslo (23)	24	Lyon (44)
11	Zurich (24)	25	Milan (45)
12	Madrid (25)	26	Brussels (48)
13	Barcelona (26)	27	Riga (49)
14	Bern (29)	28	Tallinn (50)

We have also looked into AT Kearney, that presents the Global Cities Index 2018. It examines the current performance of cities based on 27 metrics spanning five dimensions: business activity, human capital, information exchange, cultural experience, and political engagement.



AT Kearney further presents the Global Cities Outlook. It evaluates a city's potential based on the rate of change for 13 metrics across four dimensions: personal well-being, economics, innovation, and governance. These metrics help evaluate long-term investment and success by assessing elements such as environmental performance, infrastructure, and innovation capacity.

The European cities presented in AT Kearney's global rankings are presented below.

Table 4 AT Kearney Global Cities Index 2018 and Global Cities Outlook 2018

Smart City Ranking Europe	Global Cities INDEX Smart Cities in Europe (World ranking in parentheses)	Smart City Ranking Europe	Global Cities OUTLOOK Smart Cities in Europe (World ranking in parentheses)
1	London (2)	1	London (3)
2	Paris (3)	2	Paris (4)
3	Brussels (10)	3	Amsterdam (6)
4	Madrid (13)	4	Munich (7)
5	Berlin (16)	5	Stockholm (11)
6	Vienna (21)	6	Zurich (13)
7	Amsterdam (22)	7	Geneva (16)
8	Barcelona (23)	8	Berlin (18)
		9	Brussels (22)
		10	Copenhagen (23)
		11	Vienna (25)

The Juniper report 2018 lists yet another index; The Top 20 Global City Performance by Index 2017. This index measure "smartness" – defined as how well a given urban ecosystem employs digital technology, shared knowledge and cohesive processes to benefit its citizens, as measured by "mobility, public safety, health and productivity". The best performing European cities are London, Barcelona, Berlin and Nice.

Our shortlist of FCs consists of those cities that are represented both in our list of nearly 100 cities and in at least one of the other rankings/indexes we looked at (the CIMI Index, the Global Cities Index, the Global Cities outlook and Juniper rankings). The European cities that fulfil these criteria are presented in the shorter list of cities in this report. Note that we chose not to put Gothenburg or Nice on the short list since they are already a part of IRIS.

2.4.5 Applying SCICI on the chosen data sets

The SCICI indicators adapted to the transition tracks and integrated solutions of largest interests for the Lighthouse cities were applied on the data sets listing Smart cities. The resulting "long" short list of approximately 100 European cities was then compared with the CIMI index, the Global Cities Index, the Global Cities outlook and Juniper rankings to produce the final shortlist of top potential European follower cities and an overview of these cities and districts willingness and possibility to implement and replicate smart IRIS solutions.

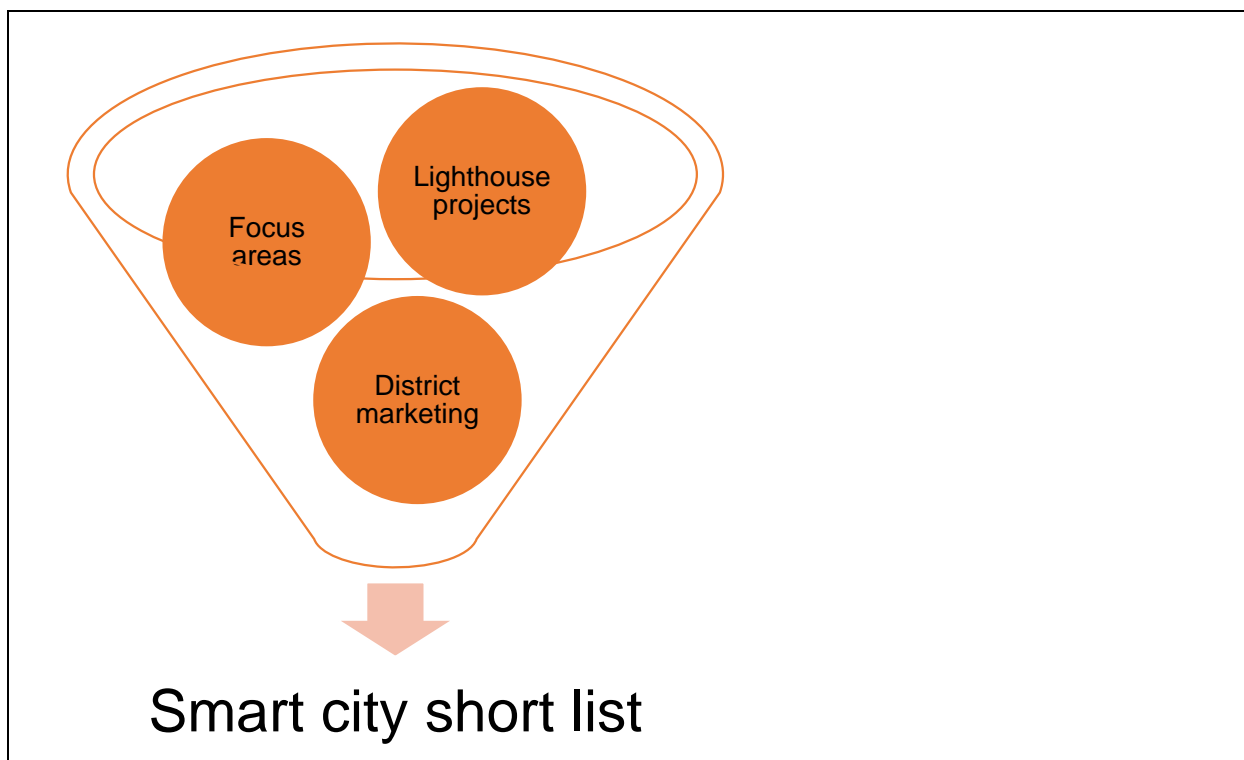


Figure 1 The SCICI indicators (Lighthouse projects, Focus areas and District marketing) were applied on the data sets listing Smart cities to produce the final short list of potential replication cities.

3 IRIS solution managers and advancements of market analysis

The initial workshops arranged in each IRIS Lighthouse City led to the conclusion that the city authorities not are the key actors to replicate implementation of IRIS Solution. The most important actors are private and public companies which practically act as solution managers, purchasing solutions from suppliers on the market and offering services to end-users, i.e. citizens.

This conclusion lead to an advancement of the SCICI methodology for the use of indicators to identify European cities and districts with high replication potential. The conclusion also implicates that the main audience for the resulting smart city short list, are solution managers within the Lighthouse cities.

3.1 The two roles of a city

A city can play the role of an enabler or a buyer. The easiest assumption is to see the city as the buyer of integrated solutions that solve the challenges the city is facing. However, many times it is other actors, such as property developers that play the crucial part as buyer, as they design and implement the solutions.

3.1.1 The city as an enabler or facilitator

The workshops IMCG held together with RISE in the lighthouse cities of IRIS, Gothenburg, Nice and Utrecht, clarified how cities prepare themselves for handling innovations. The most interesting discovery is that most often the city is not the potential buyer of the solutions provided by IRIS partners. Instead, cities often play the part of enabling the market for the solutions. E.g. by restricting the area for parking places there will be an increased demand for mobility services.

The city representatives in IRIS also often serve as facilitators for the other local partners. Assisting them with documentation and reporting, organising the local network and communicate with project coordinator. They are also requested to communicate results and market solution providers offerings.

3.1.2 The city as the buyer

The city authority can be the buyer and owner of an integrated solution when the solution is included in the city infrastructure and may generate value all over the city. Solution managers within the city are responsible administrations and municipality owned companies.

When the city is the buyer, represented by an administration or a municipality owned companies, purchase is publicly procured and there is sometimes also a public political debate before investments take place. These processes are often time consuming and private companies must be strict when establishing business plans which includes either the city as key partner (as infrastructure provider) or the city as a customer. However, the city can establish large markets for innovations when the necessary conditions are established.



3.1 Smart City Solution Managers

When a solution is to be replicated it is necessary for the solution provider to understand who is to handle the solution on the buyer side of the transition. At the workshops with IRIS lighthouse cities we made a first attempt to describe these actors – the solution managers - for each integrated solution. In this report it's sufficient to describe the solution managers as the actors that purchase solutions from suppliers and offer the solution service to their customers, or to the citizens if the manager is a city authority.

The objective for the IRIS project is to demonstrate integrated solutions which deliver services with new values. It is for example renewable electricity produced from solar cells instead of nuclear plants. The integrated solutions will thereby also be built on new value chains from production to end-consumers.

The value follows a value chain and business models demonstrated in the IRIS project covering one or more links in the value chain. Each link can also be described with key activities as well as cost and revenue models. For example, for short term storage with batteries in buildings, a key activity is the maintenance of the batteries. A supply company has a business model that offer this value to building owners for a competitive price and with a sufficient profit for the company to survive over time.

An integrated solution is often a result of several value propositions and key activities and sometime several business models as a business model is related to one actor only. E.g. for mobility services there is one actor who supplies the building owner with an IT platform and an interface for the tenants to book mobility services. Other actors that operate the different services, such as bicycles and car sharing, are connected to the platform and convert bookings into mobility.

While some integrated solutions call for the city as a whole to be one of the actors in the value chain, other solutions call only for an individual building to be the actor, without any dependencies on any external infrastructure on district or city level. The demonstrated value generation and related business models can also be divided into three categories presented in the table below.

Table 5 Three categories of value generation

The value generation is at:	The Solution Managers are:	The integrated solutions are typically included:
City level	City authorities and the responsible administration	In the city infrastructure
District level	Infrastructure developers	A cooperation between several actors within a district
Building level	Property developers	And upgraded in individual buildings

By providing a documentation of the replication, with solid and useful information (and contacts to collaborate with) the effort and risk to try a new solution is reduced for the solution manager. This replication documentation serves as a basis for solution managers in others cities when producing purchase specifications.



The replication documentation also serves as a basis for solution providers developing and expanding their business. The replication documentation describes the necessary conditions for a solution to be implemented. It can be used when priorities are made to target markets.

3.2 The property developers as the key solution managers

Real estate developers and owners proved being important and can often play the part of a buyer since they handle mobility, energy and ICT matters with focus on increased value creation related to their properties. Often, the property developers design and implement a solution while property owners use the solution or offer it to the tenants.

Together with developers and owners of new infrastructure for mobility, energy and ICT they also create new values on a district level which is positive for their property portfolios in the district. Property developers interact regularly with their tenants and through them they can engage citizens and move the tenants towards the necessary behavioural change needed for cities to become even smarter.

Most of the integrated solutions demonstrated and replicated in IRIS are related to properties and tenants. The property developers and managers are important actors for implementing solutions and to engage tenants (citizens) in embracing and using the new services.

For some solutions the scope is on the building level (e.g. solar cells for electricity production) while other solutions include infrastructure outside the building (electricity market). The infrastructure can be city wide or even international (as with digital services) However physical infrastructure benefit from district level cooperation. The more properties within the district that implement the solution and use the services the lower the cost for infrastructure will be.



4 European Smart City Innovation climate analysis and top follower cities

The scope of the project was to perform a desk top market analysis study using an adapted version of the Smart Cities Innovation Capacity Index (SCICI). The adaption was included as a topic at the workshops in all three lighthouse cities participating in IRIS (Gothenburg, Nice and Utrecht), arranged initially in the work process.

The context for the objective where to: present a shortlist of top potential European follower cities and an overview of these cities and districts willingness and possibility to implement and replicate smart IRIS solutions. The content was tuned to fit the new main audience for IRIS solution replication opportunities.

Smart cities throughout Europe demonstrate solutions contributing to solve the global sustainability goals. Through the mapping of cities in smart city projects, lighthouse projects and some FP-projects IMCG has identified European cities with potential for replicating IRIS solutions. Here we present the cities with an overview on their focus areas for change regarding to the integrated solutions demonstrated in IRIS. The identified cities have expressed similar ambitions and have focus areas that often relates directly to the ones that IRIS has.

Approximately 100 city regions have been identified to possible have actors interested of replicating IRIS solutions. The cities present, on official web sites, an innovation climate and focus areas similar to the Lighthouse Cities in IRIS. The city regions are presented in this chapter with regards to:

- Name of EU project the city participates in
- Type of project partner: Lighthouse city/Follower city/Pilot city
- City region facts (mainly inhabitants and sometimes location or history worth knowing)
- Ambition and engagement from actors in the city region (regarding sustainable solutions)
- Information and/or name of Demonstration district/Replication district in the city region
- Information about chosen focus areas for demonstrated solutions (energy, ICT and/or mobility)

There are thousands of cities in Europe communicating to be and or working to become smart cities. We consider the list of nearly 100 cities as being a short list of potential Follower Cities, (FCs) of the IRIS Smart City. However, it's understandable that an even shorter list is easier to handle and focus on. In order to make such a list we have compared the European cities ranked on the IESE Smart Motion Index (CIMI). The result of that is presented in the end of this chapter.



4.1 Cities within the IRIS Smart Cities project

IRIS - Integrated and Replicable Solutions for Co-Creation in Sustainable Cities - focuses on the fact that cities can act as large-scale demonstrators of integrated solutions and want to contribute to the socially inclusive energy and mobility transition. IRIS offers an excellent opportunity to demonstrate and replicate the cities' great potential.

Lighthouse cities: Utrecht (The Netherlands), Nice (France), Gothenburg (Sweden)

Follower cities: Vaasa (Finland), Alexandroupolis (Greece), Santa Cruz de Tenerife (Spain), Focsani (Romania)

Table 6 Focus areas in IRIS Smart Cities

Focus areas				
Energy positive districts	Smart energy management	Smart e-mobility sector	City innovation platform	Citizen engagement and co-creation
Energy positive districts	Smart energy management	Smart e-mobility sector	City innovation platform	Citizen engagement and co-creation

Utrecht (The Netherlands) – Lighthouse city

City facts: Home to 340,000 inhabitants, Utrecht is the fourth municipality in the Netherlands. It is the fastest growing city in the country and expects to have 400,000 inhabitants in 2025.

Ambition: Utrecht is very consistent in its sustainable energy policy. As of 2009 Utrecht takes part in the Covenant of Mayors. The city's 2008 Strategic Energy Action Plan (SEAP) was updated in the 2016 SEAP, aiming at transforming the urban energy systems into sustainable, yet reliable and affordable systems. Core principle is that Utrecht wants to be a climate neutral and a climate robust city in 2030. Utrecht has the highest rate of PV-systems installed in the Netherlands (10 MWp, 2015). The city wants the number of PV-systems to grow from 4,000 in 2015 to 10,000 in 2020. The number of EV-charging stations should grow to 1,000 and the number of EVs to 10,000, both in 2020. Utrecht became 2015 Solar City of the Netherlands, leading the way with regard to installed solar panel power, smart grid technology and solar V2G charging infrastructure for e-cars. This is also illustrated by the 2015 nomination for the European e-CarTec Award of Utrecht's smart charging infrastructure for e-cars connected with solar panels on neighbouring public and private buildings.

Demonstration district: The Utrecht lighthouse district Kanaleneiland Zuid is situated in the Utrecht Centre-West area, just south-west of the beautiful historic city centre and the Utrecht Central Station. With 4,800 inhabitants living in this residential area of 64 Ha, it is a densely populated district, home to in majority low-income households. The district hosts about 40 social housing apartment buildings, some semi-detached and row houses, three schools and some shops. The district has a poor energy profile. Deep retrofit towards label A has started - The social housing associations Bo-Ex, Portaal and



Mitros who own the apartment blocks have recently started refurbishing buildings, resulting in energy labels A/B, including a total make-over of the building and increased comfort levels.

Focus area: Energy efficiency, become energy neutral district, mobility, ICT and data management. Citizen engagement.

Nice (France)- Lighthouse city

City facts: Nice has 343,000 inhabitants. Located at the heart of the French Riviera (Cote d'Azur), including an international airport, Nice is the 5th largest municipality in France. It is the capital city of the metropolitan area where 540,000 inhabitants range over an 80% mountainous territory (South Alps).

Ambition: Turning Nice into the “green city of the Mediterranean region” is the city authority and teams new ambition. In order to consolidate these strategic objectives, the "French Riviera" intends to be France's benchmark region in terms of sustainable development. Nice is thus a member of several networks such as Eurocities, Green Digital Charter and the Global Covenant of Mayors.

Demonstration district: Nice Eco Valley – with three sections: Nice Meridia, Les Moulins and Sport Valley District. A business international centre built in 1980s entering in execution phases of urban renewal project including a multimodal mobility centre (airport, train station, tramway, buses, electric mobility). At south, Grand Arenas is bordered by Mediterranean Sea and Nice city Airport. At north, Les Moulins area delimits the sub-district. In an increasing energy consumption perspective, the district needs to produce renewable energy for heating and cooling new office and residential buildings.

Focus area: Mobility. Energy efficiency. ICT and data management. Citizen engagement.

Gothenburg (Sweden) - Lighthouse city

City facts: Gothenburg is a port city with a strategic location between Oslo and Copenhagen. It has a population of around 533,000 and is Sweden's second largest city.

Ambition: Gothenburg was first in the world to release Green Bonds in 2013, to fund sustainability initiatives and projects. Ambitious innovative strategies and efforts have been taken to reduce residents' consumption-based greenhouse gas emissions concerning climate impact; Energy Efficiency Strategy (part of the SEAP), was adopted by the City Council will remain in force through to 2020, and The Climate Programme expands on the content of the Energy Efficiency Strategy and has an extended timeframe. Gothenburg has signed the EU Covenant of Mayors and has committed to go beyond the objectives of EU energy policy. Gothenburg's Sustainable Energy Action Plan (SEAP) was successfully approved in 2012 and also includes the consumption perspective and Gothenburg is recognised as a smart energy system frontrunner. Gothenburg have also one of the least carbon intensive electric grids (amongst the lowest 5% globally). The city furthermore has increased engagement and ambitions by having the fortune to lead the largest energy innovation project.

Demonstration district: Johanneberg Campus, which is situated in the south city centre of Gothenburg is mainly a Campus area and as well a residential area with some 8,000 inhabitants. It is strongly characterised by students due to the close location to Chalmers University of Technology. The campus area consists of 15,000 end-users. At the campus area there are today 55 buildings of various age. Integrated solutions will be demonstrated, in the housing company Riksbyggen's innovative



development of a residential neighbourhood (Housing association Viva), in 132 apartments in six buildings with planned occupation in 2018. Citizen involvement from planning stage are implemented in the process. The unique aspect of Viva is the courageous implementation of the full-scale housing solutions of the future when it comes to social, economic and environmental sustainability. Solutions that have never been tested in Swedish housing projects before will be implemented. The construction frames will be built from a new type of environmentally friendly concrete. Recycled bus batteries will serve as storage for electricity from photovoltaic panels on the roofs. E-car pool, e-bikes and e-cargo bikes. Swedish housing company HSB has erected a Living Lab together with Chalmers University of Technology and Johanneberg Science Park with 29 apartments, where mainly students and researchers live in a constantly monitored testing environment.

Focus area: Mobility. Energy efficiency. ICT and data management. Citizen engagement.

Vaasa (Finland) – Follower city

City facts: The City of Vaasa is rapidly growing municipality with about 67,600 inhabitants. Vaasa is also the largest University city in Finland. Vaasa Region has over 140 private enterprises which operate in the energy cluster.

Ambition: Aims to be a carbon neutral city in 2035. Vaasa has been chosen to participate in the network of Finnish Sustainable Communities (FISU). The members of FISU aim at a carbon neutral, waste-free and globally sustainable consumption by the year 2050. The municipalities will also strengthen the regional economy and employment, create business opportunities and improve the welfare of the citizens. Vaasa has its own energy education strategy starting from kindergarten continuing up to university level. The aim is to establish an energy education continuum and thus secure the availability of competent energy expertise.

Replication district: No information.

Focus area: Mobility. Energy efficiency. ICT and data management. Citizen engagement.

Alexandroupolis (Greece) – Follower city

City facts: Alexandroupolis has 73,000 inhabitants. It is situated in the gate between the Mediterranean and the Asian countries.

Ambition: Transform Alexandroupolis into a sustainable city for its citizens with the use of new, efficient and user-friendly technologies and services in the areas of energy, transport and ICT. At the same time, the ambition is to become an internationally recognized hub of innovation, where the utilization of scientific knowledge for the development and the production of innovative technologies, products and services with a marked impact on sustainable economic growth will take place. The city is committed in implementing a number of activities as part of the urban plans of the city that already exist (Urban Plan compiled for the Covenant of Mayors, Sustainable Urban Mobility Plan and others) and integrate buildings planning, energy networks, ICT, transport/mobility planning and other additional issues. Alexandroupolis is an active member of Covenant of Mayors initiative and co-founder Greek Green Cities Network.

Replication district: No information.

Focus area: Mobility. Energy efficiency. ICT and data management. Citizen engagement.

**Santa Cruz de Tenerife (Spain) – Follower city**

City facts: The city of Santa Cruz de Tenerife, with 206,000 inhabitants, is the shared capital (with Las Palmas de Grand Canaria) of the Autonomous Community of Canary Islands and it is of strategic importance for Spain, due to its geographical position since it constitutes an interconnection gate between Africa and Latin-America.

Ambition: The strategic plan of the city pursues to transform Santa Cruz into a more sustainable and economically active city for its people with the use of new, efficient and user-friendly technologies and services in the areas of energy, transport and ICT. In addition, Santa Cruz de Tenerife has the determination to become an internationally recognized attraction hub of high standard of well living for professionals from all over the world, thanks to its high connectivity, great technological development and its well know quality of life. Santa Cruz de Tenerife local authorities are committed in implementing a number of activities as part of the urban plans of the city that already exist (Urban Plan compiled for the Covenant of Mayors, Sustainable Urban Mobility Plan and others) and integrate buildings planning, energy networks, ICT, transport/mobility planning and other additional issues. Santa Cruz de Tenerife is a member of Covenant of Mayors and member of the Spanish Smart Cities Network.

Replication district: No information.

Focus area: Mobility. Energy efficiency. ICT and data management. Citizen engagement.

Focsani (Romania) – Follower city

City facts: Focșani is a medium sized city with 79,300 inhabitants and the capital of Vrancea County. Focsani city is situated at the border between Moldova and Muntenia historical regions of Romania.

Ambition: The city is committed to become a smart and sustainable urban centre, starting from efficiently tackling all local issues (economic, social, administrative, environmental etc.) through an integrated innovative approach.

Replication district: No information.

Focus area: Mobility. Energy efficiency. ICT and data management. Citizen engagement. Together with its citizens, the key stakeholders and urban utilities' providers, the municipality is focused on: increasing buildings' energy efficiency and the living standards; mitigating CO2 footprint by reducing primary energy resources consumption and implementing adequate renewable energy sources (RES); developing an eco-smart public transport, efficiently managed and monitored; implementing an ICT decision-based management tool in order to develop a transparent and efficient public administration process; securing its citizens' safety and enhancing their level of knowledge, awareness and engagement; maintaining a low unemployment rate by increasing the economic potential of the city.

4.2 Cities within the MAtchUp project

MAtchUP will design and implement a palette of innovative solutions in the energy, mobility and ICT sectors that will serve as a model of urban transformation for other cities in Europe and beyond.

Lighthouse cities: Valencia (Spain), Dresden (Germany), Antalya (Turkey)



Follower cities: Ostend (Belgium), Herzliya (Israel), Skopje (Macedonia), Kerava (Finland)

Table 7 Focus areas in MAtchUp

Focus areas				
Energy positive districts	Smart energy management	Smart e-mobility sector	City innovation platform	Citizen engagement and co-creation
Energy: Smart controls, Electrical storage, Urban renewables, Smart grids, Public lightning, District heating, New building, Retrofitting, Building integrated RES, Thermal storage and Storage		Mobility: Charging stations, Mobility, Urban-freight, Multi-modality an Intelligent transport system	ICT: Urban Platform and Internet of things	Citizens: Policy improvements, Innovation businesses, Urban planning, Citizen engagement and Staff exchange

Valencia (Spain) – Lighthouse city

City facts: 787,000 inhabitants.

Ambition: Is going to improve several neighbourhoods and placing València at the European forefront of comprehensive urban regeneration. Its 2020 Smart City strategy envisages to reduce urban emissions by 40% by 2030.

Demonstration district: The coastal district Poblats Maritims - a traditional maritime fishermen district with a strong identity character. The district has been the subject of urban aggression and its population has been peacefully resisting against dispossession. As the district has acquired global visibility, its needs to repair and solve the deteriorate situation.

Focus area: renovating and constructing old and new buildings in the district, improving the sustainable mobility across the whole city (e-vehicles, charging points and multimodality hubs) building a dedicated platform for citizens to improve the ICT services.

Dresden (Germany) – Lighthouse city

City facts: 530,000 inhabitants.

Ambition: Expects to turn into electrical the 100% of the municipal fleet for 2025 in all its departments.

Demonstration district: Johannstadt, located to the east of the city centre, following the Elbe Course on the left. The area is one of the densely built inner city areas of Dresden. With regard to the socio-demographic composition of the residential population, Johannstadt differs from the Dresden average. Indicators point to tense social conditions in the centre of gravity. In recent years, important research and development facilities in the field of biotechnology have been located in the district, including a university hospital and some institutes of the Technical university of Dresden.

Focus area: Renovate and new construction of some buildings in the district, improvement of the sustainable mobility across the whole city (e-cars, e-buses, charging points and multimodality hubs, building a dedicated platform for citizens to improve the ICT services.



Antalya (Turkey) – Lighthouse city

City facts: 2,4 million inhabitants.

Ambition: A smart district planned to be pedestrian and bike friendly with a large green corridor.

Demonstration district: New Kepez Smart City is one of the largest urban regeneration projects in Turkey and will be the first implementation of Ecologic Smart City vision of Antalya. Having 1,4 million m² area, New Kepez Smart City will create a 2 billion USD economy for Antalya and will be the first of its kind where a smart city is being created from scratch with several smart city initiatives including infrastructure, energy, mobility, water, lighting, environment, security, health, smart home and integrated technology solutions for 80,000 residents that will live and work in the region by the year 2019. Dangerous and earthquake-risk urban area has been demolished while all ownership problems have been completely resolved. These allow the development of a smart, green, liveable area.

Focus area: constructing new high-performance buildings in the district, improving the sustainable mobility across the whole city (a new fleet of electrical vehicles with the corresponding charging points).

Ostend (Belgium) – Follower city

City facts: Ostend is located on the coastline with an ever-growing population of 72,000 inhabitants. On peak days, the population explodes to as much as 300,000 people.

Ambition: Ostend is the Flanders' leader of renewable energy: future model of resilience and sustainability. The city is on the verge of transformation to become a more resilient, smart and sustainable future proof city.

Replication district: No information.

Focus area: A lot of the current ongoing initiatives and future plans are related to this strategy. With the approval of the Covenant of Mayors and the local Energy Plan, the necessary measures and initiatives to reduce the local carbon footprint in policymaking are taken into account. With these commitments, the City of Ostend is a leader in Flanders in the field of sustainable and renewable energy. Smart Society Ostend, Energy Plan (e.g. LED-lighting, overall energy reduction of private households), overall greening of the inner city, climate adaptation related to coastal and marine cities, urban heat network, various participation/co-creation networks and initiatives

Herzliya (Israel) – Follower city

City facts: Herzliya is located on the Mediterranean coastline, 15km north of Tel Aviv. The city has a population of 100,000 people.

Ambition: As a member, on 2008, Herzliya signed the Climate Convention of the Forum 15, which is a local Israeli version of the SEAPs. Under the Convention, Herzliya is committed to reducing air pollution in a way that resembles those of the world's leading cities, and to reducing greenhouse gas emissions by no less than 20% by the year 2020 as against the year 2000.

Replication district: No information.

Focus area: Reducing emissions.



Skopje (Macedonia) – Follower city

City facts: 486,000 inhabitants. Skopje is the capital of Macedonia, situated in the heart of the Balkan Peninsula. The rapid development of Skopje after the Second World War is stopped by the catastrophic earthquake that struck the city on July 26, 1963. It was rebuilt and is now a modern and functional city.

Ambition: Becoming a green capital and a smart city in the near future. The city of Skopje actively participates in a number of European projects and initiatives, in which it exchanges significant experiences, practices and innovative solutions in order to achieve the planned goals for becoming a green capital and a smart city in the near future. At the same time, a number of projects for urban mobility, energy efficiency and adjustment of the overall infrastructure for the needs of the citizens are realized.

Replication district: No information.

Focus area: Skopje is currently improving its mobility services with the introduction of e-vehicles. The new bus is made according to the latest technological trends in this industry. It is an energy efficient bus that consumes a minimum amount of electricity and is equipped with a quick charging system. The biggest advantage is that there is no emission that pollutes the air.

Kerava (Finland) – Follower city

City facts: Kerava is Finland's third most compact city with 35,500 inhabitants. The number of households that don't have cars is very high according to the Finnish scale. Inside the city, over 60% of all travelling is done by walking or bicycling.

Kerava Energy Ltd is owned by the city of Kerava. Its electricity as well as its district heating are produced using bioenergy.

Replication district: No information.

Focus area: In 2015, Kerava Energy Ltd established its first Solar Power plant. Lately, it has developed strongly charging points for electric cars since as of today, there are more charging points other than gasoline stations in Kerava.

4.3 Cities within the Stardust project

Stardust is an EU Horizon 2020 Smart Cities project. Technical green solutions and innovative non-technical solutions will be implemented and validated, enabling them to be bankable and replicable for other cities.

Lighthouse cities: Pamplona (Spain), Tampere (Finland), Trento (Italy)

Follower cities: Cluj-Napoca (Romania), Derry (United Kingdom, Northern Ireland), Kozani (Greece), Litomerice (Czech Republic)

Table 8 Focus areas in Stardust

Focus areas				
Energy positive districts	Smart energy management	Smart e-mobility sector	City innovation platform	Citizen engagement and co-creation
Retrofitting and innovative heating and cooling systems	Efficient energy management protocols, user-designed interfaces of smart grids and storage systems and open sharing of data Renewable energy sources and smarter energy storage systems and lighting materials	Electric vehicles and their charging stations will be developed and installed to reduce the carbon emissions. Different types of incentives will be introduced in order to encourage citizens in using electric vehicles.	The latest generation of the ICT smart city platform, the open access strategy, data centres and infrastructures, and user-driven and demand-oriented city infrastructures will be introduced to reduce greenhouse emissions and to promote social innovation and co-creation of ideas between stakeholders.	Developing sustainable citizen-oriented Smart Cities using different approaches that promote citizen engagement via communication channels, activities, and ICT tools.

Pamplona (Spain) – Lighthouse city

City facts: Pamplona has nearly 200,000 inhabitants. Its region is highly regarded for developing its energy grid based on renewable energy sources (RES). As of the moment, it covers more than 80% of the region's electrical consumption.



Ambition: implements smart and sustainable solutions for its communities. These are aligned with the Sustainable Development Plan of the City, the Sustainable Energy Action Plan (SEAP) under the Covenant of Mayors, the e-Vehicle Action Plan of Pamplona, and the Navarra Energy Plan 2030.

Demonstration district: No information.

Focus area: Energy-efficient solutions in the form of ICT, renewable energy resources and other unconventional techniques will be introduced to the old buildings and social housing. These will provide more sustainable energy usage and heating system for the people to relish. District heating networks will be renovated to provide cleaner energy to the city. Accessible transport in the form of electric vehicles will be available for everyone to use. These include e-taxis, e-cars, e-bikes and e-buses and a number of charging points and chargers in communal garages will be installed in selected areas.

Tampere (Finland) – Lighthouse city

City facts: Tampere is the second largest metropolitan area in Finland with 228,000 inhabitants. One of three most rapidly growing regions in the country.

Ambition: These include The Open and Agile Smart Cities (OASC) initiative, and the Innovative Cities Programme (INKA). The projects formulated are based on developing smart cities solutions, renewable industry and future health care programmes. Moreover, it envisions the city to be carbon-neutral by 2030, 20 years earlier than it was initially planned.

Demonstration district: No information.

Focus area: To meet the city's ambitious goals, digital solutions, new business innovations and smart infrastructure will be incorporated to the lives of its citizens and to the city as a whole. Buildings will be refurbished using smart energy-efficient systems like heat recovery, building energy modelling and other advanced ICT schemes. In addition, combined heating and cooling energy systems will be introduced to reduce and recycle heat waste.

Aside from the electric vehicles and charging stations, which will be introduced to the local community, advanced ICT solutions like the Green Light Optimised Speed Advisory (GLOSA) will be established to advise the drivers the correct speed needed to pass through the traffic lights. They will promote better mobility within the city while reducing the carbon emissions generated by fuel-based cars and traffic.

Trento (Italy) – Lighthouse city

City facts: Trento is situated close to the alps and has 117,000 inhabitants.

Ambition: The municipality wants to push for their Urban Mobility Plan.

Demonstration district: No information.

Focus area: New retrofitting techniques and energy-efficient systems that rely heavily on ICT will be installed to the different buildings in Trento. Moreover, new renewable energy resources and novel combined heating and cooling systems will be installed in selected sites to boost the efficiency of the city's district heating network. Will promote car-sharing of e-vehicles and limit the usage of fuel-based cars. Included are a set of ICT tools, which will be implemented to optimize the city's transport system.



Cluj-Napoca (Romania) – Follower city

City facts: Cluj-Napoca is Romania's second largest city with its 300,000 inhabitants.

Ambition: The city of Cluj-Napoca wishes to change that after submitting the recently approved Sustainable Energy Action Plan (2011-2020) and its Sustainable Urban Mobility Plan that has yet to be approved.

Replication district: No information.

Focus area: Is in need of sustainable mobility pattern and poor thermal energy distribution.

Derry (United Kingdom, Northern Ireland) – Follower city

City facts: Derry has almost 150,000 inhabitants.

Ambition: The region plans to improve the citizens' quality of life including its youthful and available workforce, which possess optimal academic and technical skills.

Replication district: No information.

Focus area: No information.

Kozani (Greece) – Follower city

City facts: Kozani has 50,000 inhabitants. Kozani is the main energy producing area of Greece as it provides more than 50% of the total country's power via district heating.

Ambition: No information.

Replication district: No information.

Focus area: No information, but the project focuses on the same challenges that IRIS does, so there should be a great interest for these areas.

Litomerice (Czech Republic) - Follower city

City facts: Litomerice has 15,000 inhabitants. The city has been called the Black Triangle, due to its long struggle with various structural and environmental problems arising from heavy industrialization back in the 19th and 20th centuries.

Ambition: Since then, Litoměřice has participated and supported actively the Local Agenda 21 scheme and other actions to promote sustainability via public participation.

Replication district: No information.

Focus area: No information, but the project focuses on the same challenges that IRIS does, so there should be a great interest for these areas.



4.4 Cities within the GrowSmarter project

GrowSmarter brings together cities and industry to integrate and demonstrate 12 smart city solutions in energy, infrastructure and transport, to provide other cities with valuable insights on how they work in practice and opportunities for replication.

Lighthouse cities: Stockholm (Sweden), Cologne (Germany), Barcelona (Spain)

Follower cities: Porto (Portugal), Graz (Austria), Cork (Ireland), Suceava (Romania), Valletta (Malta)

Table 9 Focus areas in GrowSmarter

Focus areas				
Energy positive districts	Smart energy management	Smart e-mobility sector	City innovation platform	Citizen engagement and co-creation
Low Energy Districts: Smart building shell refurbishment, Smart building logistics, Smart Energy-saving tenants, Smart local electricity management Integrated infrastructures: Smart street lighting, Waste heat recovery, smart waste collection, Big data management		Sustainable urban mobility: Sustainable delivery, Smart traffic management, Alternative fuel driven vehicles, Smart mobility solutions		

Stockholm (Sweden) – Lighthouse city

City facts: Stockholm has 955,000 inhabitants and is the capital of Sweden.

Ambition: Their long-term aim is to become completely fossil-fuel free by 2040, with the immediate objective of reducing CO2 emissions.

Demonstration district: Demonstration of the 12 smart solutions will take place in Årsta, a fast-growing district in the south of Stockholm.

Focus area: Årsta is demonstrating low energy district, integrated infrastructure and sustainable urban mobility.

Cologne (Germany) – Lighthouse city

City facts: Cologne has 1 million inhabitants and is situated on the banks of the river Rhine, Cologne is the fourth largest city in Germany.

Ambition: Cologne wants to develop blueprints for the sustainable development of complete neighbourhoods.

Demonstration district: The 12 smart solutions are being implemented in Mülheim, a vibrant area in the North-East of Cologne which is currently undergoing a process of regeneration.



Focus area: The focus areas include sustainable mobility, energy efficiency of buildings, low-emission heating facilities and ensuring an integrated infrastructure as the city expands.

Barcelona (Spain) – Lighthouse city

City facts: Barcelona has 1,7 million inhabitants and was capital of innovation 2014.

Ambition: Barcelona's Smart City program began over thirty years ago when the city installed fibre optic cables to connect two municipal buildings. Currently, the City Council is using public-private partnerships to encourage innovation in areas such as transport, shopping, street lighting and environmental monitoring. Barcelona has been transformed into an urban laboratory, piloting projects and services that make the city more open, efficient and friendly.

Demonstration district: The innovation zone known as 22nd District has been chosen for Barcelona's implementation of the smart solutions. This multi-purpose area mixes residential, industrial and academic buildings in a lively, vibrant area bordering the Mediterranean Sea.

Focus area: Solutions being implemented in the 22nd District include introducing electric vehicles and installing charging infrastructure, refurbishing current buildings to create 'zero energy' blocks and installing district heating and cooling.

Porto (Portugal) – Follower city

City facts: Porto has 238,000 inhabitants.

Ambition: Porto would like to develop into a responsive city which shapes public policy and services to meet the ever-evolving needs of its citizens. The city has an overarching target of reducing CO2 emissions by 45% against 2004 levels by 2020 and is planning to use the smart solutions to improve quality of life while reducing emissions within the city.

Replication District: The District of Campanhã is an important historical area in the east of the city. Home to nearly 33,000 people, this former industrial zone is in need of redevelopment to meet the requirements of its inhabitants.

Focus area: To solve particular difficulties identified in this area and these include: congestion and air pollution, water pollution and social difficulties.

Graz (Austria) – Follower city

City facts: Graz has 325,000 inhabitants. It is a rapidly expanding city with a population that is expected to double by 2050. Located in a geographical basin, the city has difficulties with local air quality.

Ambition: Invest in cleaner energy and transport which will help it to grow sustainably while maintaining a high quality of life.

Replication District: Graz has identified two areas for redevelopment: SC Waagner Biro and Graz Reinighaus. These are busy districts in the centre of the city with engaged populations.

Focus area: To solve particular difficulties identified in these districts and these include: high energy usage, air pollution, reliance on traditional fossil fuels and heavy reliance on motor-driven private transport. The replication plan is to maximise resource efficiency and reduce greenhouse gas emissions,



reduce land consumption for buildings and infrastructure, construct compact, energy-optimised building structures and optimise development of public transport infrastructure.

Cork (Ireland) – Follower city

City facts: Cork is a well-connected and dynamic small city of 120,000 people.

Ambition: The city intends to be seen as a smart, sustainable and inclusive place in which to live and work, capable of competing with other cities globally. It plans to achieve this goal by combining hard infrastructure, social capital, including local skills and community institutions, and (digital) technologies. The city grows rapidly and wishes to mitigate the negative side effects of such rapid urbanisation while embracing modern technology. Increasing citizen expectations are a significant driving force, in terms of the quality of interaction with government and access to information and services.

Replication district: No information.

Focus area: Involves a replication plan that encourage sustainable economic development, facilitate job creation, increase citizen involvement and participation, increase resource efficiency, improve quality of life and services and provide an attractive environment for all.

Suceava (Romania) – Follower city

City facts: Suceava has 106,000 inhabitants and is a historic settlement located near the Romanian capital of Bucharest. In recent years, the city has seen an explosion in the use of private motorised transport leading to increased greenhouse gas emissions and local air pollution.

Ambition: The city would like to modernise its housing stock and introduce alternative forms of transport whilst maintaining its distinctive character.

Replication District: Suceava's Centrum District has a population of 25,000 inhabitants and 2-3,000 daily commuters working in the area. The area combines traditional housing, with more modern apartment buildings and newly constructed office blocks and shopping malls.

Focus area: Involves particular needs identified which include: ageing and inefficient building stock, increased motorised traffic leading to congestion and air pollution and limited green space. The replication plan is set to reduce energy consumption and increase energy efficiency in public and private buildings, reduce traffic-related emissions and associated impacts through car-sharing, park and ride schemes and the introduction of electric vehicles and infrastructure, increase the use of alternative energies (solar, biomass, geothermal) and reduce dependency on fossil fuels.

Valletta (Malta) – Follower city

City facts: Valletta is the capital of Malta and has 5,700 inhabitants. The Maltese Capital is surrounded by fortifications and has a high concentration of residential, administrative and commercial buildings.

Ambition: If the Valletta Region can implement smart solutions successfully, other such small cities may follow.

Replication district: Valletta views itself as a large laboratory, whose size and unique challenges can be a testing ground for smart city replication.



Focus area: The Valletta region is a centre for administration, business and transport – including the international airport, the principal land transport hubs as well as both the Grand Harbour and the Marsamxetto Harbour which cater for cargo shipment, cruise landings and the Malta-Sicily ferry. Particular difficulties identified by Transport Malta include congestion in the city centre, difficulty of access and local air pollution. The replication plan is to explore the use of alternative fuels, including hydrogen and electricity, introduce e-bike and e-car sharing projects and schemes focusing on better accessibility within urban centres, improve the harbour ferry and water taxi landing sites to encourage a shift away from private passenger cars, introduce last mile delivery of goods using clean and energy efficient vehicles within Valletta City and increase the role of ICT, particularly within urban centres, to focus on road safety and intramodality.

4.5 Cities within the Triangulum project

Triangulum is a lighthouse project set to demonstrate, disseminate and replicate solutions and frameworks for Europe's future smart cities. The lighthouse cities serve as testbeds for innovative projects focusing on sustainable mobility, energy, ICT and business opportunities.

Lighthouse cities: Manchester (United Kingdom), Eindhoven (Netherlands), Stavanger (Norway)

Follower cities: Leipzig (Germany), Sabadell (Spain), Prague (Czech Republic)

Table 10 Focus areas in Triangulum

Focus areas				
Energy positive districts	Smart energy management	Smart e-mobility sector	City innovation platform	Citizen engagement and co-creation
Energy		Sustainable mobility	ICT – data platform	

Manchester (United Kingdom) – Lighthouse city

City facts: Manchester has 510,000 inhabitants.

Ambition: Improve energy efficiency and remove cars from certain areas within the city.

Demonstration district: Corridor Manchester will be the focus of activity; a 2km spine that contains two of the UK's largest universities and one of the largest medical research campuses in Western Europe. It employs 60,000 people in the knowledge economy sector with a further 20,000 expected to be added in the next 10 years. The 72,000 students in the Corridor is expected to reach 110,000 by 2020.

Focus area: All the new investments around renewable energy generation, supply and demand management will be connected through a new ICT infrastructure called "The MCR-i". This platform will consist of a number of discrete layers, which will create two new knowledge environments. The first; a network of data and services that bridge the investments set out above in an integrated way to enable greater analysis and better-informed decision making at both a strategic and operational level to improve energy efficiency, reduced carbon emissions and a greater ability to meet demand in a more



cost-effective way. The second is the establishment of an open access marketplace from which innovative end-user and business applications can be developed and marketed independently. In addition, the city's programme to remove cars from the Corridor also provides the opportunity to develop a new mobility component focused on logistics and freight distribution, whilst at the same time exploiting the opportunity to connect new modes of e-vehicle transport to the electricity infrastructure.

Eindhoven – Lighthouse city

City facts: Eindhoven has 223,000 inhabitants.

Ambition: Significant increase of joint ownerships in Smart City Eindhoven among users. Citizens and other relevant actors will be engaged in the process of investing into Eindhoven as a Smart City. Introduce new, smarter city administration that allows true integration of Smart City aims and objectives within and outside the municipal organisation, that will reduce energy bills and limit CO2 emissions.

Demonstration district: In Eindhoven, two districts transform into sustainable living environments during the course of the project. The former Philips industrial complex in the "Strijp-S" neighbourhood becomes a creative smart district and in Eindhoven's Eckart district, Woonbedrijf invites tenants to take ownership of the renovation processes of their own houses.

Focus area: In Strijp-S an innovative concept to clean up contaminated land will double as a means of producing energy. A district-wide ICT solution will allow residents to access different kinds of infrastructure, such as booking e-vehicles from a district car sharing scheme or using smart parking concepts. The IT-based tool will help residents to develop sustainable patterns of energy and mobility behaviour. In Woonbedrijf, e-buses make city traffic eco-friendlier. In the Eckart Vaartbroek district, energy-efficiency renovations are carried out on the social housing stock that predominates in this area. In order to precisely calculate energy savings, an IT-based instrument capable of modelling costs and yield in a 3D visualisation of the district is used along with an open data platform to further facilitates smart city developments.

Stavanger (Norway) – Lighthouse city

City facts: Stavanger has 198,000 inhabitants. The Stavanger region claims to be the energy capital of Europe; it holds the European status as smart city lighthouse (among only nine cities in Europe) and is the Norwegian Smart Care Cluster on welfare technology. Further, the region has a high level of digital service development and provision, due to its high speed digital infrastructure.

Ambition: Lowering emission, both by enabling people to make the right choices and introducing equipment and infrastructure for electric mobility, Improve the quality of public transportation and thus increase its competitiveness compared to individual motor car traffic, smarter houses make cities smart: decision support, energy control, safety and comfort, Lowering energy consumption both in dwellings and public buildings, 75% of the heating requirement to be covered by renewable energy in the buildings which the municipality new energy plant (centre) will provide meaningful citizen involvement in everyday life and seeking business opportunities globally.

Demonstration district: Paradis/Hillevåg is transformed to a living lab. Within this area, substantial changes will take place in buildings such as 100 private homes fitted with integrated solutions and smart generic gateways. Services include heat and light control, innovative video solutions, security features



and charging electric vehicles. Stavanger regards smarter homes as a crucial part of building a smart city, due to the opportunities of enabling the inhabitants being part of the process.

Focus area: Stavanger municipality will install a renewable energy plant for three major municipal office buildings, making the energy supply for light and heating greener and reducing the CO2 emission. Further, a school and a nursing home are involved in the project. Through the smart generic gateway developed and installed by Lyse, they will benefit from innovative video solutions, strengthened energy efficiency, building automation and smart charging of e-vehicles. A cloud data hub will be developed.

Leipzig (Germany) – Follower city

City facts: Leipzig has 544,000 inhabitants.

Ambition: The main focus is to establish a real integrated approach (powered by the development of a Smart City Implementation Plan).

Replication District: The activities are focused on a former industrial urban area called “Leipzig West” which represents deprived areas and neighbourhoods in terms of the social, economic and structural situation. Integrative and participative strategies have been implemented in the area during the course of the last 15 years, which helped to establish strong connections between the local economy, private house owners and civil actors. The resulting networks form valuable structures for the development and the realisation of the Smart Cities Implementation Plan in the next three years.

Focus area: A stronger recognition of the use of renewable energy resources as well as a rethinking of multimodal traffic/logistic/ICT system solutions.

Sabadell (Spain) – Follower city

City facts: Sabadell has 208,000 inhabitants and belongs to Barcelona’s Metropolitan Region.

Ambition: In 2012 Sabadell pioneered the introduction of a Smart City programme in a structured, comprehensive and systematic approach complementing the implementation of new technologies for urban management. These measures included an increased level of LED installation in public lighting, the implementation of remote management systems of air conditioning in 59 municipal buildings etc.

Replication district: No information.

Focus area: Sabadell expects to develop a concrete Smart City implementation plan on integrated Smart City solutions for energy, transport and ICT that identifies integrated actions that generate the highest impacts on energy efficiency, emissions reductions, resources optimisation, economic development and citizenship involvement. The Smart City model implies innovative management measures to reduce demand of fossil fuels and decreasing CO2 emissions.

Prague (Czech Republic) – Follower city

City facts: Prague is the capital of the Czech Republic and has 1,3 million inhabitants.

Ambition: The aim of the project is to create a complex sustainable city profile and put relevant strategic recommendations in the agenda of Smart cities. It is therefore the ambition of the City of Prague to actively build on the Morgenstadt City Lab in the Triangulum project, to contribute through active



cooperation within the follower cities, to share best practices and make every effort to replicate Lighthouses solutions according to Prague's conditions.

Replication district: No information.

Focus area: No information, but is participating in a project focusing on energy, ICT and mobility, so the city is obviously interested in these focus areas.

4.6 Cities within the Ruggedised project

Ruggedised is a smart city project funded under the European Union's Horizon 2020 research and innovation programme. It brings together lighthouse cities and follower cities: to test, implement and accelerate the smart city model across Europe. Working in partnership with businesses and research centres, the cities will demonstrate how to combine ICT, e-mobility and energy solutions to design smart, resilient cities for all.

Lighthouse cities: Rotterdam (Netherlands), Umeå (Sweden), Glasgow (United Kingdom)

Follower cities: Parma (Italy), Brno (Czech Republic), Gdansk (Poland)

Table 11 Focus areas for Ruggedised

Focus areas				
Energy positive districts	Smart energy management	Smart e-mobility sector	City innovation platform	Citizen engagement and co-creation
Energy management, Smart thermal grid, smart electricity grid		E-mobility	ICT, sensor techniques	

Rotterdam (Netherlands) – Lighthouse city

City facts: Rotterdam, the second largest city in the Netherlands, has 633,000 inhabitants and has Europe's largest port.

Ambition: To have a major social economic impact on job creation, citizen participation and quality of life.

Demonstration district: The Heart of South area, where 13 smart solutions with the aim to achieve maximum energy efficiency and CO2 reduction will be implemented. The South of Rotterdam faces relatively severe social-economic challenges accompanied by a young and multi-cultural population. The area is currently dominated by a car-oriented infrastructure where citizens and visitors sometimes feel estranged. Through Ruggedised the Heart of South district will undergo a serious transition in the upcoming years, consisting of the renovation of the public transport hub as well as various large-scale multifunctional buildings. Furthermore, the public space in the area will be drastically redeveloped. With this project the city of Rotterdam will prepare the district for the future with the aim to achieve maximum energy efficiency and CO2 reduction while simultaneously looking to have a major social economic impact in terms of job creation, levels of participation of citizens and quality of life.



Focus area: The transition from a mainly fossil fuel driven economy to an economy based on the use of sustainable energy sources will be bolstered within the next decades, providing opportunities to significantly stimulate a circular economy. This development will be strongly boosted by the dynamic and rapidly growing ICT-sector. The use of internet, big data, robotics and sensor techniques will have enormous disruptive effects on existing business models.

Umeå (Sweden) – Lighthouse city

City facts: Umeå is situated in the north of Sweden and has 123,000 inhabitants.

Ambition: Smart city thinking is at the core of the City of Umeå's overall vision of continued social, economic and environmentally sustainable growth. Ruggedised will facilitate a unified smart district, which is underpinned by planned regeneration and new developments, existing smart city capabilities and committed public and private sector investments

Demonstration district: Umeå focuses on an innovation district that is situated immediately to the east of Umeå city centre, the University city area, which includes a mix of residential, academic and research facilities from two universities, a regional hospital, and community, recreational and commercial building. The neighbourhood is characterised by its young, student-influenced, population with 40,000 daily visitors. As such, the neighbourhood is one of the least car-dependent neighbourhoods in Umeå. The area will triple its inhabitants during the time of the project.

Focus area: Amongst the smart solutions implemented, the Ruggedised project will look at peak load variation management, shared use of energy and a smart, open data city decision platform.

Glasgow (United Kingdom) – Lighthouse city

City facts: Glasgow has 592,000 inhabitants.

Ambition: Glasgow aims to be a leading city for renewable technology and is using its historic strengths in engineering and education, to deliver a low carbon economy that will not only deliver a greener environment but will deliver a better life for all our people.

Demonstration district: Focus on the development of a smart street located in the city centre along a section of George Street and Duke Street, in an area of mixed residential, academic, community, retail, and industrial buildings.

Focus area: The smart street addresses the challenges Glasgow faces from ageing infrastructure, fuel poverty and air pollution; by integrating planned regeneration and development with smart city capabilities. The Smart Street will include: district heating, an innovative roof mounted solar PV canopy, ducted wind turbines, energy arbitrage, power storage, EV charging, and smart grid controls.

Parma (Italy) – Follower city

City facts: Parma has 192,000 inhabitants and is located in the Emilia-Romagna region, halfway between Milan and Bologna.

Ambition: To accelerate the city's sustainability and innovation. The City has a zero-waste strategy and in 2015 new energy regulations for the city were issued to increase energy efficiency and the use of RES. The new policy and plan for urban planning and regeneration protects and promotes the city's



environmental integrity and cultural identity. Parma expects to be a model replicator and an inspirational example for other Italian and European mid-size cities

Replication district: The Parma University Campus is the scientific centre of the University of Parma. It covers an area of about 77 hectares located in the south of the city, with several buildings for teaching and scientific research. A strategic and innovative project, called Master campus, has been developed for the regeneration of the area.

Focus area: The project sees the area as a model district for the experimentation of innovative and integrated solutions to be later extended to other areas of the city. It currently includes 35 projects of 16 research departments in seven main thematic areas: energy management, environment, innovative construction, ICT, green economy, wellbeing health and lifestyle, architectural and urban forms, liveability and sociality.

Brno (Czech Republic) – Follower city

City facts: Brno has 378,000 inhabitants and is the second largest city in the Czech Republic and is situated at the centre of the South Moravian Region. There is more than 500 ha of unused properties in Brno. Over 200 ha are industrial brownfields, located near the city centre. These areas have the potential to create new revitalised districts. Brno is currently developing a revitalisation and innovation plan for the brownfields and is setting out the best strategy to complete the smart city districts.

Ambition: The motto is that Brno is “a city which cleverly, sensibly and effectively uses modern technology and approaches, leading to an improvement in quality of life, supporting effective governance, preserving natural resources, and enhancing energy sustainability”.

Replication district: In the Ruggedised project we are focusing specifically on these two locations: “Špitálka” – is an industrial area 1 km away from the main train station in the historical centre of Brno. A building complex of factories has operated since 1930 and generates electric power by using natural gas. Špitálka is a part of a large industrial area formed by brownfields that surround the center of Brno. Trade Fairs Brno Company - offers more than 130,000 sq m of net exhibition area, ranking it among the world’s largest exhibition centres. This exhibition centre first opened in 1928 commemorating the first decennium of Czechoslovakian independence. Since the 27th of December Brno is the only shareholder of the Trade Fairs Brno Company. The area has the potential to create an environment where new technological innovations meet academia and the private sector.

Focus area: Energy sustainability.

Gdansk (Poland) – Follower city

City facts: Gdansk has 460,000 inhabitants and it’s situated on the Baltic coast.

Ambition: “Gdańsk 2030 Plus Development Strategy” is a document which outlines the vision of growth and progress in Gdańsk by 2030. The top priorities defined in the strategy, using participatory methods, are: learning, cooperation, mobility, and openness. Gdańsk is also a role-model city when it comes to the implementation of open data standards.

Replication district: The projects included in the replication plan will be implemented in the Gdańsk Śródmieście (“Downtown”) district, which encompasses the old town. The quarter covers 5.65 km2 and



is populated by nearly 30,000 inhabitants, which gives it a population density of approximately 5,244 persons per square kilometre.

Focus area: The smart solutions proposed in the Downtown district will be deployed on the grounds of the replication plans elaborated within the scope of Gdansk's "Next Economy" proposal. Their role is to offer activities complementary to building insulation, thermo-modernisation, and heat-network connections, which will offer an innovative edge to typical construction/refurbishment investments.

4.7 Cities within the mySMARTLife project

The mySMARTLife project aims at making its' lighthouse cities more environmentally friendly by reducing the CO2 emissions of cities and increasing the use of renewable energy sources. It also includes innovative technological solutions in connection with refurbishments of buildings, usage of renewable energies, clean transport and supporting ICT solutions.

Lighthouse cities: Nantes (France), Hamburg (Germany), Helsinki (Finland)

Follower cities: Varna (Bulgaria), Bydgoszcz (Poland), Rijeka (Croatia), Palencia (Spain)

Table 12 Focus areas for MySMARTLife

Focus areas				
Energy positive districts	Smart energy management	Smart e-mobility sector	City innovation platform	Citizen engagement and co-creation
Focus on increasing the use of renewable energy sources, refurbishments of buildings		Clean transport	Focus on urban platform (digitalisation) Supporting ICT solutions	Focus on citizen involvement

Nantes (France) – Lighthouse city

City facts: Nantes has 900,000 inhabitants. A major challenge of Nantes is to keep this high standard in times of demographic expansion. Invests a lot in research and innovation.

Works together with Enedis in Datalab Energie for stimulating innovation for the energy transition.

Ambition: Reduce the CO2 emissions of cities and increasing the use of renewable energy sources

Demonstration district: The "Ile de Nantes" (Island of Nantes) is one of the eleven districts of Nantes and the demonstration area which concentrates most of the planned activities of mySMARTLife: 4.9 km long and 1 km wide, located in the centre of the city of Nantes, the two branches of the Loire River define the island's boundaries. The demo area is divided into three zones with different objectives where the 47 mySMARTLife actions are carried out:

Zone 1 (new buildings area in île de Nantes); construction of new buildings including connection to the high-performance district heating. Project actions will include a carbon neutral multimodal concept



including renewable energy sources production and storage, smart energy systems and "soft" mobility services, the integration of innovative digital boilers in two new buildings, the development of smart public lightning concept. Furthermore, a new multimodal concept will be implemented, including renewable energy sources, smart energy systems and "soft" mobility services such as smart power management, smart charging and rental services.

The focus of the activities in Zone 2 (retrofitting area in Île de Nantes) is set on retrofitting. A multi-owner residential building will be retrofitted, including façades, roof insulation, connection to district heating and an integration of renewable energy sources managed through a power management system together with an innovative financing instrument. At the same time, an innovative concept of energy retrofitting in individual houses is taking place comprising insulation of attics and walls, the installation of smart thermostats and a hybrid solar thermal and photovoltaic system.

Zone 3 (district-city level) covers the entire city, with a focus on mobility and infrastructure actions. 20 new e-buses, nearly 80 charging stations, optimisation of the district heating operation, smart metering and public lighting will be realised, together with a new Urban Data Platform. Citizen solar projects and multi owner building retrofitting projects will be facilitated through two web-based platforms.

Focus area: energy, mobility, ICT.

Hamburg (Germany) – Lighthouse city

City facts: Hamburg has 1.8 million inhabitants.

Ambition: Reduce the CO2 emissions of cities and increasing the use of renewable energy sources.

Demonstration district: the borough of Bergedorf, is Hamburg's biggest district, located in the East of the city. The district is diverse, with a historic centre with numerous heritage-listed houses as well as residential buildings. All are subject of an integrated strategy targeting the quality of life, citizen involvement, technical and social infrastructures, public buildings and spaces. There are three zones of interventions, where the 59 mySMARTLife actions in Hamburg will be implemented:

Zone 1 comprises the new construction area "Schleusen graben", where more than 1,400 new residential units will be built. They will be above national energy efficiency standards, with smart controls and connection to an innovative low-energy district heating mainly based on renewable energy sources. Also, new smart adaptive lighting for bicycle routes will be implemented.

Zone 2 "Bergedorf-Süd" is the name of an ambitious retrofitting area, where an innovative concept of independent Smart Heating Islands will become reality, again mainly based on renewable energy sources. Also, a humble lamppost initiative is foreseen to replace the existing street lamps.

Although the mobility interventions affect the whole city, they are in the focused of activities in Zone 3, comprising the entire borough of Bergedorf. Here, 10 e-buses, 40 e-cars and 50 e-bikes for public and private fleets are planned as well as e-bus charging stations at the bus depot, many fast charging stations and a set of private stations for e-cars, all supplied with energy stemming to 100% from RES.

Focus area: energy, mobility, ICT.

Helsinki (Finland) – Lighthouse city



City facts: Helsinki, the capital of Finland, has a population of over 626,000 inhabitants.

Ambition: Has tested vehicle to grid (V2G) systems in the project. The smart city development is determined by the strong role of the city where the staff actively works directly with the citizens and other stakeholders. In areas where the city owns the land this offers a good opportunity to directly influence the integration of smart home solutions in new buildings. The city owns a utility company which is in charge of the electricity as well as district heating and cooling grids and is also main provider of electricity for these grids. This allows the city council to make independent decisions on the energy development. The city has strongly invested in open, digital technologies for smart city developments.

Demonstration district: Helsinki's demonstration area Vanhankaupunginlahti (old Town Bay) is representing the history, present and future of smart energy systems in Finland. While the oldest hydroelectric plant in Finland is still producing electricity on the site, the world's most eco-efficient coal-based electricity and heat co-generation plants and further modern power plants are situated right next to it. A major step forward was the recent decision by the City of Helsinki to phase out the current coal power plant by 2024. MySMARTLife is involved in promoting the transition towards decentralised production and increasing the share of renewable energy sources.

Zone 1 ("Merihaka & Vilhonvuori" retrofitting area) is the residential retrofitting zone where large retrofitting actions are taking place, including smart metering and control for heat demand response. This service connects to the urban platform through IoT allowing a performance evaluation and thermal imaging e.g. to pinpoint heat loss and management and optimisation of the district heating and cooling.

Activities in Zone 2 ("Kalasatama" new construction area) are focusing on the construction of a high-performance residential zone with smart home solutions, smart meters in all flats, the integration of RES, e.g. to the e-mobility charging network and utilising waste heat from individual sources.

Zone 3 (Viikki environment house) comprises a high-performance office building where the contribution of renewable energy sources will be maximised through a better control and power management.

Zone 4 (old town bay area) covers the entire district and even city level. Several interventions, mainly mobility actions, will be implemented.

Focus area: energy, mobility, ICT.

Varna (Bulgaria) – Follower city

City facts: Varna is the third largest city in Bulgaria and has a population of 335,000 people.

Ambition: Get recognition as an energy efficient city.

Replication district: No information.

Focus area: Buildings & Districts: Retrofitting of residential houses, Municipal building with nearly-zero energy consumption, Mobility: Conventional and PV charging stations for electric vehicles, "Rent an e-bike" system plus control system, City Infrastructure: Waste heat recovery with heat pumps.

Bydgoszcz (Poland) – Follower city

City facts: Bydgoszcz is located in northern Poland and has 363,000 inhabitants.



Ambition: Due to its engagement in various European programmes, numerous examples of smart solutions are already implemented, such as an intelligent transportation system, smart street-lighting and a public bicycle system.

Replication district: No information.

Focus area: District heating and cooling: Building on the previously modernised heating network, the plan is to modernize all grids and networks using smart technology and there also plans for introducing district cooling system which do not yet exist in Bydgoszcz. Public Lighting – street lighting: Modernisation of the remaining public lighting and enhance the smart steering including an idea of a citizen application for notification of emergencies and damages. Buildings and districts: Enhancing the existing monitoring system which optimises the power consumption in all types of buildings. The main idea is based on delivering one tool integrating all measuring devices and automations which is connected to the responsible company for controlling and managing installations in buildings. Mobility: Management of municipal roads including smart parking meters, automatic red light crossing, speed measurement, city bike system and a system for public communication (voice communication in public transport). Non-technical actions: Citizen engagement – citizen's participation for energy efficiency, evaluation of participation process.

Rijeka (Croatia) – Follower city

City facts: Rijeka is the third largest city in Croatia with approximately 130,000 inhabitants.

Over the last decade, Rijeka has put strong efforts in urban development projects, particularly with regard to the plans for switching over to renewable energy sources in public transportation, energy efficiency growth in the field of construction works as well as in information management and regarding the indicators of energy efficiency measures after the provision of new ICT infrastructure.

Ambition: The vision of the city is the transformation of the urban area, environment and economy through the widespread development and adoption of modern ICTs. The aim is to stimulate innovation, create jobs, empower citizen engagement and improve the quality of city life.

Replication district: No information.

Focus area: Buildings & Districts: Smart Lighting; RES emphasizing on PV and Solar Thermal plus retrofitting of public and residential buildings. City Infrastructure: Smart metering and smart meter data management and optimisation of the heating network. Mobility: Electric public transportation. Non-technical actions: Citizens participation in energy efficiency measures and evaluation of the participatory process. ICT: Open data platform

Palencia (Spain) – Follower city

City facts: Palencia has about 80,000 inhabitants and is co-founder of the RECI Network (Red Española de Ciudades Inteligentes – the Spanish Network of Intelligent Cities), with a focus on energy efficiency, renewable energy and intelligent transport.

Ambition: Becoming a smart city and lowering greenhouse gas emissions are two of the most important pillars of the city of Palencia's concept of sustainable development.

Replication district: No information.



Focus area: Electrical mobility as a priority: the city will invest in electric vehicles for all purposes, like e-car sharing, multimodality, public transportation and urban freight. City infrastructure: district heating and cooling for public school boilers, street lighting using new technologies considering different perception and intensities. ICT to encourage citizens to change different behaviours. Non-technical actions in connection with citizen involvement and policy improvement. Buildings & Districts - encouraging private capital owners to invest in reducing emissions accompanied by economic savings.

4.8 Cities within the REPLICATE project

REPLICATE – RENaissance of PLaces with Innovative Citizenship And TEchnologies – is a European research and development project that aims to deploy integrated energy, mobility and ICT solutions in city districts.

Lighthouse cities: San Sebastian (Spain), Florence (Italy), Bristol (UK)

Follower cities: Essen (Germany), Nilhüfer (Turkey), Lausanne (Switzerland)

Table 13 Focus areas for Replicate

Focus areas				
Energy positive districts	Smart energy management	Smart e-mobility sector	City innovation platform	Citizen engagement and co-creation
<p>Low energy districts: cost-effective retrofitting, new constructive techniques with optimal energy behaviour and high enthalpy RES in residential buildings. Include also efficient measures in public and residential buildings: ICT tools, PV, shading or natural ventilation; district heating is demonstrated hybridising local biomass, recovered heat and natural gas.</p> <p>Low energy districts: cost-effective retrofitting, new constructive techniques with optimal energy behaviour and high enthalpy RES in residential buildings. Include also efficient measures in public and residential buildings: ICT tools, PV, shading or natural ventilation; district heating is demonstrated hybridising local biomass, recovered heat and natural gas.</p>				
		Urban mobility: sustainable and smart urban bus service, electric urban bike transport, 3-wheeler delivery and transport services, deployment of EV charging infrastructures and ICT tools.	Integrated Infrastructure: deployment of ICT architecture, from IoT to applications, to integrate the solutions in different areas. Smart Grids on electricity distribution network to address the new challenges, connecting all users: consumers, producers, aggregators and municipality. Intelligent lighting.	



San Sebastian (Spain) – Lighthouse city

City facts: San Sebastian has 186,000 inhabitants.

Ambition: The demonstration district aims to become a nearly zero emissions district, a district branding in sustainability, thanks to the different interventions of the REPLICATE project, which seek an integrated strategy aiming for a smart district.

Demonstration district: The Urumea Riverside District; 200 hectares of surface, Residential area, 20,000 inhabitants (Txomin, Antzieta, Martutene), Industrial Park (Poligono 27), over 350 companies and 4,500 people. Largest green park of the city (Ametzagaina). The transition process will be enhanced in three areas: Energy Efficiency, Sustainable mobility and ICT /infrastructures actions.

Focus area: Energy: building retrofitting. The connection of the dwellings to the District Heating will also be done. District heating: Service to more than 1,500 new properties and 156 existing dwellings. Latest generation model solution adopted is two Biomass boilers and two gas boilers. Power plant with 7400kw power, with two 1400kw biomass boilers. Renewable energy supply: biomass. Energy picks will be covered by gas. The power plant development started in autumn 2017. Service owned by San Sebastián City Council, through its public company, Fomento de San Sebastián. Public private partnership. Mobility: Electric buses: Complete electrification of a public bus line, linking the district with the city centre. Municipal EV fleet deployment. Acquisition of 4 EVs for municipal fleet. 3 Citroen Zero for maintenance and surveillance and 1 KIA Soul for municipal corporation. Private EV fleet deployment: E-taxis: working with 2 taxi associations. Tests with different brands: Mercedes, Nissan, Renault and Hyundai. Smart mobility platform: High Speed Mobile Network deployment for the whole city. Fomento San Sebastian is responsible for Municipal telecommunications Infrastructure. The network is deployed in the entire city. Intelligent Public Lighting System etc.

Florence (Italy) – Lighthouse city

City facts: Florence has 383,000 inhabitants.

Ambition: Florence aims to implement an integrated smart city plan (co-created together with local stakeholders in the framework of the FP7 project STEEP and with the other two REPLICATE lighthouse cities) for the first smart district to be replicated and scaled up.

Demonstration district: The Novoli urban park: it has been selected because its mix of uses: industrial settlements dismissed (e.g. Fiat, Manifattura Tabacchi) and tertiary activities (University campus, Justice Court, wholesale chain market etc), residential area: 5,000 m2 constructed area/6,000 buildings

Focus area: Mobility: city's new entrance, transport infrastructures (airport, stations, highway, tramlines under construction, mix mode parking lots, bike paths). Towards an eco-district: taking care of the environment and to city users thanks to the innovation. The process will be implemented integrating the three technological areas (energy, e- mobility and ICT) exploiting synergies. Energy: Retrofitting and district heating: Social housing (energy poverty), 300 dwellings with 700 people, 20,000 m2. Smart grid. Smart info: Device to monitor real time electricity consumption. A supporting app, including heating consumption and mobility behaviours, with gaming to reward the energy heroes is under development

E-mobility: Improving the public recharging network in the pilot area and make the taxi service more efficient. Offer a comprehensive information system to control mobility.



New mobility public services such as bike sharing free flow and new additional e-car sharing (car and van) have been started in the last months. ICT: Smart lightning: Refurbishing with led lights and empowering adding services the public lighting infrastructure. City-wide dashboard regarding Smart City measurements etc.

Bristol (UK) – Lighthouse city

City Facts: Bristion has 456,000 inhabitants.

Ambition: The Bristol demonstration within the REPLICATE project is informed by the Mayor's Vision and supporting Council Corporate Plan which concentrates on people, place and prosperity underpinned by cross cutting themes of addressing inequalities, active citizens and an empowered city. REPLICATE touches upon all of these priorities but particularly the priorities of Addressing Inequalities, Active Citizens, Keep Bristol Moving, Global Green Capital, and Healthy and Caring Bristol.

Demonstration district: Ashley, Easton and Lawrence Hill district: 50,600 residents in the Ashley, Easton and Lawrence Hill Neighbourhood Partnership: Largest in Bristol.

Focus area: Energy: Building retrofitting, District heating, Smart grid, Renewable energies. Mobility: E-cars and e-bikes, EV minibus, Transport infrastructure adaption, Journey planner development, Parking app. ICT & Infrastructure: Sensors deployed on Intelligent public lightning, Integration of Demonstration IT systems with ICT smart city platform concept. Citizen Engagement.

Essen (Germany) – Follower city

City facts: Essen is located in the heart of the Ruhr Area and has 235,000 inhabitants.

Ambition: For many years, Essen has been involved in various networks and initiatives to improve the climate regionally and municipally and to achieve sustained climate mitigation.

Replication district: No information.

Focus area: Energy, mobility and ICT solutions.

Nilhüfer (Turkey) – Follower city

City facts: Nilhüfer has approximately 415,000 inhabitants.

Ambition: No information.

Replication district: No information.

Focus area: Energy: Buildings refurbishment (mainly residential), District heating, Renewables in the city (wind, geothermal, photovoltaic, biomass, renewable wastes, solar collectors), Efficient urban lighting. Mobility: Electric vehicle promotion (deployment and management of electric fleets, etc.). Efficiency in urban mobility. ICT services and infrastructures: Smart grid, Services to the citizen, Open data for new services and ICT platform for Smart City data management.

Lausanne (Switzerland) – Follower city

City facts: Lausanne has 142,000 inhabitants. The city's metropolitan area has 350,000 inhabitants. Lausanne has been awarded with the European Energy Award gold.



Ambition: No information.

Replication district: No information.

Focus area: Energy, mobility and ICT solutions.

4.9 Cities within the SmartEnCity project

SmartEnCity – Towards Smart Zero CO2 Cities across Europe. SmartEnCity, a project funded under the European Union's Horizon 2020 research and innovation programme, aims to develop a systemic approach for transforming European cities into sustainable, smart and resource-efficient urban environments in Europe. The aim is to develop strategies that can be replicated throughout Europe in order to reduce energy demand and maximise renewable energy supply. Enhance the use of clean energy in urban mobility by means of extensive deployment of green vehicles and infrastructure.

Lighthouse cities: Vitoria-Gasteiz (Spain), Tartu (Estonia), Sonderborg (Denmark)

Follower cities: Lecce (Italy), Asenovgrad (Bulgaria)

Table 14 Focus areas for SmartEnCity

Focus areas				
Energy positive districts	Smart energy management	Smart e-mobility sector	City innovation platform	Citizen engagement and co-creation
Reduce energy demand and Maximise renewable energy supply				

Vitoria-Gasteiz (Spain) – Lighthouse city

City facts: Vitoria-Gasteiz is the capital of the Basque Country, and with 240,000 inhabitants. Vitoria-Gasteiz, as the rest of the Basque Country, relies almost completely (more than 90%) on the import of fossil fuels both for direct use (natural gas, petroleum products) and for electricity generation. A natural gas network is available throughout the city, and is widely used. Cogeneration units are installed in a few public buildings such as hospitals, and to a minor scale in some residential buildings. Petroleum products are the main fuel for transport. The use of biomass fuel remains very low in percentage.

Ambition: To become greener, promoting energy efficiency, renewable energy, low carbon mobility and smart infrastructures. Citizens in focus. Vitoria-Gasteiz aims to reduce its energy consumption by rationalizing energy use and promoting the use of more efficient technologies such as district heating and micro-cogeneration, as well as greater energy efficiency in new and refurbished buildings. At the same time, the city aims to promote RES such as solar power, geothermal systems, wind farms and biogas from urban waste. In line with these objectives, the city council adopted a Climate Change Prevention Strategy in 2006 and agreed to cut emissions by 16% by 2012. In 2009, it signed up to the Covenant of Mayors and in 2010, approved the Plan against Climate Change, promising more ambitious reductions. The city's long-term objective is to become a carbon-neutral zone, with an interim goal of cutting emissions by half by 2050.



Demonstration district: The Coronacion district – Retrofitting package - As one of the city’s most vulnerable neighbourhood, the Coronación district, 750 dwellings (60,000m2), will see a considerable number of residential buildings fully renovated, including their facades, insulation, windows and doors.

Focus area: Urban management system: City platform. Biomass district heating system. Citizen engagement strategy for the retrofitting package. Sustainable Mobility: Acquisition of EVs (taxis and private cars) will be granted, and the recharge network will be extended. ICTs: An Urban Management System will be developed and deployed.

Tartu (Estonia) – Lighthouse city

City facts: The intellectual capital of Estonia with 100,000 inhabitants. Tartu has developed its e-services and paperless administration practices for decades and has been one of the first in the world to implement many smart solutions – m-parking in 2000, public Wi-Fi throughout the city in 2000, local e-elections in 2005, city mobile applications in 2006, digital signature in 2007, a fully electric taxi service in 2012, and participative budgeting in 2013 etc.

Ambition: Demonstrate a comprehensive approach to retrofitting outdated panel buildings according to near zero energy standards; Boost the liveability of the town through intelligent street lighting, biogas buses, electric car and bike rentals as well as charging stations and many ICT solutions; Engage the citizens in creating a high-quality living environment that inspires environmentally aware decisions and new patterns of behaviour. Tartu’s Sustainable Energy Action Plan (SEAP) sets three general strategic objectives – decrease CO2 emissions, consume less energy in final consumption and increase the share of renewable energy. More specifically, the aim is to increase the share of renewable energy from 38% in 2010 to 45% in 2020.

Demonstration district: Kalevi 10 Apartment Association; Within the framework of SmartEnCity, an energy efficient city district operating based on smart solutions will be created from the Khrushchyovkas located in the City Centre, where the Soviet era apartment buildings will be renovated into near zero energy buildings. A smart home solution will be created within the apartments of the renovated buildings, allowing residents to monitor and regulate energy consumption from their home.

Focus area: Renewable energy in the city: As Tartu uses wood chips in district heating, the system is already almost 100% renewable as only the top load is covered from natural gas. However, in general, ca. 80% of electricity is generated from oil shale, making Estonia’s energy mix a very carbon intensive one. Smart Solutions for Tartu: retrofitting package turn the Soviet-time “khrushchyovkas” into “smartovkas” that offer an energy-efficient and high-quality living environment to the pilot area residents. Install a district cooling system that uses residual heat. Reusing old EV batteries. Tartu has quite a large electric taxi fleet and seeks to repurpose these EV batteries by developing an energy storage solution that allows to partially recharge electric taxis with renewable energy that is produced on-site with PV panels. Public bike sharing system. Gas buses in the whole city. Smart home solution. Smart lights. Lecture series “Planning an energy-efficient city”. A number of social innovation models will be experimented with in Tartu in order to facilitate behavioural change and mutual learning among the residents of the pilot area and Tartu as a whole.

**Sonderborg (Denmark) – Lighthouse city**

City facts: The 76,000 citizens of the little-known Danish municipality Sonderborg act, while politicians talk and climate change is accelerating. They share the vision of ProjectZero and have committed themselves to make Sonderborg zero carbon by 2029. Sonderborg town is supplied with district heating from the Sonderborg District Heating company.

Ambition: Demonstrate ambitious electrification of Sonderborg's Roadmap2020, including integration of wind energy from coastal near turbines and rooftop PV power production

Integrate local green power production in district heating networks and green mobility solutions.

Demonstration district: No information other than; In Sonderborg, a total of 7 social housing departments will be fully retrofitted to reduce energy consumption.

Focus area: Energy retrofitting existing house association buildings in close cooperation with tenants. Engage the citizens as co-designers of the Smart Zero Carbon Sonderborg ambition based integrated solutions, comprehensive learning and the introduction of new ICT based energy information. New biogas buses and biogas filling stations. As a zero-carbon mobility solution, a considerable number of new energy-efficient biogas-fuelled buses will be deployed in Sonderborg, while each of the buses can carry bikes on board for a combined trip. Citizen engagement program. Mobility campaigns.

Lecce (Italy) – Follower city

City facts: Lecce has 95,000 inhabitants.

Ambition: Promotes energy saving solutions and the use of renewable energy sources. Moreover, the municipal policy supports the creation and development of green spaces in the urban built environment in order to improve the air quality and, in general, the quality of life.

Replication district: No information.

Focus area: Reduce energy demand and maximise renewable energy supply.

Asenovgrad (Bulgaria) – Follower city

City facts: Asenovgrad has 70,000 inhabitants.

Ambition: Promoting energy efficient solutions, the use of renewable energy and environmentally aware citizens. The main priority areas of Asenovgrad's Sustainable Energy Action Plan are: Energy savings in buildings through building refurbishment – mainly municipal and residential buildings; street lighting refurbishment; utilisation of renewable energy – fuel switch from heavy fuel oil to biomass (wood chips); utilisation of available wind potential; utilisation of available solar potential.

Replication district: No information.

Focus area: Solar energy. Wind energy.



4.10 Cities within the Smarter Together project

Smarter Together delivers 5 clusters of co-created, smart and integrated solutions: 5 areas: citizen engagement, district heating & renewable energy, holistic refurbishment, smart data and e-mobility.

Lighthouse cities: Lyon (France), Munich (Germany), Vienna (Austria)

Follower cities: Santiago de Compostela (Spain), Sofia (Bulgaria), Venice (Italy)

Table 15 Focus areas for Smarter Together

Focus areas				
Energy positive districts	Smart energy management	Smart e-mobility sector	City innovation platform	Citizen engagement and co-creation
District heating and RES for low energy districts	Renewable energy and holistic refurbishment	E-mobility solutions for sustainable mobility	Smart data management platform and smart services	Living labs for citizen engagement

Lyon (France) – Lighthouse city

City facts: Lyon has 500,000 inhabitants.

Ambition: Zero carbon objectives.

Demonstration district: Lyon Confluence - one of the largest urban redevelopment projects in France (150 ha – 600,000 m² existing floor area – 1,000,000 m² of new buildings).

Focus area: Will refurbish existing buildings to reduce energy consumption (refurbish existing buildings of the Perrache/Sainte-Blandine area with a target of 550 dwellings – 35,000 m²), develop local renewable energy production, reduce the use of conventional cars, enhance e-mobility, provide new services such as e-car sharing and electric autonomous shuttles, develop data platform etc. Citizens are involved through the Urban Living Lab Lyon, Expo House "Maison de la Confluence".

Munich (Germany) – Lighthouse city

City facts: Munich has 1,43 million inhabitants.

Ambition: Refurbish houses aiming towards 100% renewable energy, install smart street lamps, design neighbourhood app, increase shared e-mobility solutions. Citizen engagement through Urban Living Lab Munich (Stadtteillabor).

Demonstration district: Neuaubing-Westkreuz/Freiham is the project district in which Munich is implementing the pioneering smart city solutions. Around 30,000 people live in this district on the western edge of the city. Whereas Freiham is a new housing development area, many of the residential properties in Neuaubing-Westkreuz were built in the 1960s and 1970s. Their energy-efficiency standards are comparatively poor.



Focus area: With the aid of cutting-edge technology and the intelligent use of data, the aim is to reduce fossil fuel consumption in Neuaubing-Westkreuz/Freiham and improve residents' quality of life. In Neuaubing-Westkreuz/Freiham, Smarter Together aims to cut CO2 emissions by more than 20%, raise the use of renewable energy to above 20% and increase energy efficiency by more than 20%. Until 2050 Munich strives to be CO2-neutral in Neuaubing-Westkreuz/Freiham.

Vienna (Austria) – Lighthouse city

City facts: Vienna has 1,8 million inhabitants.

Ambition: Refurbish neighbourhood, secure more future oriented energy supply, enhance e-mobility. Citizen engagement by Local Urban Renewal Office and Urban Living Lab Vienna (the SIMmobile – an information bus)

Demonstration district: The project demonstration area in Vienna is located in the central part of the south-eastern district of Simmering between Simmeringer Hauptstraße (an ancient main street axis) and the eastern railway line (district areas of Geiselberg, Enkplatz, Braunhuberviertel). In total, 21,000 inhabitants will benefit from smart project solutions.

Focus area: Implement smart solutions within the fields refurbishment, energy, mobility and information and communication technologies. An emphasis is made on dialogue, in line with the Vienna Smart City Framework Strategy where the human dimension of the Smart City is the focus of attention.

Santiago de Compostela (Spain) – Follower city

City facts: Santiago de Compostela has 100,000 inhabitants and is the capital of Galicia. It is a UNESCO World Heritage City, pilgrimage destination, European capital of culture and example of historical, urban and environmental regeneration, attracting thousands of visitors.

Ambition: Since 2012, the City Council of Santiago de Compostela has been working on SMARTiAGO initiative, a strategy to address the smart city challenges, involving different agents of the local, regional and national innovation ecosystem. Its main objective is the implementation of a Smart City Roadmap aimed at placing Santiago de Compostela as reference point on how to address smart city challenges in heritage cities. Due to special requirements as heritage city, the city council has proposed a roadmap based on non-intrusive solutions as a starting point for all smart city deployments to be implemented.

Replication district: No information.

Focus area: Energy efficiency, mobility, citizen engagement.

Sofia (Bulgaria) – Follower city

City facts: Sofia is the capital of Bulgaria and has 1,3 million inhabitants. It is a social and economic metropolitan centre.

Ambition: Its ambition towards a smart city are laid down in the Sustainable Energy Action Plan 2012-2020 with integrated actions for the implementation of energy management, holistic energy planning and renovation of the building stock, integrated measures in the transport and waste management.

Replication district: No information.



Focus area: Energy efficiency, mobility, citizen engagement.

Venice (Italy) – Follower city

City facts: Venice has 265,000 inhabitants and is a touristic destination as well as the capital of Veneto region, hosting all the state, regional and provincial administrative functions and related offices, and two important universities. Has a high energy consumption – highly related to mass tourism.

Ambition: The City of Venice has appointed a Smart City Secretariat to develop and coordinate projects aimed to create a Venetian Smart City and Community. Deeply committed in the field of smart cities, Venice has also signed the Green Digital Charter. The commitment to the reduction of local impacts on the environment is further highlighted by its membership to the Climate Alliance.

Replication district: No information.

Focus area: Energy efficiency, mobility, citizen engagement.

4.11 Cities within the Sharing Cities project

At three strategic locations, Sharing Cities demonstrate the effectiveness of new technologies in improving urban mobility, increasing the energy efficiency of buildings and reducing carbon emissions. The lighthouse cities will retrofit buildings, introduce shared electric mobility services, and install energy management systems, smart lamp posts and an urban sharing platform through engaging with citizens. ‘Fellow’ cities will co-develop, validate, or implement the solutions.

Lighthouse cities: London (United Kingdom), Lisbon (Portugal), Milan (Italy)

Follower cities: Bordeaux (France), Warsaw (Poland), Burgas (Bulgaria)

Table 16 Focus areas for Sharing Cities

Focus areas				
Energy positive districts	Smart energy management	Smart e-mobility sector	City innovation platform	Citizen engagement and co-creation
Energy efficient districts, Energy management Local renewable energy sources		Promote new models of e-mobility	Accelerate smart city solutions, exploit city data to maximum effect, urban sharing platform	Citizen engagement

London (United Kingdom) – Lighthouse city

City facts: The capital of United Kingdom has 8,4 million inhabitants.

Ambition: Has a low emission neighbourhood programme.



Demonstration district: The Royal Borough of Greenwich- one of 32 London boroughs, is implementing the Sharing Cities programme in London. The Royal Borough is recognised as a leading local council in the Smart City field and was the first London Borough to introduce a Smart City Strategy. Launched in October 2015, it has four key components: transforming neighbourhoods and communities; transforming infrastructure; transforming public services; and transforming the Greenwich economy. Citizen engagement is a further priority across all four themes. East Greenwich and Greenwich Peninsula are one of the most strategic locations in London. It stretches along the riverfront – from the UNESCO World Heritage Site to Greenwich Peninsula – and occupies 516 Ha. The site includes visitor attractions (e.g. the O2 Arena); a new business start-up district; existing and new residential sites; and considerable water frontage. Approx. 35% social housing.

Focus area: Mobility - will involve a Smart Mobility Living Lab.

Lisbon (Portugal) – Lighthouse city

City facts: Lisbon has 553,000 inhabitants.

Ambition: Lisbon has drafted an urban development strategy for the coming decades and has committed to invest €307 million in related projects (Programa Operacional Regional de Lisboa 2020). The strategy's main objectives are to attract more inhabitants by improving the quality of housing and offering smart living services and smart ageing opportunities; to boost the economy and increase employment by investing in R&D, attracting more entrepreneurs and broadening access to higher education; and improving the quality of life in the city through measures for energy efficiency, mobility and social cohesion. Local regeneration and citizen participation are also priorities.

Demonstration district: downtown Lisbon - Lisbon's ten square kilometre demonstrator area has 100,000 inhabitants. This strategic location stretches from the riverfront to the centre of the city and includes the main historic and tourist districts. The area poses several challenges, ranging from its particular orography to the historic nature of its buildings, and its ageing population.

Focus area: Energy efficiency, mobility and social cohesion through; 540 electric vehicle public charging points from 4 providers, MOBIE single platform to manage electric vehicle charging points, public transport platform, 64,000 street lights, open data etc.

Milan (Italy) – Lighthouse city

City facts: Milan has 1,38 million inhabitants.

Ambition: Smart city for Milan covers smart mobility, a smart environment, smart inclusion and citizenship. This sets out a bold agenda, which will see the re-orientation of demand for transport services; the standardization of payment technologies and methods; and the adoption of a range of energy efficiency solutions.

Demonstration district: Porta Romana/Vettabbia - is under complete re-development. Its renewal will connect the historic centre of the city to its agricultural belt by "stitching together" two geographically, economically and socially separated areas.

Focus area: Retrofit, mobility, energy efficiency etc through; 21,000 m2 private buildings retrofit, 4.000 m2 public buildings retrofit, 62 e-cars, 150 e-bikes / 14 stations, 60 charge points (20 rapid), 125 parking bays, 10 e-logistics vehicles, 300 smart lamp posts, 1 social housing car sharing and a smart city lab.

**Bordeaux (France) - Follower city**

City facts: Bordeaux has 750,000 inhabitants.

Ambition: Energy management and smart lighting are key priorities for the city.

Replication District: No information.

Focus area: Energy management and smart lightning. With strong support for citizen engagement and e-mobility, Bordeaux is also interested in data sharing and building retrofit.

Warsaw (Poland) – Follower city

City facts: Warsaw is the capital and the largest city of Poland with 1,7 million inhabitants.

Ambition: Warsaw aims to install a new energy management system, and it plans to embrace the smart sharing economy concept as part of its smart city planning.

Replication district: No information.

Focus area: The challenge for Warsaw is to retrofit a smart city in a large and densely populated area. Electric vehicles and charging points feature high in the city's plans to improve its urban environment. Smart lampposts. Energy management.

Burgas (Bulgaria) – Follower city

City facts: Burgas is the fourth largest city in Bulgaria with 210,000 inhabitants, situated on the Black Sea, in the south-eastern part of the country.

Ambition: Burgas encourages digital entrepreneurship through its business-friendly strategies. The city faces recurrent environmental and sustainability challenges of flood risk management.

Replication district: No information.

Focus area: The planned smart parking system and the introduction of e-mobility solutions will greatly benefit the city's growth. Key priorities include: transport, electric vehicles, data management; energy efficiency (smart management of urban areas, including street lighting, waste management, rainwater re-use, flood management); integrated infrastructure (waste, water, traffic); and citizen engagement.

4.12 Cities within the Remourban project

Remourban offers a large-scale demonstration of the potential that offers the proposed model for urban regeneration to deploy integral actions in the areas where energy, mobility and ICT sectors are intimately linked. Building retrofitting, new charging points, shared mobility solutions, energy management systems, citizen engagement.

Lighthouse cities: Valladolid (Spain), Nottingham (United Kingdom), Eskisehir (Turkey)

Follower cities: Seraing (Belgium), Miskolc (Hungary)



Table 17 Focus areas for Remourban

Focus areas				
Energy positive districts	Smart energy management	Smart e-mobility sector	City innovation platform	Citizen engagement and co-creation
Low energy districts	Energy management systems	Sustainable mobility, shared mobility solutions	Integrated infrastructures	Society, citizen engagement

Valladolid (Spain) – Lighthouse city

City facts: Valladolid is north-western Spain's biggest city with 305,000 inhabitants. Focus is on the automotive industry.

Ambition: No information.

Demonstration district: Fasa District - s located in the South-East of Valladolid and has a surface of 3.5 km² that was built during the 50's and 60's decades. The population of the Fasa district is about 1,180 inhabitants, and its total number of dwellings is 398 (the nineteen blocks come to 342 dwellings, and the tower contains the remaining 56), so the conditioned area reaches the amount of 24,700 sqm (3,900 m² from the tower and 20,800 m² from the nineteen blocks). Fasa district is a compact residential area of buildings of medium-poor constructive quality in a progressive ageing. The district is also characterized by its high construction density (135 DU/ha) and high population density (340 inh./ha). Regarding mobility aspects, the district is located in the South Periphery of the City, with a medium level of motorization (400 vehicles/habitants) and concentrating most of the travels by private vehicle.

Focus area: Energy, ICT, mobility. The location of the chosen district is in the traditional entrance to the City from the South makes this district to be positioned in a strategic area of the city regarding mobility.

Nottingham (United Kingdom) – Lighthouse city

City facts: Nottingham, one of the major cities in East Midlands, is situated 130 miles north of London and has a population of 305,000.

Ambition: Nottingham City has developed a City 2020 Energy (and Carbon) strategy in 2010 this was adopted by cross party consensus. The strategy covered domestic, commercial, public and industrial infrastructure, energy saving, energy generation and transport.

Demonstration district: Sneinton District - The site is very close to the existing district heating. The pipe line is reaching the Bio City which is very close to Sneinton Road (100 – 200m). There is a substantial Nottingham City Council housing in the area that need upgrading to much more energy efficient state.

Focus area: Energy, ICT and mobility.

Eskisehir (Turkey) – Lighthouse city

City facts: Eskisehir has 810,000 inhabitants and is located in the mid-western side of Anatolia.



Ambition: No information.

Demonstration district: Tepebasi district - Although relatively newly built, similar to most buildings built before the Energy Efficiency Law that came into force also that year, the district building stock consists of inefficiently constructed buildings in energy consumption terms. There are 57 dwellings (9,110 m2 of conditioned area) in the district in which approximately 300 people will inhabit permanently by the end of the year. The building typology consists mainly of semi-detached villas. On the other hand, the municipality is presently building an additional community centre in the centre of the district (approximately 600 m2) which, apart from housing the district heating/cooling system and roof PV system, will be an educational, re-training and re-skilling centre in Tepebasi.

Focus area: Energy, ICT and mobility. The centre will act as a smart city and community demonstration site, with the smart and renewable energy urban management system in place with Remourban. With workshops the district community centre is attended to attract a large number of citizens.

Seraing (Belgium) – Follower city

City facts: Seraing is located in the Walloon Region (Wallonia), nearby the city of Liège. Seraing has around 64,000 inhabitants. The territory has a surface area of 35 km2, consisting broadly of one-third housing, one-third forest and one-third industry and brownfield sites.

Ambition: Sustainable development and evolution towards a territory emitting few greenhouse gases are also among the priorities of the city of Seraing, which was one of the first Walloon cities to achieve a carbon footprint of its territory in 2009. From a city strongly marked by industrial activities, Seraing is building its future to become a Smart and sustainable post-industrial city, worthy of interest.

Replication district: No information.

Focus area: Energy: passive administrative building, new passive social buildings, central power plant, refurbishment, district heating. Mobility: e-mobility for civil servants, carpooling etc, ICT: urban wifi etc.

Miskolc (Hungary) – Follower city

City facts: Miskolc is the fourth biggest city in Hungary with 160,000 inhabitants.

Ambition: No information.

Replication district: No information.

Focus area: Energy: intelligent street lightning in selected districts, solar roof, increase energy efficiency in public buildings, smarter tram stops etc. Mobility: municipal e-fleet, intelligent traffic lights system, smart bike storage. ICT: smart service points, development of e-fleet management tools, development of smart-grid systems.

4.13 Cities within the Sinfonia project

The Sinfonia project is a smart city project, not a lighthouse project. It's a five-year initiative to deploy large-scale, integrated and scalable energy solutions in mid-sized European cities. At the heart of the initiative is a unique cooperation between two smart cities, working hand in hand to achieve 40-50% primary energy savings and increase the share of renewables by 20% in two pioneer districts.



Pilot cities: Bolzano (Italy), Innsbruck (Austria)

Early adopter cities: Borås (Sweden), Pafos (Cyprus), Sevilla (Spain), La Rochelle (France), Rosenheim (Germany)

Table 18 Focus areas for Sinfonia

Focus areas				
Energy positive districts	Smart energy management	Smart e-mobility sector	City innovation platform	Citizen engagement and co-creation
Increase the share of renewables through retrofitting; optimisation of the electricity grid and solutions for district heating and cooling.				

Bolzano (Italy) – Pilot city

City facts: Bolzano has 100,000 inhabitants.

Ambition: Since 2005, Bolzano has developed an ambitious investment plan for large scale urban refurbishment in collaboration with both public and private stakeholders. The work undertaken in Sinfonia is part of this plan and aims to achieve 40-50% primary energy savings in the demo sites and to increase the share of renewables in the district of Bolzano South West by 20%.

Demonstration district: Bolzano SW (South West)

Focus area: Building refurbishment. Extended and optimised district heating and cooling network. Improved electricity grid. Recharge points for vehicles and bicycles; Meteorological stations for local climate condition monitoring; Smart retrofitting of the public lighting system.

Innsbruck (Austria) – Pilot city

City facts: Innsbruck has 120,000 inhabitants.

Ambition: Innsbruck defined its 2025 Energy Plan back in 2009. In this context, and as part of Sinfonia, the city has selected its eastern district to demonstrate the large-scale implementation of energy efficient measures, with the objective of achieving on average 40-50% primary energy savings in the demo sites and to increase at least by 30% the share of renewables in the district's energy mix.

Demonstration district: No information.

Focus area: Building refurbishment: 66,000m² of residential and public buildings from the 30s-80s will be retrofitted. Extended and optimised district heating and cooling network. Integration of solar energy and innovative biomass gasification. Smart grids and smart home applications will combine demand and supply side measures to reduce the overall electricity demand.

Borås (Sweden) – Early adopter city

City facts: Borås has 110,000 inhabitants.



Ambition: The City of Borås has the ambition to become a leading environmental municipality in Sweden. In that sense, the city intends to be a good example for others and take advantage of networking with other municipalities in and outside Sweden. Since 1990, Borås has already reduced its carbon dioxide emissions from energy use by 40% and plans a 60% reduction of these emissions by 2020. To continue its efforts beyond 2020, the municipality of Borås has designed an Energy- and Climate strategy integrating a sustainable energy perspective into city planning.

Replication district: Not specified, but in the municipality, there are 5 housing companies covering a total of 747,272 m² apartments. The housing companies are working with energy efficiency both with renovating and with campaigns to inform tenants. Housing companies have built several houses with low energy use and a low carbon footprint, thus reducing the total energy use from buildings.

Focus area: Involves key targets; 60% reduction of CO₂ emissions from energy used by 2020. Reduction of the climate footprint of buildings through a life-cycle perspective and utilisation of renewable fuels for municipal fleet vehicles.

Pafos (Cyprus) – Early adopter city

City facts: Pafos is a coastal city located in the south-western part of Cyprus and has a population of approximately 32,000 inhabitants.

Ambition: The municipality of Pafos has upgraded existing infrastructure and services while creating new solutions to improve the quality of life of its citizens. On its way to become a smarter city, the municipality of Pafos aims to use available ICT to improve the quality, performance and interactivity of urban services while reducing costs and resource consumption. Pafos will exchange knowledge and experiences with the other cities involved in the project regarding the implementation of innovative urban processes in building refurbishment, district heating and cooling as well as electricity grids.

Replication district: No information.

Focus area: To promote the use of low-carbon transport systems, the city has modernised the public transport network by refurbishing the bus shelters and creating an electronic communication system, updating users about their waiting time via mobile apps. Pafos has established a network of electric bicycles and created new charging points for electric vehicles and is developing digital solutions to better inform about life in the city. Pafos provides free high-speed WiFi networks in central areas and has an online portal describing the city services offered by individuals and local businesses.

Sevilla (Spain) – Early adopter city

City facts: Sevilla has a municipal population of about 703,000 and a metropolitan population of about 1.2 million, making it the fourth-largest city in Spain. It is situated in the region of Andalusia, which is characterised by its huge potential in terms of renewable energy production. The main RES developed within the region are wind power and solar energy and in particular photovoltaics and concentrated solar power. The region is also the national leader in the biomass sector. The Sevilla harbour, located about 80 km from the Atlantic Ocean, is the only river port in Spain.

Ambition: In the framework of the Covenant of Mayors Initiative, the city of Sevilla has committed to reduce its CO₂ emissions by 29% by 2020. In addition, Sevilla is working to develop “urban ecology” projects focused on the optimisation of resources and reduction of fossil fuel consumption.



Replication district: No information.

Focus area: The municipal waste management company is implementing for instance a new model of cleaning service relying on electric vehicles. EMVISESA, a public housing company in Sevilla, has spent several years conducting research on buildings' energy efficiency, and on the integration of RES.

La Rochelle (France) – Early adopter city

City facts: La Rochelle has 150,000 inhabitants and is located on the French Atlantic coast between Bordeaux and Nantes. The combination of naval, food and transport (Alstom, Delphi, Rhodia-Solvay) industries with three (commercial, marina and fishing) harbours gives the city an exceptional position amongst all maritime cities on the French Atlantic coast. In addition, the University of La Rochelle has highly developed teaching and research activities in the building science and technology field.

Ambition: Deeply committed to develop “urban ecology” approaches. For ten years, the city has been implementing an innovative urban planning strategy involving deep retrofitting of social housing. A privileged partnership with the university has been in place for nearly 20 years, helping the city's services to benefit from the latest progresses in terms of energy efficiency. La Rochelle has also been a pioneering eco-city and one of the first cities in France to install collective solar hot water systems (in the 70s), develop solutions for sustainable transport (first bike rental service was promoted in 1976) and e-mobility (e-vehicles were tested by selected households in the frame of a partnership with Peugeot, a car fleet of self-service electrical vehicles was launched in 1999) and promote district heating (the heat network was connected to an incineration plant, built in 1988). Furthermore, the city is engaged in the labelling process Cit'ergie since July 2012, with the support of the French National Energy Agency.

Replication district: An ambitious project is taking place near the city centre: the release by the army of a piece of land of 27 hectares has given an opportunity to develop a low-carbon industrial district. This district will host sustainable industrial facilities for testing, training, information and technological development in the field of building refurbishment, but also housing and training services.

Focus area: Assess the replication potential of the new concepts developed within the project in order to upgrade the existing building stock to reduce its carbon footprint.

Rosenheim (Germany) – Early adopter city

City facts: The urban district of Rosenheim, with its 60,000 inhabitants, is the regional metropolis of South Eastern Bavaria. It is a modern city, characterised by a medium-sized economy with a high quality of life. It is a very dynamic location with a wide range of products and services.

Ambition: In 2012, the City Council of Rosenheim approved the creation of an integrated energy, climate and environmental protection concept named “Rosenheim 2025” for the city. Its overall goal is to reduce the energy-related emissions by 40% by 2025, in comparison to the year 2010. To do so, the city will expand and develop its district heating network, invest in cogeneration and increase the share of renewables in its energy mix.

Replication district: No information.

Focus area: Rosenheim is especially interested in innovative cooling solutions, the coupling of heat-intensive facilities to the heating networks and the enhancement of the heat storage. Furthermore, the



internal development of an innovative gasification technology, which cogenerates electricity and heat out of regional wooden biomass, contributes to the goal of increasing the renewable energies.

4.14 Cities within the EU-Gugle project

The EU-Gugle project aims at bringing together already planned or started actions on achieving nearly Zero Energy Building Renovation in a coherent and comprehensive way, demonstrating that smart practice makes political, economic and social sense.

Pilot cities: Aachen (Germany), Bratislava (Slovakia), Milano (Italy), Sestao (Spain), Tampere (Finland), Vienna (Austria), Gaziantep (Turkey), Gothenburg (Sweden)

Table 19 Focus areas for EU-Gugle

Focus areas					
Energy positive districts	Smart energy management	Smart e-mobility sector	City innovation platform	Citizen engagement and co-creation	
Nearly zero energy building renovation.					

Aachen (Germany) – Pilot city

City facts: The City of Aachen has 248,000 inhabitants and is situated at the western border of Germany to Belgium and the Netherlands. Focus on science and education with more than 50,000 students.

Ambition: Has a multi-year urban development program called “social city”.

Demonstration district: The district Aachen-North (300 ha, 15,500 inhabitants) is a heterogeneous area with a mixture of recent and ancient industrial and residential buildings. Due to the development of the last 80 years there are many historical buildings for housing, a lot are listed buildings. Therefore, urban planning focuses on revitalizing and improving the attractiveness of the district. The buildings are mainly owned by the City of Aachen (75%) and 25% by the public housing company GEWOGE, where the municipality of Aachen is an important shareholder.

Focus area: Advisory activities to reduce energy consumption through consumer behaviour. The main challenges in the work is to realize ambitious measures on a most cost-effective way, so that the rents can remain on a socially responsible level, because most of the residents have only low income or receive social welfare. Some of the energy supply systems will be realized by a contracting model with the local energy company. The CO₂-emissions will also be reduced through green energy supply.

Bratislava (Slovakia) – Pilot city

City facts: Bratislava is the capital of Slovakia and, with a population of about 420,000, the country's largest city. Administratively Bratislava is divided into five districts. For self-governance purposes, the city is divided into 17 boroughs. Bratislava belongs to the regions with very low unemployment's rate. The city is a target of daily mobility to work and schools (about 150 thousand people per day).



Ambition: Energy savings compared to national regulation will reach up to 43%.

Demonstration district: The apartment buildings, selected for the project EU-Gugle demonstration are located in two districts: the wider city centre and the western part of Bratislava city. A wide range of different building types from different construction systems and construction materials were selected for the EU-Gugle project demonstration and are representing the typical city's building composition. Almost all of the selected buildings are characterized by high energy demands and present diverse typical technical difficulties. The buildings, in current stage, have very poor thermal protection of the envelope and require high amount of energy for space heating and domestic hot water preparation. Most of the buildings are connected to a district heating network. Housing stock is usually managed by public housing companies and most of the buildings are in private ownership (usually every apartment). The large number of owners or tenants and low level of awareness complicate any actions when renovating buildings. For the renewal of the building, a combination of credits from State fund for housing development and from First home saving bank will be used. The Energy Performance Contracting system will be applied for the social housing buildings owned by the City of Bratislava.

Focus area: Energy savings. Lifespan and sustainability of the buildings will be increased as well as the living comfort of tenants. Raise the inhabitants' awareness of proper renovation of property, regardless if it is historical or contemporary buildings. Increase knowledge in terms of environmental and ecological issues and fostering social interaction. Improvement of the energy performance of buildings through renovation and retrofitting measures. Implementation of renewable energy sources in district heating systems. Replacing of fossil energy sources by several innovative technologies.

Milano (Italy) – Pilot city

City facts: Milano, the second-largest city in Italy and the capital of Lombardy has a population of about 1.35 million people. As the main industrial, commercial and financial centre of Italy, it has a metropolitan region that contains a population of over 8 million people.

Ambition: To replicate throughout the city. Plans to reduce energy demand.

Demonstration district: Zona 4 is one of the 9 administrative districts of Milano, located at the Southeast border. With a surface of about 21 km², and a population of 152 300 inhabitants, its density is in line with the average density in Milano, about 7,250 inhabitants/km².

Focus area: Reduce the energy demand of the building, and at the same time reaching higher levels of indoor comfort; then work on the mechanical systems, in order to improve their efficiency; finally, use as much energy from renewable sources as possible to satisfy the energy demand of the building.

Sestao (Spain) – Pilot city

City facts: Sestao has 28,000 inhabitants and is located at 11 km from Bilbao city, on the left bank of the River, with a strong post-industrial character, on whose sides much of the municipalities of Biscay were developed. It has an area of 3.5 Km², where only 0.9 Km² are devoted to residential use and the rest is devoted for industrial use. Its development was mainly due to the 19th century industrial boom.

Ambitions: Get higher energy efficiency and refurbish the buildings.

Demonstration district: The district is on the lower area of Sestao and it's the most affected by the deindustrialization process. The district has been punished by the deindustrialization process that



started in 1995. The unemployment rate is 30% several points higher than the rest of the city, compared to other municipalities, the rate of unemployment of this district is about 10% higher. There is a mixture of local and immigrant population with limited economic resources and a very low academic level.

The special social, technical, and economic situation makes it impossible to be owners who refurbish without help their properties. The society public SESTAO BERRI 2010, S.A., with a no repayable subsidy provided by Basque Government and municipality of Sestao buys the homes of those owners who are unable or unwilling to refurbish and subsidises almost 50% the cost of rehabilitation to those owners who participate. The works are financed with the sale of homes once refurbished.

Focus area: Energy efficiency.

Tampere (Finland) – Pilot city

City facts: Tampere has 215,000 inhabitants and is the third biggest city and 2nd biggest growth centre in Finland.

Ambition: Energy savings.

Demonstration district: Tammela - which is a sparsely built traditional residential area right next to the city centre and the railway. Tammela has a need for refurbishments and large potential for infill development. Has done a lot of refurbishing within the project EU-Gugle. The expected energy savings are 40% in heating energy, based on calculations. The energy efficient renovation demonstrations will produce environmentally friendly living spaces with a better quality for living, and a format that can be replicated in the specific area as well as in all other areas. The improved quality will also help to save and raise the value of the existing buildings. If the whole Tammela-project will succeed according to the plan, it will provide new modern and energy efficient residence to over 4,000 citizens.

Focus area: Energy efficiency.

Vienna (Austria) – Pilot city

City facts: Vienna has 1,77 million. Vienna is the capital of Austria situated close to Hungary.

Ambition: Refurbish in an energy effective way.

Demonstration district: The district is called Penzing or the 14th district. All envisaged demonstration buildings have poor energy performance values and urgently need the foreseen renovation. The district has about 84,362 inhabitants. Citizens in the age 40-50 years are dominant. The buildings within the district are residential buildings and social housing, they are owned by tenants and flat owners.

Focus area: The main focuses are the efficient refurbishments of around 62,546m² gross floor area with prefabricated façade elements, the intelligent integration of renewable energy in buildings and realisation of suitable accompanying measures to create a high-quality city district. Special appointments with “house representatives” will be organised to countercheck baseline data of the social housing company Wiener Wohnen and other partners, as well as to map building particularities during the preparation phase of the realisation. The demonstrations will use several innovative integration measures and enabling technologies such as: Solar thermal, Replacement of decentralised fossil heating systems by centralised renewable heating plants

**Gaziantep (Turkey) – Pilot city**

City facts: Gaziantep is the sixth biggest city of Turkey with a population of 1,7 million.

Ambition: The building stock is mainly composed of buildings constructed after the 50s, most of which have no external insulation and inadequate heating systems. Following a recently adopted Climate Change Action Plan, Gaziantep intends to build on the experiences cumulated in EU-Gugle to reduce its own CO2 emissions and energy consumption by 20% by 2023, through smart renovation measures.

Demonstration district: No information.

Focus area: Energy efficiency.

Gothenburg (Sweden) – Pilot city

City facts: Gothenburg is the second largest town in Sweden with 526,000 inhabitants. The city has changed since the 1970s from being an industrial city to also become a knowledge city with the University of Gothenburg, and Chalmers University of Technology. Gothenburg has a rich cultural life, but it is also one of the most segregated cities in Sweden.

Ambition: Social sustainability and integration is high on the cities agenda.

Demonstration district: The area of Hammarkullen is located in Angered, one of ten city districts in Gothenburg, northeast of downtown. Angered is verified, with agricultural landscapes, and large housing areas as part of the Swedish “Million homes program” from the late 1960s to early 1970s. Hammarkullen is stigmatized as a neighbourhood with large-scale buildings and social problems. Today more than 80% of the population in Hammarkullen has an immigration background and about 57 % of the inhabitants are born abroad. Many have come here as refugees. The middle income in Hammarkullen is about 54% relative to the average income of Gothenburg, and 29% of the families have social benefits. The municipal housing company, Bostadsbolaget, who owns 1.342 apartments, renovated the facades of most of their buildings about five years ago. During the renovation some of the apartments got an extra room. About 1,000 dwellings are to be renovated. Owners of the buildings are both municipal and private owners.

Focus area: Energy efficiency.

4.15 Cities within the ZenN project

The research project ZenN was a FP7-project that ended in 2017. Nearly Zero Energy Neighbourhoods, aims to reduce energy use in existing buildings and neighbourhoods. The residential areas that are participating in the project and in conjunction with the renovation of these areas a number of specific measures will be implemented. The challenges the project faced in connection with the near-zero renovation of existing buildings faced by the ZenN project were technical challenges, financial challenges and property structure challenges.

The cities in ZenN has expressed interest for replication of EU-Gugle-solutions. Therefore, they might be interested in replicating other solutions on their journey to become even smarter cities.

Demonstrating cities: Eibar (Spain), Grenoble (France), Malmö (Sweden), Oslo (Norway)



Table 20 Focus areas for ZenN

Focus areas				
Energy positive districts	Smart energy management	Smart e-mobility sector	City innovation platform	Citizen engagement and co-creation
Nearly zero energy neighbourhoods				

Eibar (Spain) – Demonstrating city

City facts: Eibar has 27,000 inhabitants.

Ambition: Nearly zero energy neighbourhoods.

Demonstration district: Mogel.

Focus area: Energetic efficiency improvement of the residential buildings. Energy renovation.

Grenoble (France) – Demonstrating city

City facts: Grenoble has 156,000 inhabitants.

Ambition: Nearly zero energy neighbourhoods.

Demonstration district: Arlequin. It is a 1970's residential development of 1,800 dwellings in a high-rise complex within a larger district called Villeneuve. The buildings range from 6 to 15 storeys and are concrete structure with two kinds of façade: light pre-fabricated concrete modules and heavy modules. The neighbourhood is seen as a deprived area with low income residents of more than 30 nationalities, a high unemployment rate, and confused public and private spaces.

Focus area: Energetic efficiency improvement of the residential buildings. Energy renovation.

Malmö (Sweden) – Demonstrating city

City facts: Malmö has 341,000 inhabitants and is the third largest city in Sweden. It is situated in the south of Sweden.

Ambition: Nearly zero energy neighbourhoods.

Demonstration district: The Lindängen neighbourhood is located in the southern part of Malmö and has a population of approximately 6,000 inhabitants. The average income in here is lower compared to the average income in Malmö, and the average unemployment rate is higher. About 1,000 residents live in the four buildings that are included in the Lindängen demo site. The buildings were constructed during the 1970s, and prior to the renovations performed within ZenN the buildings had an outdated heating system, exhaust ventilation without heat recovery, and old windows that needed replacement.

Focus area: Energetic efficiency improvement of the residential buildings. Energy renovation.

Oslo (Norway) – Demonstrating city

City facts: Oslo is the capital of Norway and has 634,000 inhabitants. Not part of the EU.

Ambition: Nearly zero energy neighbourhoods.



Demonstration district: Økern nursing home was built in 1975 and contains 140 dwellings for senior citizens. The retrofitting project is completed and tenants moved in in October 2014. The project used known and well-tried techniques and products, while the innovative part of the project was the process itself and a novel collaboration with research institutes during the design and execution of the work.

Focus area: Energetic efficiency improvement of the residential buildings. Energy renovation.

4.16 Cities within the R2Cities project

The aim of R2Cities was to develop and demonstrate replicable strategies for designing, constructing and managing large scale district renovation projects for achieving nearly zero energy cities.

Demonstrating cities: Genoa (Italy), Kartal (Turkey), Valladolid (Spain)

Table 21 Focus areas for R2Cities

Focus areas				
Energy positive districts	Smart energy management	Smart e-mobility sector	City innovation platform	Citizen engagement and co-creation
Nearly zero energy cities, residential district retrofitting				

Genoa (Italy) – Demonstrating city

City facts: Genoa has 595,000 inhabitants.

Ambition: Nearly zero energy city.

Demonstration district: The social housing district of Lavatrici was developed during 1980-1990. The pilot is located on the west part of the city in the so called Pegli 3 District on a natural hill.

Focus area: Energy efficiency.

Kartal (Turkey) – Demonstrating city

City facts: Kartal has 463,000 inhabitants.

Ambition: Nearly zero energy city.

Demonstration district: The use of low efficiency lighting systems and appliances and a slim insulation means very high energy consumption for Yakacik district of Kartal, Istanbul and therefore a high potential for improving.

Focus area: Energy efficiency.

Valladolid (Spain) – Demonstrating city

City facts: Valladolid has 305,000 inhabitants.

Ambition: Nearly zero energy city.



Demonstration district: A complete retrofitting based on façade improvements, ICTs and renewable energy systems has been implemented in the Cuatro de Marzo district, the demo site chosen for the R2CITIES project.

Focus area: Energy efficiency.

4.17 Short list of top follower cities

As stated in the beginning of this chapter, the nearly 100 cities presented above, should be considered the short list of potential follower cities (FCs) of IRIS, since there are thousands of cities claiming to work on becoming smarter. In order to make an even shorter list, IMCG has compared the European cities ranked on the IESE Smart Motion Index (CIMI) with the list of nearly 100 cities presented above.

CIMI lists smart cities from all over the world. Our shortlist of FCs consists of those cities that are both represented in our list of nearly 100 cities and in the top of the CIMI ranking. The cities that fulfil these criteria are presented in the table below in no particular order. We chose not to put Gothenburg on the list since Gothenburg is already a part of IRIS.

Table 22 Shortlist of Top potential FCs – all with focus areas Energy, mobility and ICT

Country	Cities	Location of city	Smart City District
Austria	Vienna	West-European City	The district is located in a central part of the south-eastern district of Simmering between Simmeringer Haupt-straße & the eastern railway line (district areas of Geiselberg, Enkplatz, Braunhuberviertel).
Czech Republic	Prague	West-European City	Morgenstadt City Lab (not really a district)
Finland	Helsinki	North-European city	Vanhankaupunginlahti (old Town Bay)
France	Lyon	West-European City	Lyon Confluence
Germany	Hamburg	West-European City	The borough of Bergedorf
Germany	Munich	West-European City	Neuaußing-Westkreuz/Freiham
Italy	Milan	South-European City	Porta Romana/Vettabbia
Netherlands	Rotterdam	West-European City	The Heart of the South Area
Norway	Oslo	North-European city	Økern
Spain	Barcelona	South-European City	22nd District
Sweden	Stockholm	North-European city	Årsta
United Kingdom	London	West-European City	The Royal Borough of Greenwich

5 European Smart City and city district analysis

This section presents an initial market analysis based on the smart city mapping and the methods described in the previous section. The market analysis should be seen as a first version of gathering cities and city districts into groups with similar situations and ambitions.

This analysis should give us all a better understanding of what to expect from the city authority, important actors carrying out what is needed by the city and solution providers.

One of the objectives of IRIS is to, early in the project, identify how the project can strengthen the cooperation and exchange of solutions between solution managers and solution providers within European cities.

5.1 Analysing the list of European cities with potential to replicate IRIS solutions

By looking at the selected cities presented in the previous chapter, we see that certain parameters could be of special interest, such as the size and location of the city. Whether or not there is a branded smart district or not and if there are clear focus areas are also important factors.

5.1.1 The size of the city as funding potential

Some integrated solutions benefit from being implemented in a larger city. The larger the city, the larger is the market for the solution providers. During the workshops together with the lighthouse cities of IRIS it became clear that some solution providers – especially the ones offering mobility services – are interested only in cities of a certain size. Below we present the ten largest Lighthouse/Pilot/Follower cities presented in our list with 100 smart cities.

Table 23 The ten largest Lighthouse/Pilot/Follower cities presented in the totally mapped 100 smart cities

	City	Country		Size of city - inhabitants	Type of city
1	London	UK		8,400,000	Lighthouse
2	Antalya	Turkey		2,400,000	Lighthouse
3	Hamburg	Germany		1,800,000	Lighthouse
3	Vienna	Austria		1,800,000	Lighthouse/Pilot
4	Warsaw	Poland		1,700,000	Follower
4	Gaziantep	Turkey		1,700,000	Pilot
5	Munich	Germany		1,430,000	Lighthouse
6	Barcelona	Spain		1,609,000	Lighthouse
7	Milan	Italy		1,380,000	Lighthouse/Pilot
8	Sofia	Bulgaria		1,300,000	Follower
9	Prague	Czech Republic		1,200,000	Follower
10	Cologne	Germany		1,000,000	Lighthouse



5.1.2 Infrastructure for sustainable solutions in Energy, Mobility and ICT

Most of the solutions demonstrated in IRIS are dependent of a supporting infrastructure on district level or city level. Examples of infrastructures are low temperature district heating, digital platforms for mobility services and digital platform for exchange of energy between buildings.

The majority of the cities we have looked at focus on similar areas as IRIS and has established similar infrastructure support. To keep the comparison simple, we have merged IRIS transition tracks (Energy positive districts, Smart energy management, Smart e-mobility sector, A City innovation platform and Citizen engagement and co-creation) into the challenges areas of Energy, Mobility and ICT. Many of the cities also emphasize the importance of citizen engagement, but it's integrated in the other focus areas and hard to compare.

In order for the cities and solution providers of IRIS to understand if a certain city is of interest or not, we have listed cities according to what they have expressed that they focus on.

Table 24 Cities that focus on either all three areas of Energy, Mobility and ICT and the supporting infrastructure of them, or one or two of them

Country	City	Energy	Mobility	ICT
Austria	Vienna	x	x	x
Austria	Graz	x	x	
Austria	Innsbruck	x		
Belgium	Ostend	x	x	x
Belgium	Seraing	x	x	x
Bulgaria	Sofia	x	x	x
Bulgaria	Burgas	x	x	x
Bulgaria	Varna	x	x	x
Bulgaria	Asenovgrad	x		
Croatia	Rijeka	x	x	x
Cyprus	Pafos	x	x	x
Czech Republic	Litomerice	x	x	x
Czech Republic	Prague	x	x	x
Czech Republic	Brno	x		
Denmark	Sonderborg	x	x	x
Estonia	Tartu	x	x	x
Finland	Tampere	x	x	x
Finland	Vaasa	x	x	x
Finland	Kerava	x	x	x
Finland	Helsinki	x	x	x
France	Nice	x	x	x
France	Bordeaux	x	x	x
France	Nantes	x	x	x
France	Lyon	x	x	x
France	La Rochelle	x	x	
France	Grenoble	x		
Germany	Cologne	x	x	x
Germany	Hamburg	x	x	x



Germany	Essen	x	x	x
Germany	Dresden	x	x	x
Germany	Leipzig	x	x	x
Germany	Munich	x	x	x
Germany	Rosenheim	x		
Germany	Aachen	x		
Greece	Alexandroupolis	x	x	x
Greece	Kozani	x	x	x
Italy	Venice	x	x	x
Italy	Parma	x	x	x
Italy	Trento	x	x	x
Italy	Leece	x	x	x
Italy	Florence	x	x	x
Italy	Milan	x	x	x
Italy	Genoa	x		
Italy	Bolzano	x		
Israel	Herzliya	x	x	x
Ireland	Cork	x	x	x
Macedonia	Skopje	x	x	x
Malta	Valetta	x	x	x
Netherlands	Utrecht	x	x	x
Netherlands	Eindhoven	x	x	x
Netherlands	Rotterdam	x	x	x
Norway	Oslo	x	x	x
Poland	Warsaw	x	x	x
Poland	Bydgoszcz	x	x	x
Poland	Gdansk	x		
Portugal	Porto	x	x	x
Portugal	Lisbon	x	x	x
Romania	Focsani	x	x	x
Romania	Cluj-Napoca	x	x	x
Romania	Suceava	x	x	x
Slovakia	Bratislava	x		
Spain	Valladolid	x	x	x
Spain	Vitoria-Gasteiz	x	x	x
Spain	San Sebastian	x	x	x
Spain	Santa Cruz de Tenerife	x	x	x
Spain	Barcelona	x	x	x
Spain	Pamplona	x	x	x
Spain	Santiago de Compostela	x	x	x
Spain	Valencia	x	x	x
Spain	Palencia	x	x	x
Spain	Sabadell	x	x	x
Spain	Sestao	x		



Spain	Eibar	x		
Spain	Sevilla	x		
Sweden	Gothenburg	x	x	x
Sweden	Stockholm	x	x	x
Sweden	Umeå	x	x	x
Sweden	Borås	x	x	
Sweden	Malmö	x		
Switzerland	Lausanne	x	x	x
Turkey	Nilhüfer	x	x	x
Turkey	Eskisehir	x	x	x
Turkey	Antalya	x	x	
Turkey	Kartal	x		
Turkey	Gaziantep	x		
United Kingdom	Bristol	x	x	x
United Kingdom	Derry	x	x	x
United Kingdom	Nottingham	x	x	x
United Kingdom	Manchester	x	x	x
United Kingdom	Glasgow	x	x	x
United Kingdom	London	x	x	x

5.1.3 A demo- or replication district

Many of the cities we have listed have chosen a demo- or replication district. That is not a coincidence, but a strategy. All city districts have characteristics which are used by the citizens to describe the area. When building a brand for the district it is important take control over the used characteristics to fill the brand with chosen characteristics. There is a need to have real activities in the district, and marketers should use storytelling to spread the word.

In many cases from a city perspective, development and transformation is achieved city district by city district. This is especially the case when development and transformation is a partnership with private partners for property development and for infrastructure development.

An example of cities that have realised the value of districts is My Smart City District. It is a network of cities. Eight projects involving 27 districts belonging to 25 cities from 13 different countries have joined forces for greater leverage in sharing contents and promoting energy efficient renovation for cities and communities leading to large-scale replicability of sound energy efficiency solutions. This network includes the following cities from our list: Aachen (Germany), Bilbao (Spain), Bratislava (Slovakia), Gaziantep (Turkey), Genoa (Italy), Gothenburg (Sweden), Kartal (Turkey), Milano (Italy), Sestao (Spain), Tampere (Finland), Valladolid (Spain) and Vienna (Austria).

Some cities have more than one district and are sometimes engaged in different projects where one or two of these districts are involved. In this section we present a list of the districts that are to be found in the almost 100 cities listed in the previous chapter.



Table 25 Presentation of cities that brand a Smart City District

Country	City	Name of the district(s)
Austria	Vienna	Penzing/14th district
Austria	Graz	2 districts: SC Waagner Biro and Graz Reinighaus
Czech Republic	Brno	2 districts: Spítálka and Trade Fairs Brno Company
Estonia	Tartu	Kalevi 10 Apartment Association
Finland	Tampere	Tammela
Finland	Helsinki	Vanhankaupunginlahti (old Town Bay)
France	Nice	Eco Valley
France	Nantes	The "Ile de Nantes" (Island of Nantes)
France	Lyon	Lyon Confluence
France	Grenoble	Arlequin
Germany	Dresden	Johannstadt
Germany	Leipzig	Leipzig West
Germany	Hamburg	The borough of Bergedorf
Germany	Aachen	The district Aachen-North
Germany	Cologne	Mulheim
Germany	Munich	Neuaubing-Westkreuz/Freiham
Ireland	Cork	Cork Smart Gateway
Italy	Bolzano	Bolzano SW
Italy	Genoa	Lavatrice
Italy	Parma	The Parma University Campus
Italy	Milan	Porta Romana/Vettabbia and Zona 4
Italy	Florence	Cascine/Navoli/Le Piagge district
Netherlands	Rotterdam	The Heart of the South Area
Netherlands	Eindhoven	2 districts: Eckart Vaartbroek district and the former Philips industrial complex in the "Strijp-S" neighbourhood
Netherlands	Utrecht	Kanaleneiland Zuid
Norway	Stavanger	Paradis/Hillevåg
Norway	Oslo	Økern
Poland	Gdansk	The Gdańsk Śródmieście ("Downtown") district
Portugal	Porto	The district of Campanha
Portugal	Lisbon	Downtown Lisbon
Romania	Suceava	Suceava's Centrum District
Slovakia	Bratislava	2 districts: the wider city centre and the western part of Bratislava city
Spain	Valladolid	2 districts; Fasa District and Cuatro de Marzo
Spain	Eibar	Mogel
Spain	Valencia	Poblats Maritims
Spain	Vitoria-Gasteiz	The Coronacion district
Spain	Sestao	The district is on the lower area of Sestao
Spain	San Sebastian	The Urumea Riverside District
Spain	Barcelona	22nd District
Sweden	Göteborg	2 districts: Johanneberg Campus and Hammarkullen
Sweden	Malmö	Lindängen
Sweden	Umeå	University City Area
Sweden	Stockholm	Årsta



United Kingdom	London	The Royal Borough of Greenwich
United Kingdom	Bristol	Ashley, Easton and Lawrence Hill district
United Kingdom	Manchester	Corridor Manchester
United Kingdom	Nottingham	Sneinton District
Turkey	Kartal	Yakacik
Turkey	Eskisehir	Tepebasi
Turkey	Antalya	New Kepez Smart City
Country	City	Not really districts/districts lacking a name
United Kingdom	Glasgow	A smart street instead of a district; it is located in the city centre along a section of George Street and Duke Street
France	La Rochell	Close to city centre: a low-carbon industrial district
Czech Republic	Prague	Morgenstadt City Lab (not really a district)
Austria	Vienna	The district is located in a central part of the south-eastern district of Simmering between Simmeringer Haupt-straße & the eastern railway line (district areas of Geiselberg, Enkplatz, Braunhuberviertel).

5.1.4 Different locations call for different needs

As the IRIS project proposal states, despite the common challenges, the cities of Utrecht, Nice and Gothenburg also face city and district specific challenges due to divergent geography, geology, demography, climate and socio-economic and cultural characteristics. These characteristics make them embark on their urban energy transition from different perspectives with Utrecht, Nice and Gothenburg representing three different city types. We have categorized the cities we have studied in the same manner as the IRIS project does, namely categorized them into being either North-European, West-European or South-European.

North-European cities (Gothenburg) - where district heating is dominant and solar potential is limited. Other cities with these features are: Sweden (Stockholm, Gothenburg, Malmö, Borås, Umeå), Finland (Helsinki, Tampere, Vaasa, Kerava), Norway (Oslo, Stavanger), Denmark (Sonderborg), Ireland (Cork), Italy (Trento), Estonia (Tartu),

West-European cities (Utrecht) - strongly dependent on natural gas for electricity and heating. Other cities with these features are cities in United Kingdom (London, Glasgow, Bristol, Nottingham, Derry, Manchester), Germany (Hamburg, Cologne, Leipzig, Dresden, Aachen, Essen, Rosenheim, Munich), Austria (Vienna, Graz, Innsbruck), Poland (Warsaw, Gdansk, Bydgoszcz), Czech Republic (Prague), France (Nantes, Bordeaux, Grenoble, Lyon), Slovakia (Bratislava), Netherlands (Utrecht, Eindhoven, Rotterdam), Hungary (Miskolc), Switzerland (Lausanne), Belgium (Ostend, Seraing)

South-European cities (Nice) - not much invested on reducing footprint of their household sector but can enjoy an abundant solar potential. Other cities with these features are: Spain (Palencia, Sevilla, Valladolid, Vitoria-Gasteiz, Sabadell, San Sebastian, Santiago de Compostela, Sestao, Eibar, Barcelona,



Santa Cruz de Tenerife), Turkey (Antalya, Gaziantep, Nilhufer, Eskisehir, Kartal), Italy (Milan, Genoa, Florence, Venice, Parma, Bolzano, Lecce), Bulgaria (Sofia, Varna), Portugal (Lisbon, Porto), Macedonia (Skopje), Czech Republic (Brno, Litomerice), France (Nice, La Rochelle), Romania (Cluj-Napoca, Suceava), Croatia (Rijeka), Israel (Herzliya), Greece (Alexandroupolis, Kozani), Cyprus (Pafos), Malta (Valetta)

6 Output to other work packages

6.1 WP2 – EU wide cooperation with ongoing projects, initiatives and communities

The aim of work package 2 (WP2) is to ensure cooperation with other selected projects. By capitalising and benchmarking with existing knowledge and lessons learnt, we are able to be more efficient, replicate the best practices we already have and ensure the added value of the European cooperation. Our study of the cities in EIP-SCC related projects is most likely of special interest for WP2. See task 2.1 (T2.1) – EIP-SCC cooperation with selected lighthouse projects and Deliverable 2.1 (D2.1) Lessons learnt through cooperation with other lighthouse projects.

6.2 WP5/6/7 – Utrecht, Nice, Gothenburg

For the cities: Information about cities to benchmark with.

For the solution providers: Information about the buying process and what actors that might be involved. Heads up about matters to include in an adaptable business model. There is also information about cities that might be open to replicate a certain integrated solution.

6.3 WP8 Replication by lighthouse regions, follower cities, European market uptake

Replication is a method for making public knowledge of the results and experiences from testing and implementing solutions to common city challenges. It is the blue print for an implementation project that is the item to replicate. Such a replication package includes thorough descriptions how to set up a solution. In order to replicate there is a need for a clear offer and a clear picture of who will buy and handle the replicated solution.

This report is especially of value for Task 8.7 (T8.7), European scale-up activities, in work package 8. The aim is to establish and operate IRIS European smart cities network. The mile-stone goal is to have minimum 80 active cities as members. The list of cities in D3.3 will provide a starting point for this. The output of the report is valuable for designing and implementing replication plans. This report is one step towards increasing replication potential, as we here list European cities and districts with high replication potential.

6.4 WP10 Communication

A strong key element of IRIS lies on a detailed Communication, Dissemination and Exploitation planning, while the inclusion of horizontal partner, as that of ESCI, who already has a big network of cities collaborating with them, justifies the expected EU wide link of IRIS project with similar on-running ones.



ESCI will be involved in T2.1 for preparation of strong presentations and active exchange. Therefore, D3.3 is of importance for ESCI in work package 10 (WP10), as well as for Utrecht, lead of WP2.



7 Conclusion and recommendations

This chapter refers back objectives described in the introduction, to present a shortlist of top potential European follower cities and an overview of these cities and districts willingness and possibility to implement and replicate smart IRIS solutions. It draws conclusions from results presented the main chapters, the market analysis methodology for IRIS partners, the market analysis and the shortlist of European city districts with potential to replicate implementation of IRIS solutions.

The conclusions and recommendations in this section is mainly for the partners in Smart City Lighthouse projects with similar transition track (Focus areas) as in the IRIS projects.

7.1 Identifying the roles of different actors in the buying process

From the initial workshops with Lighthouse cities, we've got a better understanding of the different actors that play a vital part when implementing IRIS solutions in a city district. The actors handling the replication of solution implementation must have a collaborative perspective (with other solution managers) and the actors providing the solutions must have a marketing perspective. All partners of IRIS need to stop talking in terms of that the city is the buyer of a certain solution. Even if that is the case the "city" is too wide of a concept. One need to break it down to individuals and specific authorities.

For all the solutions of IRIS there is a need to specify who the potential buyer is and where this buyer is located. Identify the plan for reaching and approach this buyer.

7.2 The list of top potential follower cities

The short list of top potential FCs consists of twelve cities which is a merge done by comparing the list of nearly 100 potential FCs with several different indexes and rankings, such as the CIMI index. However, since this report clearly states that the role of the city many times can be secondary compared to other actors, such as property developers, when it comes to decision making regarding implementing sustainable solutions, this type of list should not be the only indicator when choosing a city to introduce the IRIS solutions to.

We recommend you to widen your perspective when looking for FC cities. Don't only consider the short list of the twelve Top FC Cities, but also look the list of nearly 100 cities presented in this report. One important factor is to look into if the city you're interested in is focusing on the challenges that you are working with, such as ICT, mobility or energy.

7.3 District business generation

This report has highlighted the importance of smart districts and that is of essence for a IRIS solution provider to get to know the relevant actors within the district.

All city districts have characteristics which are used by the citizens to describe the area. These characteristics is the core values of the city district brand and is important for funding and investment.



Strong city district brands reduce investment risks and contribute to making new solutions considered bankable.

When building a brand for the district it is important to take control over the used characteristics to fill the brand with chosen characteristics. There is a need to have real activities in the district, and marketers should use storytelling to spread the word.

In many cases from a city perspective, development and transformation is achieved city district by city district. This is especially the case when development and transformation is a partnership with private partners for property development and for infrastructure development. In this report a city district market analysis is presented for market uptake of integrated solutions demonstrated in the EU funded project IRIS Smart Cities.

The challenge for how to establish the brand differs from brown fields, green fields and social degraded areas. They all have since long established characteristics in the citizens opinion, but it can be more difficult to shift from social degraded than from forest in city outskirts. In some cases, it could be necessary to invent a new brand, a new name for the district, to make it possible to introduce new values and characteristics. For many of the integrated solutions the solution providers' business model would benefit from having all customers in the city in the same district. Closeness make logistics more efficient, will make infrastructure investments per customer lower and market communication easier as customers (property owners) have invested interests in the same neighbourhood.

The city should assist in generating dense business in prioritised districts. By promoting the districts and demonstrating the business generated, the city will also encourage competition and well-functioning market.

The city can promote smart city district development by building the brand. Supporting new business incentives (reduced parking areas). The city can invest in infrastructure - digital or real - such as public transport, energy grids, internet connections, bicycle lanes etc.

7.4 Smart city development – district by district

Not all cities we have studied have a named district dedicated for demonstration and or replication. However, but having a district dedicated to these matters is of utter importance for the success of the solutions being tested, demonstrated and replicated in IRIS, since it will make it more visible to both actors within the city and fort those outside.

For many of the integrated solutions the solution providers' business model would benefit from having all customers in the city in the same district. Closeness make logistics more efficient, will make infrastructure investments per customer lower and market communication easier as customers (property owners) have vested interests in the same neighbourhood.

Benefits of naming or clearly pointing out a district is that both inhabitants and visitors get to see evidence on what's going on. It's also easier to get other cities interested to replicate integrated solutions that are clearly working well in a regular city environment.

The city should assist in generating dense business in prioritised districts. To develop district by district should be part of the smart city development plan. By promoting the districts and demonstrating the



business generated, the city will also encourage competition and well-functioning market. The city should set a target for implementation of the different solutions within the district. The target should be as high as it takes to make the growth within district self-generated.

In the long term the property owners in a district should cooperate to take control over the district brand and continuous development. The city focus will shift to the next district and the property owners must continue the development themselves. The city should during the first phase support the property owners to engage in a collaboration platform. It is also important that the city uses its own infrastructure companies as long-term support for the district development. That includes City Innovation Platform, energy utilities, public transport and mobility solutions, such as bike rentals.

Over time the city will have a number of districts with their own district consortia's which in turn will form a great network of experienced actors, both property owners and solution providers. Together they form a resource for open innovation which makes implementation of new solutions easier.

From a city perspective, development and transformation is achieved city district by city district. This is especially the case when development and transformation is a partnership with private partners for property development and for infrastructure development. We recommend solution managers to make sure that the chosen integrated solution is implemented as much as possible in the district, rather than single installations wide spread over the city.

7.5 The size of the city or district

Some integrated solutions benefit from being implemented in a larger city. The larger the city, the larger is the market for the solution providers. During our workshops with the lighthouse cities of IRIS, it became clear that for some of the partners of IRIS, like the ones offering mobility services, a city must be of a certain size in order to be suitable for their integrated sustainable solution. However, since districts matter too, it is often of equal importance to investigate the size of the specific district.

Gather the type of information that is of value when replicating your solution. It is good to study average income in targeted district as new solutions usually need some extra purchasing power. It is also good to identify solution managers who have an ambition to be early adopters of new sustainable solutions.

7.6 Market analysis are perishable goods

A general conclusion from this task is that market analysis are perishable goods, with quite short life span. This is especially important to keep in mind when aggregation of data and material from several different sources which may have different dates for when data was produced. It is often better to do a narrower market analysis and update it on regular interval to spot trends, rather than a wide market analysis done just once.

Our recommendation to IRIS partners is to use this report as a basis and do annual updates.



7.7 Full focus on demonstration in Lighthouse cities

The workshops IMCG held together with RISE indicate that it's not yet a clear and common opinion among the solution managers on what solutions will be possible to replicate first. Some of the solution providers will most likely want to start with replicating within the city they're demonstrating. Some companies, like the ones offering mobility services, demand a large number of potential users, and can only be replicated in cities of a certain size. The replication plans were not that clear, but the discussions during the workshops were important, as they indicated to all participants the importance of all ready at this stage think in terms of replication.

The workshops did not give us the insight in the lighthouse cities that we hoped for regarding cities' innovation management processes. However, IMCG is acting as bankable business model manager of IRIS in the task group for bankable business models of EIP-SCC projects, and from there, we'll transfer valuable knowledge to the IRIS cities as the IRIS project proceeds. As of now, the lighthouse cities of IRIS did not name any smart cities they get inspired by, but the list in this report will hopefully serve as such an inspiration.

A general recommendation from the workshops is also a need for clarification of the commonly used word "city". It is important to stress that in most cases the word "City" used in the IRIS project plan should be interpreted as "City region actors" and not "City authority". The word "City" would thereby refer to a larger audience of actors included in city transition, including all solution managers.

7.8 Value chains and business models

It is of essence to understand the three categories of value generation presented in this report. The value generation can be of city level, district level or building level. Depending on what type of integrated solution that is to be implemented, the solution provider needs to investigate where the person acting as solution manager will be.

We recommend the city partnerships to present successfully demonstrated and replicated integrated solutions in IRIS with administration models for the authorities (the city) and with business models for the solution providers. By presenting clear and comprehensive information and descriptions, the solutions will be considered as bankable with low risk for city investments. This will increase the speed for implementation in the city and build-up of a local market, one city district after the other.

7.9 Relevant information for several Work Packages in the IRIS Smart City project

The content of this report is of relevance for several work packages within the project. It's our hope that the WPs mentioned in the report will pay attention to this delivery.

If you are one of the solution providers of the project or if you are part of one of the WPs mentioned in this report, we encourage you to contact IMCG to further discuss how this information can contribute to move towards market impact.



7.10 Replication and strengthening cooperation

WP3 objectives include increasing replication potential. The European cities presented in this report all indicate that the IRIS hypothesis that the fastest way for a city to get smarter is to replicate innovative solutions that other cities already have tested, demonstrated and proved sustainable and bankable, is correct. This report shows that IRIS will be more successful when it comes to market impact, if knowledge regarding challenges cities are facing will be shared both within and outside of the IRIS project.

WP3 objectives include to efficiently support knowledge transfer. This report can inspire IRIS project partners to strengthen the links and active cooperation between a large number of cities, all with the ambition to speed up Smart City development. The main objective with this report was to present a European smart city overview in relation to the IRIS Smart City objectives and transition tracks. This list of cities serves to increase all project members of IRIS's knowledge of market development in Europe.

Smart cities collaborate with other cities, sharing knowledge and replicating each other's best practices. It is recommended that all the cities in the IRIS Smart Cities project do that.

7.11 Possibility for knowledge transfer and awareness of a competitive market

There are many cities in Europe focusing on the same challenges as the IRIS Smart City project does. This report shows that energy-, ICT- and mobility-related focus is very common. This means that many cities are aware of that new integrated solutions are needed to solve the problems the cities are facing. At the same time, it is important to understand that there are many solution providers that want to supply the cities and other potential buyers acting in the city.

Cities should learn as much as they can from one another. A smart city will be even smarter if implementing something that other cities already have tested and that has proved work satisfying.

Solution providers should work on a replication plan and a clear documentation of how to implement the solution. Make the solution tangible and easy to understand. The buyer is most likely not a technician.

8 References to information sources

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IRIS Smart Cities – H2020 for Research and Innovation under grant agreement no 774199, <http://www.irissmartcities.eu>

Match up – H2020, research and Innovation programme under grant agreement no 774477, <https://www.matchup-project.eu>

Stardust – H2020, research and Innovation programme under grant agreement no 774094, <http://stardustproject.eu>

Grow Smarter – H2020, research and innovation programme under grant agreement no 646456, <http://www.grow-smarter.eu/lighthouse-cities/>

Triangulum- H2020, research and innovation programme grant agreement no 656578, <http://triangulum-project.eu>

Ruggedised - H2020 research and innovation programme under grant agreement no 731198, <http://www.ruggedised.eu>

MySmartLife – H2020, research and innovation programme under grant agreement no 731297, <https://www.mysmartlife.eu/mysmartlife/>

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Smarter Together – H2020, research and innovation programme under grant agreement no 691876, www.smarter-together.eu

Sharing Cities – H2020, research and innovation programme under Grant Agreement no 691895, <http://www.sharingcities.eu>

Remourban – H2020, research and innovation programme under grant agreement no 646511, www.remourban.eu

Sinfonia – FP7 - for research, technological development and demonstration under grant agreement no 609019, <http://www.sinfonia-smartcities.eu>

EU-Gugle - FP7 - for research, technological development and demonstration under grant agreement no 314632, <http://eu-gugle.eu>

ZenN – FP7 - under grant agreement no 314363, <http://zenn-fp7.eu>

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