



# IRIS

Integrated and Replicable Solutions  
for Co-Creation in Sustainable Cities

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

## Deliverable 8.3

### Replication tool box

<b>Work Package:</b>	WP8: Replication by Lighthouse regions, Follower cities, European market uptake
<b>Task:</b>	Task 8.2: Replication tools development for capacity building, training and knowledge transfer
<b>Lead Beneficiary:</b>	VAASA
<b>Due Date:</b>	31/10/2019 (M25)
<b>Submission Date:</b>	22/4/2020 (M36)
<b>Deliverable Status:</b>	Final
<b>Deliverable Style:</b>	R
<b>Dissemination Level:</b>	PU
<b>File Name:</b>	D8.3 Replication toolbox



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	25/6/2019	VAASA created the first structure of the deliverable
0.2	1/8/2019	UPB and ICEM chapter contribution added
0.3	13/11/2019	CERTH chapter contribution added
0.5	10/3/2020	First complete draft distributed to partners for comments
0.6	27/3/2020	Updated version according to feedback from project partners
0.7	6/4/2020	Updated with comments and input from first review
0.8	9/4/2020	Updated with more comments and input
0.9	15/4/2020	Updated version for final review
1.0	17/4/2020	Final version to be released to the EC

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## Executive Summary

Deliverable 8.3 Replication tool box is a report describing IRIS' exploitable results available for post-project and beyond-project continuation for capacity building, training and knowledge transfer.

The aim of this deliverable is to gather all tools available for replication activities in the IRIS project, together with explanations of what the tools are, when they can be used, how they are to be used and also when, and to whom, they are available.

The document contains a list of available tools for replication, for cities in the IRIS project, but also for cities outside the project.

In the cities, the target groups are those who are working with the city's transition into a smart city.

This list should be used together with the deliverable D8.1 A Roadmap for replication of activities, where the different stages of the replication process is described in more detail, and also what tools to apply in which part of the process.

The deliverable, together with the deliverable D8.1, supports cities in their creation of a replication plan by describing exploitable results as needed to replicate the demonstrated solutions within the IRIS project.

This deliverable will produce valuable output to the replication plans to be created by the follower cities in the IRIS project, D8.4 Vaasa replication plan, D8.6 Alexandroupolis replication plan, D8.8 Santa Cruz de Tenerife replication plan and D8.10 Focsani replication plan.

The deliverable 8.3 Replication tool box gathers all tools created from other deliverables in all work packages within the IRIS project.



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## List of Abbreviations and Acronyms

Abbreviation	Definition
API	Application Programming Interface
BIM	Building Information Model
DSO	Distribution System Operator
CIP	City Innovation Platform
CPB	Consortium Plenary Board
DHS	District Heating System
EIB	European Investment Bank
EIP-SCC	The European Innovation Partnership on Smart Cities and Communities
EMS	Energy Management System
ESCO	Energy service company
EU	European Union
FC	Follower City
FIWARE	A curated framework of open source platform components to accelerate the development of Smart Solutions
ICT	Information and Communication Technologies
IS	Integrated Solution
KPI	Key Performance Indicator
LHC	Lighthouse City
RES	Renewable Energy System
ROI	Return on Investment
SC	Smart City
SCIS	The Smart Cities Information System
SCC1	Smart Cities and Communities lighthouse projects
SWOT	Strengths, Weaknesses, Opportunities, and Threats
TG	Task Group
TSO	Transmission System Operator
TT	Transition Track



USEF	Universal Smart Energy Framework
WP	Work Package



## 1. Introduction

The deliverable D8.3: Replication tool box is a report describing IRIS' exploitable results available for post-project and beyond-project continuation for capacity building, training and knowledge transfer.

It is related to the task T8.2 Replication tools development for capacity building, training and knowledge transfer:

*A Toolbox will be developed for capacity building, training and knowledge transfer including 1) public authorities, 2) public utilities, 3) know-how–stakeholders (universities-consultants) 4) citizens/NGOs, 5) financing stakeholders, 6) building owners and their subsequent stakeholders as well as 7) business stakeholders. On the development of the Tool-box LHs act as active mentors based on their own experience. For the capacity, building and knowledge transfer different methodologies are utilized including guidelines, technical support staff and staff exchange between cities. More specifically training sessions will be organised, they will allow the aforementioned stakeholders of all IRIS cities partners to get to know citizens main interests. They will be trained to make use of the IRIS solutions, providing valuable feedback to the technological partners and public bodies.*

The deliverable is structured as a list of tools available for the cities who want to replicate the demonstrated integrated solutions within the transition tracks in the IRIS project. Each tool in the list has a description of what it is, how and when to use it and where to find it. Each tool in the list is also connected to the deliverable D8.1 A Roadmap for replication of activities, which is a process description of how to carry out a successful replication of the IRIS integrated solutions. Every tool is connected to a step in the process presented in the replication roadmap.

Using these two deliverables D8.1 A Roadmap for replication of activities and D8.3 Replication tool box the cities aiming for replication will be able to create a replication plan, create city teams and plan replication actions for successfully solving the transitional challenges for a smart city.

### 1.1. Scope, objectives and expected impact

The main objective of this deliverable is to provide a list of tools available to plan, and carry out, replication actions in a city, with focus on the follower cities of the IRIS project, but also for other cities interested in replicating the solutions within the IRIS project. By using the tools in this document, during the different phases of the roadmap, follower cities will be able to create their individual replication plans and carry out the process of implementing replication of chosen LH demonstrated solutions.

The secondary objectives with this deliverable are:

- To function as an overview of deliverables within the IRIS project that is of use for replication activities
- To function as an overview of replication tools that can be found outside the IRIS project

The expected impact of this deliverable is that smart city demonstrations will be better known, easier to analyse and that all replication activities performed, by LH or FC, shall be better prepared and carried out;





the replicated projects can be faster implemented, with lower risks and leading to higher impact on the city level.

## 1.2. Contributions of partners

All work packages in the IRIS project will contribute to the toolbox with results relevant to the replication process. The lighthouse cities will contribute with information regarding the demonstrations in the project. Horizontal partners will contribute with information from other projects, initiatives and communities, bankable business models, KPIs and evaluations. The toolbox will be updated with all new information acquired at a later stage of the project. In this version all contributions available by M30 of the project are included.

Every result in the IRIS project with a relevance to the replication process of the follower cities will be considered a tool that will be added to this list.

## 1.3. Relation to other activities

The toolbox is firstly meant to be used side by side together with the deliverable *D8.1 A Roadmap for replication of activities* by the FC in the IRIS project, while working with their tasks T8.3/4/5/6 replication activities and preparing their replication plans, D8.4/6/8/10.

The toolbox will also add input to the offer of the IRIS projects for uptake by cities in the EU outside of the project, and also for cities outside of the EU.

In WP8 the task *T8.7 European scale-up activities* will use the tools in forming the offering from the IRIS project to other cities interested in replicating smart city solutions. WP8 will also work together with WP3 in the task *T3.6 Beyond IRIS* in catalysing deployment of IRIS solutions through-out Europe and beyond after 2021.

## 1.4. Structure of the deliverable

The deliverable is structured as a list with explanations for each chapter. The tools are categorized according to the follow order:

- IRIS Deliverables
- Publications
- Tools specific for the IRIS project
- General tools
- Knowledge exchange
- Capacity building

Each tool comes with an explanation of when in the process they are meant to be used.



## 2. Methodology

This deliverable is part of IRIS WP 8: Replication by Lighthouse regions, Follower cities, European market uptake, and it is related to T8.2 Replication tools development for capacity building, training and knowledge transfer. D8.3 Replication tool box provides an overview of the replication tools available in the IRIS project and of tools that can be found outside the project that can assist in the task of replication. These tools will help follower cities in creating a replication plan for the actions of replicating the integrated solutions demonstrated by the LH cities.

The replication toolbox is created through gathering all results in the IRIS project that can be of use for the follower cities in their replication plans and actions, and from gathering tools found in other projects, initiatives and communities.

This document gathers available tools in one single document, linking tools to specific steps in the replication process (D8.1 A Roadmap for replication of activities), making it easier for FCs to find their way in the organization and documentation of the IRIS project and the whole family of SCC01 projects and initiatives (like SCIS). The document will also function as a support for creating a digital platform for the IRIS project.

Tools have been found through internal communication in the IRIS project and through co-operation with other projects, cities and organizations.

The main sources of information has been the EU Smart Cities Information System (SCIS), The Marketplace of the European Innovation Partnership on Smart Cities and Communities (EIP-SCC) and other EU Smart Cities projects participating in the SCC Collaboration Framework Task Group on Replication.

### 2.1. Tools in support of replication

In this report, tools in support of replication are defined as tools that help (Follower) cities in planning, knowledge exchange and capacity building. The tools that were found available were initially grouped along these lines of purpose, as below.

#### 2.1.1. Planning Tools

- Smart City Guidance Package for Integrate Planning and Management (EIP-SCC)
- Citizen Engagement Ladder
- City strategy for smart and sustainable development
- General city plans
- Zonal/local city plans
- City strategy for smart and sustainable development
- City urban development plan
- Pre-feasibility study
- Feasibility study



- Technical/design project
- Gant diagram
- SWOT analysis
- Opportunity study
- Evaluation and decision for project implementation
- Kick-off meetings
- Project management performed by the Municipality's working team
- Regular meetings with all parties involved in project implementation with clear milestones / deadlines / deliverables / reports
- Project implementation monitoring on a regular basis (e.g. weekly, monthly)
- Efficient use of communication channels among all involved parties in project implementation
- Constant information of citizens to ensure their full support

### ***2.1.2. Tools for knowledge exchange***

- Events
- Webinars
- Physical meetings
- Workshops
- Regular virtual meetings
- Presence at related events (internal and external)
- Collaboration or visits to other LH cities and demonstration sites
- Use of an online digital platform

### ***2.1.3. Tools for capacity building***

- Mentoring visits
- Physical meetings
- Workshops
- Regular virtual meetings
- Collaboration or visits to other LH cities and demonstration sites
- Surveys on specific reform issues
- Studies on specific reform issues
- Policy and expert advice
- Conferences
- Seminars
- Workshops
- Round tables
- Staff trainings on policy issues
- Organization of awareness-raising campaigns



## 2.2. Sources of tools

For this report, two sources of tools in support of replication were explored: IRIS and other SCC01 (Lighthouse) projects and initiatives.

### 2.2.1. IRIS Deliverables as sources of tools

The IRIS deliverables are the main source of primary knowledge regarding the demonstrations in IRIS LH cities. The deliverables document the progress in LH cities as well as on the horizontal issues. Therefore IRIS deliverables are important sources of tools in support of replication. All IRIS deliverables are available on the project's repository

(<https://emdesk.eu/cms/?p=334&hash=8Ozl3MzQ1cmVkaXJlY3Q7Zm9sZGVVyc>). All public IRIS deliverables are also available on the IRIS website (<https://irissmartcities.eu/public-deliverables>).

Below is an overview of the most relevant deliverables per (group of) Work Package(s).

#### WP1 Transition strategy: five tracks to maximize integration synergy and replicability (M1-24)

- **D1.2,3,4,5,6 (M9):** Each deliverable contains a technical introduction to the corresponding Transition Track and its Integrated Solutions. Moreover, it contains detailed description of the pre-pilots along with a top-level description (objectives, technical specifications, regulatory framework, drivers and barriers, and business models) of the expected demonstrations in the LH cities. Finally, it presents the initial ideas of the LH and FCs about their **replication activities**.
- **D1.1 (M9):** The deliverable contains the initial list of KPIs that can be used for the project's monitor and evaluation phase. The KPIs are listed per Transition Track and Integrated Solution.
- **D1.7 (M12):** The deliverable provides a detailed transition strategy plan.

#### WP5, 6 and 7: the Lighthouse cities' demonstration activities (M12-60).

Compared to WP1 deliverables, these deliverables contain updated and more detailed information. The deliverables follow a common structure whenever it is possible. There are 4 rounds of LH cities deliverables:

- **D5.1, D5.2, D6.1, D6.2, D7.1, D7.2<sup>1</sup> (M12):** Per LH city two deliverables that contain the initial planning of the IRIS demonstrations in the corresponding LH city. All the measures (demonstrators) in the five transition tracks are presented. D5.1 deliverables describe the baseline, ambitions, activities, and the barriers & drivers for each of the five transition tracks (TTs) for the integrated solutions that will be demonstrated in each LH city. D5.2 deliverables provide the coordination structures and procedures concerning governance, communication, monitoring and impact analysis, local risk assessment, periodic reporting, and planning of the integration and demonstration activities in each LH city.
- **D5.3/4/5/6/7, D6.3/4/5/6/7, D7.3/4/5/6/7 (M24):** Per LH city, per Transition Track, one deliverable (15 deliverables in total) describing the set-up of demonstration activities and initial experiences of operation. All measures in the specific TT are presented in detail. These

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<sup>1</sup> D6.1 (NCA) has a different structure than the deliverables from UTR (D5.1) and GOT (D7.1). D5,7.2 are mainly for internal use in LH cities.



deliverables follow a holistic approach in the presentation of actions, as apart for the technical specifications, they cover (a) societal, user and business aspects, (b) monitoring and impact assessment, (c) commissioning plan, (d) implementation plan, and (e) ethics and GDPR compliance.

- **D5.8, D6.8, D7.8 (M48):** Per LH city one deliverable presenting the intermediate results of the demonstration activities in the corresponding LH city. The deliverable supports the finetuning and optimisation of the demonstration activities until M60
- **D5.9, D6.9, D7.9 (M60):** Per LH city one deliverable presenting the final results of the LH demonstrations. The deliverable will support the replication of the specific solutions by capturing the lessons learnt and the citizen engagement and business modelling results.

## Horizontal WPs deliverables (M6-M60)

These deliverables cover the following topics:

- EU wide cooperation with ongoing projects, initiatives and communities (WP2)
- Business modelling, financing, IPR management, exploitation (WP3)
- City Innovation Platform (WP4)
- Replication Strategy (WP8)
- Monitoring & Evaluation (WP9)
- Communication and dissemination (WP10)

## Summarizing the IRIS deliverables that are sources of tools for replication:

- D1.1 Report on the list of selected KPIs for each Transition Track
- D1.6 Report on Citizen Requirements from the Transition Track #5 Solutions
- D1.7 Transition Strategy, Commissioning Plan for the demonstration & replication work
- D2.1: Lessons learnt through cooperation with other Lighthouse projects
- D3.2 Sustainable Business Model Dash-board tool
- D3.7 Financing solutions for cities and city suppliers
- D5.1 Report on baseline, ambition & barriers for Utrecht lighthouse interventions
- D5.2 Planning of Utrecht integration and demonstration activities
- D5.3 Launch of T.T.#1 activities on Smart renewables and near zero energy district (Utrecht)
- D5.4 Launch of T.T.#2 activities on Smart energy management and storage for flexibility (Utrecht)
- D5.5 Launch of T.T.#3 activities on Smart e-mobility (Utrecht)
- D5.6 Launch of T.T.#4 activities on City Innovation Platform and information services (Utrecht)
- D5.7 Launch of T.T.#5 activities on Citizen engagement and motivating feedback (Utrecht)
- D6.1 Report on baseline, ambition & barriers for Nice lighthouse interventions
- D6.2 Planning of Nice integration and demonstration activities (Nice)
- D6.3 Launch of T.T.#1 activities on Smart renewables and near zero energy district (Nice)
- D6.4 Launch of T.T.#2 activities on Smart energy management and storage for flexibility (Nice)
- D6.5 Launch of T.T.#3 activities on Smart e-mobility (Nice)
- D6.6 Launch of T.T.#4 activities on City Innovation Platform and information services (Nice)
- D6.7 Launch of T.T.#5 activities on Citizen engagement and motivating feedback (Nice)



- D7.1 Report on baseline, ambition and barriers for Gothenburg lighthouse interventions SWOT analysis
- D7.2 Planning of Gothenburg integration and demonstration activities
- D7.3 Launch of T.T.#1 activities on Smart renewables and near zero energy district (Gothenburg)
- D7.4 Launch of T.T.#2 activities on Smart energy management and storage for flexibility (Gothenburg)
- D7.5 Launch of T.T.#3 activities on Smart e-mobility (Gothenburg)
- D7.6 Launch of T.T.#4 activities on City Innovation Platform and information services (Gothenburg)
- D7.7 Launch of T.T.#5 activities on Citizen engagement and motivating feedback (Gothenburg)
- D9.2 Report on monitoring and evaluation schemes for integrated solutions
- D9.5 Report on monitoring framework in LH cities and established baseline

### ***2.2.2. Other SCC01 projects and initiatives as sources of tools***

Other sources of tools are the other SCC01 (Lighthouse) projects and related initiatives. Most important sources among these are:

**Other Lighthouse project's deliverables**, such as REMOURBAN deliverable D5.2, Annex 2, 3: Programs for direct funding and structural funds.

**SCC01 Task Groups**, for example Task Group Business modeling and financing has created an overview (Toolkit) of deliverables published by the first seven Lighthouse project's deliverables with a business modeling and finance aspect.

**SCIS (EU Smart Cities Information System)**. SCIS is a knowledge platform to exchange data, experience and know-how and to collaborate on the creation of smart cities, providing a high quality of life for its citizens in a clean, energy efficient and climate friendly urban environment. SCIS brings together project developers, cities, research institutions, industry, experts and citizens from across Europe. SCIS publishes solution booklets, reports on barriers and drivers, guides, webinars, etc. Find all publication here: <https://smartcities-infosystem.eu/library/publications>

**EIP-SCC (The Marketplace of the European Innovation Partnership on Smart Cities and Communities)**, for example the AC Integrated Planning's Smart City Guidance Package. Find all EIP-SCC guides, toolkits and blueprints here: <https://eu-smartcities.eu/documents>

## **2.3. Allocation of tools to steps in D8.1 Replication roadmap**

Based on the lessons learnt from FCs and LHCs, IRIS D8.1 Replication Roadmap identified 13 steps in the replication process that support FCs in creation of their individual Replication plan.

The 13 steps are:

1. Identify Follower city needs, challenges, and stakeholders
2. Identify, evaluate and choose IRIS Integrated Solutions for identified transition needs
3. Create working groups for chosen Transition Tracks and Integrated Solutions



4. Map similar integrated solutions in other national smart city projects
5. Plan knowledge exchange actions
6. Plan capacity building actions
7. Design integrated solutions adapted to local circumstances
8. Use adapted business model and map funding options
9. Create FC implementation plan
10. Involve users and engage citizens
11. Identify barriers and risks, and how to address them
12. Implement
13. Monitor

Regarding step 10, *Involve users and engage citizens*: although included as a step, IRIS and other Lighthouse cities have experienced that citizen engagement is to be considered with every step in the replication process. Citizens should be constantly informed via different local media channels regarding a specific project that Municipality wants to implement, ensuring high transparency and at least majority support of citizens.

In the next Chapter, the tools in support of replication identified in this Deliverable, are allocated to the 13 steps identified in D8.1 Replication Roadmap.



## 3. Tools per step in the replication process

In this Chapter the tools are described per step in the replication process as identified in D8.1 Replication Roadmap, to make it easier for (follower) cities to focus on the most suitable tools per step in the process of drafting a Replication Plan

### 3.1. Identify Follower city needs, challenges and prioritization

- D3.2 Sustainable Business Model Dash-board tool: The document aims to help cities in the replication process of Integrated Solutions (IS) in evaluating their achievements and potentialities on the way to replication. Moreover, weaknesses and strengths of the LHCs are described in view of capturing the opportunities of replication from the LHs to the FCs. FCs could get both insights and a benchmark on the replicability of IS from LHCs to FCs.
- D9.5 Report on monitoring framework in LH cities and established baseline: The document presents the Key Performance Indicators (KPIs) that are used in each LH city for the monitoring and evaluation of the IRIS solutions. It can serve as a starting point for the evaluation of the replication potential of smart technologies in a city.
- D1.2,3,4,5,6 User, Business and Technical Requirements of T.T.#1,2,3,4,5 Solutions: FCs have already identified their early-stage needs in each TT.
- D1.7 Transition Strategy, Commissioning Plan for the demonstration & replication work: The document presents a methodology for the identification of the relevant stakeholders and citizens, as well as for the collection of their needs and challenges.
- IRIS LH Cities Deliverables: The documents present the ambitions, activities, and the barriers & drivers for each of the five TTs in each LH city.
- City strategy for smart and sustainable development, including the main objectives and directions for a sustainable city development. This strategy should include, but not be limited to, sustainable development of city districts, smart grid / smart city, smart and sustainable urban mobility, IT&C platform in different city areas (e.g. utilities, mobility, citizen engagement), and citizen engagement and co-creation. The strategy should also include a long-term implementation plan of different solutions contributing to sustainable development, and possible financial sources. City strategies for smart and sustainable development may be elaborated in zonal/district plans.
- Risk assessment, and Risks Mitigation and Contingency Planning: The Replication Roadmap and D11.5 (Chapter 4) present the IRIS risk assessment procedure. A specific tool, the Risk register (presented in D11.5) can be used to support the process. The LH cities deliverables contain risk assessment of all IRIS demonstrations.
- The SCIS publication **The making of a smart city: replication and scale-up of innovation in Europe** Once the arduous path of finding a successful new innovative solution is completed in the Lighthouse cities, the road is far from over. Innovations in general face a day of reckoning,





the moment where the costs of entering the market and upscale simply cannot be overcome. Lack of venture capital, market failures and other barriers can bring the process to a halt. This is not only a reality for smart city solutions, but because of their nature, the number of barriers are often far higher than in many other areas of innovation. Download publication:

[https://smartcities-infosystem.eu/sites/www.smartcities-infosystem.eu/files/document/the\\_making\\_of\\_a\\_smart\\_city\\_-\\_replication\\_and\\_scale\\_up\\_of\\_innovation\\_across\\_europe.pdf](https://smartcities-infosystem.eu/sites/www.smartcities-infosystem.eu/files/document/the_making_of_a_smart_city_-_replication_and_scale_up_of_innovation_across_europe.pdf)

- The SCIS publication **The making of a smart city: best practices across Europe**. Ensuring that successful innovative technologies tested in European cities are replicated in other budding projects lies at the heart of the Smart Cities Information System (SCIS). Bringing together project developers, cities, institutions, industry and experts from across Europe, SCIS encourages the exchange of data, experience and know-how to collaborate on the creation of smart cities and an energy-efficient urban environment.

Download publication: [https://smartcities-infosystem.eu/sites/www.smartcities-infosystem.eu/files/document/the\\_making\\_of\\_a\\_smart\\_city\\_-\\_best\\_practices\\_across\\_europe.pdf](https://smartcities-infosystem.eu/sites/www.smartcities-infosystem.eu/files/document/the_making_of_a_smart_city_-_best_practices_across_europe.pdf)

- The EIP-SCC publication **Smart City Guidance Package – A Roadmap for Integrated Planning and Implementation of Smart City projects**. The Smart City Guidance Package (SCGP) helps to plan and implement smart city and low energy district projects in an integrated way by describing common situations and giving real-life examples. It bundles the generously shared experiences and expertise of cities, businesses, citizens, research institutes and Non-Governmental Organisations (NGOs) that work together in the European Innovation Partnership Smart Cities and Communities (EIP-SCC).

Download publication: [https://eu-smartcities.eu/sites/eu-smartcities.eu/files/2019-07/Smart%20City%20Guidance%20Package%20LowRes%201v22%20%28002%29\\_0.pdf](https://eu-smartcities.eu/sites/eu-smartcities.eu/files/2019-07/Smart%20City%20Guidance%20Package%20LowRes%201v22%20%28002%29_0.pdf)

### 3.2. Identify, evaluate and choose IRIS Integrated Solutions for identified transition needs

- **Opportunity study, pre-feasibility study, feasibility study.**

An opportunity study is a first analysis, performed in-house or by a specialized company, that determines if the specific project is feasible from different points of view (i.e. technical, energy, financial, economic, social, environmental, etc.). This study can have a quite high degree of error. Based on the results (positive or negative) the decision regarding further project analysis can be taken.

A pre-feasibility study analyses different solutions for a specific project and the result of this analysis is choosing the optimal solution for a specific project. The degree of error in this case is lower than in the opportunity study, but still can be about 20-25 %. It is recommended that this study is elaborated by a specialized company in order to increase the objectivity of the analysis.



A feasibility study is an analysis that takes all project's relevant factors into account—including economic, technical, legal, and scheduling considerations—to ascertain the likelihood of completing the project successfully. The study is a detailed analysis of the optimal solution provided by pre-feasibility study and the degree of error is quite low about 5%. The feasibility study should be based on more precise estimations of investment costs, revenues and expenses. It is recommended that this study is elaborated by a specialized company in order to increase the objectivity of the analysis.

- **Software tools for assessing replication measures of integrated solutions.**

In order to assess the performance of the replicated measures, the use of appropriate numerical tools either simple or more complicated embedded on house-built or commercial software can be a promising way. In order to make the selection of the most appropriate ones, for meeting the targets of the replication studies, aiming at enhancing the short-term goals of Follower Cities for tendering and designing the necessary specifications of the necessary equipment, a set of criteria could be used to ensure that the software selected is fit for that purpose:

- Technical capacity to model the replicated technologies.
- Cost-effectiveness: The use of advanced modelling software that requires significant resources (cost for purchase, training, use) is not considered suitable for the feasibility analysis. Selected software should be easy to use and cost-effective.
- User friendliness: Assessing the feasibility of the replicated solutions requires communication of results between different stakeholders, many of which may not hold extensive technical knowledge may be involved in the process at the early stages of a project. User-friendly software will contribute to higher levels of stakeholder engagement.
- Ability to provide results fast to allow for the assessment of several replication measures and their combinations and facilitate the iterative process of the analysis.
- Ability of the software to provide results using simplified/easy to obtain input data as detailed information is not usually available at the preliminary stage of the projects.
- Ability to provide results in a format that can easily be used for the KPI's analysis.

Initially and based on a literature survey, a range of available software was considered for the purposes of the analysis. Different software with different model capabilities were reviewed due to the requirement to determine energy loads and energy production at both the building and district levels. These are presented in Table 1, while considering the above criteria, RETScreen Expert and EnergyPlan were recommended to support the specific replication activities.

Table 1: Review of available software for the purpose of the Transition Track 1 Integrated Solutions

	Building analysis	System analysis	District/ grid analysis	Heat	Electricity	Transport	Storage	Simulation level	Access
TRNSYS	X	X	X	X	X	X	X	Detailed generic simulations of transient systems	Priced
HOMER Pro	-	X	X	X	X		X	Advanced simulation for assessing power plant and grid performance	Priced
PV SYST	-	X	-	-	X	-	X	Advanced simulation for assessing PV performance	Priced
T*sol	-	X	-	X	-	-	X	Advanced simulation for solar thermal systems performance	Priced
PV*sol	-	X	-	-	X	-	X	Advanced simulation for assessing PV performance	Priced
GeoT*sol	-	X	X	X	X	-	X	Advanced simulation for assessing heat pump and/or solar thermal system performance	Priced
IDA ICE	X	X	-	X	X	-	X	Detailed simulations	Priced
ESP-r	X	X	-	X	X	-	X	Detailed simulation of building thermal and electricity loads and HVAC systems. Capacity for façade integrated PV	Free
EDSL Tas	X	X	-	X	X	-		Detailed simulation of building thermal and electricity loads and HVAC systems	Priced
Design Builder	X	X		X	X	-		Detailed simulation of building thermal and electricity loads and HVAC systems	Priced
Energy Plus	X	X	-	X	X	-	X	Detailed simulation of building thermal and electricity loads and HVAC systems	Free
RETScreen	X	X	X	X	X	-	X	Preliminary analysis of various renewable energy and energy efficiency measures	Priced
Energy Plan	-	-	X	X	X	X	X	Advanced simulation of complex energy systems at regional level	Free
Energy Pro	-	X	X	X	X	-	X	Advanced simulation of complex energy systems at system/regional level	Priced

**RETScreen Expert<sup>2</sup>** is a Clean Energy Management software used for the feasibility analysis of renewable energy and energy efficiency projects. The software includes extensive databases for technical and cost parameters of different technologies, as well as worldwide climate data, facilitating the quick evaluation of the technical, financial and environmental performance of individual systems or combinations of themes, mainly on a building level. The software has extensive capabilities for performing financial analysis and risk assessment of a potential investment, as well as estimating the emissions reductions resulting from the renewable energy and/or energy efficiency measures considered. Most representative renewable energy technologies are included in RETScreen. In addition, the energy consumption of buildings is also taken into account. The cost of the software is relatively low or even free on viewer mode, rendering it as a cost-effective solution for projects, where many stakeholders, even not much experienced, are involved.

**EnergyPlan<sup>3</sup>** is a simulation software developed for the assessment of national or regional energy systems. The analysis is conducted on an hourly basis and involves all main energy sectors, i.e. heating, cooling, electricity, industry and transport. The model considers all main renewable energy and energy storage technologies. It is deterministic in nature and is structured as simple input and output model, where the user enters the energy demands (electricity, heating, cooling etc), as well as the capacities and fuels of power stations and renewable energy plants and the model calculates the energy production, the energy balance, electricity imports and exports and the resulting emissions from an energy system. Inputs are provided by the user in the form of a single annual value (in the case of energy demand) or a single plant capacity (in the case of energy production facility) and an hourly distribution profile for the whole year. It is therefore suitable for performing the early stage analysis required for the replication activities roadmap. Despite the fact that EnergyPlan was developed to simulate much larger and complicated systems, it was proven useful for performing the technical analysis of the technologies replicated at the district level.

RETScreen and EnergyPlan have already been used in FC Alexandroupolis. In that city, the typical case study of replicating and assessing the performance of IRIS solutions at district scale was conducted in two steps. At first, the energy balance of buildings was obtained in RETScreen. The user entered the climate data (from the software database or manually), the desired indoor conditions and the properties of the building fabric (building geometry, thermophysical properties of building elements, internal gains etc) and building systems (in terms of technology, fuels, and system efficiency). Renewable energy production was also taken into account to offset part or all of the heating and electricity loads. The software then provided the heating, cooling and electricity loads. This step is repeated for all buildings or groups of buildings of the district.

The aggregated energy production and consumption data from all buildings are then used as an input in EnergyPlan to obtain the energy balance of the district. For this, annual values of heating, cooling and electricity demand were used. It should be noted that the user is required

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<sup>2</sup> <https://www.nrcan.gc.ca/maps-tools-publications/tools/data-analysis-software-modelling/retscreen/7465>

<sup>3</sup> <https://www.energyplan.eu/>



to enter an hourly distribution profile of these demands. Heating and cooling hourly distributions may be determined with the use of hourly weather data (TMY) and the use of Heating and Cooling Degree Days, while the hourly profile of the electricity demand may easily be developed by the user. Renewable energy production is also considered, and energy storage technologies are also considered and the resulting energy balance is provided on an hourly basis.

More information about the use of these tools is available on the specific IRIS webinar entitled “How numerical software tools support the creation of replication plans in smart cities energy projects” which is available on the IRIS website<sup>4</sup>.

- **SCIS Solution booklets.**

Written in co-creation with one or more Lighthouse projects on a specific solution, for other cities to reduce the effort, speed up the process, strengthen quality and confidence in outputs, align across disciplines, and generally prepare a city to engage the market to acquire a solution. Find all solution booklets here: <https://smartcities-infosystem.eu/solutions>

Here follows a short description regarding three of the booklets, as examples:

### **E-BUS SOLUTION BOOKLET**

This solution booklet presents electric buses’ replication potential and barriers from a technical, financial, social and governance perspective. Desk research, expert interviews with different stakeholders and webinars were conducted in order to gather experiences from various EU/national/regional/local projects in different European countries.

Download booklet: <https://smartcities-infosystem.eu/content/e-bus>

### **URBAN FREIGHT LOGISTICS SOLUTION BOOKLET**

Urban freight logistics cover all movements of goods into, out of, through or within the urban area made by light or heavy vehicles, including service transport and demolition traffic as well as waste and reverse logistics.

This ambition is complemented by the European Commission’s interest regarding Urban Freight Logistics, as the White Paper on transport states in its initiative “Zero emission urban logistics in major urban centres by 2030”; its main actions intend to:

- Produce best practice guidelines to better monitor and manage urban freight flows.
- Define a strategy for moving towards ‘zero emission urban logistics’, bringing together aspects of land planning, rail and river access, business practices and information, charging and vehicle technology standards.
- Promote joint public procurement for low emission vehicles in commercial fleets (delivery vans, taxis, buses).

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<sup>4</sup> <https://irissmartcities.eu/content/webinar-how-numerical-software-tools-support-creation-replication-plans-smart-cities-energy>



Download booklet: <https://smartcities-infosystem.eu/content/urban-freight-logistics>

## PV AND BATTERY SOLUTION BOOKLET

The overall goal of the transition in the electricity system is to increase the share of renewable energy sources in buildings and neighborhoods. The large-scale rollout of photovoltaic (PV) panels and battery energy storage systems (BESS) play an important role in this perspective.

Download booklet: <https://smartcities-infosystem.eu/content/batteries-and-pv>

### 3.3. Create working groups for chosen Transition Tracks and Integrated Solutions

Curate FX tool<sup>5</sup> helps different stakeholders to manage digital information and the digital ecosystem as a whole. It gives users the ability to make faster, more confident, more informed, collaborative decisions around complex business scenarios. Regarding the IRIS case, the CurateFX platform provides several capabilities:

- Enable the management of data exchanges related with the City Innovation Platform (CIP);
- Represent all the stakeholders involved in a specific use case and all the relations between these stakeholders at contractual, financial and technical levels; and
- Contribute to the formulation of specific business and technical objectives through the representation provided.

Curate FX is presented in detail in IRIS D1.7 (Annex 2).

### 3.4. Map similar integrated solutions in other national smart city projects

- SCIS (EU Smart Cities Information System) resources (booklets, publications, guides, webinars, etc.)
- EIP-SCC (The Marketplace of the European Innovation Partnership on Smart Cities and Communities resources)

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<sup>5</sup> <https://www.tmforum.org/curatefx/>

## 3.5. Plan knowledge exchange actions

### 3.5.1. Possible knowledge exchange tools

The following instruments are available for knowledge exchange between LH and FC, as well as within the ecosystem of a LC.

#### *Webinars*

Webinars cover broader topics (i.e. Positive Energy Buildings, Electricity Grid Flexibility, MaaS, etc.). They include 2-3 presentations from experts in the field, Q&A, and discussion on specific topics. The webinars will help novice partners or local stakeholders to understand a topic. Moreover, Q&A and discussion could help experienced partners to solve implementation problems. Finally, webinars are open to external audiences, so they can be used to disseminate the IRIS project's results.

#### *Storytelling Activities*

Narratives and storytelling have been used for a long time as powerful communication tool. They offer increased comprehension, interest, and engagement. In the 4<sup>th</sup> CPB meeting in VAASA, IRIS partners agreed to share short video clips (3 to 6 minutes) to report to each other:

- **Local introductions;** short generic introductions to local demonstrators, issues and solutions.
- **Plans and questions;** short clips on proposed local actions for which they would like to get feedback or advice from other partners to inform their decision making
- **Bears;** obstacles on their road in the project that might set them back in achieving their project results
- **Victories;** lessons learned of small or larger local successes, potentially inspiring other partners to try out to replicate these victories in their own local contexts.

Another type of similar activity is “The Making of IRIS” interview series by Muriel Pels. Muriel interviews key persons from the IRIS LH cities that were involved in the preparation of the IRIS proposal. These interviews aim to provide insight in the process that resulted in the demonstration description in each LH city and consequently to help the FC to create their replication strategy. Some indicative questions are: How to come to choices for specific integrated solutions to accelerate the energy transition, in a specific district, in a given time? How to find the stakeholders and connect their interests collaboratively in an investment plan? At time of writing and finishing of this report, only the interview with Utrecht is available. The interviews with LHCs Gothenburg and Nice will be available after M30 of the IRIS project.

Storytelling can be also used to communicate experiences gained during the implementation of the IRIS demonstrations. LHCs and FCs can exchange experiences on how to create bankable business models, engage citizens and stakeholders, setup the monitoring protocols, create justified impacts, build the local ecosystem, manage complex technical projects across contradictory interests, mobilise partners, develop IPR agreements, etc. +CityxChange project has a similar activity named ‘Storytelling workshops’.

The initial outcomes of the above-mentioned activities can be further elaborated and enhanced to create richer documents like the metro map proposed by HKU, infographics, interactive PDFs, etc. offering a transmedia storytelling experience. Even the technical presentations of the IRIS solutions can be enhanced by adding audio narrative.



## *IRIS Factsheets*

The Factsheets will be short documents (4-8 pages), aiming to give an overview of an IRIS solution. One factsheet per Integrated Solution per LH city will be made. The Factsheets will use information from the LH Cities deliverables. The first version of the factsheets will be created during months 24-36 and the updated/extended version during months 48-60. The factsheets will be placed as an annex to D8.14 (Capacity building activities based on the IRIS smart cities tool-box M60).

## *SCIS Solution Booklets*

The EU Smart Cities Information System (SCIS) consolidates knowhow from European smart cities projects and creates guides for smart cities solutions. Each solution booklet includes a summary of the management framework, the societal and business aspects, technical specifications, business models and financing options, governance and regulation frameworks, and lessons learned. Each booklet is about 32-36 pages and it is primarily written for cities. It seeks to reduce the effort, speed up the process, strengthen quality and confidence in outputs, align across disciplines, and generally prepare a city to engage the market to acquire a solution. Three booklets are already available (November 2019) about e-buses, urban freight solutions, and batteries and PV<sup>6</sup>.

## *IRIS Exploitation plan*

The IRIS exploitation plan was published in M24 (D3.8). The plan contains useful information about the IRIS solutions that helps partners to find the most appropriate for their city. Moreover, it presented the roles of partners in the different solutions.

## *IRIS Workshops during CPB meetings*

The IRIS partners meet physically every 9 months during Consortium Plenary Board meetings. During these meetings many workshops are organized. Some of them aim to facilitate the preparation of specific deliverables while the other cover issues that are of a great interest of the partners.

## *Site visits*

Study visits are designed to provide the opportunity to see first-hand technological application of the smart solutions and meet the local industry partners. The visits will be organised to LH cities and all the FCs will participate. A group (about 20 people) of representatives from different FC will visit a LH city to explore solutions in a specific TT. Site visits offer also the opportunity to organise workshops on topics relevant to demonstrated solutions.

## *Mentor visits*

IRIS FCs will host mentoring visits in their city. Those visits will take the form of a LH city (~2-3 city experts) visiting a follower city as a mentor, to help local partners work out how the chosen measure/solution could be adapted/implemented in their own context. The aim of the visits is to support short-term wins and improvements, which can accelerate the follower city replication roadmap. Task 8.1 foresees 1 mentoring visit per follower per year, in other words three mentoring visits between year 3 and 5 of the project.

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<sup>6</sup> <https://smartcities-infosystem.eu/solutions>





### On-line infrastructure

- **Project website:** To show off solutions in a more structured and compelling way, a website should not ‘mirror onto internal structure’ but have a thematic transition track approach.
- **Online document repository:** The official project’s repository contains the submitted deliverables as well as the contact details of all partners. Example: EmDesk.
- **Online communication and collaboration platform.** The platform supports the creation of working groups to post status updates, to share info and resources, to ask questions, and to collaborate. Example: Microsoft Teams Platform and GoToMeeting communication tool.

### Other knowledge exchange instruments

- Physical and virtual meetings, workshops.
- Guidelines, handbooks.
- Presence and presentations at relevant events (internal and external).

## 3.5.2. IRIS knowledge exchange planning for M27-M36

During M27-M36 of the IRIS project, the following knowledge exchange activities are planned.

### IRIS LH Cities deliverables:

The 2<sup>nd</sup> round of LH deliverables (D5,6,7.3,4,5,6,7) will be available during December 2019. These deliverables describe the set-up of demonstration activities and initial experiences of operation for all IRIS measures (demonstrators). To achieve the maximum reach of the presented information without overload the LH partners the following process is proposed:

1. The PMT will inform FCs about the availability of the deliverables
2. The FCs teams will analyse the deliverables and identify key demonstrators with replication interest.
3. The Microsoft Teams platform will be used as interaction tool to collect questions. Roel and Panos will create the appropriate channels to capture questions and feedback.
4. If a sufficient interest from FCs in a specific deliverable is expressed, a conference call will be organised between the LH partners that were involved in the preparation of the deliverable and the interested FCs.
5. The Microsoft Teams platform will be used to collect additional feedback from LH partners.

### Webinars

The following table presents the webinar topics that agreed during the knowledge exchange working session organised during IRIS 4<sup>th</sup> CPB in Vaasa.

TT1, TT2	TT3	TT4
<ul style="list-style-type: none"> <li>• Positive Energy Buildings</li> <li>• Electricity Grid Flexibility</li> <li>• Low Temperature DH/DC</li> </ul>	<ul style="list-style-type: none"> <li>• V2G energy management</li> <li>• V2G e-buses</li> <li>• Free floating EV sharing scheme</li> <li>• Mobility as a Service (MaaS)</li> </ul>	<ul style="list-style-type: none"> <li>• Digitalisation of the real estate industry</li> </ul>

For each webinar a number of thematic areas have been identified. CERTH has contacted the most appropriate partners to organise the webinars for TT1, 2, 3. CIV is expected to do the same for TT4. Our



target is to have about 4 to 5 webinars before March 2020. There will also be a webinar regarding TT5 Citizen Engagement organised by IRIS project partner HKU.

### *Storytelling activities*

Three types of storytelling activities will take place:

- **Short videos related to TT5 activities (citizen engagement).** HKU will coordinate the creation of these videos and their publication in a poster containing a metaphoric ‘metro map’. Each clip, securely posted on YouTube, will generate a unique URL. HKU will turn each URL into a QR code. Part of the poster will contain small clips provided by HKU revisiting the key aspects of IRIS design-based methodology as part of WP1 to revisit some of its key components. This could provide LH and FCs with material that can help ‘onboard’ professionals that join the project at a later stage.
- **“The Making of IRIS” interview series.** Continuation and completion of interviews (GOT+NCA). Processing of the materials to create a transmedia storytelling experience (infographics, interactive PDFs, website articles).
- **Storytelling to address specific ‘roadmap’ steps in the Joint FC monthly calls.** In the monthly calls between the FCs a time slot could be used from one partner to present his experience in a specific topic that is related to the replication process. HKU and ESCI could provide instructions on the process. +CityXchange project has a deliverable that presents the way that storytelling is used for knowledge exchange.

### *IRIS Factsheets*

5 factsheets (at least one for each TT) to be produced before September 2020. See annex 1 for an example regarding TT3 on mobility.

### *IRIS Workshops during the 5th CPB in Santa Cruz Tenerife*

Because of the global COVID-19 situation the 5<sup>th</sup> CPB meeting of IRIS was arranged as a digital CPB meeting 31 March – 2 April. During the meeting several Peer 2 Peer meetings were arranged where representatives from the LHCs and the FCs could discuss specific demonstrations and ISs. Results of the replication activities of the FCs were presented and Key Exploitable Results were worked upon in digital workshops. Many follow-up meetings were agreed upon to continue knowledge exchange between LHC and FC stakeholder, partners and experts.

## **3.6. Plan capacity building actions**

- Studies on specific reform issues. Local Authorities can use consulting companies to create studies on particular topics related to smart city strategy. These studies could provide a broad overview, but the main focus must be on the local context.
- Surveys on specific issues to identify knowledge gaps in involved teams. These surveys can be on-line but also off-line (paper questionnaires). There are many solutions to create on-line surveys, i.e. Google Forms, Microsoft Forms, TypeForm, Survey Monkey, etc.
- Policy and expert advice. Local Authorities can hire experts from local universities and R&D institutions, but also from the private sector to support the internal team during the planning and implementation process. The involved experts could vary based on the specific needs that must be fulfilled at a particular phase. It is more useful to have a group of experts rather than an individual. Expert advisory panels are a group of appointed experts who typically provide



technical advice and recommendations based on their expert knowledge on specific issues directly to policymakers. The members of the panel should be independent from government or decision-makers.

- Conferences: general-purpose events that could be used on specific phases of the process. In the beginning, a conference could be used to inaugurate the process, in the middle to present the intermediate results, and in the end, to showcase the final results of the smart city projects.
- Seminars: Seminars provide tools and methods to enhance the capacities of a local group. They offer an exciting opportunity to foster dialogue between experts and local players on a variety of topics related to smart cities. Seminars also allow project partners to understand the related technologies, methodologies better, and in general, the context in which they will be operating. Seminars usually last 3-5 days. Some indicative topics: Smart city leadership, strength and barrier identification and prioritisation, data leadership, data prioritisation, stakeholder engagement, governance & process evaluation. Also, the IRIS Integrated Solutions could be the topics for seminars.
- Workshops: Workshops generally involve collaborative planning and action-oriented training to solve relevant problems. As hands-on approach, workshops often include learning via role-playing and experimentation as opposed to lecture- or classroom-style format. The workshops can bring together the project leaders and a selection of relevant urban local authorities, stakeholders and industry experts in a safe and open space to share experiences, learn from best practices, benefit from peer-to-peer support, and begin working together to find innovative solutions to their local challenges. Workshops usually are 1- or 2-days events. The deliverables D6.1 and D1.7 present a detailed methodology for organising co-creation workshops.
- Round tables: Roundtable discussions are small group discussions where everybody has an equal right to participate. Roundtables can encompass many different formats; roundtables are a form of academic discussion, used as a technique for community and public engagement, and may also be used by organisations and businesses. Roundtables are generally not open to the broader public but involve a relatively small number of participants who discuss or deliberate on a topic that is usually identified beforehand. The fundamental principle underpinning a roundtable is that all participants are on equal footing.
- Staff trainings on policy issues: Staff training is the process of training the current staff of the organization for enhancing the performance of the staff as well as the productivity of the organization. Some indicative topics: Basics of urban planning, strategic planning and land use transport integration, public-private partnerships, e-governance, project management, financial planning, etc.
- Organization of awareness-raising campaigns: The awareness-raising campaigns are activities that aim to create awareness on particular topics, behavioural change among the general population and to improve the focus on better outcomes. They often take the form of mass media campaigns. Messages can be conveyed through many different channels, such as mass media (television, radio), social media, public relations, events, talks, demonstrations, tours and leaflets. Awareness-raising campaigns are recognised as one of the most efficient and effective means of communicating information, especially to the general public.



## 3.7. Design integrated solution adapted to local circumstances

- D7.1 Report on baseline, ambition and barriers for Gothenburg lighthouse interventions SWOT analysis: The document presents the IRIS Framework for Action Plan per Integrated Solution.
- LH Cities Deliverables for M12 present how LH cities design their demonstrations.

## 3.8. Use adapted business model and map funding options

- D3.7 Financing solutions for cities and city suppliers
- D5.3 Launch of T.T.#1 activities on Smart renewables and near zero energy district (Utrecht)
- D5.4 Launch of T.T.#2 activities on Smart energy management and storage for flexibility (Utrecht)
- D5.5 Launch of T.T.#3 activities on Smart e-mobility (Utrecht)
- D5.6 Launch of T.T.#4 activities on City Innovation Platform and information services (Utrecht)
- D5.7 Launch of T.T.#5 activities on Citizen engagement and motivating feedback (Utrecht)
- D6.3 Launch of T.T.#1 activities on Smart renewables and near zero energy district (Nice)
- D6.4 Launch of T.T.#2 activities on Smart energy management and storage for flexibility (Nice)
- D6.5 Launch of T.T.#3 activities on Smart e-mobility (Nice)
- D6.6 Launch of T.T.#4 activities on City Innovation Platform and information services (Nice)
- D6.7 Launch of T.T.#5 activities on Citizen engagement and motivating feedback (Nice)
- D7.3 Launch of T.T.#1 activities on Smart renewables and near zero energy district (Gothenburg)
- D7.4 Launch of T.T.#2 activities on Smart energy management and storage for flexibility (Gothenburg)
- D7.5 Launch of T.T.#3 activities on Smart e-mobility (Gothenburg)
- D7.6 Launch of T.T.#4 activities on City Innovation Platform and information services (Gothenburg)
- D7.7 Launch of T.T.#5 activities on Citizen engagement and motivating feedback (Gothenburg)
- REMOURBAN deliverable D5.2 Annex 2,3: Programs for direct funding and structural funds
- National funding agencies
- EU and NON-EU funding opportunities
- EIB (European Investment Bank).

The European Investment Bank is the lending arm of the European Union. The EIB Group has two parts: the European Investment Bank and the European Investment Fund. The EIF specialises in finance for small businesses and mid-caps. EIB publishes overviews of the annual EIB investments in EU countries:

- for Finland: <https://www.eib.org/en/publications/econ-eibis-2019-finland>

- for Greece: <https://www.eib.org/en/publications/econ-eibis-2019-greece>

- for Romania: <https://www.eib.org/en/publications/econ-eibis-2019-romania>

- for Spain: <https://www.eib.org/en/publications/econ-eibis-2019-spain>



Projects funded by EIB must be bankable and comply with high social, technical and environmental standards. EIB hosts a variety of experts within economy, engineering and financial analysis as well as climate and environment. EIB funds entities within the private as well as the public sector and supports small companies and start-ups through local banks. Mid-cap companies can receive support from EIB for research and development investments, but the support is in general limited to half of the cost of a project in order to crowd in financing from private investors and other public financial institutions.

For projects, supporting innovation, capacity and knowledge generation EIB accepts more risk than commercial banks and EIB can offer technical assistance to help prepare and implement projects. To benefit from financial support through EIB, a project needs to undergo the standard EIB due diligence process to verify if the project is eligible for EIB financing.

More information regarding the EIB and replication within the IRIS project can be found in the deliverable *D3.7 Financing solutions for cities and city suppliers* and on the EIB web-page.

<https://www.eib.org/en/>

### 3.9. Create FC implementation plan

- Gantt chart: a type of bar chart that illustrates a project schedule. This chart lists the tasks to be performed on the vertical axis, and time intervals on the horizontal axis. The width of the horizontal bars in the graph shows the duration of each activity. Gantt charts illustrate the start and finish dates of the terminal elements and summary elements of a project. Terminal elements and summary elements constitute the work breakdown structure of the project. Modern Gantt charts also show the dependency (i.e., precedence network) relationships between activities. Gantt charts can be used to show current schedule status using percent-complete shadings and a vertical "TODAY" line as shown here.
- SWOT analysis: a technique used to determine, define and analyze project's Strengths, Weaknesses, Opportunities, and Threats – SWOT. SWOT analysis can be applied to an entire company or organization, or individual projects within a single department.
- Technical design of project: this includes all technical details for project implementation. It should be elaborated by a specialized company and its elaboration can start once the project implementation decision has been taken. After project implementation technical/design project can be updated to "As built" form including all changes compared to initial version.

### 3.10. User involvement and citizen engagement

- IRIS Citizen Engagement Ladder

IRIS partner HKU designed the Citizen Engagement Ladder approach following in-depth consideration of complementary activities in related Smart City and other ICT-driven projects, participation in the related EIP-SCC activities, and an extensive tour d'horizon of related approaches and methodologies.



This approach involves extensive awareness-raising among project stakeholders and capacity building on related issues. LH cities are currently following this approach with local stakeholders and stakeholder groups in order to raise awareness of the importance of citizen engagement in the deployment of Integrated Solutions.

More information regarding the Citizen Engagement Ladder can be found in the deliverable D1.6 Report on Citizen Requirements (IRIS Transition Track #5).

[https://irissmartcities.eu/system/files/private/irissmartcities/d1.6\\_user\\_business\\_and\\_technical\\_requirements\\_of\\_transition\\_track\\_5\\_solutions\\_v1.2.pdf](https://irissmartcities.eu/system/files/private/irissmartcities/d1.6_user_business_and_technical_requirements_of_transition_track_5_solutions_v1.2.pdf)

### 3.11. Identify barriers and risks, and how to address them

- IRIS Risk Register

The IRIS Risk Register can be used by project managers as a management tool for monitoring the risk management processes within the project and it is used to identify, assess, and manage risks down to acceptable levels through a review and updating process. The purpose of a Risk Register is to record the details of all risks that have been identified along with their analysis and plans for how those risks will be treated. D11.5 (Quality Assessment Plan, Risk Assessment and Contingency Plans) in section 4.1 has instructions on how to use the Risk Register. The Risk Register is available as a Microsoft Excel file and can be downloaded from the EmDesk (<https://emdesk.eu/cms/?p=334&hash=f7bGF0ZXN0OzI3NzYxMg|ZG93bmxxvYWQ9>).

- SCIS publication **Why may replication (not) be happening - Recommendations on EU R&I and regulatory policies**

This report investigates why replication of smart urban energy, mobility and ICT solutions for a clean energy future may be difficult. While evidence from smart city projects suggests that the devil is often in the details, it is at the same time possible to determine common mechanisms that appear to hamper replication. The report identifies and discusses some general barriers and presents opportunities for overcoming them. Further, more specific barriers and opportunities will be examined in follow-up publications with a view to formulating additional policy recommendations. Download publication:

[https://smartcities-infosystem.eu/sites/www.smartcities-infosystem.eu/files/document/4767\\_scis\\_report\\_2x16-20seiten\\_web.pdf](https://smartcities-infosystem.eu/sites/www.smartcities-infosystem.eu/files/document/4767_scis_report_2x16-20seiten_web.pdf)

### 3.12. Implement

- A kick-off meeting should be organized at the beginning of project implementation. All stakeholders should participate at this meeting. General and specific objectives/ responsibilities/ deliverables etc. should be discussed and set.

Project management team: for each specific project there should be a project management team including Municipality personnel for management and monitoring of project implementation. At the level of Municipality there should only one person who supervise a



specific project implementation and leads the Municipality's working team. There should always be only one communication channels between two parties involved in the project implementation. This way, misunderstandings that can lead to delays/penalties/etc. can be avoided.

- Regular meetings with all parties involved in project implementation with clear milestones / deadlines / deliverables / reports. These meetings aim to set responsibilities and deadlines, check and approve deliverables/reports/works/etc, set tasks, and monitor activities.
- Project implementation monitoring on a regular basis (e.g. weekly, monthly) by the Municipality's working team, in order to check the implementation, deadlines, deliverables, avoid delays, deal with delays, avoid penalties and deal with penalties, etc.
- Efficient use of communication channels among all involved parties in project implementation
- Constant information of citizens to ensure their full support

### **3.13. Monitor implemented projects using KPIs**

- D1.1 Report on the list of selected KPIs for each Transition Track: The document contains a list of KPIs that can be used for facilitating the monitoring phase of the demonstrated Solutions and their evaluation. The repository of KPIs will differentiate based on the character of each of the five Transition Tracks (TT) already identified and described in the context of IRIS.
- D9.2 Report on monitoring and evaluation schemes for integrated solutions: The document contains the KPIs and target numbers in relation to the all-embracing monitoring program, designed to be able to evaluate the effectiveness and impact of the cities proposed integrated solutions at different time horizons, including necessary harmonization of metrics. The document also contains an evaluation plan based on defined KPIs as well as a defined monitoring program, which is necessary to create a baseline for later reference.
- D9.5 Report on monitoring framework in LH cities and established baseline: The document presents the Key Performance Indicators (KPIs) that are used in each LH city for the monitoring and evaluation of the IRIS solutions. It also presents how these KPIs will be measured in each demonstration.



## 4. Output to other work packages

This deliverable will mostly consist of material gathered from other work packages and will therefore not contribute with much new information to the other work packages. It will however offer a great overview of all input from other work packages regarding replication, and can therefore provide valuable information for coming deliverables in other work packages. Especially *WP 2 EU wide cooperation with ongoing projects, initiatives and communities* will find useful information to communicate to other projects and co-operations. *WP 10 Communications and Dissemination* will receive a helpful overview of results in the IRIS project that can be of interest to be communicated outside the project, and foremostly to the FCs of the IRIS project. *WP 3 Development of Bankable Business Models and Exploitation Activities* will have use of the list of tools available while working on the Key Exploitable Results of the IRIS project. The whole IRIS project will also use this document for working on the digital platform for the project.

On a general level the overview of all tools in the project will be of interest for all partners in the project, and also of interest to parties outside the project who are looking for tools to accelerate their replication processes.





## 5. Conclusions

The replication toolbox provides a set of existing tools to plan, and carry out, replication actions in a city, with focus on the follower cities of the IRIS project, but also for other cities interested in replicating the solutions within the IRIS project. By using the tools in this document, during the different phases of the roadmap, follower cities will be able to create their individual replication plans and carry out the process of implementing replication of chosen LH demonstrated solutions. Using this list will provide an overview of what tools are available for the replication process, and also in which step of the process they can be used, where to find them and how to use them. Having the toolbox on the side while going through the steps in the replication roadmap will provide FCs in the IRIS project with a clear path towards successful replication.

There will also be many new tools to be made available after the first version of this report is delivered, amongst others factsheets for all IRIS integrated solutions, see Annex 1. The factsheets will be made available on the IRIS homepage.

*D8.3 Replication tool box*, supports the use of deliverable *D8.1 A Roadmap for replication of activities*. In the same way, the upcoming deliverable *D8.2 A mentoring roadmap* [M36] will support the use of both of the previous deliverables. The deliverable *D8.2 A mentoring roadmap* [M36] will focus on the “how” of knowledge exchange, capacity building and mentoring actions. Tools such as webinars, Peer 2 Peer meetings with experts and stakeholders, staff exchange, site visits and mentoring visits will be the main focus during the work within *D8.2 A mentoring roadmap*.

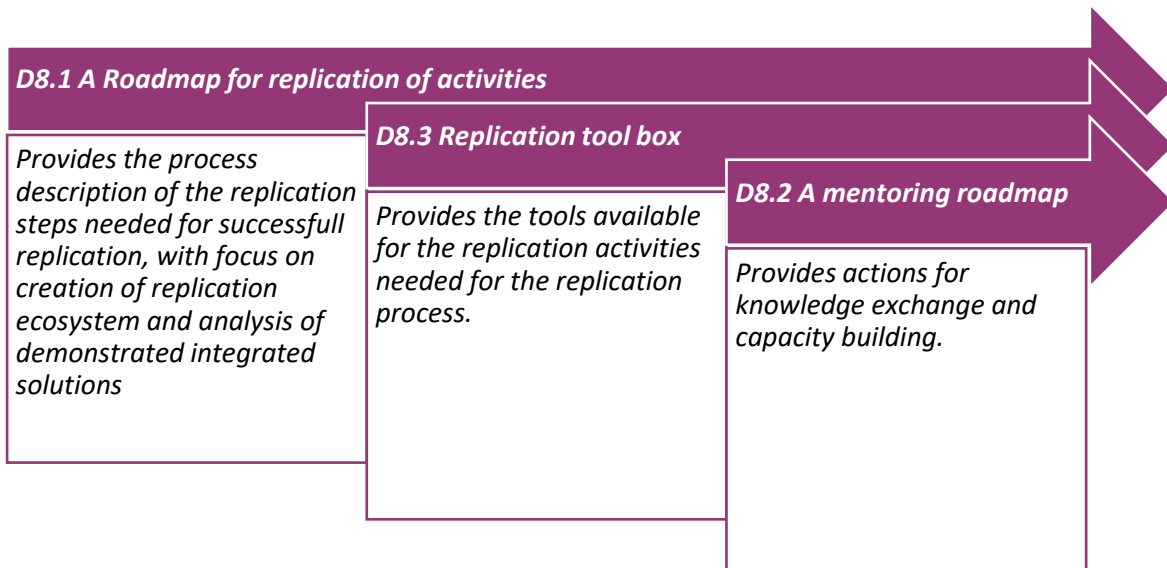


Figure 1 How the WP8 deliverables are associated with each other to support the IRIS replication process



## 6. References

- [1] D6.1 (NCA) has a different structure than the deliverables from UTR (D5.1) and GOT (D7.1). D5,7.2 are mainly for internal use in LH cities.
- [2] <https://irissmartcities.eu/content/webinar-how-numerical-software-tools-support-creation-replication-plans-smart-cities-energy>
- [3] <https://smartcities-infosystem.eu/solutions>
- [4] Participedia: Roundtable Discussion (<https://participedia.net/method/5309#>)



# Annex 1: Factsheet (example)

Factsheets regarding demonstrated solutions will be produced for each transition track (TT) for each city. The factsheets will be produced during the year 2020.

The first one to be created as an example of how they will be is a factsheet regarding mobility as a service (Maas) in Gothenburg.

## Maas in Gothenburg

A new Mobility as a Service (MaaS) concept called EC2B (“Easy to be” or “Easy to B”), will be implemented in Gothenburg. EC2B offers customers an attractive alternative to owning their car, allowing easy access to a variety of transport modes (as e-cars, e-bikes or public transport) for their daily trips. EC2B is developed by the IRIS-partner Trivector, an SME based in Lund in the south of Sweden.

MaaS innovation projects often have a large focus on the ICT-solution needed to integrate several different mobility services into one app. In contrary to that the main focus of the EC2B demonstration in IRIS is not on the app, but the focus is given on designing a service that responds to the needs all actors involved (users, property developers and transport service providers). The EC2B service integrates several different mobility solutions within one app. To start with, the following are included: e-cars, e-bikes (standard bikes as well as cargo bikes), light e-vehicles and public transport. Further on, taxi, rental cars and municipal bike-sharing might be added. The APIs (Application Programming Interfaces) of all these services are integrated into the EC2B app.

## Baseline (City context)

The mobility situation in the Johanneberg area is strained, as Gothenburg is a city traditionally planned and built for cars. During recent years, the city and the regional public transport company have implemented many measures to change this, but 44% of journeys are still made by car. In the area around campus Johanneberg, main actors such as Chalmers University of Technology, Akademiska Hus, other property owners and the municipality of Gothenburg have been working for several years to achieve and implement a Green Travel Plan for the area. According to the plan, the total travel by car to and from the area will not increase, compared to today's level.

Before the launch of the IRIS project, there was no MaaS available in the Johanneberg campus area, neither for residents nor for employees or students. Chalmers Technical University, Akademiska Hus and HSB have all procured car-sharing services that employees can use for business trips. Usage varies between the organizations. Whereas Chalmers have procured their own car sharing service from MoveAbout with three e-cars which have a high degree of usage, HSB and Akademiska Hus rely on the main Swedish car sharing operator Sunfleet, who has a relatively high number of ordinary cars and also some hybrid cars (but no pure e-cars) stationed in the main campus area. Usage of these cars for business trips among the employees is however, rather low. Akademiska Hus has some shared bikes for employees to use (one e-bike and a couple of ordinary bikes), but these are not very often used as they are not possible to book on beforehand, employees do not know where to find these bikes, and there are no routines for keeping the bikes in good standard. At Chalmers, some departments have bikes for loan, but there is no common booking system for these.



Sunfleet had before the start of the IRIS project (and before the construction of Brf Viva) five ordinary cars stationed within 500 meters from Brf Viva, but no e-cars or hybrid cars.

Currently, the city has two electrical bus lines, powered by fully electric and hybrid buses. The first, that has been in operation for some years now, is the bus 55, operating the line between campus Johanneberg/Johanneberg Science park and campus Lindholmen/Lindholmen Science Park. The line is operated by eleven buses, of which three are fully electric, and eight are hybrid. The bus line 16 is partly operated with two electric, articulated buses.

There is charging infrastructure available for electric vehicles, currently 27 chargers, in the Johanneberg campus area.

## **Demonstration areas / EC2B Versions**

The two demonstration areas are:

- Riksbyggen's Brf Viva: Tenants from 132 apartments get direct access to EC2B through accommodation, with specific measures implemented in connection to the building complex. The city of Gothenburg works to create favorable conditions for property developers who work with innovative housing concepts that reduce the demand for private car ownership.
- Johanneberg campus: In the 2nd version of the EC2B service, the employees in the Johanneberg campus area (e.g. tenants to Akademiska Hus and Chalmersfastigheter) will get access to a light version of EC2B, which includes booking and payment of e-vehicles (e-cars and e-bikes) at several locations around the district. A variety of transport suppliers already active in the district will provide transportation services (e-car sharing, bike sharing, e-scooters and public transport). Furthermore, a function will be developed within the EC2B app which allows employees to send receipts of their transport expenses (as car rental fee or public transport tickets) directly from the app to their employer's economy.

## **Technical specifications**

In these two demonstrations the technical specifications that will be used are:

### Hardware

- 4 electric cars ( Renault Zoe)
- 2 light vehicles (Zbee)
- 4 electric cargo bikes
- 5 electric bikes
- Charging infrastructure (55 recharging polls for e-bikes, 6 for e-cars and 2 for light e-vehicles).

### Software

The EC2B app has been implemented based on a MaaS ICT platform from the subcontractor SmartResenär. The SmartResenär platform consists of three main parts: a frontend component library for rapid mobile app development, a collection of generic MaaS backend services and tools that runs on



SmartResenär servers and an integration layer where API integrations towards mobility suppliers are implemented and managed by SmartResenär. The purpose of the SmartResenär platform is to facilitate rapid development and efficient management and operation of MaaS applications.

## **Societal, user and business aspects**

### Citizen engagement

One of the tag lines that Trivector has had in mind while developing the EC2B concept has been “easier every-day life with EC2B”. In order to create a service that can really help users achieve hassle-free and sustainable mobility, a close dialogue with potential and real users has been central. During the first year of the IRIS project, before the first residents moved into Brf Viva, interested future residents were invited to a series of three meetings where the plans for EC2B in Viva were described, and input was collected on different aspects of the concept. Although residents knew there would be no private car parking in their new home, the specification of the mobility service they would get in exchange was still quite open. Trivector wanted to know more about both their needs and their expectations of the service.

### Business model

EC2B’s business model has several dimensions and is more like a network than a straight value chain. There are at least two groups of customers (residents and property owners/developers) and several different payment streams. Value is created in the different relationships between the actors in the network, where multiple actors are both producer and consumer, or both customer and supplier.

EC2B comprises three parts: flexible mobility services (attractive packages through digital services), advice (counseling in sustainable mobility) and community (platform for sharing). The main value propositions are:

- EC2B helps residents in the (larger) cities to carefree mobility without the need of owning a car. This is done through the packaging of flexible mobility services, counseling and a community for sharing.
- EC2B helps real estate developers who want to offer the market a modern, urban and low-car housing concept, through a package solution for sustainable and flexible mobility that is attractive to both customers (residents) and authorities (the municipality).
- EC2B helps mobility service providers who want to reach a large and affluent market for their sustainable mobility services. It will form part of a comprehensive service for sustainable mobility, easily available at home.
- EC2B helps cities create a more attractive urban environment and sustainable development with fewer cars and significantly more efficient land use.

The main idea is that property developers save money through avoiding the construction of expensive car parking. The money that is saved is spent on paying for the EC2B service for the residents during a certain period of time. As the concept is further developed, one could also imagine that service providers (e.g. car sharing, public transport or taxi) pay a kick-back to EC2B for the transactions that are generated through the app and the value the service creates through bringing in new customers and increasing customer satisfaction.



## Governance

The EC2B service operates at the intersection between many different actors: in addition to the end-users, Trivector interacts with property developers, mobility service providers (both public and private), and in the case of the campus area also employers, as well as with the municipality. Trivector does not intend to provide mobility services under the EC2B brand in its own right, but only to bring together the services of others in an integrated offer which benefits both mobility providers (who can gain a broader audience), and users. For the EC2B service to thrive, good relations with collaborating mobility providers (both public and private) is hence crucial. Furthermore, for the EC2B concept to be viable, local authorities need to be supportive of the idea of exchanging parking lots against MaaS in connection to a building, allowing the construction of buildings with a reduced number of parking lots but requiring property developers to provide other services in exchange. The new parking policy adopted by the city of Gothenburg is one step in this direction. Local authorities can also create a favourable environment for MaaS through promoting public transport, biking and walking, as well as discouraging car traffic through parking fees and other incentive structures

## **Impact Assessment**

### Expected impact

EC2B is unique among MaaS concepts in linking its mobility services to the place where most trips start: where people live (or work), creating an integrated solution with multiple benefits. Previous studies show that people who don't own a car have a more sustainable travel pattern than others, which means that EC2B has a great potential for reducing car traffic. Furthermore, if property developers can skip building expensive underground garages and instead offer attractive mobility services, this means previously locked financial assets are released. If EC2B is broadly implemented, this may have an impact on how mobility is considered when planning new developments in cities, resulting in less car traffic and reduced accommodation costs. Through using shared vehicles, users can also access newer and less polluting vehicles. Furthermore, fewer vehicles in circulation also mean fewer resources are being used for the manufacturing of vehicles, which is a substantial share of a vehicle's environmental footprint.

The demonstrator will hence contribute directly to the goals of rolling out electric vehicles and reducing transport-based CO<sub>2</sub> emissions, and indirectly also to the goal of increasing local air quality

### KPIs

The following KPIs were selected for the 1<sup>st</sup> version of the EC2B service:

- Improved access to vehicle sharing solutions
- Ease of use for end-users of the solution
- Reduction in car ownership among tenants
- Yearly km driven in e-car sharing systems
- Reduction in driven km by users of the service
- Energy savings
- Carbon dioxide reduction

The following KPIs were selected for the 2<sup>nd</sup> version of the EC2B service:

- Improved access to vehicle sharing solutions
- Ease of use for end-users of the solution
- Yearly km driven in e-car sharing systems
- Reduction in driven km by users of the service
- Energy savings
- Carbon dioxide reduction



## Annex 2: Replication Plan Template

A replication plan template was created for the Fellow cities to use when working on their replication plans.

See separate attachment: *IRIS Replication Plan Template*