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), additional 6 months, ending 31 March 2023.

Deliverable 3.9

IRIS Beyond Business Plan

Work Package:	WP3 Development of Bankable Business Models and Exploitation Activities
Task:	T3.6 Beyond IRIS
Lead Beneficiary:	IMCG International
Due Date:	30 September 2022 (M60)
Submission Date:	31 March 2023 (M66)
Deliverable Status:	Final
Deliverable Style:	R
Dissemination Level:	Public
File Name:	D3.9 IRIS Beyond Business Plan.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
1.0	220830	Johan Emanuel, Jonas Norrman and Emma Troedsson
2.0	230110	Johan Emanuel, Jonas Norrman and Emma Troedsson

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Executive Summary

This report, D3.9 IRIS Beyond Business Plan, aims to set and launch a strategy on how to catalyse the deployment of IRIS solutions and other project values beyond project termination. The work aims to maximise the impact based on values originating from the IRIS project.

The outcome of the report is a set of recommendations for strategy and plan, based on IRIS's exploitable results, business models, value chains, profit and loss calculations, analysis of market stimulators, funding and financial instruments and potential collaborations with external organisations. The expected impact is utilization of project results and values beyond project end.

The work is led by work package 3, Development of bankable business models and exploitation activities, and is especially related to T3.6 Beyond IRIS and is confidential, thus only for members of the consortium (including the Commission Services). The content is mainly of interest for the Lighthouse Cities and Follower Cities, but it also provides valuable insight for the solutions providers within the consortium.

The content of the report is based on interviews, email conversations and desktop studies, including the IRIS showcase website. Furthermore, valuable inputs come from the participation in the IRIS Consortium meeting (Utrecht, May 2022), the Scalable Cities Event – Moving from Solution to System Change (Utrecht, June 2022) and the IRIS Consortium meeting (Nice, September 2022).

Through initial meetings held with project coordinator team where the task description T3.6 Beyond IRIS was used as a starting point, the following topics demonstrated in the figure below were brought forward as the foundation of the IRIS and Beyond Strategy:

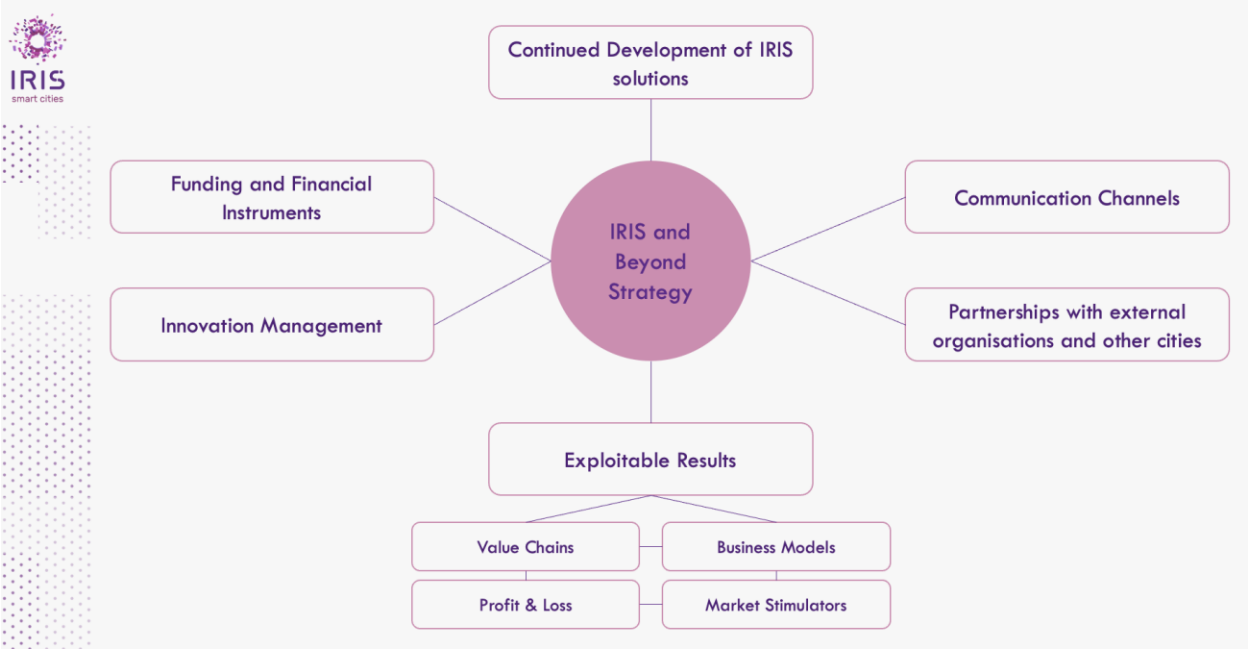

Figure 1: The foundation of the IRIS and Beyond Strategy.

Based on this foundation the IRIS and Beyond Strategy consist of a number of recommendation and conclusions aiming at further developing project results and values, hence creating impact beyond IRIS. The key findings from the strategy are the following:

- Engage end-users through the process as the solution is more likely to be customized according to the end-users, thus meet the actual needs. That is further a prerequisite for a successful implementation and up-scaling of the solution.
- Implement market mechanisms as a key activity to support system transformation in creating competitiveness for business models delivering climate friendly services and products.
- Implement a city centric communication strategy in order to reach all relevant transition track stakeholders.
- Develop cities district by district to generate positive feedback loops in engagement, communication and acceptance.
- Enable knowledge sharing both within different departments and towards other cities and regions by using different forms of organisations, networks and communications channels to share key learning from demonstrating smart city solutions.
- Appoint a transition manager for each transition track, identifying relevant stakeholder, tuning the business models to fit the particular needs in the city, as well as analysing profit and losses in the city based on the value chains relations.
- Through implementing an innovation strategy clearly pointing out what transition the city is focusing on and provide guidance when it comes to implementing smart city solutions.
- Secure funding and financial instruments to enable and facilitate up-scaling and replications activities besides innovation development and capacity building.

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List of Abbreviations and Acronyms

Table 1: List of Abbreviations and Acronyms.

Abbreviation	Definition
EU	European Union
WP	Work Package
EIP-SCC	European Innovation Partnership on Smart Cities and Communities
D	Deliverable
MS	Milestone
T	Task
SME	Small and medium sized enterprises
IP	Intellectual property
SDG	Sustainable Development Goals
ICT	Information and Communications Technology
LH Cities	Lighthouse Cities
FCs	Follower Cities
TIS	Technological Innovation System
TRL	Technical Readiness Level
UNS	University of Nice
UN	University of Utrecht
KER	Key Exploitable Result
VCD	Value Chain Design
BMF	Business Model and Finance task group
SBM	Sustainable Business Model
BMC	Business Model Canvas
MaaS	Mobility as a Service
NUTS	Nomenclature of Territorial Units for Statistics

CIO	Chief Information Officer
NGO	Non-Governmental Organisation
MNCA	Metropolis Nice Côte d'Azur
CCAS	Cohesion and social action committee
CRI	Commercial Readiness Index
SME	Small and Medium-sized Enterprises
IRR	Internal Rate of Return
EIB	European Investment Bank
EIF	European Innovation Fund
ERRDF	European Regional Development Fund
Urban-LEDS	Urban Low Emissions Development Strategy

1 Introduction

This report, IRIS Beyond Business Plan (D3.9), forms a strategy on how to catalyse the deployment of IRIS solutions and other project values beyond project termination. The working process was initiated through meetings held with the IRIS project coordinator team. The aim of the initial meeting was to bring forward a scope. During a second meeting a table of contents was developed for D3.9 including the following topics:

- Continued development of IRIS solutions
- IRIS communication channels
- Partnerships with external organisations
- Beyond IRIS exploitable results
- Market mechanisms
- Profit and loss estimations
- Value chains and business models
- Innovation management
- Funding and financial instruments

The outcome of the report is a set of recommendations for the IRIS and Beyond Strategy aiming at further developing project results and values beyond project end. The work is of importance since it aims to set and launch a strategy to capitalise on the developed values during the project, hence, to maximise impact.

Work package 3 and IMCG, main authors of this deliverable, have gathered information through interaction with the site managers of the lighthouse cities (LH cities) and follower cities (FCs) and based on content on the IRIS Showcase Website[1]. Besides that, inputs were gathered through participation in the IRIS Consortium Meeting in Utrecht (May 2022) and in Nice (September 2022) based on workshops, presentations and site visits. In addition, the Scalable Cities event: Moving from Solution to System Change (June 2022), was also held In Utrecht and inputs regarding results, unexpected outcomes and success factor proved to be valuable contributions to the report.

This deliverable shifts focus between the cities and transition tracks depending on the subjects. This is because some topics are specific to the cities, whilst others add more value from a transition track point of view.

The report contributes to the following WP3 objectives:

- Develop and exploit 30+ new business models for IRIS Smart City Solutions, whereof 5+ bankable solutions put in to practice and 20+ novel ideas incubated
- Enhance all existing business models
- Increase innovation management performance of LHs and FCs to business models

[1] IRIS Smart Cities Showcase – Co-creating smart and sustainable cities

- Efficiency support exploitation of European services, solutions and knowledge, developed in IRIS, to a strong growth market estimated globally at €1.3 trillion in 2020 leading to 20+ official IRIS deployment agreements signed
- Adapting for IRIS already established financial instruments and financing solutions for the cities and service providers

The IRIS and Beyond strategy aligns well with the project's overall objectives listed below:

- Objective 1: Demonstrate solutions at district scale integrating smart homes and buildings, smart renewables and closed-loop energy positive districts.
- Objective 2: Demonstrate smart energy management and storage solutions targeting Grid flexibility.
- Objective 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.
- Objective 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.
- Objective 5: Demonstrate active citizen engagement solutions providing an enabling environment for citizen to participate in co-creation, decision making, planning and problem solving within the Smart Cities.
- Objective 6: Put in practice bankable business models over proposed integrated solutions, tested to reduce technical and financial risks for investors guaranteeing replicability at EU cities.
- Objective 7: Strengthening the links and active cooperation between cities in a large number of Member States with a large coverage of cities within different size, geography, climatic zones and economical situations.
- Objective 8: Measure and validate the demonstration results after a 3-year large-scale demonstration at district scale within 3 highly innovative cities.

1.1 Scope, objectives and expected impact

This deliverable provides the baseline for continued development of the IRIS solutions after project termination. Aligned with the abovementioned objective of D3.9 this report this report forms an overall "IRIS and Beyond Strategy" with the purpose of supporting the knowledge-sharing and on-going existence of the IRIS project.

The outcome of the report is a set of recommendations for strategy and plan, including business models, profit and loss calculations, analysis of market stimulators, continued development of solutions, innovation management, funding, financial instruments and potential collaborations with external organisations. The expected impact is utilization of project results, values and solutions from IRIS beyond project end.

The target group for D3.9 is primarily the Lighthouse Cities and Follower Cities. However, the content will also be of interest for the solution providers as it reflects a strategy to support the on-going

existence and continued development of particular solutions. Besides this, the city's ability to handle innovations is also valuable from the solutions provider's point of view.

The expected impact is to provide knowledge sharing between those parties through numerous examples of best practice provided in the report. Further, it will provide valuable insight into new potential partnerships, the dependencies among partners, business and replication potential and market simulators.

1.2 Contributions of partners

IMCG (Impact Management Consulting Group) is the main author of this deliverable. However, the following parties have provided valuable text section and insight for the development of the report:

- Nice: Nice Metropole Côte d'Azur, Estelle Michele and Céline Gindre, the Innovation Department.
- Utrecht: Arno Peekel and Roel Massink, Utrecht Sustainability Department.
- Gothenburg: Eva Pavic, Johanneberg Science Park.
- Alexandroupolis: Kostas Lymperopoulos, Kriton Energy.
- Santa Cruz de Teneriffe: Diego Broock Hijar, Sustainable Building Centre (CCS).
- Vaasa: Mona Enell-Nilsson, University of Vaasa and Maria Backman, City of Vaasa.
- Focsani: Dan Cazaciuc, City of Focsani

Both the Lighthouse Cities (Nice, Utrecht and Gothenburg) and the Follower Cities (Alexandroupolis, Santa Cruz the Teneriffe, Vaasa and Focsani) have contributed to the Innovation Management section through interaction over email. In addition, the following interviews have been held:

- Gothenburg: Interview over Microsoft Teams with Eva Pavic, Johanneberg Science Park (April 27 2022).
- Nice: Interview held in Utrecht with Estelle Michele and Céline Gindre from Nice Metropole Côte d'Azur, the Innovation Department (June 1 2022).
- Nice: Interview held over Microsoft Teams with Arno Peekel, Utrecht Sustainability Department (June 10 2022).

During the interviews with the Lighthouse Cities the following sections in the report were also discussed:

- Partnerships with External Organisations: The initiatives listed in the Grant Agreement (GA) were discussed and if applicable examples on how the initiatives can support the on-going existence of IRIS. This also was an opportunity for the cities to bring forward new initiatives the cities consider to be relevant for IRIS.
- Continued development of IRIS solutions: Based on the featured solutions on the IRIS Showcase Website a discussion was held regarding how the city intends to utilize the results and findings from IRIS for upcoming projects, activities and in some cases new projects and companies.

All cities have been given the same opportunities to provide inputs for the report.

1.3 Relation to other activities

Work packages

WP3 Development of Bankable Business Models and Exploitation Activities is a horizontal work package and is thus interacting with all other work packages. Below the most relevant work packages for this report are listed.

As exploitation is very much aligned with replication, this deliverable is related to the ongoing work in WP8 Replication.

Furthermore, since exploitation and replication require communication, both these work packages are highly related to WP10 Communication and Dissemination.

As already seen in the very beginning of this deliverable, a lot of the work is based on the outcomes and outputs of the three lighthouse cities. Therefore, their work packages are also very important for this deliverable: WP5 Utrecht, WP6 Nice and WP7 Gothenburg.

Deliverables

D3.6 IRIS City innovation management performance – in this deliverable innovation management roadmaps were provided to each IRIS City. In D3.9 we have investigated what steps each city have taken in order to improve their innovation management processes. Furthermore, other content from D3.6 also feeds in to D3.9; especially the methods adopted regarding key exploitable results and value chain design. When working on business models, you start off your journey of planning for the future of the solution providers.

D5.8 / D6.8 / D7.8 Preliminary report on Utrecth/Nice/Gothenburg lighthouse demonstration activities as well as the on-going work in D5.9/D6.9/D7.9 Final report on Utrecht/Nice/Gothenburg lighthouse demonstration results and lessons learnt.

Milestones

Milestone 16

IRIS innovative solutions planned for replication and deployment in other cities. Means of verification: At least 30 city members of the EU smart cities network have plans/planning in progress for a similar smart city strategy. Lessons learned from the demonstration of the IRIS Innovative Solutions adopted by at least 20 other cities.

Milestone 17

Citizens and community stakeholders in the demonstrations districts actively engaged in the IRIS project. Means of verification: At least 75% of citizens and community stakeholders in the demo-district express "excellent/good" on engagement in demo- activities.

Milestone 18

At least 20 official replication/deployment agreements signed with cities outside EU. Means of verification: Completion of detailed report with available guidelines.

There have been recurring dialogues regarding this milestone due to difficulties in signing agreements. However, the milestone can be considered partly accomplished as over 20 cities outside of the EU have shown interest in particular IRIS solutions. The interaction has been through external networks and organisations.

1.4 Structure of the deliverable

This deliverable presents an IRIS and Beyond Strategy for the continued development of IRIS solutions and project values to support the on-going existence of IRIS for the Lighthouse Cities and Follower Cities. It also highlights improvements and draws conclusions based on previous deliverables and milestones delivered.

Through initial meetings held with project coordinator team where the task description of T3.6 Beyond IRIS was used as a starting point, the following topics demonstrated in the figure below was brought forward as the foundation for the IRIS and Beyond Strategy:

Henceforth, the deliverable is structured in the following way:

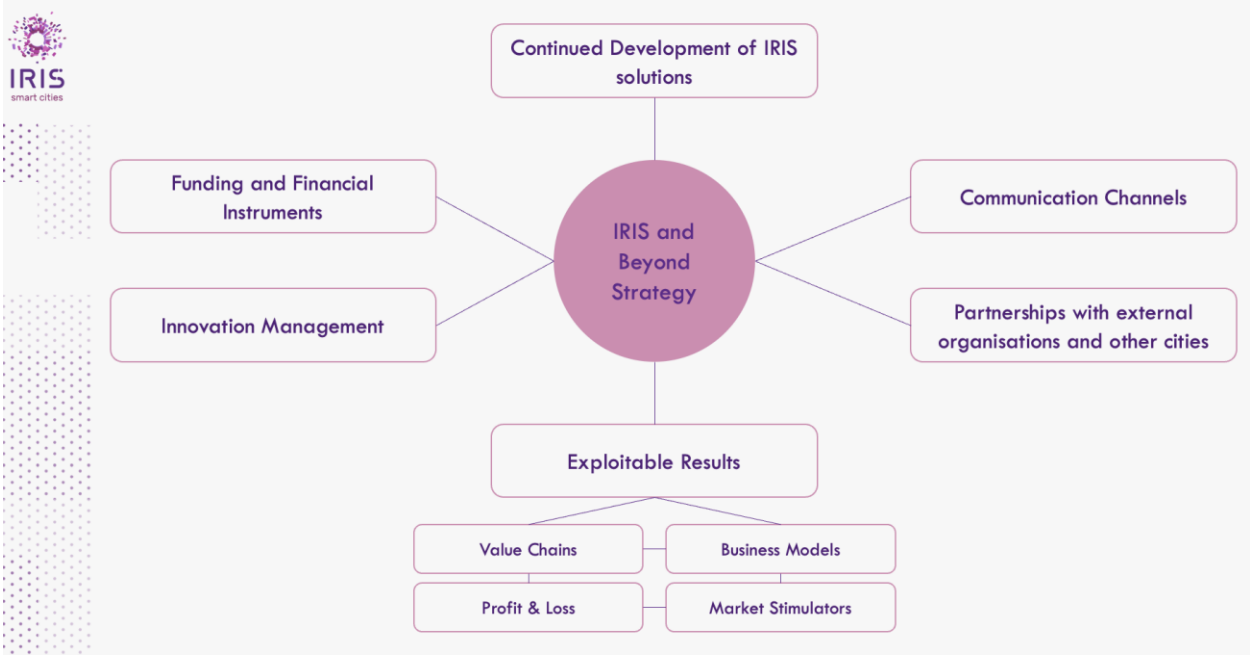

Figure 2: The foundation of the IRIS and Beyond Strategy.

Chapter 1: Introduction – Provides an introduction to D3.9 IRIS Beyond Business Plan, as well as scope, expected impact and outcome.

Chapter 2: Methodology for IRIS Beyond Business Plan – Gives an overview of the methodologies used. That includes methods related to the innovation management, business models and value chains.

Chapter 3: The foundation of the IRIS and Beyond Strategy – Demonstrates the foundation of the IRIS and Beyond Strategy including the following topics:

- Continued development of IRIS solutions
- Communication channels
- Partnerships with external organisations and other cities
- Exploitable results
- Innovation management
- Funding and financial instruments

Chapter 4: The IRIS and Beyond Strategy, including conclusions and recommendations – Provides the IRIS and Beyond Strategy consisting of a number of recommendations and conclusions, based on chapter 3. Further, an evaluation of WP3 objectives and project objectives is given.

2 Methodology for IRIS Beyond Business Plan

From the start of IRIS, well established business development methods have been introduced to the project partners and together the methods have been adapted to fit the tasks in work packages. Below there are short description of these methods and explanations on how they have been used to

contribute to the content of this deliverable. Each exploitable results from the demonstrated integrated results presented in the cities launch activities reports available to download from the IRIS Showcase site[2].

Additional to the methods presented below the authors of this deliverable have gathered information through interaction with the site managers of the lighthouse cities (LH cities) and follower cities (FCs), as well as through desktop studies, including the IRIS Showcase Website. Besides that, inputs were gathered through participation in the IRIS Consortium Meeting in Utrecht (May 2022) based on workshops, presentations and site visits. In addition, the Scalable Cities event: Moving from Solution to System Change (June 2022) was also held In Utrecht and inputs regarding results, unexpected outcomes and success factors proved to be valuable contributions to the report.

2.1 Innovative business models adaption tool

The IRIS milestone four *Innovative business model adaptation tool* presented a tool for adapting innovative business models for an integrated IRIS solution to city district specific context, aiming at a city-wide scale-up. This tool has been the basis for the recommendations in this report to the City partners on how to develop IRIS beyond business plans.

The IRIS Innovative business model adaptation tool has been used in the SCC01 Business Model and & Finance group and integrated with tools from other projects. The result is a methodology called Impact management which relates tools for setting Impact goals on district levels and establishes transition track roadmaps to use packed solutions to transform the district. The ambition has been that the adapted methods should be of use for other cities in Europe and support their development towards climate neutrality.

For both methodologies key questions are:

- Who governs a system in a specific city district?
- How is it governed?
- How does the system operate and how can the system be transformed along a transition track?

2.2 Business Model Canvas as method for exploring new value chains

The Business Model Canvas (BMC) is used to describe the value chain relations. It is a well-known model, presented earlier in D3.8 IRIS exploitation plan and operations[3], visualizing a business model on a one pager (Figure 3), taking into account the following aspect:

- Key Partners
- Key Activities

[2] IRIS Smart Cities Showcase – Co-creating smart and sustainable sities
[3] https://irissmartcities.eu/wp-content/uploads/2022/01/d3.8_exploitation_plan_and_operation.pdf

- Key Resources
- Value Propositions
- Customer Segments
- Customer Relationships
- Channels
- Cost Structure
- Revenue Streams

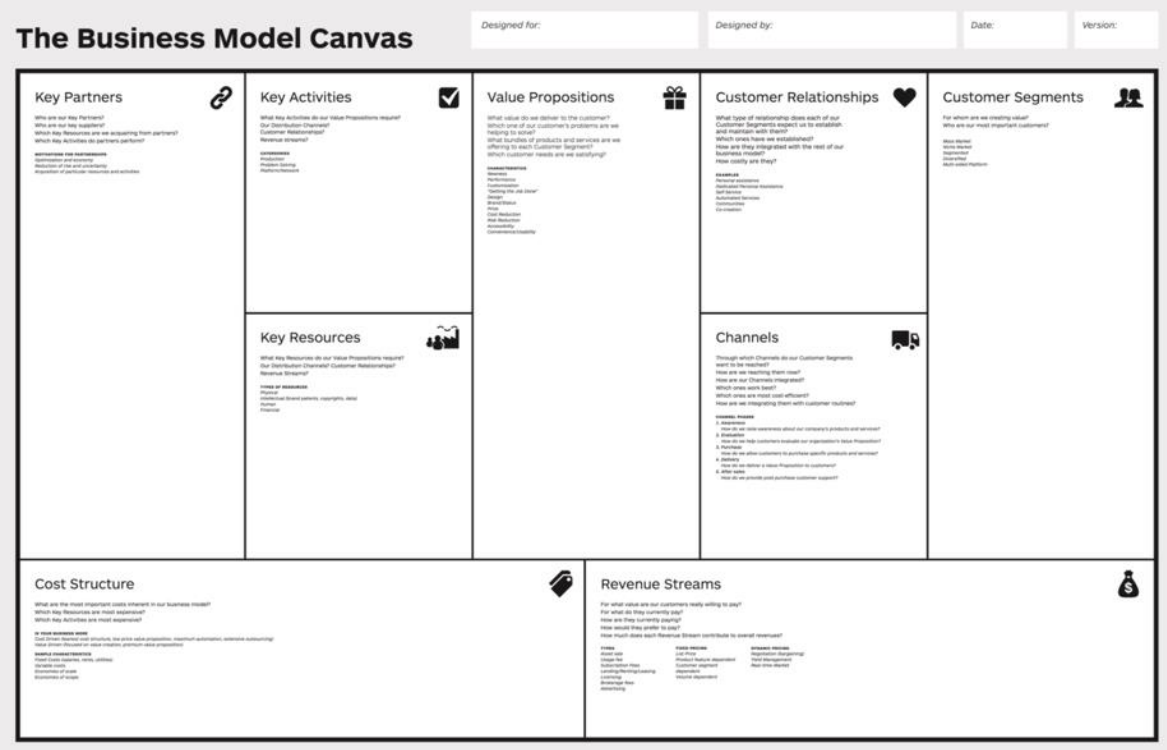

Figure 3: Business Model Canvas.

The Business Model Canvas is used to demonstrate the solutions in IRIS. This works is based on the content previously presented in D5.8 Preliminary report on Utrecht lighthouse demonstration activities, D6.8 Preliminary report on Nice lighthouse demonstration activities and D7.8 Preliminary report on Gothenburg lighthouse demonstration activities. The Business Models are further assessed in this report. As a continuation, those are also evaluated based on its market stimulation, profit and loss estimations as well as through its value chains.

Value Chain Design

The Value Chain Design is based on the Business Model Canvas. It addresses the dependencies among suppliers and buyers in order to deliver value to the end-users. In this report, the exploitable results are assessed through its value chains relations. Figure 4 presents an example of value chain design.

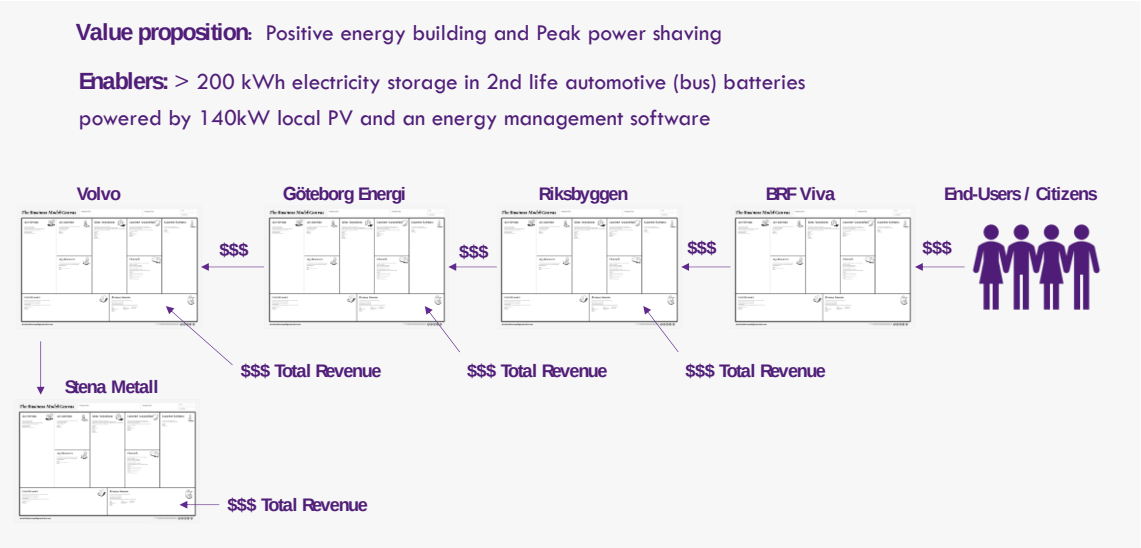

Figure 4: Example of Value Chain Design.

2.2.1 Technology Readiness and Commercial Readiness

In some discussions there are much emphasize on a solutions technology readiness as the key to a successful roll out on a city market. This is true up to a certain point of maturity, often described as TRL7 (Technology Readiness Level). Above this level, the market design increases in importance for a successful continuous development and market penetration of the solution. *Figure 5* presents the Relation between Technology Readiness Level (TRL) and Commercialisation Readiness Index (CRI).

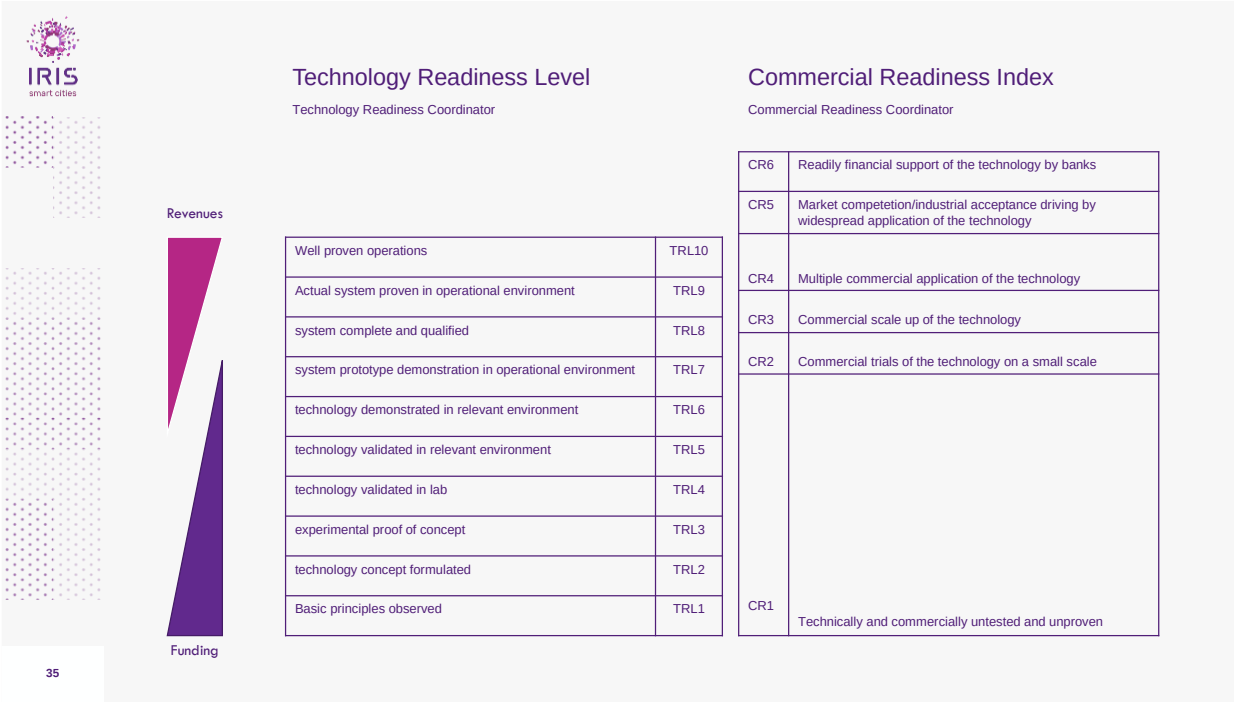

Figure 5 Relation between Technology Readiness Level (TRL) and Commercialisation Readiness Index (CRI) Reference: ARENA, 2014 and Straub, 2015 .

The two tables in *Figure 5* are also a good overview of responsibilities along a value chain with solution providers to the left and buyers to the right. At TRL7 the buyers need to, together with responsible authorities, work with a market design which makes commercialisation possible. This includes establishing supporting infrastructure for the solution, but also making sure regulations allow for the new technology and preferably also a city policy that promotes the solution as a preferred solution for the city.

2.2.2 Profit and Loss calculations

With a new market design to support competitiveness for business models delivering climate friendly services and products, new value chains will establish. In the shift from the old to new value chains, different actors will profit and others will lose revenues. The changes will generate positive and negative forces on the market. The city authorities should calculate the profit and loss with the new market to prepare for criticism and lobbying, but also to understand what to promote.

Every chain in the value chain is in a market with competitors offering similar services or products. With substitutes, such as electrification, not only is one link that affected but most likely all the links left from that point. A major shift based on a substitute can also create the need for business model development

to the right in the value chain. There can be new cost models, going from investment to leasing, there can be a need for new key resources such as IT competence or energy engineering.

2.2.3 The IMProve method - Innovation Management

In order to assess the Innovation Management of a respective city the roadmaps developed in D3.6 Innovation Management Performance have been followed up upon, which in turn is based on the IMProve Method. In the method the following aspects are considered:

- Innovation strategy
- Innovation organisational culture
- Innovation life cycle process
- Factors enabling innovation
- Result from innovation

For further reading of the IMProve method, see D3.6 IRIS City Innovation Management Performance and Roadmaps.

D3.9 follows up upon the innovation roadmaps developed. Through interaction with respective city representative, including the lighthouse cities (Utrecht, Nice and Gothenburg) and the follower cities (Alexandroupolis, Focsani, Santa Cruz de Teneriffe and Vassa), the main focus is the improvement within respective area. The questionnaire developed in D3.6 has been used as a starting point for the work in D3.9. The interaction has been done both through questionnaires sent out by email and in some cases through meetings conducted, including Gothenburg, Utrecht and Nice. The questionnaire sent out addresses the following two topics:

- Identify at least one area where improvements have been done within innovation management. Use examples.
- Provide one “example of best practice” within innovation management, which the city is proud to highlight in the report.

Along with the questionnaire, a summary of the Innovation Roadmap from D3.6 for respective city was sent out in order to provide an insight of the previous recommendations and to follow up on the identified rooms of improvements. The cities have been given broad topics to discuss with the purpose of letting the city decide itself which parts they identify as the most essential parts to lift within innovation management. Hence the sections on this are differently structured and adapted according to each city. There have been some difficulties in writing about the development, but in order to correlate the work, examples have been sent out from the other cities. This gives a basis for giving the same conditions for all the cities, as well as an opportunity for knowledge transfer.

3 The foundation of the IRIS and Beyond Strategy

This report is based on the seven main areas laying the foundation for the IRIS and Beyond strategy. All the components are important building blocks outlining a basis for the ongoing existence of the IRIS project. Below is an overview of those areas, see Figure 6.

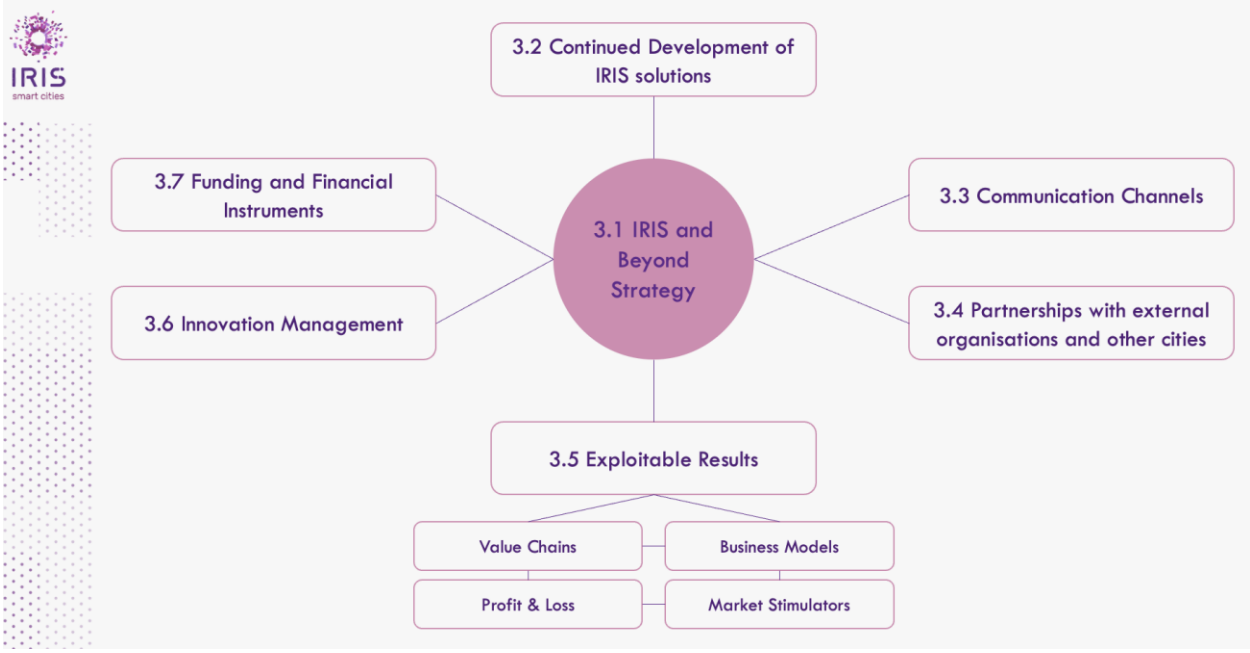

Figure 6: Overview of the IRIS and Beyond Strategy.

3.1 IRIS and Beyond Strategy

The IRIS project was built around 5 interdependent Transition Tracks enabling the transition towards reduced energy demand and high shares of renewables and e-mobility in the urban energy and mobility systems. The strategy was successful, and the IRIS lighthouse cities have successfully demonstrated solutions belonging to the five IRIS Transition Tracks.

The transition tracks, presented below, could be extended beyond IRIS, both for each city, but also as a theme for cooperation between cities in EU within networks such as Scalable cities and NetZeroCities.

The seven main areas laying the foundation presented in Figure 6 (above) could be tuned in the relation to each chosen transition track. The five transition tracks are presented in the next section.

3.1.1 Overview of the transition tracks in the IRIS transition strategy

Smart renewables and closed-loop energy positive districts (IRIS Transition Track #1)

In the this transition track, the solutions are integrating:

(a) a high share of locally produced and consumed renewable energy at district scale,

(b) energy savings at building level reducing the citizens' energy bill and

(c) energy savings at district level.

Value chains and business models: Demonstrated solutions integrate high renewables penetration like district scale PV and biomass for district heating, near zero energy housing retrofit, energy efficient low temperature district heating and smart public lighting that is energy efficient, powered by renewables and connected to the district energy system. The value chain will be extended to include solution providers with business models for energy services such as microgrids and energy efficient retrofitting services. The value chain will also be extended to includes new solutions suppliers of for example PV cells, batteries for local storage.

Profit and loss estimations: Increased district (local) production of renewable energy will generate profits for all actors involved in these businesses (e.g. energy services, PV cells) and loss for energy utilities that used to provide the district with energy.

Market stimulations: An example of market simulations from the city authority is to support a rapid deployment of district heating infrastructure (pipes) and connectivity to all buildings in the district.

Smart Energy Management and Storage for Grid Flexibility (IRIS Transition Track #2)

Integrating smart energy management and renewable energy storage for

(a) maximum profits of renewable power/heat/gas,

(b) maximum self- consumption reducing grid stress and curtailment, and

(c) unlocking the financial value of grid flexibility.

Value chains and business models: Demonstrated technical solutions include smart ICT to interconnect energy management systems at home, building and district level, and to integrate maximal renewables production, V2G storage in e-cars operated in car sharing systems with additional stationary energy storage. The value chain will change to include solution providers for energy services such as flexibility management and microgrids. The value chain includes new solution suppliers of for example battery storage and V2G technology.

Profit and loss estimations: Increased district (local) production of renewable energy will generate profits for all actors involved in these businesses and loss for energy utilities that used to provide the district with energy.

Market stimulations: The city authority should make sure there are no regulatory barriers for the development of flexibility markets.

Smart e-Mobility Sector (IRIS Transition Track #3)

Integrating electric vehicles and e-car sharing systems in the urban mobility system offering

(a) local zero-emission mobility,

(b) lower household mobility costs, and

(c) smart energy storage in V2G car batteries.

Value chains and business models: Demonstrated solutions include extensive deployment of (V2G) e-cars, exploitation of (V2G) e-cars in local car sharing systems, and district-wide smart (V2G) charging stations powered mainly by renewables. The value chain will change to include solution providers for mobility services such as carpools and bicycles. The value chain includes new solution suppliers of electrical cars and mobility platforms.

Profit and loss estimations: Smart mobility services will generate profits for all actors involved in these businesses and loss for sellers of cars and public transport service providers.

Market stimulations: The city authority should make sure to promote mobility services by reducing number of available parking lots.

Digital transformation Service (CIP) (Track #4:)

Cutting edge information technology and data framework enabling the above mentioned solutions, maximising cost-effectiveness of the integrated infrastructure.

Next, the City Innovation Platform with open, standards based application program interfaces (APIs) provides meaningful data and information services for households, municipality and other stakeholders, allowing for a Data Market with new business models. A common architecture, harmonized data models and a sustainable data governance plan ensure the interoperability and replicability of the solutions, transferring them from city to city. The City Data Market and the service marketplace manage access to

all data and services, with appropriate licenses and flexible pricing models in and across cities, and allowing real time KPI monitoring and benchmarking of smart energy and mobility performances.

Value chains and business models: The value chain expand to include solution providers for digital services. The value chain will include knowledge and programming suppliers from IT consultants.

Profit and loss estimations: Digital transformation services elevates the market with profit for many actors. There is no obvious "loser" on the market due to digitalisation.

Market stimulations: An example of market simulations from the city authority is to support a rapid deployment digital infrastructure such as data platforms for sharing and storing of city open data.

Citizen engagement and Co-Creation (IRIS Transition Track #5)

Design and demonstration of feedback mechanisms and inclusive services for citizens to achieve that they are intrinsically motivated to

(a) save energy,

(b) shift their energy consumption to periods with redundant renewables,

(c) use electric vehicles and

(d) change the vehicle ownership culture towards a use or common mobility assets culture.

Value chains and business models: Demonstrated solutions include game-theory based engagement methods and instruments ranging from co-creating infotainment apps, local school campaigns, offering training on the job to students living in the district by partaking in the demo activities, competitive energy games using the home energy management system, energy ambassadors creating local energy communities, to crowd-funding creating a sense of being part of the solution. The value chain will include communication services from consultancy companies.

Profit and loss estimations: There will an increased market for communication consultants.

Market stimulations: The city authority should continue to invest in Citizen engagement and Co-Creation for market simulation and development of market need for the new services.

3.2 Continued Development of IRIS Solutions

This section of the report addresses how the cities intend to continue the development of the solutions as the IRIS project has terminated. In addition, it highlights in what way project values and knowledge can be utilized and spread among actors in Europe. The featured solutions demonstrated on the IRIS Solution Showcase Website are used as a starting point for each lighthouse city.

3.2.1 Solutions in Utrecht

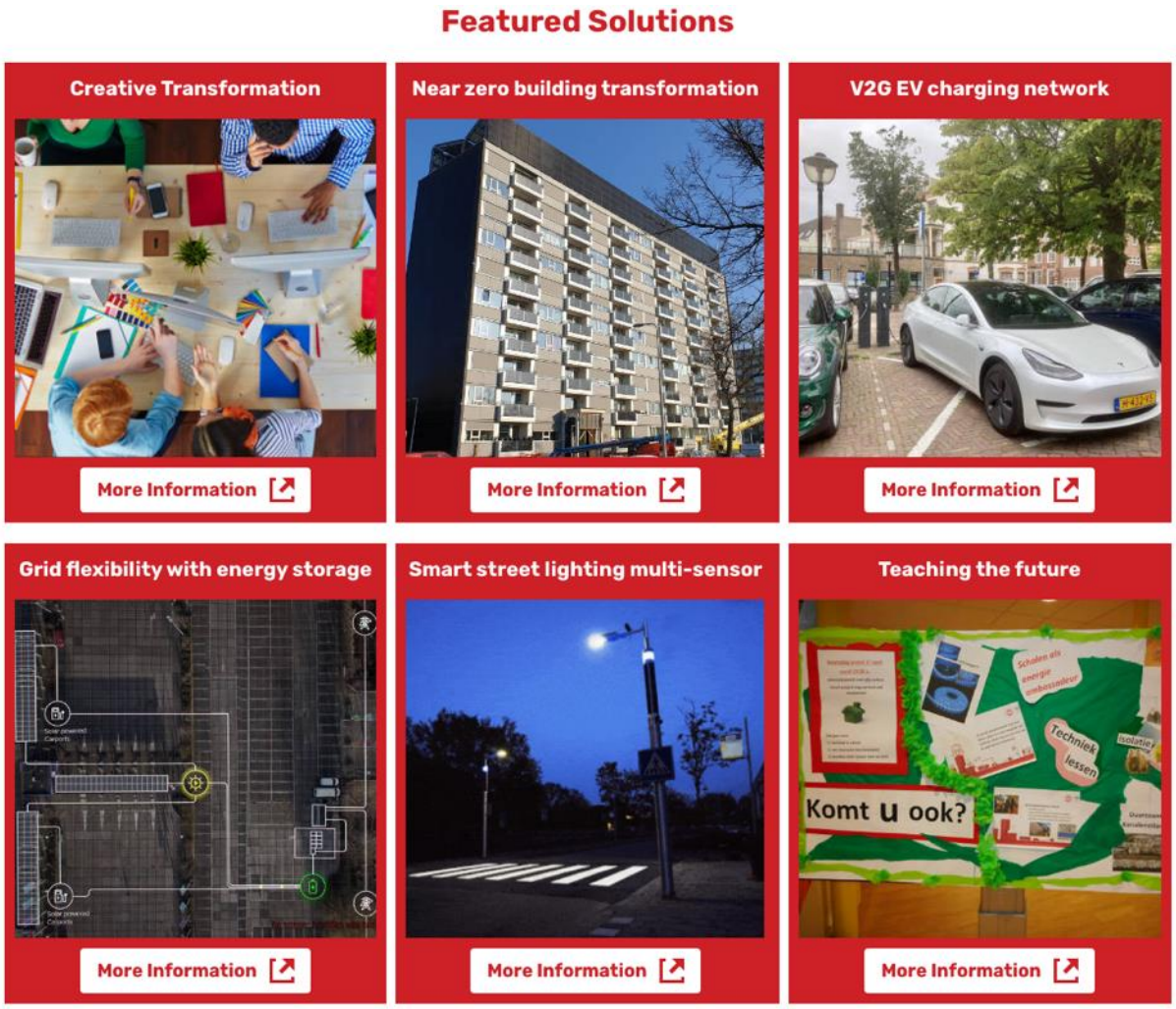

Figure 7: Overview of Featured Solutions for Utrecht, based on the IRIS Showcase Website.

Creative Transformation

Citizen engagement has turned out to be an essential component in developing solutions for the city. Further, it has turned out to be beneficial to integrate residents early in the process, as the solution is

more likely to support and be tailored according to the actual needs of the end-user. The Creative Transformation is something Utrecht aim to develop further in new projects. However, due to time constraints Utrecht have not done so yet, but plan to pick it up in the near future. Still, the lessons learnt from the design thinking methods will be beneficial for the forthcoming projects in Utrecht.

Near zero building transformation

The solution aims to reduce the carbon footprint of houses, according to the characteristics of the building and the tenant's desire. In regards to the renovations a modular approach is being adopted.

The parties currently involved are companies working on renovation concepts, in which are utilizing results and findings from IRIS demo. For instance, approaches within retrofitting activities developed within the IRIS project has been taken after by the building owner BOEX. Nowadays, the approach is well-integrated in the company and is used as a standard approach for the retrofitting activities. This is considered as an important path for knowledge sharing to other districts.

Still, there are still topics that needs to be further investigated and requires testing. Therefore, a new project by the EU was acquired last year. It is a funding in the Horizon 2020 program called the Green Deal, allowing for continued development of the building transformation.

V2G EV charging network

The V2G is considered as one of the most powerful sources to avoid congestion issues in the grid. It is a rapidly growing network in the ecosystem of Utrecht and after several successful pilots it is considered as one of the bankable business models in the IRIS project.

The V2G solutions is currently being replicated in Utrecht, as well as in other cities in the Netherlands. Further, in June 2022 a new project in the Horizon Europe program called Scale started. In particular, the project aims at further developing the software and hardware backing the V2G network. In other words, it will be a continuation of the IRIS project, building upon those results. Besides the objective is to forward knowledge and scale it up to other EU countries as well. The project will be an opportunity for knowledge-sharing of the IRIS results.

Smart street lightning multi-sensor

The Smart street lightning multi-sensor is a solution developed together with the district. It is aiding the safety of pedestrians. As a pedestrian crosses the stress, electronics makes the poles shine brighter and the crossing lines in the street lights up. It turned out to be a highly value-added solutions for the district, as it was developed together with the residents, hence the solution has successfully addressed the actual concerns in the neighbourhood.

From being a successful pilot carried out in June 2018, the result is now being implemented by the City of Utrecht replacing the public lightning in the whole city. In total 60,000 lamp posts will be replaced

throughout the city, in the coming years, utilizing the results from the pilot. The implementation will be financed by the government.

Currently, the smart street lightning is being spread in the network of public lightning, which is conceivable a lead for it to be replicated in other cities apart from Utrecht. The person from Utrecht in the Smart City also plays an important role in the Netherlands in the network of public lightning. Consequently, the knowledge and insides form Utrecht is also being spread to the public lightning network throughout the Netherlands, aiming at replicating the solution at national level.

Teaching the future

Within this direction several programs have been developed aiming to connect the different levels of schools towards the professions in the market. Through organising technical lessons and workshops for children, it has helped in involving citizens. The interacting with children, students and young people has resulted in knowledge sharing to parents and relatives, as well as it has open up new interests for children.

The approach has proven to be successful in many aspects and other cities are showing interest in the program. For instance, the follower city Santa Cruz de Tenerife has shown strong interest in following suit.

3.2.2 Solutions in Gothenburg

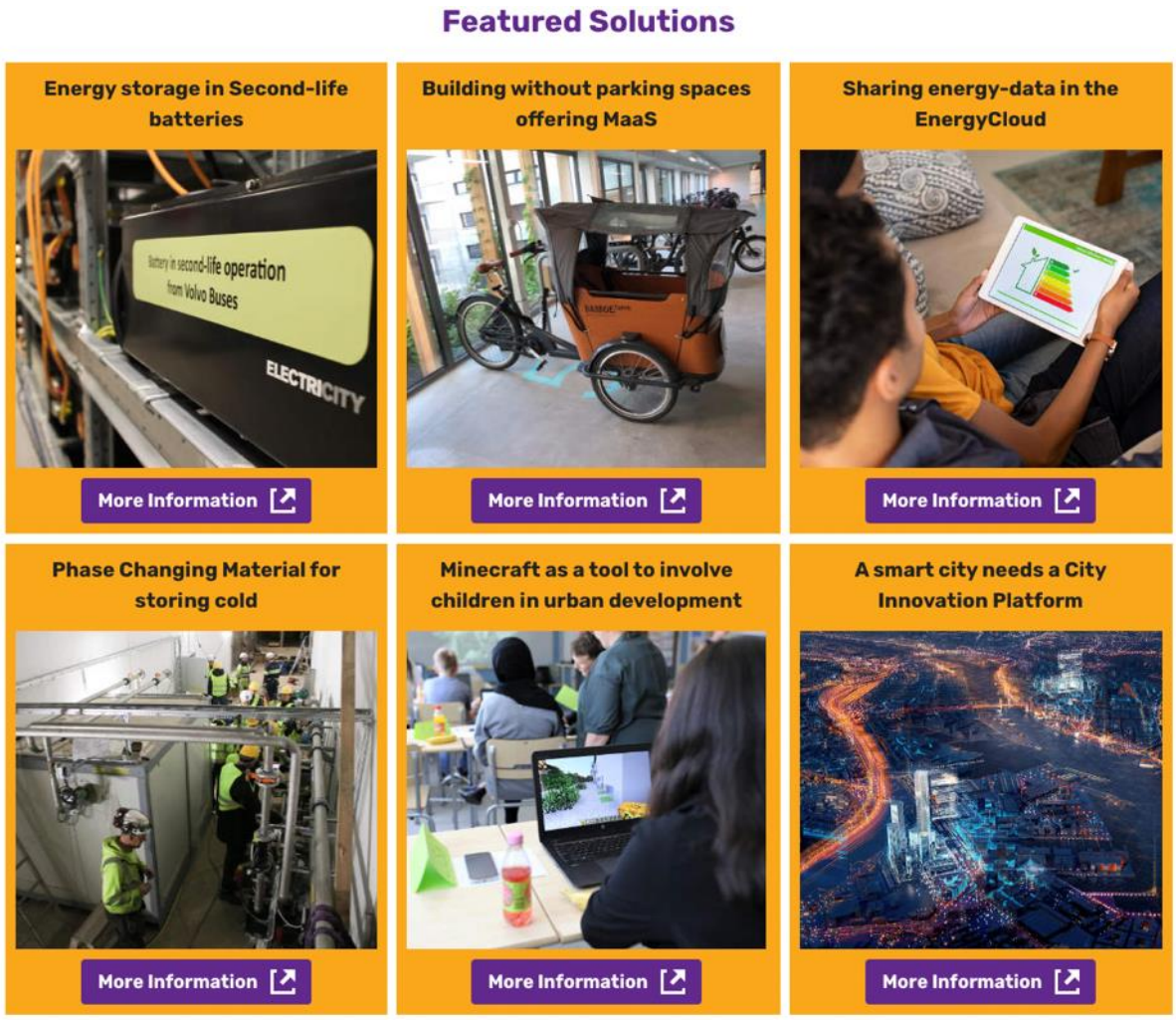

Figure 8: Overview of Featured Solutions for Gothenburg, based on the IRIS Showcase Website.

Energy storage in Second-life batteries

The demonstration of an energy storage solution with second-life batteries from electricity buses, is placed within a Positive Energy District (PED). This is a combination of several energy-saving solutions that have been designed in a housing cooperation in Gothenburg – the Viva buildings.

The business models constituting the value chain from battery supplier to the end user to the recycling have been developed together with key stakeholders. Another improvement to reach bankability is a standardized container instead of a permanent installation, to reduce the investment cost and increase the flexibility. The ongoing electrification of several sectors together with the increased share of renewables is also expected to increase the profit of the concept in the coming years.

Through the IRIS project, there is a good knowledge spreading at national level as well as internationally and study visits take place continuously. Key stakeholders continue to evaluate for upscaling and to learn more about second hand batteries for the use of storage. Two replication pilots have been taken place locally.

Building without parking spaces offering MaaS

The MaaS solution and demonstration of EC2B service, is about offering real estate operators or employers a complete and sustainable mobility service for residents and/or employees. Those living or working in an EC2B-connected property can access the service via the EC2B app. It gives them a quick overview of the transport options available here and now. Perhaps the user chooses to take the bus to work, book a cargo bike for a business trip or find out where the nearest available car pool car is. In addition to mobility services, EC2B includes individual advice and a user community.

The need for mobility services has increased as parking space is a key issue in order not to add more vehicles in a city where housing needs to be built. This is in relation to building a climate smart city and reducing noise levels. The Maas service also provides inspiration for cities on how planning for new alternative mobility solutions for residents can be included already when new areas are planned and built. The service is being replicated locally and in the City of Lund and more areas are under planning.

Sharing energy-data in the EnergyCloud

The transition into a smart energy system is completely reliable on data. Data needs to flow between different actors within the system in a secure and adaptable way. In the smart energy system that is currently being developed (for example electricity, heat, water and gas) there are tenants, utility providers, renewable energy sources industries and other actors and they are all in the need of easy data access. Data also needs to be quality assured so that decisions both automized and human decisions are taken based on reliable information.

The demonstration of the EnergyCloud has been aiming at creating a local version of this system to show that it is possible to share, and quality assure structured data within the energy system.

Beyond the Lighthouse district the Energycloud is also demonstrated in another Campus area in Gothenburg, and Skövde – just outside Gothenburg. This has shown that there is a great need of collecting and sharing this type of data. By creating structured clouds of energy data all actors involved, and even entire cities will be able to utilize data in a better way and to create new value propositions. By establishing these first cases where data is digitized and shared among interested actors this EnergyCloud project can work as a guiding star for other similar projects throughout Europe.

Minecraft as a tool to involve children in urban development

Gothenburg is undergoing major developments in urban planning. In this work there is a need to develop processes and models to engage young people for greater participation in this change. The purpose of the application of the Minecraft tool in the zoning project is to investigate whether/how Minecraft can be used as a tool to engage children in a citizen dialogue to develop detail plans and other city planning projects within the city of Gothenburg. In working with detailed plans that so clearly affect children's local environment and everyday life, it is of extra importance to strive to start from the children's own perspective. The hypothesis is that the application of Minecraft can facilitate dialogue with children, by the form of a computer game is both engaging and easily accessible to many children, and ultimately increase children's ability to influence the development of their local environment.

The dedicated work has also shown other positive effects, which were not planned within the project, and which are under analysis. Several stakeholders have contacted the project to take part in the process to enable replication and use in the context of youth work and urban planning perspectives.

A Smart city needs a City Innovation Platform

For the Gothenburg case, City Innovation Platform -CIP, will be fed with data from multiple data sources where the first will be our IoT platform. CIP will make data available to more consumers than the original IoT solution. In other words, we will create interoperability through CIP, maximize the value of our data by making available to multiple consumers and create the conditions for data driven innovation with AI, BI, etc. with standardized data models where data is interconnected. This is also an important part of the city's Open Data initiative. The initial test demonstration of the architecture, is to understand better the requirements and the challenges using Context Management, Data models and data sharing to achieve a CIP. A demonstration use case is also ongoing with the use of sensors giving real-time data for water temperatures in city lakes and more – through CIP.

3.2.3 Solutions in Nice

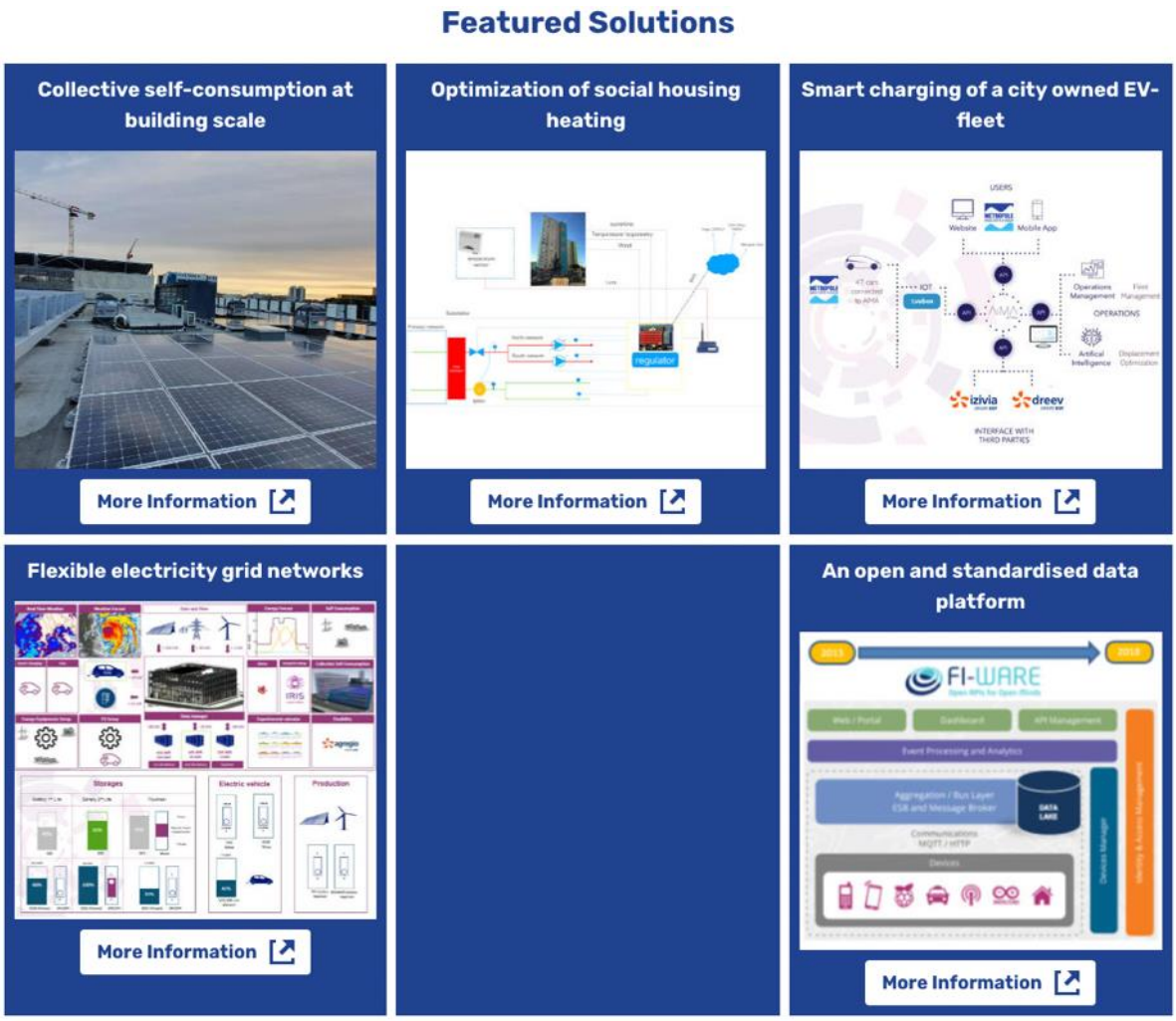

Figure 9: Overview of Featured Solutions for Nice, based on the IRIS Showcase Website.

The IRIS project has served as a basis for the implementation of an energy community in the Nice Méridia district. This will be composed of the IMREDD, other buildings and the IDEX geothermal network. This device, which will enable this ensemble to exchange energy, was made possible by a change in French regulations.

Several partners in the Nice ecosystem have responded to calls for expressions of interest (sustainable city and digital base) based on the results obtained in the framework of IRIS, where Nice aim to develop further within those areas, by utilizing the project results.

Finally, the CIP which was created by the Metropolis has been replicated as a territorial innovation platform by one of our partners: IMREDD.

3.3 IRIS communication channels

The IRIS projects have several well-established communication channels for news updates and knowledge sharing, including a project website[4], showcase website[5], LinkedIn[6],Twitter[7] and YouTube[8]. Whilst the IRIS project is ongoing the channels will continue to be regularly updated. However, after the end of the project there will be no new updates. Still, the channels will be present for those in interest of the IRIS project. In particular, the IRIS showcase website, established later on in the project, was created for this purpose. The showcase website will neither be updated but will be an important demonstration of the solutions and indicate who to contact for further information. Additionally, in the same purpose an IRIS magazine will be released piror to project-end. This working process for the IRIS magazine has been intiated but not finalized yet.

3.3.1 The IRIS Magazine

The original idea of a joint IRIS recommendations paper and the production of fact sheets for each IRIS solution has been abandoned and instead the whole IRIS consortium will work together on "the IRIS Magazine". During the consortia meeting in Nice, France in September 2022 a workshop was held to set the basis for the magazine that will show the IRIS legacy.

The IRIS Magazine will be presented as a digital pdf online and not printed. Links to video clips and webinars will be in the magazine as well as different highlights and key learnings and recommendations.

The final consortium meeting of IRIS will be held in Gothenburg (March 2023) and one day will be dedicated to external meetings and seminars, in order to provide stakeholders within the city with key takeaways.

The goal is to have the IRIS Magazine as a digital booklet – outlining what made IRIS special – rather than stating every detail of the project. The target audience is people with a professional interest in transition and smart cities development. It will be in landscape format – digital. The tone will be honest and informal and the content will be a combination of editorial texts, interviews, quotes, images etc.

[4] IRIS Smart Cities – Smart cities

[5] IRIS Smart Cities Showcase – Co-creating smart and sustainable sities

[6] IRIS Smart Cities: Översikt | LinkedIn

[7] IRIS Smart Cities (@IRISsmartcities) / Twitter

[8] IRIS Smart Cities - YouTube

3.3.2 IRIS Solution Showcase

The IRIS Smart Cities showcase is a website for demonstrating the IRIS solutions (see Figure 10 and Figure 11). The solutions/action within the project is demonstrated for respective lighthouse city: Utrecht, Nice and Gothenburg. Along with the featured solution a description answering the following questions “Why implement?”, “Why to use in my city? (USPs)”, and contacts information follows[9]. Also in some cases videos are provided. IRIS Showcase aims at promoting knowledge sharing and fostering replication of the IRIS solutions. During the last months of the project more information will be available on the website, in addition to videos added.

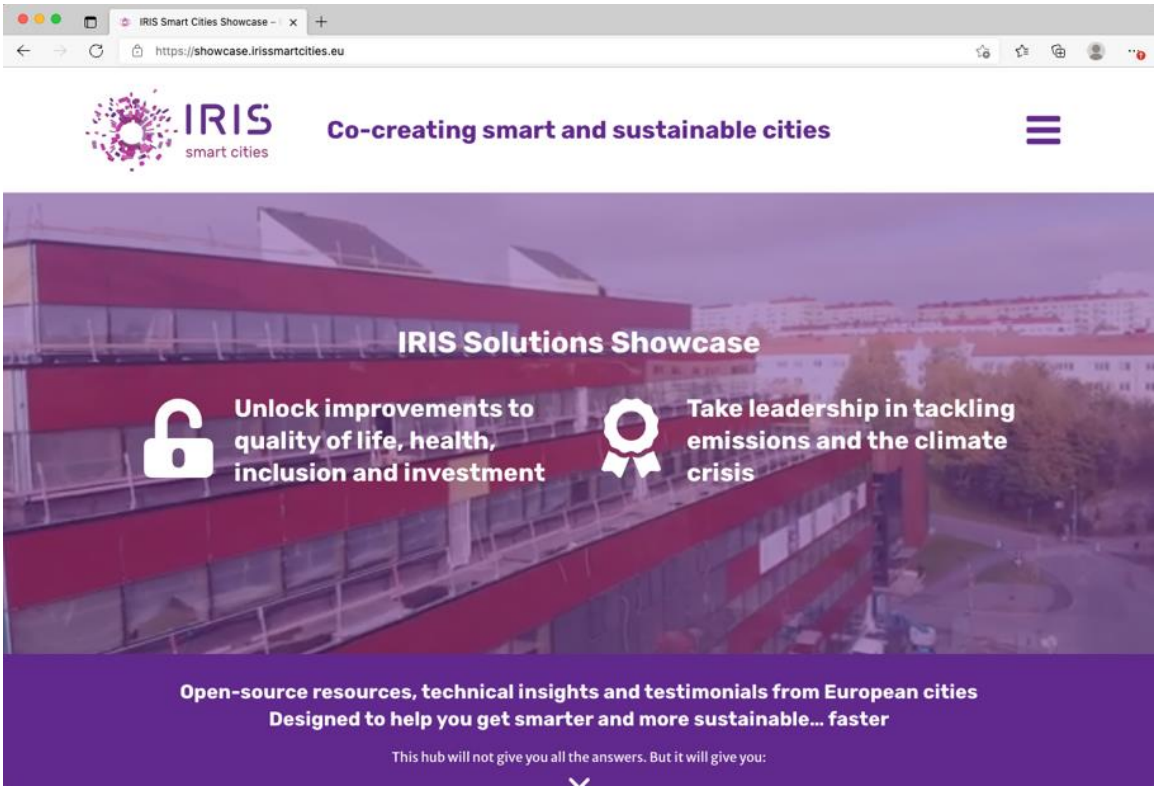

Figure 10: IRIS Solutions Showcase website.

[9] IRIS Smart Cities Showcase – Co-creating smart and sustainable sities

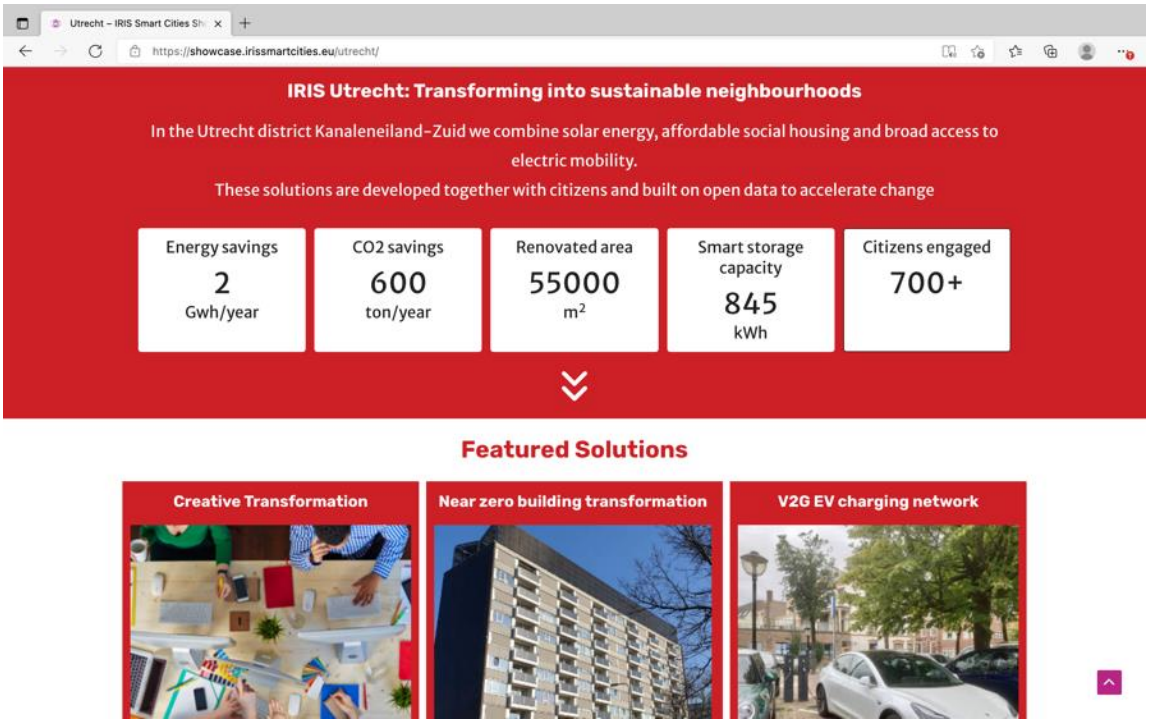

Figure 11: Example showcase of Utrecht.

3.4 Partnerships with external organisations and other cities

This section of the report addresses existing and conceivable partnerships with external organisations. Partnership for the city are valuable for knowledge sharing for the continued development of IRIS solutions and uptake by other cities.

The following inputs have been collected through interaction with the cities, desktop studies and participation in the Scalable Cities Event – Moving from Solution to System Change (1 June 2022). Further, the section is based on organisations listed in the grant agreement. However, through interaction with the Lighthouse Cities we learned that some of the initiatives are less relevant today, and some of the newly established initiatives are more relevant to consider. The initiatives considered to be most relevant follow below (see **Fout! Ongeldige bladwijzerverwijzing.**). Some of the networks are initiatives the IRIS project is already active within, whilst others are new ones. They comprise EU-supported projects and service contracts, EU- and UN-supported programmes, and membership-based network organizations of local governments / cities.

Table 2: Summary of networks and their relation to the lighthouse cities.

Initiative/network	Utrecht	Gothenburg	Nice
EU Mission “100 Climate Neutral and Smart Cities”	X	X	

18 Lighthouse Projects' Task replication Group	X	X	
Scalable Cities Secretariat	X	X	X
NetZeroCities	X	X	
Smart City Marketplace	X	X	
ICLEI	X		
Viable Cities		X	
Eurocities	X	X	X
UN-Habitat	X		

During the runtime of IRIS, several initiatives have been established that support cities aiming to become climate neutral and smart, by benefitting from the wealth of experience and expertise that was gathered in the 18 Lighthouse projects, among which IRIS. These initiatives are:

- EU 100 Climate Neutral and Smart Cities
- The Task Groups in support of the 18 Lighthouse projects, e.g. TG Replication, TG Monitoring;
- The Scalable Cities Secretariat service contract (notably the City Coordinators Group);
- The NetZeroCities project; and
- the Smart Cities Market Place service contract.

In addition to these, IRIS Lighthouse and Fellow Cities have been active, and are continuing to be active, in three other networks supporting the Cities Mission on climate neutrality:

- ICLEI;
- Viable Cities;
- Eurocities; and
- UN Habitat

Each of the aforementioned initiatives are demonstrated below, along with a description of its relation to IRIS for the applicable city/cities.

3.4.1 EU Mission "100 Climate Neutral and Smart Cities"

In support of the European Green Goal to achieve climate neutrality by 2050, the EC developed EU Missions. The Missions are novel elements of the Horizon Europe research and innovation programme for the years 2021-2027. One of these Missions is the EU Mission for 100 climate-neutral and smart cities by 2030, the so-called 'Cities Mission'. On 28 April 2022, the Commission announced the 100 EU cities from all 27 Member States that will participate, with 12 additional cities coming from countries associated or with the potential of being associated to Horizon Europe, the EU's research and innovation programme (2021-2027).

- The Cities Mission include the following sectors:
- Stationary energy (buildings, equipment, facilities),
- Energy production and distribution,

- Transport,
- Waste management,
- Industrial processes and product use, and
- Agriculture, forestry, and other land use.

Gothenburg and Utrecht got elected as two out of the 112 cities. The cities will work with the following objectives:

Reach 100 climate-neutral and smart cities by 2030.

Ensure that these cities act as experimental and innovation hubs to put all the European cities in a position to become climate-neutral by 2050.

As the IRIS project will end in 2023, the participation in the Mission will be a continuation of IRIS and outline the work until 2030 and 2050. Hence, it will be an opportunity for how the IRIS solutions can continue to be developed after project-end in addition to an excellent platform for knowledge transferring between the cities.

Being one of the 100 selected cities will provide Utrecht and Gothenburg with opportunities in terms of advice and assistance, funding and financing, network, learning and knowledge transfer and citizen involvement. In the next step the elected cities will start working on their Climate City Contracts, which will outline the strategy for achieving climate neutrality by 2030. That includes climate action plan and investment strategy, innovative city governance and citizen engagement, besides the involvement of EU, national and regional level10.

Transition plan Utrecht

As mentioned above, in order to be one of the selected, the city had to write a proposal describing its plan for becoming climate neutral in 2030. For Utrecht the paper covered topics from IRIS including mobility, how to deal with grid stress (V2G), transformation of buildings, saving energy in public space with lightning, teaching young people to choose technical professions in the future, etc. In other words, all those topics Utrecht has been working on within IRIS are part of the paper. By participating in the program, the city expects to develop further within those areas. Besides the project results, there are also policies in place that are connected to the paper. The policies are an important piece for new projects, funding and corporations with companies. The alignment with the policies is something that could benefit all these topics and it one of the key learning in the IRIS project, from Utrecht's point of view. The interaction with the policies within those areas will hopefully benefit the IRIS solutions and

[10] ec_rtd_he-cities-mission-reveal-factsheet.pdf (europa.eu), The NZC project - NetZeroCities

foster the continued development. Furthermore, through the exchange and twinning activities of NetZeroCities the learnings on the IRIS solutions could be exchanged with other Mission cities and stakeholders.

Transition plan Gothenburg

Within the mission of being selected to be one of the 100 Climate Neutral Cities in Europe, Gothenburg city wrote a paper describing their plan for becoming climate neutral in 2030. This was a working process with the lead of Environmental administration together with other administrations, companies and Science Parks locally. For Gothenburg the paper covered topics from IRIS including a mobility service for tenants, second hand batteries for local energy storage, IoT development for the city and more. By participating in the program for 100 Climate Neutral Cities, the city expects to develop further within those areas. One concrete example so far, is the MOSAIC project supporting cities through developing processes for Citizen engagement.

Besides the project results, there are policies, programs/plans and strategies in place that are strongly connected to the paper. These are important for new projects, funding and corporations with companies. The interaction with the policies within those areas will hopefully benefit the IRIS solutions and foster the continued development.

The political decision to work on a national Climate Contract was taken in 2020. Gothenburg signed the first national Climate Contract in December 2020 and updated it in 2022. Gothenburg is one of 23 cities in Sweden that have signed a Climate Contract to reach the goal of becoming climate neutral by 2030. The initiative is backed by the national strategic innovation programme Viable Cities, of which the City of Gothenburg and Johanneberg Science Park are members. As a city, it must describe its strategy for becoming climate neutral, how it will drive, lead and manage the climate transition, how it will finance it, what strategy it has for involving citizens and taking advantage of the opportunities offered by digitalisation. The work on environmental and climate issues is based on the City of Gothenburg's new Climate and Environment Programme. The City of Gothenburg has changed the way it works with environmental and climate issues and is collaborating with the business community on initiatives that take a more holistic approach. The Climate Contract states, among other things, that Viable Cities will support the municipality's implementation of innovations that accelerate the climate transition – by contributing with competence networks and process support, particularly in the areas of mobility, energy, the built environment, the circular economy and digitalisation. Citizen engagement is also a focus, with Viable Cities now developing a citizen lab.

Vaasa

One example of a city not being selected to the 100 Climate Neutral Cities is Vaasa, in Finland.

Finland has initiated a national organisation gathering all the Finnish cities that are part of the 100 Climate Neutral Cities. Furthermore, three other Finnish cities that had great ambitions and applied to become one of the 100 cities, but didn't get approved, are also part of this Finnish national organisation. One of these three cities is Vaasa. Vaasa now considers itself to be "a hang around" to the 100 Climate Neutral Cities or a "fellow city". This is a great example for the other cities to follow suit.

3.4.2 18 Lighthouse projects' Task Group Replication

The network aims to improve the cooperation between cities representatives, focusing on replication. Further, the initiative advice the EU Mission "100 Climate Neutral and Smart Cities" on experiences of what has been working well and not within the area of replication.

Utrecht and Vaasa

Utrecht and Vaasa together chaired the Task Group Replication of the Horizon2020 Smart Cities and Communities projects cluster[11] from September 2019 until September 2022, focusing on:

- Sharing replication (best) strategies and results between Lighthouse projects.
- Sharing replication (best) experiences and results between Fellow Cities and their innovation ecosystems.
- Dissemination and exploitation of TG Replication lessons learnt.
- Collaboration with European research networks and with European other city networks in support of scale-up and replication.

The Task Group Replication organized and shared 33 presentations between the 18 Lighthouse projects and (co-)coordinated contributions from the Lighthouse projects' cities to the European Sustainable Energy Week (2020) and the European Week of Regions and Cities (2021).

TG Replication is explicitly open to finished Lighthouse projects and will stay an important source of information and experiences, best practices and lessons learnt, as well as the informal network for further inspiration and information.

3.4.3 Scalable cities secretariat

Scalable Cities is the new name since 2021 of the 18 Horizon2020 Smart Cities and Communities project cities. The Scalable Cities Secretariat, a EU service contract established in 2021, aims to:

- Develop knowledge transfer between cities in the SCC Lighthouse projects cluster
- Favour upscaling through financial engagement, and
- Increase the outreach of the projects.

An important initiative under this Scalable Cities Secretariat is the City Coordinators Group (CCG) (established in 2021), which particularly focuses on knowledge sharing, and works actively together with the SCC01 project cluster's Task Group Replication. Most (if not all) IRIS cities are members of the City Coordinators Group and participate actively in the CCG and Task Group Replication sessions, which have taken and will take place in 2021-2022 virtually every month.

[11] The Horizon2020 Smart Cities and Communities projects cluster includes 18 Lighthouse projects with a total budget of more than 420 million €, in which 48 Lighthouse cities and 72 Fellow Cities implement over 550 solutions.

In 2021-2022, Scalable Cities City Coordinators Group and SCC01 Task Group Replication organized several joint information and knowledge exchange sessions for the Scalable/ SCC01 cities community, e.g. on the EU Mission "100 Climate Neutral and Smart Cities" in which IRIS cities have also participated. In 2022-2023, this cooperation will continue, probably also in cooperation with SCC01 Task Group Monitoring, in which IRIS has actively participated.

Like TG Replication, the City Coordinators Group is explicitly open to finished Lighthouse projects and will stay important sources of information and new insights, best practices and lessons learnt, as well as the informal network for further inspiration and information.

Business Model and Finance Task Group

The Business model and Finance Task group (BMF) started out as a network activity among the experts in the 19 SCC01 Lighthouse projects, all tackling much the same scope. The Business Model and Finance Task Group was establishing, as a community for cooperation and supporting, knowledge sharing between cities. The BMF task group could be important for the replication of IRIS solutions in other cities. However, the collaboration has stranded since the Scalable Cities resources was assigned by the commission to support the smart cities.

The role of Scalable Cities is to identify and promote solutions and business models that can be scaled up and replicated across Europe and lead to measurable outcomes such as new jobs and energy savings.

Scalable Cities offer two services for cities to go Beyond Iris:

- Scalable Cities Expert Group, which is an online networking and co-working community of experienced and motivated smart city experts ready to provide technical advice and support to cities.
- Scalable Cities Action Grant, which is a financial tool to support the replication of measures already successfully tested in Smart Cities and Community projects.

3.4.4 NetZeroCities (H2020 project)

NetZeroCities is developing the Mission Platform, a one-stop for cities providing access to a wealth of online resources and tools, an online peer learning and collaboration space, as well as zero-carbon technology and innovation factsheets to support cities on their journey to climate neutrality by 2030. It consists of 33 partners across 13 different countries. The partners consist of 13 leading city networks, 5 companies & consultancies, 8 research organisations, 3 think-tanks and 4 universities, providing a diverse set of knowledge to the consortium.

The work within NetzeroCities will support the EU Mission "100 Climate Neutral and Smart Cities" mainly within the upscaling activities to support the overall objective of reaching 100 Climate Neutral

Cities[12]. An activity of this Panel in 2022 was to provide feedback on the design of the Mission Climate Neutral Cities Platform. This Platform is to be (cities') demand-driven, aiming to foster exchange, and mutual learning and access to relevant support to cities, which should accelerate the realization of the EC's Climate Neutrality Ambition.

The platform will include the following modules to promote collaboration and joint learning by cities:

- Peer-to-Peer collaboration space
- City Dashboard reporting tool
- Introduction & onboarding tool
- How the Climate-Neutral City Advisors will work with cities

3.4.5 Smart City Marketplace (service contracts)

The Smart City Marketplace aims to bring cities, industries, SMEs, investors, researchers and other smart city actors together. It covers the following areas which are well aligned with the transition tracks:

- Energy (Transition track 1, 2 and 3)
- Transport (Transition track 3)
- Mobility (Transition track 3)
- Information and Communications Technology (Transition track 4)

An important activity of the Smart Cities Marketplace, in which several IRIS Lighthouse and Fellow cities have participated, is the matching of cities and market parties in masterclasses to prepare invest plans, provide access to investors/ banks, free downloadable Solutions Booklets and SmartCity Guidance Package for strategy and portfolio development.

The Smart City marketplace is open to finished Lighthouse projects, and will keep being an important source of information and matchmaking, notably for expertise, roadmaps and institutional investor network for bankability and financing of solutions.

3.4.6 ICLEI – Local Governments for Sustainability

ICLEI – Local Governments for Sustainability is a global initiative active in over 125 countries and more than 2500 local and regional governments, aiming for urban development in the cities[6]. The initiative has the following five main directions designed for achieving the sustainability goals: Low emissions, Nature-based, Equitable, Resilient, and Circular development. Amongst other areas, the initiative is currently active within renewable energy, food security, data-driven climate action, eco-mobility alliance and urban-LEDS. Further, the initiative has monthly webinars, organised by Yuanus Arikan, Director of ICLEI Global Advocacy. The webinars cover the areas of multilevel governance and

[12] NZC Partners - NetZeroCities

progress in the global climate negotiations for local and regional governments. Utrecht is active within the network.

Utrecht
The city of Utrecht is a member of ICLEI, and through the sharing of best practices Utrecht can exploit the knowledge gained in IRIS. The Utrecht lighthouse solutions vehicle-2-grid bidirectional ecosystem, NZEB/PEB renovation packages and the innovative citizen co-creation methods can be part of this exchange.

3.4.7 Viable Cities

Viable Cities is a strategic innovation program aiming at helping cities in their transition to become climate neutral by 2030. The initiative is well-aligned with the Global Sustainability Goals and the Paris Agreement, taking into account a broader perspective of social, ecological and economic sustainability. The program is implemented in corporation with the Vinnova and Formas where the Swedish Energy Agency is the responsible party. It is an agreement with the municipalities and public authorities[13].

As a member each city is to outline its strategy for reaching climate neutrality, how to drive, lead and steer the climate transition, the finance, strategies for involving citizens, besides the opportunity for utilizing digitalisation.

The initiative supports the cooperation between the city and the industries and businesses. In addition, the climate contract states that Viable Cities will facilitate the implementation of innovation in order to accelerate the climate transition. That will be accomplished by offering support through competences, network, and processes mainly within the sectors of mobility, energy, circular economy and digitalizing. Besides, Viable Cities is currently developing a citizen lab where citizen engagement is put in focus. Those are all areas well-aligned with the transition tracks and will naturally be a path for continued development within those sectors and for utilization of previous project results. Currently, Gothenburg is active within viable Cities.

Gothenburg

In December 2020, Gothenburg city signed their first Climate Contract with Viable Cities, which latterly also has been updated in 2022. In total 23 cities in Sweden have signed the contract, to reach climate neutrality by 2030. The reason behind the contract is to outset the transition to a strategic and systematically climate work to enable influential and fast implementation and upscaling of innovations, transformation, and knowledge sharing. Gothenburg's participation in the initiative will be a highly valuable opportunity for other cities at national level to take a part of the results from the IRIS project and follow suit and utilize results.

[13] Home - Viable Cities

3.4.8 EUROCITIES

Eurocities is the network of major European cities with a focus on joint lobby towards European Commission and networks and the peer to peer exchange of best practices and knowledge on city topics. Through six thematic forums (such as Environment Forum, Mobility Forum, Knowledge Society Forum) Eurocities offers members a platform for sharing knowledge and exchanging idea. Through participation in the network the city's can benefit in terms of international expertise, a strong network, funding and financing, year-round support besides a strong network[14]. Utrecht city is member of the initiative.

71 of the municipalities that have been selected to join the Mission are Eurocities members.

"However, we will not forget about the other cities that did not make it to this stage – they share our ambition, and we will work with them to continue their journey towards climate neutrality by 2030 or soon after. We need all governments, businesses, and people to pull in the same direction to stand a chance of achieving European and global climate goals," said Dario Nardella, Eurocities President.

The city of Utrecht, Gothenburg and Nice, are members of Eurocities and through the sharing of best practices Utrecht, Gothenburg and Nice can exploit the knowledge gained in IRIS.

Utrecht

The Utrecht lighthouse solutions vehicle-2-grid bidirectional ecosystem, NZEB/PEB renovation packages and the innovative citizen co-creation methods can be part of this exchange. Furthermore, through Eurocities new cooperation projects focussed on the scale-up and further development of IRIS solutions can be done.

3.4.9 UN-Habitat

UN-Habitat aims at creating a better quality of life for all in an urbanizing world. The network is active in over 90 countries through knowledge sharing, policy advice, technical assistance and collaborative action. Recently, a strategic plan 2020-2023 was adopted promoting a more strategic and integrated approach towards challenges and opportunities for people and communities, inequalities, discrimination, and poverty[15]. Utrecht is involved in the UN-Habitat.

[14] Goals - Eurocities

[15] About Us | UN-Habitat (unhabitat.org)

Utrecht

The city of Utrecht is mainly involved with UN-HABITAT through the World Urban Forum. Most recently at WUF 11 in Katowice Utrecht Mayor Sharon Dijksma has been appointed as special envoy for the United Nations' network of cities in the run-up to and during the COP27 in Sharm-el-Sheikh in November 2022. In the run-up and during the COP27 she will work on improving the representation of cities in the establishment of new climate agreements. Through these activities the ambition on climate transition of the IRIS cities and the hands-on experiences of doing this through smart solutions can be disseminated to the COP27.

3.4.10 Cities outside of Europe showing interest in IRIS solutions

During the IRIS project the cities has been in contact with cities outside of Europe, through e.g. study visits and external organisations and network. This has facilitated knowledge sharing of project values and results beyond Europe and is well-aligned with Milestone 18. Below follows a list of the countries that has shown particular interest in the IRIS solutions, see Table 3.

Table 3: List of cities outside of Europe that have showed interest for the IRIS solutions.

AT LEAST 20 CITIES OUTSIDE OF EUROPE THAT HAVE SHOWED PARTICULAR INTEREST FOR ONE OR TWO IRIS SOLUTIONS.									
Number	**IRIS City**	**City outside of Europe**	**Country outside of Europe**	**Transition track 1: Renewable and energy positive districts**	**Transition track 2: Flexible energy management and storage**	**Transistion track 3: Intelligent mobility solutions**	**Transition track 4: Digital Transformation And Services**	**Transition track 5: Citizen Engagement and Co-creation**	**Comment**
1	Gothenburg	Santiago	Chile	Brf Viva					
2	Gothenburg	Fujisawa	Japan	Energy efficient buildings, virtual tours					
3	Gothenburg	Beijing	China	Energyrenovation					
4	Gothenburg		Thailand			Smart mobility			
5	Gothenburg	Jiading	China			Smart mobility			
6	Gothenburg		Mexico			Smart mobility			
7	Gothenburg	Namyangju	South Korea	Sustainable city development					
8	Gothenburg		Turkey	Sustainable city development/Energy efficient					

9	Gothenburg	Jakarta	Indonesia	Sustainable city development/Energy efficient					
10	Gothenburg		Laos	HSB Living Lab					
11	Gothenburg		Malaysia	HSB Living Lab					
12	Gothenburg		Philippines	HSB Living Lab					
13	Gothenburg		Vietnam	HSB Living Lab					
14	Utrecht	Seoul	Korea			V2G Hyundai Ioniq 5			Hyundai is the first car manufacturer to have implemented V2G-capabilities in a production car,
15	Utrecht	Pittsburgh	United States		EV integration in smart grid	EV integration in smart grid			Smart Solar Charging - Region Utrecht', has been selected as the Winner of the 2022 ISGAN Award of Excellence, to be awarded 21-23 September 2022
16	Utrecht	Oregon	United States			Innovative Mobility			
17	Utrecht	Florida	United States			Innovative Mobility			
18	Utrecht	Taipei	Taiwan						Economic development, all transition tracks.
19	Utrecht	Paramaribo	Surinam			Innovative Mobility			
20	Utrecht	Teheran	Iran			Innovative Mobility			
21	Utrecht	Zhuhai	China						Economic development, all transition tracks.
22	Utrecht	New Delhi	India		Accelerating clean energy in India				
23	Utrecht		United Kingdom		Fully Charged LIVE Europe (20th-22nd May, RAI, Amsterdam).				
24	Utrecht		United Kingdom		Midlands Connect				
25	Utrecht		United States		IEEE Spectrum (This Dutch City Is Road-Testing Vehicle-to-Grid Tech - IEEE Spectrum)				
26	Utrecht	New Castle	Australia		Adam Clarke				
27	Utrecht		United States		CoMotion: Giving Back To The Grid: The Future of EV Charging is Reciprocal				
28	Utrecht		Germany		3SAT nano Bidirektionales Laden 3sat NANO, 20.06.2022 Bidirektionales Laden: Das Auto als Schwarmspeicher für erneuerbare Energie!				
29	Utrecht		United Kingdom		Fully Charged				
30	Utrecht		Germany		Charging Infrastructure Conference of the Federal Ministry of Digital Affairs and Transport				

3.5 Exploitable results

This section presents how IRIS cities could include exploitable results presented at the IRIS showcase site in their IRIS beyond business plan, transforming their city district-by-district towards climate neutrality.

The table below presents the prediction of exploitable results in the IRIS project Grant agreement.

Table 4: IRIS Exploitable results, from Grant Agreement, page 111 (page 298 in pdf).

EXPLOITABLE RESULTS	TYPE OF RESULTS	OWNERS	PROVISIONAL IPR STRATEGY/ FORSEEN EXPLOITATION
CIM (City Information Model)	Other	Tyréns, Gothenburg, LH cities, CSTB	City traffic and planning tool. Open.
CIP (City Innovation Platform) and CIP Market place (3rd party apps)	Product (Platform)	Civity, CERTH, Engie Cofely, Gothenburg, Nice, KPN, Metry, Utrecht, CSTB	Free for educational, academic and research purposes. Market place; Free/Freemium/Pay per app download (depending on the scope of each app, the type of user and the purpose of use)
BIM & game-based VR Platform	Product (Platform)	Trivector, HSB, CERTH/ITI, LH cities, BOEX	Free for educational, academic and research purposes. SaaS for all other purposes
Urban monitoring services	Product & Service	KPN, Stedin, ATMOSUD, Enedis, RISE, LH cities	Free for educational, academic and research purposes. Free/Freemium for all other purposes
City management & planning services	Product & service	LH cities, BOEX, CAH, Nexity, Akademiska Hus, HSB	Free for educational, academic and research purposes. Free/Freemium for all other purposes
Mobility services	Product & service	Vulog, Trivector, CERTH/HIT, Lomboxnet, Eneco	Free for educational, academic and research purposes. Free/Freemium for all other purposes
Grid flexibility services	Product & service	Eneco, Stedin, Enedis, EDF, Chalmers, Lomboxnet, Qbuzz, CERTH/CPEI, Riksbyggen, Engie Cofely.	Free for educational, academic and research purposes. Free/Freemium for all other purposes
Storage solutions (2nd life batteries, thermal storage)	Products	BOEX, Qbuzz, Lomboxnet, Eneco, Stedin, CSTB, EDF, Akademiska Hus, CERTH/CPERI, Riksbyggen	Patent; Licensed use.
IRIS Replication tools (roadmap, replication wizard, training etc)	Other	CERTH, Utrecht University, HKU, Vaasa, CSTB, Chalmers, Riksbyggen, LH cities	The roadmap for replication activities will be public & provided for free. Provision of citizen engagement tools for free. The replication

			guide/wizard will be public & provided for free. Provision of training on a fee-basis.
IRIS business model tools	Other	IMCG, University of Nice, Utrecht University	Open to public

3.5.1 Material on exploitable results at the IRIS showcase site

Below, short summaries of the different groups of exploitable results is presented. The summaries are based on the documentation available on either the IRIS Showcase site[16] or the IRIS Smart Cities project website[17].

3.5.1.1 CIM (City Information Model)

Information on IRIS Showcase site
Information on CIM is presented on the IRIS Showcase site in downloadable pdf document called Launch of T.T.# 4 activities on City Innovation Platform and information services (Gothenburg)[18].

Value chain and business models
The company Tyréns is the solution supplier and the IT department at the Urban Transport Authority at the City of Gothenburg is the solution provider for three construction projects in Gothenburg. Business model beyond the project will be based on public procurement of CIM services providers.

Profit and Loss
In Gothenburg City, the CIM pilot is expected to contribute to improved planning management, control and maintenance for better energy and transport services for citizens and businesses. It is a new service and not a substitute that compete with existing alternatives. Thus, no obvious loser on the market but potential profit for software and service providers.

Market design overcoming transformation barriers
City authorities should make sure there is resources available to build, expand and maintain a CIM. There should be policies in place that clearly states the cities long term strategy for CIM.

3.5.1.2 CIP (City Innovation Platform) and CIP Market place (3rd party apps)

Information on IRIS Showcase site

[16] https://showcase.irissmartcities.eu
[17] https://irissmartcities.eu
[18] https://irissmartcities.eu/wp-content/uploads/2022/01/d7.6_launch_of_tt4_activities_on_city_innovation_platform_and_information_services_gothenburg.pdf

The CIP is presented at the showcase site in downloadable pdf document *Launch of T.T. #4 activities on CIP and information services*[19].

Value chain and business models
The value chain branches out in linkages starting with sensor providers and raw data communication for the different user cases. Business model beyond the project will be based on public procurement of CIP services providers.

Profit and Loss
The CIP is a new service and not a substitute that compete with existing alternatives. Thus, no obvious loser on the market but potential profit for software and service providers.

Market design overcoming transformation barriers
City authorities should make sure there is resources available to build, expand and maintain a CIP. There should be policies in place that clearly states the cities long term strategy for CIP.

3.5.1.3 Urban monitoring services

Information on IRIS Showcase site
The CIP is presented at the showcase site in downloadable pdf document *D6.6 Launch of T.T. #4 activities on City Innovation Platform and information services (Nice)*[20]

Value chain and business models
The value chains is mainly a cooperation between city departments to together deliver a joint urban monitoring platform for different user cases. Business model beyond the project will be based on public procurement of CIM services providers and sensor technology suppliers.

Profit and Loss
It is a new service and not a substitute that competes with existing alternatives. Thus, no obvious loser on the market but potential profit for software and service providers.

Market design overcoming transformation barriers
City authorities should make sure there is resources available to build, expand and maintain a CIP. There should be policies in place that clearly states the cities long term strategy for CIP.

3.5.1.4 City management & planning services

Information on IRIS Showcase site

[19] https://irissmartcities.eu/wp-content/uploads/2022/01/d5.6_launch_of_t.t.4_activities_on_city_innovation_platform_and_information_services_utrecht.pdf
[20] https://irissmartcities.eu/wp-content/uploads/2022/01/d6.6_launch_of_tt4_activities_on_city_innovation_platform_and_information_services_nice.pdf

Information on CIM is presented on the IRIS Showcase site in downloadable pdf document named Launch of T.T.# 4 activities on City Innovation Platform and information services (Gothenburg)[21] and *Launch of T.T. #4 activities on CIP and information services*[22].

Value chain and business models
The value chain branches out in linkages starting with sensor providers and raw data communication for the different user cases. Business model beyond the project will be based on public procurement of CIP services providers.

Profit and Loss
The CIP is a new service and not a substitute that competes with existing alternatives. Thus, no obvious loser on the market but potential profit for software and service providers.

Market design overcoming transformation barriers
City authorities should make sure there is resources available to build, expand and maintain a CIP. There should be policies in place that clearly states the cities long term strategy for CIP.

3.5.1.5 Mobility services

Information on IRIS Showcase site
Information on Mobility services is available at the IRIS Showcase site in three different documents: Launch of T.T.#3 activities on Smart e-mobility (UTR)[23] ; Launch of T.T. #3 activities on Smart e-mobility (Nice)[24] and Launch of T.T. #3 Activities on Smart e-mobility (Gothenburg)[25] .

Value chain and business models
In the thematic transition track for Intelligent mobility there has been several demonstrators with integrated solutions for new services to the citizens. The integrated solutions build on value chains and sometimes ecosystems of several value chains with actors and individual business models.

The demonstrations also presented different user cases, some for citizens and others for businesses, with end user value propositions adapted to each user case. The demonstrated user cases were:

- MaaS with e-cars

[21] https://irissmartcities.eu/wp-content/uploads/2022/01/d7.6_launch_of_tt4_activities_on_city_innovation_platform_and_information_services_gothenburg.pdf
[22] https://irissmartcities.eu/wp-content/uploads/2022/01/d5.6_launch_of_t.t.4_activities_on_city_innovation_platform_and_information_services_utrecht.pdf
[23] https://irissmartcities.eu/wp-content/uploads/2022/01/d5.5_launch_of_t.t.3_activities_on_smart_e-mobility_utrecht.pdf
[24] https://irissmartcities.eu/wp-content/uploads/2022/01/d6.5_launch_of_tt3_activities_on_smart_e-mobility_nice.pdf
[25] https://irissmartcities.eu/wp-content/uploads/2022/01/d7.5_launch_of_t.t3_activities_on_smart_e-mobility_gothenburg.pdf

- Shift to e-vans (Boex)
- Public transports with e-buses
- MaaS with e-cars, e-bikes or public transport

User cases is well presented and can a basis for setting impact goals on district level including estimation of market development.

Profit and Loss
The change in the value chain is electrification which is a substitute to fossil fuels. This will generate a profit for all business related to electrification and loss to business related to fossil fuels.

The change in the value chain related to ownership of cars will generate a profit for carpool companies and a loss for car dealers. It could also have a secondary affect generating loss for parking companies and profit for property developer having the opportunity to increase property space when the is less demand for parking lots.

Market design overcoming transformation barriers
City authorities should have a long-term communication strategy to build acceptance for low traffic areas with high density of mobility services. The City authorities should have a clear policy on lowering the parking norm to actively stimulate the roll-out of MaaS concepts.

3.5.2 Material on exploitable results available at the IRIS Project web site

3.5.2.1 Grid flexibility services

Information on IRIS Showcase site
Information on Flexibility Energy Management is available on the IRIS project web site in three different documents: Launch of T.T.#2 activities on Smart energy management and storage for flexibility (UTR)[26], Launch of T.T.#2 activities on NCA[27] and Launch of T.T. #2 Activities on Smart energy management and storage for flexibility (Gothenburg)[28] .

Value chain and business models
The demonstrators present a new set of value chains opening up markets for new solution suppliers and solution providers. The demonstrations presented different user cases, some for citizens and others for

[26] https://irissmartcities.eu/wp-content/uploads/2022/01/d5.4_launch_of_t.t.2_activities_on_smart_energy_management_and_storage_for_flexibility_utrecht.pdf
[27] https://irissmartcities.eu/wp-content/uploads/2022/01/d6.4_launch_of_t.t.2_activities_on_smart_energy_management_and_storage_for_flexibility_nice.pdf
[28] https://irissmartcities.eu/wp-content/uploads/2022/01/d7.4_launch_of_tt2_activities_on_smart_energy_management_and_storage_for_flexibility_gothenburg.pdf

businesses, with end user value propositions adapted to each user case. The demonstrated user cases where:

- Solar V2G charging points for e-cars
- Solar V2G charging points for e-buses
- Smart energy management system.
- Smart Charging infrastructure (Nice)
- Flexible electricity grid networks
- DC building microgrid

Profit and Loss
The change in the value chain is storage of solar electricity for charging e-cars and to use when there is no sunshine and when there is a high power demand (in the district). This will generate a profit for all business related to electrification and electricity management solutions and loss to business offer electric energy and power from the electrical grid. And also, a loss for suppliers of fossil fuels to cars and buses.

Market design overcoming transformation barriers
The city authorities should support the roll-out of charging places in the district. The city authorities should communicate the transfer from polluting to non (city-wise) polluting mobility system. Cities authorities should support a market development by establish infrastructure and support from city authorities.

3.5.2.2 Storage solutions (2nd life batteries, thermal storage)

Information on IRIS Showcase site
Information on Flexibility Energy Management is available on the IRIS project web site in three different documents: Launch of T.T.#2 activities on Smart energy management and storage for flexibility (UTR)[29], Launch of T.T.#2 activities on NCA[30] and Launch of T.T. #2 Activities on Smart energy management and storage for flexibility (Gothenburg)[31] .

Value chain and business models
The demonstrators present a new set of value chains opening up markets for new solution suppliers and solution providers. The demonstrations presented different user cases, some for citizens and others for businesses, with end user value propositions adapted to each user case. The demonstrated user cases where:

[29] https://irissmartcities.eu/wp-content/uploads/2022/01/d5.4_launch_of_t.t.2_activities_on_smart_energy_management_and_storage_for_flexibility_utrecht.pdf
[30] https://irissmartcities.eu/wp-content/uploads/2022/01/d6.4_launch_of_t.t.2_activities_on_smart_energy_management_and_storage_for_flexibility_nice.pdf
[31] https://irissmartcities.eu/wp-content/uploads/2022/01/d7.4_launch_of_tt2_activities_on_smart_energy_management_and_storage_for_flexibility_gothenburg.pdf

- Stationary storage in apartment buildings
- V2G för short term storage and grid flexibility (Utrecht)
- Smart multi-sourced low temperature district heating with innovative storage solutions
- Utilizing 2nd life batteries for smart large-scale storage schemes
- Low temperature DH 45/30 system for six buildings
- A 1700 kWh PCM (Phase Change Material) cooling storage.
- Integration and evaluation of a 200kWh energy storage

Profit and Loss
The change in the value chain is storage of solar electricity for use when there is no sunshine and when there is a high-power demand. This will generate a profit for all business related to electrification and storage solutions and loss to business offer electric energy and power from the electrical grid (or heat from the district heating network).

Market design overcoming transformation barriers
City authorities should support the development of regulation in this area which allows large scale roll-out of the new integrated solutions.

3.5.2.3 IRIS Replication tools

Information on IRIS Showcase site
Information on Flexibility Energy Management is available on the IRIS project web site in document: Replication toolbox[32]

Market design overcoming transformation barriers
The toolbox supports activities for replication activities to overcome transformation barriers. It is a resource for city authorities for capacity building, training and knowledge transfer.

Value chain and business models
The replication toolbox can be used by the city authorities or with the assistance from management consultants specialised in smart city development.

3.5.2.4 IRIS business model tools

Information on IRIS Showcase site
Information on Flexibility Energy Management is available on the IRIS project web site in the document: IRIS exploitation plan and operations[33] .

Market design overcoming transformation barriers

[32] https://irissmartcities.eu/wp-content/uploads/2022/01/d8.3_replication_toolbox.pdf
[33] https://irissmartcities.eu/wp-content/uploads/2022/01/d3.8_exploitation_plan_and_operation.pdf

The business model tools are designed to be used by the city authorities to us for communication, polices and regulation to implement a market design that support the new integrated solutions to overcoming transformation barriers.

Value chain and business models
The business model tools can be used by the city authorities or with the assistance from management consultants specialised in smart city development.

3.5.3 Overview of value chains and business models

In this section an overview of the value chains and business models (more than 30 individual business models) identified in the presentations of integrated solutions. The table below also indicates if the solutions and investments are bankable (9 solutions estimated as bankable) and if the value chain includes Novel ideas (6 of the value chains). See Table 5 below.

Table 5 Overview of value chains and business models, including estimation of bankability and novelty.

Integrated solution	BM in value chain	Bankable solution	Novel ideas
Solar V2G charging points for e-cars	▪ V2G charging stations ▪ Payment system ▪ Electrical grid ▪ PV-system ▪ Management and maintenance	Yes	Yes
Solar V2G charging points for e-buses	▪ V2G charging stations ▪ Payment system ▪ Electrical grid ▪ PV-system ▪ Management and maintenance	Yes	Yes
Smart energy management system	▪ Electrical grid ▪ Aggregator of accumulated flexibility ▪ Effect balance responsibility	No	Yes
Smart Charging infrastructure	▪ Local energy management system	Yes	No
Flexibility electricity grid networks	▪ Local energy management system	Yes	No
DC building microgrid	▪ DC systems ▪ Geothermal heat pumps ▪ Ice-storage solution ▪ Management software ▪ Management and maintenance	Yes	No
Stationary storage in apartment buildings	▪ Battery leasing ▪ Energy management software ▪ Electrical grid	Yes	Yes

V2G för short term storage and grid flexibility (Utrecht)	▪ Software platform for aggregators and grid operators.	No	Yes
Smart multi-sourced low temperature district heating with storage	▪ District heating/cooling networks ▪ Thermal energy storage ▪ Management and maintenance	Yes	No
Low temperature DH 45/30 system	▪ District heating grid ▪ Heat exchangers ▪ Heat pumps ▪ Control system software ▪ Management and maintenance	Yes	No
Cooling storage (PCM – Phase Change Material)	▪ Cooling storage technology ▪ Management and Maintenance	Yes	No
Mobility as a service	▪ MaaS facilitator ▪ Booking and payment platform ▪ Smart optimisation software ▪ Vehicle providers ▪ Management and Maintenance	No	Yes

3.6 Innovation Management

Innovation management is crucial for a city for utilizing opportunities and fostering new ideas in order to eventually implement, scale-up and distribute innovative solutions. In other words, it is a key enabler for creating a city smarter. Based on the Innovation Roadmaps, previously presented in D3.6 Innovation Management Performance and Roadmaps, this section of the report will assess the innovation management of each city, focusing on the improvements and highlighting examples of best practice. Therefore, the sections highlight different elements and are differently structured according to each city.

3.6.1 Market Mechanisms

Cities have different possibilities to mitigate the city's climate impact by affecting the market design to support competitiveness for business models delivering climate friendly services and products.

In some cases, a city authority is responsible for the citizen service and can increase technology specifications in public procurement in line with the best available climate technology. For example, public transport. In another case, a city authority can permit the use of properties in a way that supports climate friendly services. For example, permit building a larger building and fewer parking spaces on the property. In other cases, a city authority can support a market development by establishing infrastructure and support from city authorities. For example, an electrical grid that supports the development of privately owned electrical grids for flexibility markets in a district.

Systematic changes in the governance structure of local authorities facilitate the transition towards climate neutrality. Cities authorities can design markets using different mechanisms such as regulations, procurements, and promotion of climate positive technologies. City authorities are usually a group of actors and there can be conflicting targets which sometimes makes it hard to agree on conflicting market designs.

The governing body of the city sometimes needs to introduce mechanisms which will create a loss for some publicly owned companies for the benefit of the climate. This is especially true when market changes are dependent on investments in infrastructure. Sometimes the city does not have the necessary funding and the change can take place only if private investment is encouraged.

Market design and change of market mechanisms to support system transformation should be key activities in cities innovation management. This topic was also brought up during the Scalable cities event "Moving from Solution to System Change" taking place in Utrecht. In the event six main enabling factors were brought up, as shown in Figure 12 below.

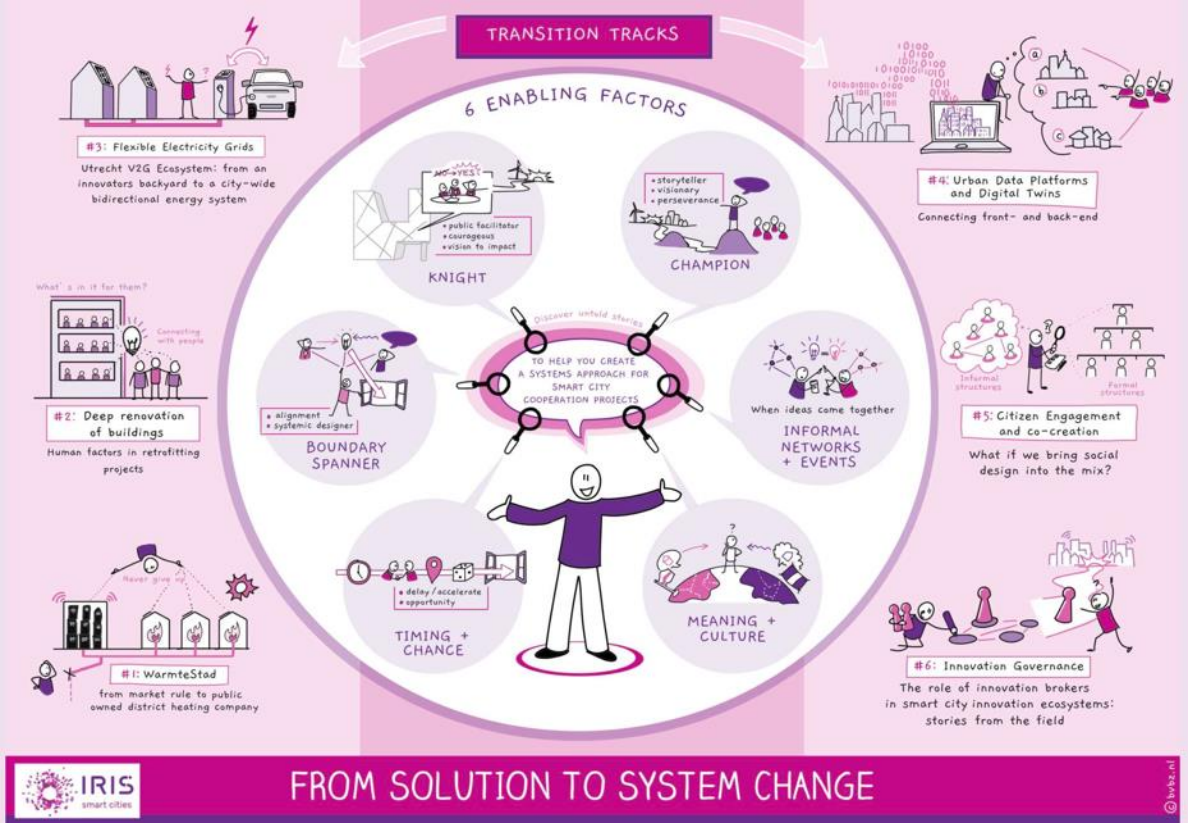

Figure 12: "From Solutions to System Change", from The Scalable Cities Events taking place in Utrecht.

3.6.2 Innovation management in Utrecht

In the roadmap for Utrecht the city highlighted their focus upon culture development, a culture where managers see their ability to innovate the processes. By involving innovation agents in the processes, new projects are continuously initiated by Utrecht with different European partners. The projects are considered as an approach for spreading ideas and experiences. Overall, the city puts lots of focus on IT-driven and data-driven solutions, aiming at becoming a smart city.

Political Actions

In March 2022 Utrecht got a new city council. The green party is currently the biggest in Utrecht, which is the same as from the previous election. Advantageously, that means that the work will be continuously built upon results and ambitions from the previous election. The council wants to build upon being climate neutral, by growing within sectors such as mobility, renewable energy, building and material use. Further the council intend to make a speech with the action of the sustainability topics in applying for new funds and opportunities for cooperation between partners in the ecosystem in Utrecht.

In the Netherlands the national government has decentralized many tasks from national level to local level, with the idea that policies can be better connected to the needs of the city. At the same time,

cities in the Netherlands made a change in roles from a co-investing role to a facilitating role. Hence the city has had activities trying to facilitate the companies to do invest and develop on sustainable topics. However, only facilitating the market is not enough to reach sustainable ambitions in the coming years and decades. Therefore, Utrecht wants to become less facilitating and instead more cooperating and participating, which is a big transformation to come.

Cooperation

The cooperation between actors is an important piece throughout the innovation process, from testing ideas to scaling up solutions. The government actively tries to facilitate the cooperation between SMEs, companies and research institutes. Not only, the cooperation between those but also the government's cooperation with respective. For instance, within the sector of heat and heat that is to be renovated, it will also affect the infrastructure, and due to that the city will also need to cooperate and invest into it. Overall, Utrecht expresses the cooperation between those as a prerequisite for implementing solutions into the real world.

Fostering new ideas

Utrecht Science Park and The University of Applied Science are two actors continuously fostering new ideas into the city. There are also non-profit research institutes such as Deltas and private research institutes like TNO Innovation for Life, particularly working on topics that can benefit the city. Those are important actors for bringing new ideas into the city.

Further the program "Pathways to Sustainability" in connection with the University of Utrecht, aims at connecting the facilities to work on the sustainability topics. That includes the facilities of geography, science, physics and laws, in which the city tries to connect to the research institutes. The goal of this pathway is to connect those with the outside questions, besides Utrecht Sustainability Institute.

Contrarily, The Utrecht Sustainability Institute works the other way around, as the institute starts with the practical questions. They see the need for a new technique, and thereafter seek for the suitable partners to cooperate with within these topics. That is also based on requests from the government and companies. The Utrecht Sustainability Institute thereafter connects partners from the practical world with researchers.

Scaling up/replication activities

"Start early with replication activities as that is when there are usually most resources available, in the end it is usually too late." – Arno Peekel, Utrecht Sustainability Institute.

Utrecht always aims at trying to manage the results and utilize in some way, in accordance with the solution phase. The city highlights that it is important to work with such in a preventive manner. By that said, it is not only important to work with this at the end of the project. It is of particular important

during the project, since that is when there is usually both time and money available for upscaling/replication activities. In the end it is usually too late, since people starts with new projects and shift focus.

One method the city uses is through involving end-users early in the process. That could for instance be a company that could invest in the technology, the research institutes who uses the knowledge to further develop their research and lessons programs for students or the City of Utrecht itself aiming to involve the results in the policy making. Those are all important actors brining a path for continued development of solutions. In addition, Utrecht organize events, webinar, papers, videos to disseminate the results and key learnings form the projects. That is also seen as an opportunity for involving the end-users, a key method for scaling up solutions.

One example of this is the building owner BOEX. When BOEX wants to retrofit a building, they require at least 70% support from tenants. If that support level is not reached, BOEX cannot start with the retrofitting activities. The approach being used towards tenants was an old fashion approach, which needed change. Therefore, within the IRIS project they started to experiment with BOEX together in a different manner, turning into a successful outcome. Nowadays BOEX are using this approach more or less as the standard approach in other projects. The IRIS project is not related to it nowadays, however it is now late down in their policy and working methods. Besides, the approach is finding its way to other districts through BOEX.

Barriers to overcome

The main barriers for the city are policies and regulations, that do not align and are out-dated. One example within the IRIS project is the retrofitting approach of buildings, where the architectural side want to keep the look of districts as it is now. However, to make the building more sustainable it also requires changes in the looks. This results in lack of time in debates with the City of Utrecht. Besides, as the government consists of many different entities e.g., a sustainability department it results in different interest.

The Utrecht Sustainability Department is not a part of the City of Utrecht but rather plays an important part as an external partner having a close cooperation with the city. In order to overcome the barrier, the institute always tries to involve a person from the city of Utrecht in the project or action taking place. Hence, they can hopefully overcome the barrier inside the city between the departments and persons, having a closer corporation from outside than inside. This is an important piece as the people working at the Utrecht Sustainability Department does not have any mandate in the city. Therefore, it must come from inside the city, and clearly state what is important for the future of the project already from the start.

The cooperation is a continuous work for the city. There is always room for improvements within the area. This was also pointed out in the roadmap for Utrecht where the city highlighted their participation in an initiative with the purpose of becoming “one government” rather than different agencies and municipalities.

Participation in IRIS

Utrecht's participation in the IRIS project has in particular helped the city in involving the right person in the organization. That is a person seeking opportunities with knowledge in a different way. Involving those people foster knowledge sharing as they talk about the IRIS projects in meeting. Such talks are important for knowledge sharing between organizations and districts, which has also developed into new projects.

3.6.3 Innovation Management in Gothenburg

In the innovation roadmap for Gothenburg the city pointed out an innovation program (2018-2023). The program aims to create double loop learning. Within the program a core strategy was to improve the cooperation between different actors, including public sector, academia, civil society and business sector, to enable innovation. Within the innovation program a schematic innovation life cycle process was described. See Figure 13 below, previously presented in D3.6.

Figure 13: Innovation process of Gothenburg city, presented in the Innovation Program.

Figure 13 demonstrates the following steps:

- Generate ideas and concepts
- Develop, test, and verify
- Implement and scale-up
- Distribute

Innovation process

Nowadays, the model is well-integrated in the city where collaboration between actors is put in focus to foster ideas throughout the whole process. That is an area where the city continuously sees paths for improvements. At present, Gothenburg demonstrates very successful performance in generating ideas and concepts and in developing, testing, and verifying. One great example is the three Science parks in Gothenburg: Johanneberg, Lindholmen and Sahlgrenska. The science parks play an important role as it is an exceptional platform fostering the first two steps, bringing both citizens and investors together.

When it comes to implementing, scaling up and distributing ideas it requires mature decisions that are decided by actors carrying through and testing, besides political actions for up-scaling. A barrier highlighted in previous report. However, through Gothenburg's participation in several plans, strategies, and programs the demonstrations can be a part of those to foster the scale up and distribution at local, regional and national level. Some examples are the following:

- BRF Viva batteries (private actors and energy companies): BRF Viva Batteries uses second life as energy storage in the real estate company Riksbyggen. Latterly, it has been successfully replicated by the real estate company Stena Fastigheter and by the company Essity.
- FED - Gothenburg Energy (Göteborg Energi): The Fossil-free Energy District project, FED, is a project in Gothenburg aiming to decrease the dependence on fossil fuel, ongoing during 2017-2019. It is a cooperation of several actors including energy companies, city actors, companies, academia and research institutes[34].
- Maas (private actor with local organisations): An initiative fostering new sustainable technologies and business models aiming at changing the travel behaviour of employees of companies located at Lindholmen, in Sweden[35]. The business model has been proven to be replicable within several new projects being implement during the last years, also on commercial terms[36].

Another example is, Gothenburg Energy (Göteborg Energi). The organisation has over the years developed several interesting directions within innovation. For instance, trough interaction with parties they seek public actors that could potentially have an interest in cooperating, continuing projects and perhaps initiating project applications. Such process is in interest for the whole city. An example is the FED project, an initiative for reducing the energy consumption and the dependency of fossil fuels in buildings, during 2016-2019[37].

Political Actions

One of the strategies presented in the roadmap for Gothenburg was the importance of prioritizing innovations in the city, partly through political actions. Latterly, numerous political actions have been taken, fostering the innovation as well as climate transition of the city.

Firstly, the city of Gothenburg signed their first Climate Contract in December 2020, underlined by the initiative Viable Cities where the national strategic innovation program stands behind. In addition, Gothenburg successfully applied for being one of the 100 Climate Neutral Cities (for further details

[34] FED – Fossil-free Energy Districts | Johanneberg Science Park

[35] Lindholmen Integrated Mobility Arena (LIMA) | Chalmers

[36] Gothenburg – IRIS Smart Cities Showcase

[37] FED – Fossil-free Energy Districts | Johanneberg Science Park

regarding the initiatives see section 3.4.1: Partnerships with External Organisations). Gothenburg's participation in such initiatives foster the cooperation between the city, the industries and businesses, which is an important component in bringing new innovative solutions to the market. That was highlighted as a barrier in the innovation roadmap for Gothenburg. However, by participating in such initiatives the city tries to prevent the gap and continuously aims to improve within the area. In addition, the initiatives enable influential and fast implementation and upscaling of innovative solutions, in the purpose of accelerating the transition to become climate neutral. Not least, citizen engagement is an important aspect within the initiatives, a prerequisite for tailoring solutions and meeting the actual needs in a particular area.

An additional example is the initiative Gothenburg Green City Zone aiming at reaching zero emissions on transports within the green zone by 2030. By introducing new innovative solutions, testing ideas and existing solutions, share knowledge and scaling up the initiative foster cooperation between SMEs, city actors, researchers and academia[38].

Participation in IRIS

Gothenburg's participation in IRIS has been crucial for driving the development in generating ideas, testing, implementing, and distributing. The city plays an important role in planning and building real estate and infrastructure, thus must be integrated in the process. In other words, Gothenburg's participation in the IRIS project is fostering cooperation between the city and other actors, an essential step for the development of a smart city. For further reading regarding Gothenburg's innovation management relation to IRIS please see D7.8 Preliminary Report on Gothenburg Lighthouse Demonstration Activities.

3.6.4 Innovation Management in Nice

In the innovation roadmap for Nice the city was pointed out as pioneering innovation metropolitan area, as well as a unique climate experimental spot fostering projects, start-ups, and major manufactures. The city has a metropolitan economic development, innovation and internationalization strategy focusing on the following areas: governance, urban testing, supporting innovation and entrepreneurship, territorial marketing and support for training.

Process of bringing new ideas forward

In general, Nice identifies itself as good at flourishing new ideas into the city. Chiefly the innovation department for Nice is a design office, playing a central role in fostering new ideas for the city. In

[38] Gothenburg Green City Zone (businessregiongoteborg.se)

particular, the Innovation Department receives requests from for instance SMEs, private companies, academia, to specific problems in which the department conduct a study within the direction, aiming at offering a solution to the problem. Thereafter the board is responsible for bringing the solutions forward and after/if being verified scaling up and replicating the idea. The board is composed by the advisors of the mayor which make decision and vote as representatives for the citizens. This flow of communication fosters the cooperation between actors, an essential piece for bringing new innovative solutions to the market. Consequently, the city has a continuously growing portfolio of projects evolving around the four major urban challenges: energy management, resilience and risk management, environment, and new forms of mobility. Such projects aim to test new services with the purpose of making Nice a smart and sustainable city, besides influencing other cities to replicate the solutions. Two newly established innovative projects are within digital inclusion and new technologies, both aligned with transition track #4 Digital Transformation and Services and transition track #5 Citizen Engagement & Co-creation within the IRIS project.

Digital Inclusion

As part of the 2022 dematerialisation law, “Action publique 2022”, the Nice Côte d'Azur Metropolis (MNCA) has embarked on the path of the smart city in transforming its city over time to make it more efficient, less energy-consuming and responsible, and by offering innovative services to users. On the ground, fragile populations needing support to make the transition to digital technology are supported by the city's policy, which is mobilised to implement levers that tend to reduce the digital divide through concrete actions aimed at: decompartmentalising the public, proposing learning and supporting the targeted public, and supporting and enhancing the actions of associative and national partners.

The Metropolis is reinforcing its actions in the field of digital inclusion to carry out actions in favour of the most digitally excluded populations with the ambitious objective of reducing the proportion of citizens left behind to 0% within the next two years. This is well-aligned with the Economic Development Strategy in which Nice in their roadmap stated that more focus will be put upon.

The conditions for success are intrinsically linked to co-construction, where the commitment of the partners, the active support of the state and local authorities (via funding) and the total availability of the coordinators, namely City of Nice, MNCA and the CCAS (cohesion and social action committee), are essential for achieving this objective.

In 2022, in accordance with the government's programme, which has already been launched, no more administrative procedures will be carried out other than online. In view of the known statistics, between 30 and 40% of citizens will not be able to carry out their procedures on their own using digital means. The Nice Côte d'Azur Metropolis and the City of Nice have therefore decided to invest heavily in this challenge of digital inclusion for its citizens by setting the following course:

- Access to the law (excluded citizens must be able to access their rights like any other citizen without any difference).
- Bridging the digital divide (enabling people who do not have access to digital technology or who do not know how hardware, software, search engines, etc. work to have access to it and to

know how to use it so that they are not penalised in relation to the rest of the population who have these skills).
- To provide citizens with a digital culture in order to make them autonomous in their actions.

In this sense, since 2020, actions have been deployed to achieve these objectives:

- Fluicity (in progress): The Metropolis provides a collaborative platform for digital inclusion actors to exchange information, share best practices, co-construct, organise events, etc. This tool contributes to the dynamics of the territory and to the improvement of networking. In 2021, the platform has been completely revamped and communication actions have been reinforced. To date, the platform has 85 subscribers and 2 proposals. Workshops are planned in the near future.
- Contract for the development of a metropolitan digital inclusion project (in progress): The aim is to support the Metropolis in the implementation of a metropolitan digital inclusion project. The territorial diagnosis is underway, including the needs of citizens and professionals who are far from the digital world, throughout the territory. The benchmark has been carried out. The action plan and work on governance are to be carried out.

The digital inclusion action plan includes 3 strategic axes which are broken down into several actions. The three axes are the following:

Communication action

- Animation of the network of actors on the scale of the Metropolis.
- Implementation and deployment of a metropolitan mapping of digital inclusion.
- Establishment of information resources for the community of partners on opportunities related to digital inclusion and the actors involved.

Capacity building

- Coordination of a training offer for digital inclusion actors on the territory of the Metropolis.
- Deployment of tools to increase skills for the network of actors.

Improvement of the service offer

- Supporting digital inclusion actors in their search for funding for their actions.
- Coordination of an equipment supply chain.
- Support for the increase of the number of digital inclusion places on the territory.

Autonomous and Resilient Emergency network for the Metropolis

In October 2020, the Metropolis territory got hit by storm Alex which devastated the valleys. Torrential rains fell on the area and the floods caused by the rains destroyed everything in their path. The Tinée and Vésubie valleys were cut off from electricity, communication and road networks for several days.

The emergency services intervened rapidly to provide assistance to the local population. With the communications networks cut off, the hinterland became isolated.

In the event of a large-scale disaster, telecommunications networks are among the first infrastructures to be put out of action. However, they are essential to the coordination of the rescue efforts, to the lives of the local population and to the companies in charge of restoring the destroyed road, electricity and communication networks.

This disaster led the Metropolis to vote, on 16 October 2020, on the metropolitan plan of solidarity and action for the reconstruction and revitalisation of the Vésubie and Tinée valleys and for the organisation of the resilience of the Metropolitan territory.

The objective of the innovative project "autonomous and resilient emergency network for the Metropolis" is to provide the Metropolis with a critical autonomous energy and resilient network to meet the needs of the citizens and communes of the middle and high country in situations of crisis, natural or industrial disasters, or large-scale accidents to avoid being cut off from the rest of the population.

This experiment will be carried out with the company INNOVAS, which specialises in reliable communications technologies, particularly for the defence sector, or for the maritime transport industry, which requires private and secure resilient networks.

Technology implemented:

The uMesh technology is a patented technology derived from military concepts based on over 10 years of R&D. The aim is to create a resilient emergency mesh network to take over from traditional communication networks. It is specifically designed for mission-critical networks requiring enhanced security and high-speed communications. Its self-forming, self-healing, infrastructure-free network architecture makes uMesh routers very attractive, especially as the technology can be deployed very quickly at high points without the need for power resources, making it electrically self-sufficient. Benefits of uMesh technology includes the following:

- Wireless routers installed in peaks/highlands.
- Inter-router distance > 10 km.
- Energy self-sufficient (batteries and/or solar panel).
- Capable of forming a mesh network that covers the entire middle and high country (routers capable of forming lines of up to 10 hops to reach all locations).
- Each commune is connected to the nearest Router in the mesh network.
- Instantaneous deployment of Wi-Fi bubbles is possible.
- Citizens, vehicles, and field staff automatically connect to this network.
- Wi-Fi accessible to all via a smartphone.

Participation in IRIS

The participation of the Nice Côte d'Azur Metropolis in the IRIS project has enabled the emergence of the transversality that is essential for the management of a project of this scale.

The project has also made it possible to raise citizens' awareness of their energy consumption and travel habits in order to reduce CO2 emissions and thus improve their quality of life.

3.6.5 Innovation Management in Alexandroupolis

In the innovation roadmap for Alexandroupolis it was highlighted that the city is experiencing difficulties in their innovation management, mainly due to lack of financial and human resources to conduct innovation. This has resulted in a lack of strategies and systems fostering the innovation of the city. However, Alexandroupolis participation in Horizon 2020 projects is an important step towards an innovative culture and sustainability development. Not least in the IRIS project where knowledge sharing and experiences from frontrunning smart cities has been highly valuable for the city.

Henceforth, Alexandroupolis has progressed moderately slow due to lack of personnel, which had a stronger affect due to COVID-19 pandemic. However, the city has still taken a few important steps forward.

Participation in IRIS

Alexandroupolis participation in the IRIS project has positively affected the implementation of new energy projects. For instance, the Municipality of Alexandroupolis recently issued a tender for the development of energy renovation studies for school buildings including the obligation (for the external experts) to investigate the application of innovative solutions demonstrated by the LHCs.

Further, as a part under the implementation of Sustainable Urban Development Plan, Evros Chamber, as partner of the Municipality of Alexandroupolis has developed a business incubator, which was discussed to be established in the roadmap in D3.6. The business incubator, so called the Light Hub, was recently developed, and established in the city. That is the first business incubator ever developed in Alexandroupolis and it is considered a crucial step in fostering the city's innovation activities. By combining the work of moderators, top market people, experts, senior executives, professionals, and academics the program aims to make ideas and visions into reality. Through connecting local talented entrepreneurs with the appropriate mentors, the entrepreneurs receive the right support in order to foster original and sustainable business results. Ultimately the aspiration is to create a sustainable ecosystem, strengthen entrepreneurship and business practice, besides creating wealth and jobs[39].

[39] About Us – LightHub | Entrepreneurship Support Structure

As the operation only recently started there are no concrete result yet. However, several events have already occurred. Those are demonstrated in Figure 14 below.

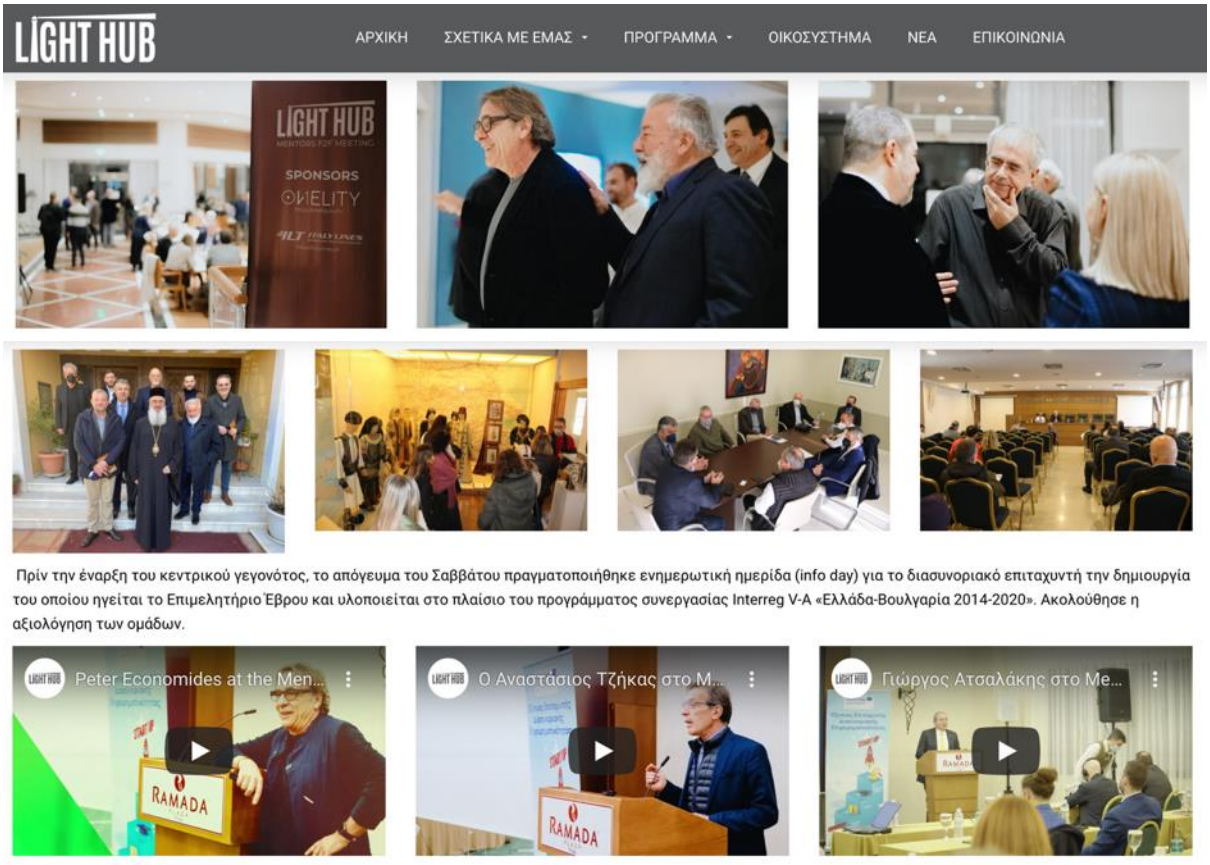

Figure 14: Events organised by the business incubator Light Hub, Alexandroupolis.

3.6.6 Innovation Management in Focsani

In the innovation roadmap for Focsani it was highlighted that very little focus has been put upon the innovation management. The city does not have an innovation strategy. However, there is a City Strategy and Urban mobility plan. In terms of culture, Focsani focuses on being open to new ideas and solutions and continuously search for partners that can solve challenging topics, and ultimately improve life for citizens. This is culture Focsani consider having accomplished.

By continuously being open to new innovative projects Focsani aims to advance within the following areas:

- Offer better services for the citizens and to make a better use of public money.
- Increase the quality of life, through environment protection,
- Increase the security of the citizens
- Allow better health and education systems

Improvement have been done particularly within “increase the quality of life through environment protection”. Focsani demonstrates several instances within the mobility sector with the purpose of improving the quality of life for all citizens. Some of the project currently being implemented are the following:

Modernization of the Local Public Transport Company and expanding its area.

The Local Public Transport Company (TPL) is operating in the City of Focşani and the surrounding areas with about 40 diesel buses. For the modernization of the local transport, TPL is implementing a project of introduction of electric buses and the necessary infrastructure for this type of transportation:

- 29 electric buses (10 m length) and 7 electric buses (6 m length)
- 10 fast charging stations and 36 slow charging stations
- 59 bus stations modernized – info electronic monitors, video surveillance, free WiFi
  automat ticketing system – in bus stations and in buses
  a buses monitoring system and a priority pass system

The first bus will arrive in autumn this year. As the diesel buses gets replaced TRL will expand its service area further to small communities outside the city, using the old buses. This expansion is requested by many villages and will create an Intercommunity Development Association. Besides, it will benefit many people working in the city, but living outside the city. Ultimately, the project aims to minimize the use of individual cars and consequently the level of pollution.

Re-systematization of the transport infrastructure in Focsani

The city is doing the following action with the purpose of facilitating the use of public transportation, bicycle, and pedestrian:

- Creating new smart bus stations
- Developing a bike sharing system and expanding the bike lanes network within the city.
- Reshaping the streets - special lanes designated to public transportation
- Reshaping the streets - special lanes designated to bicucles
- Reshaping the streets network – inserting one-way roads
- Currently in preparation, the city is Creating 2 Intermodal Centres – North and South – for the inter-city’s transportation.

Traffic Management System

The city aims to advance within the area of traffic management, by doing the following actions in the traffic systems:

- New traffic lights systems
- Video cameras for traffic
- Information Panels with variable messages
- Building a Traffic Management Centre
- Communication network in all the city for traffic needs
- Priority pass for public transportation system

Further, Focsani is implementing a project called "Vision and transparency in the local public administration", which correlates well with the city's objective: "offer better services for the citizens and to make a better use of public money". Among other components the city is implementing one that is intended to transfer most of bureaucracy processes from our local administration into the electronic environment. By doing this the city will prepare an "on-line city-hall" where citizens will have access to many of the services being provided.

Participation in IRIS

Overall Focsani participation in IRIS has helped the city in understanding their needs and how it can be implemented. It has also led to an actual change in their mentality in supporting the implementation of these types of projects.

3.6.7 Innovation Management in Santa Cruz de Tenerife

In the innovation roadmap for Santa Cruz de Tenerife the city stated that there is not a totally developed innovation strategy. However, thanks to IRIS project and the new organization of the internal municipal structure, there is a current innovation strategy being shaped. The focus on innovation management is orientated towards the implementation of information and communication technologies applied into cross-sectorial areas.

In this regard, another innovative approach transversally applied is the alignment of any action with the goals of the Covenant of Mayors and the sustainability development objectives.

Santa Cruz de Tenerife municipality faces some challenges in the innovation management. In order to obtain a more fluid intercommunication among Department a new organizational structure have been put into motion at the internal scale.

Nonetheless, Santa Cruz de Tenerife has improved within several areas such as the integral geographical information system of the different layers of the city; public buildings, social housing, public lighting, streets, water infrastructures and conductions, telecommunications, participatory process, schools,

streets, taxis, bus stops, etc. This innovation allows a much more efficient use of public resources by saving time thanks to georeferenced data.

Another area where improvements have occurred is the renewable energy systems in public buildings and efficiency in public lighting. Several investments have been made to reduce the carbon footprint of the municipality, there is already a 20% of LED installation in public lighting apart other efficiency measures. It is planned to arrive to 100% LED in 2030. Recently an important set of investment have been approved to install RES (mainly PV) in public buildings, combined with electrical vehicles charging points. This has been sped up thanks to IRIS inspirations and resources.

Example of best practice

As an example of best practice ongoing today in the municipality, it could be highlighted the digitalization of the public procedures. This has attained the elimination of paper in the whole municipal structure during internal activity. All public files are electronical as well as all internal communications, besides the communication with companies. In this regard, an important milestone has been achieved in communication with the citizenship, with more procedures are being made electronically than with the traditional approach. Furthermore, the Participation Portal has more than 4.000 registered citizens. By this portal it takes place the participatory budget definition. Where citizens choose for each city district where to spend public budget among a wide spectrum of public investments (gardens, sportive zones, roads improvements, etc.). Finally, Santa Cruz de Tenerife municipality has become on the most statistically predominant in the Brokering Platform in the Public Administration Ministry. Since the city is one of the largest consumers on this platform. This means that administrative burden is reduced for citizens and companies saving about 368.180 € only in 2020.

Participation in IRIS

Santa Cruz de Tenerife's participation in IRIS has widen the spectrum of type of innovation projects in the city by learning from IRIS partners initiatives. For instance, the city is deploying an initiative regarding bike mobility, in a very steep city. On another hand, IRIS has also helped in underlining the importance of the innovation culture in the organization. Finally, the technical support received during the replication plan and projects definition phases have been of help to reach better results.

3.6.8 Innovation Management in Vaasa

In the innovation roadmap for Vaasa, the city stated that there is no separate innovation strategy established. Instead, it is part of the city strategy and included into different departments and teams. However, in terms of pilots Vaasa is considered as a frontrunner on national level. Vaasa has developed strategies for carrying out and financing pilots, besides involving citizens and politicians. IRIS has been

highly valuable for the city not only in terms of knowledge sharing and networking, but also in attracting important stakeholders, which is an important piece within innovation management.

The City of Vaasa has signed an innovation ecosystem agreement[40] with the Ministry of Economic Affairs and Employment of Finland for the period 2021–2027. The ecosystem is a cooperation model that brings together companies, universities, research institutes, financiers, and other RDI stakeholders to speed up innovations, renewal of the business industry, and new solutions to improve the well-being of residents. The strategic content of the ecosystem agreement of Vaasa focuses on sustainable and smart energy systems. The agreement focuses on development areas based on the top competencies of the EnergyVaasa ecosystem: Smart power grids, Marine solutions, Sustainable energy production, Energy efficiency, Energy storage

Cooperation between actors

As also pointed out in the innovation roadmap for Vaasa, the innovation activities in the city needs to be developed in close cooperation with different actors in the region in order to create synergies. In addition to the Innovation ecosystem agreement , a couple of regional examples innovation cooperation:

- The EnergyVaasa ecosystem partners are continuously working on strengthening the collaboration via joint initiatives. The *Energy Academy* is an example of such a new initiative, launched in 2021. It is a triple helix collaborative effort between Vaasa's higher education institutions University of Vaasa, Vaasa University of Applied Sciences, Novia University of Applied Sciences, Hanken School of Economics, University of Helsinki and Åbo Akademi University, the companies and hubs ABB Oy, Danfoss, EnergyVaasa, Hitachi Energy, Technology Centre Merinova Oy, Wärtsilä Finland and Vaasan Sähkö as well as the City of Vaasa and the Region Development Company VASEK. The initiative is designed to attract students and graduates as well as to strengthen a connection between research and development activities and young talent. The Energy Academy is tightly linked to the Nordic Battery Belt, making Vaasa an essential link in the sustainable value chain in Finland, Sweden and Norway[41].
- The Innovation & Ecosystems team was established at the University of Vaasa in autumn 2020 with the aim to act as a catalyst for innovation and ecosystems. In cooperation with other ecosystem actors, the team is currently carrying out activities, such as piloting different approaches on the involvement of students in university-industry collaboration and coaching and advising student-led start-ups, and several other types of innovation activities are planned. In 2022 (February-August), the Vaasa Startup Challenge is arranged in cooperation with the Region Development Company VASEK, EnergySpin - Energy Solutions Business Accelerator, Technology Centre Merinova Oy, City of Vaasa, Viexpo, Vaasa Entrepreneurship Society and Design Centre MUOVA. The challenge started with an application round in

[40] Innovation ecosystems agreements | Vaasa
[41] Energy Academy | Vaasa

February 2022 followed by a pitching session in April. The winners chosen based on the pitching are participating in a 6-month growth program and get support by involved organizations and mentors.

Example of best practice: Wärtsilä's SustainableTechnology Hub (STH)

Wärtsilä's SustainableTechnology Hub (STH) is a new integrated centre of research, product development and production situated in Vaskiluoto in Vaasa. The initiative is seen as one of the latest measures adopted by Wärtsilä to achieve the vision of smart marine and a smart energy sector. STH seeks to implement the company's visions of Smart Marine Ecosystem and 100% renewable energy future by linking various marine and energy business lines with an aim to maximise customer value proposition. The hub is seen as a unique initiative enabling the company to achieve more agile, efficient testing and to develop innovative solutions for marine and energy industries. The STH aims to facilitate research and development activities, growth of innovative and pilot products and solutions that can support the journey towards a sustainable society by building one uniform agile facility that brings together various centre of excellences, stakeholders and partners to improve innovation processes by maximising synergies. The initiative is estimated to require around 230 million euros investments, with focus on developing office facilities and factory buildings, logistics and infrastructure. An estimated 83 million euros are to be invested in modern testing and production technology for the STH.

The STH is also seen as one of the measures that will assist Wärtsilä's leap into the future where advanced and flexible manufacturing systems, robotics, utilisation of data and analytics will play a key role. The facility will also work as an ecosystem of collaboration bringing together companies, start-ups, customers, organisations, academia and other stakeholders to collaborate towards the development of future sustainable societies. The collaboration and strengthening of links between Wärtsilä's other centres of excellence globally and the partner campus[42], will further deepen collaboration with both local and global partners, by serving as a platform for innovation and co-creation. The STH is strategically placed in the energy cluster of Vaasa - the leading energy region in the Nordics.

The ecosystem way of working requires a strong collaborative tie with different actors and the stakeholders. The initiative deepens the collaboration between Wärtsilä and its partner companies to bring mutual benefits and synergies for the involved parties. The STH partners include Citec, Danfoss, Hydroniq Coolers, Konecranes, and Schneider Electric, while the Smart partner campus concept is designed together with Danfoss, Demos Helsinki, NLC Ferry Ab Oy, Royal Caribbean Cruises Ltd, Vaasan Sähkö and the University of Vaasa.

The first open innovation activities at the STH were launched in Autumn 2021. One example is a two day innovation challenge, the hybrid event Sustainable Technology Hub Ecosystem Challenge (STHEC) arranged 11–12 of November 2021. In this event, students of bachelor and masters level degree programs

[42] The partner campus is a part of Sustainable Technology Hub. The partner campus enables ecosystem partners to connect together and shared a network of expertise to create win-win solution solutions by sharing learning, testing and validating different ideas in an efficient and effective manner.

teamed up to solve real practical cases in small teams. The STHEC aimed to connect students, companies, and professionals together to demonstrate a practical case of working in an ecosystem with different stakeholders to co-create new solutions. The initiative also offered a great opportunity to the students to apply the learnt knowledge in the practical setting, getting the sense of how it is to work on actual problems with industry professionals, where one is constantly pushed to do its best in the competitive working environment. STHEC was arranged as an onsite event in STH 21-22 of February 2023.

The company Wärtsilä was established in 1834, and for over 180 years has remained at the frontier of engineering innovation. The company is considered a global leader in innovative technologies and life cycle solutions for the marine energy markets. The company currently employs approximately 18,000 professionals in 200 locations, in more than 70 countries, making it a true multinational and a global player.

Participation in IRIS

The IRIS project has boosted the city to streamline development and integrated smart city solutions in Vaasa. The webinars, meetings and study visits have been of great importance and facilitated internal interaction and development. From the project owner Vaasa has learned a lot when it comes to excellent project management, which will be of importance in future smart city project development and upcoming applications.

3.7 Funding and Financial instrument toolkit

This section is based on the previous report D3.7, focusing on relevant funding opportunities and elimination of funding and financing obstacles for IRIS project partners and fellow cities. Relevant funding and financing opportunities as well as other financial instruments are crucial for all IRIS scaling and replication activities. This section provides an overview over relevant funding opportunities and financial instruments that can serve as enablers for IRIS-related innovations.

Funding opportunities were further brought up in the consortium meeting in Nice (September 2022), where a round table discussion was taking place. New collaboration opportunities, including upcoming calls, were discussed. The discussion included the following:

- *HORIZON-MISS-2023-CIT-01-02: Positive Energy districts (PED) digital twins – form modelling to creating climate neutral cities:* Utrecht showed particular interest in this call.
- *HORIZON-CL5-2022-D4-02-04 Smart-grid ready and smart-network ready buildings, acting as active utility nodes (Built4People).*

The following subsections describe actions and processes that will facilitate the IRIS partner organisations and follower cities to address various relevant European funding and financing entities. This “toolkit” will help the IRIS partners to eliminate the most common obstacles that will occur while addressing various funding programs, financing entities and organisations providing grant funding, hybrid funding as well as other financial instruments
The section below neither gives a full picture of European funding opportunities or financial instruments nor serves as a complete guide on how to interact with the funding organisations, programs and

financing entities. Instead, the ambition is to give the reader an overview regarding a few funding and financing alternatives relevant for the IRIS partners and follower cities and to prepare the partners for the process of addressing these funding programs and the financing entities.

In order to reach financing and funding, the applicant must make the innovation eligible, understandable and bankable. Eligibility can be built through a thorough road-map process aligning the proposed funding project with the relevant program and call conditions. Understanding may be built through well balanced communication activities executed by professional communicators and efforts invested in communication and acceptance building activities. This will minimize the funders' experienced risk and facilitate the funding process. Bankability, is built through activities making it possible for funders to assess whether the innovation is possible to scale-up and to replicate towards customers and end-users, appealing in terms of business potential and potential Internal Rate of Return (IRR) with a short payback period and whether it is representing a predictable risk regarding technical, operational and financial matters.

When approaching a provider of funding and/or financial instruments, for instance the European Investment Bank (EIB), Horizon Europe, European Innovation Fund (EIF) or European Regional Development Fund (ERRDF), there are a number of challenges that must be addressed to reach eligibility, understanding and bankability. If the applicant fails to meet these “soft” values and goals it is important to understand there is a great risk that the funder will consider the innovation ineligible regardless of the technical excellence represented.

3.7.1 The financial landscape in the EU

In the current frame program, the European Commission has pointed out five main objectives that will set the course for EU funding and financing until 2027. These objectives are all relevant to the objectives of the IRIS project:

- A Smarter Europe (innovation, economic transformation, digitalization and support actions to small and medium-sized businesses mentioned as driving forces)
- A greener, carbon free Europe (implementing the Paris Agreement and investing in energy transition, renewables and the fight against climate change)
- A more Connected Europe (developed strategic transport and digital networks)
- A more Social Europe (supporting quality employment, education, skills, social inclusion and equal access to healthcare)
- A Europe closer to citizens (supporting and supported by locally led development strategies and sustainable urban development across the EU)

3.7.1.1 Changes in the 9th framework

The previous report D3.7 is written from an FP8 Horizon 2020 perspective. As the beyond-IRIS activities are taking place in the current nineth frame program, Horizon Europe, there is of some importance to explain the main differences between FP8 and FP9. There is a clearer focus on regional development in FP9 compared to previous frame programs. For instance, it is visible in the transition towards lump-

sum funding in new hybrid funding projects such as the EIC Accelerator and the Innovation Fund. It is also visible through increased responsibilities for national/regional organisations in the distribution of funding and financing. Furthermore, the future cohesion policy will support investment in European regions based on the three assessed categories “less developed”, “under transition” and “more developed”.

The allocation of funding will be increasingly based on GDP per capital but there will also be other allocation criteria such as unemployment, climate change conditions and regional integrational challenges. The structural changes aim to make allocated funding and financing reflect the current situation in the area and will also support strategies developed in a local context by distribute responsibility to local authorities for funding support actions. The local authorities will to a larger extent be responsible for management of funds and financing, making IRIS partners able to find relevant funding and financing opportunities in national and regional programs.

The Commission stresses that “grants alone cannot address the significant investment gaps”. From an IRIS point of view, newly established programs such as the Innovation Fund will be highly relevant for funding although heavily exposed to competition.

3.7.1.2 Horizon Europe as a main source for funding and financing

Europe is facing an extreme period with many changes affecting the funding and financing landscape. The changes will widely affect the opportunities for funding and financing for the IRIS partners. The following subsections describe the abovementioned funding and financing sources more thoroughly. The EU Commission set a budget of €100 billion Euro for Horizon Europe and the Euratom Research and Training programme for the period of 2021 to 2027.

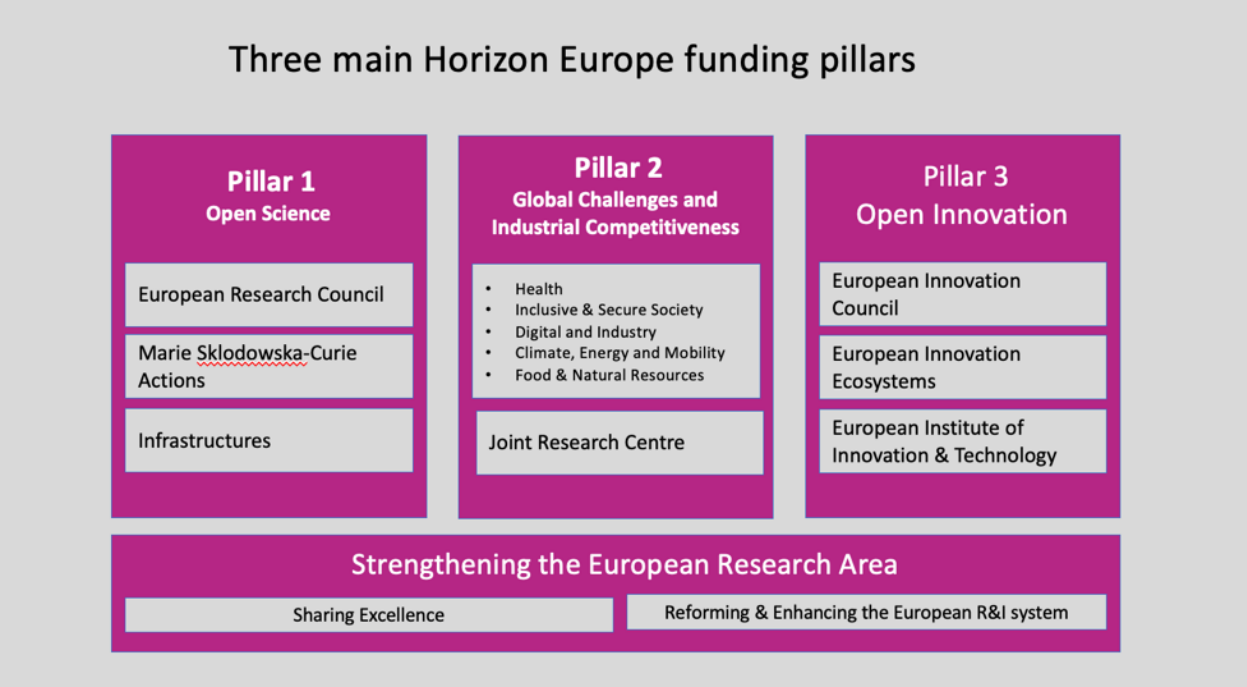

Figure 15: The Horizon Europe three main pillars.

The Open Science pillar (low relevance to the IRIS partners) supports frontier research projects developed and driven by researchers themselves through the European Research Council and through Marie Skłodowska-Curie Actions.

The Global Challenges and Industrial Competitiveness pillar (**highly relevant to IRIS partners)** supports research that relates to societal challenges, reinforces technological and industrial capacities and sets EU-wide missions with ambitious goals tackling some of our biggest problems.

The Open Innovation pillar (also highly relevant to IRIS partners) aims to make Europe a frontrunner in market-creating innovation via European Innovation Council and via the European Institute of Innovation and Technology.

Horizon Europe aims to promote, support and drive European scientific excellence. According to the program descriptions it builds upon "scientific advice, technical support and dedicated research of the Joint Research Centre and the program ambition is to set a new level for the scientific, economic, and societal impacts of the EU support by strengthening science and technology development within EU, Foster EU's industrial competitiveness and its innovation performance and by delivering on the EU's strategic priorities, such as the Paris Agreement on climate change and tackle global challenges affecting the quality of our daily life".

- The five main driving forces described for the Horizon Europe approach are: Support breakthrough innovation
- Create more impact through mission-orientation and citizens involvement

- Reinforce openness
- Rationalize the funding landscape
- Reduce administrative burden

All of these are highly relevant from an IRIS perspective, either being well aligned with IRIS objectives, aims and results or creating even better conditions for scaling activities and further funding of IRIS KERs.

3.7.2 Preparation for an application

It is important that any funding proposal work is fully aligned with the strategic intentions of the organisation to avoid funded projects that causes shortage of internal resources, disagreement, confusion, and disappointing results. The organisation must execute analyses and strategy work to secure that efforts will maximize the opportunities to reach the expected outcome. Thorough pre-proposal assessment will not take more than a couple of weeks and it will leave the organisation better prepared to meet not only the challenges of the proposal process but also the challenges of the funded project. The organisation will be able to prepare for a successful outcome if the proposal is granted and benefit from a rejected proposal capturing the remaining value from the proposal process into coming efforts.

3.7.2.1 Incentives for funding

There are four main incentives underpinning the decision to approach national or international funding environments. “Need for money” to enable replication or scaling activities might be the overarching incentive but there are a handful of other valuable assets that can be reached through the various available funding opportunities. In the IMCG assessment process there are four main incentives that you need to explore, understand, and relate to.

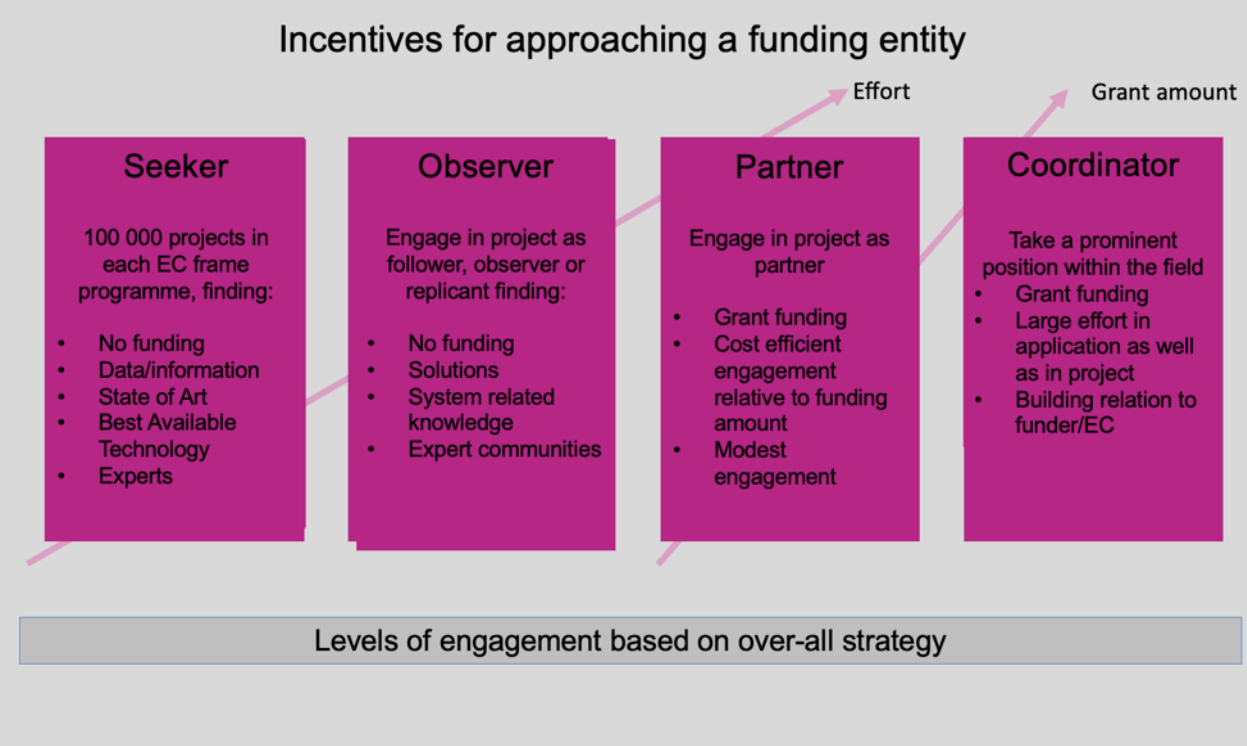

Figure 16: Incentives for approaching a funding entity.

Incentive 1 – Need for Knowledge (relevant to all IRIS partners in feasibility processes, state-of-the-art assessment and knowledge-building activities)

A proposal process may be launched to reach funding for technical development, business modelling, IPR-development, value-chain development and exploitation and outreach activities. Nevertheless, it may be possible to reach many valuable assets without investing the effort in applying, negotiating and coordinating the project. Many needs can be fulfilled by search operations in EU-project databases. By performing well-prepared search operations, it is possible to find relevant, updated, and useful results relevant to your own needs.

Incentive 2 – Need for network and collaboration (relevant to all IRIS-partners in funding/financial work, knowledge-sharing activities as well as in KER development)

A well-established network with suitable scaling and replication partners will always be a valuable asset. In a cutting-edge innovation environment as, for instance, the Horizon Europe, these networks may be hard to build and maintain. A well-timed approach towards ongoing projects on national and international level may result in reaching environments where mutual beneficial collaborations are easy or at least *easier* to build than through traditional channels.

Incentive 3 – Need for Partnership and Funding (relevant to IRIS-partners in every stage of scaling and replication work)

Participation in a proposal/project as a partner without taking the responsibility for coordinating the proposal may be an attractive opportunity for any organisation. The participation will lead to beneficial partnerships and funding and the time effort in the proposal process may be as low as 100-150 hours compared to 500-1000 hours or more in the application coordinator role. The main challenge is to get into a position where the opportunities and offers to participate as a project beneficiary are on these advantageous premises. The position is clearly a result of many parameters such as excellence of the team, success and positioning of the innovations, the organisation's ability to assess and develop its business propositions and finally the ability to communicate and disseminate the innovations.

Incentive 4 – Need for Positioning and Funding (relevant to IRIS-partners in scaling and replication work and with an ambition to take a clear position as a forerunner within EU in their area of technology or research)

Taking the coordinating role in a large EU-project will position an organisation for many years ahead. A successful EU-project is an excellent platform for dissemination and exploitation activities and will enable ground-breaking network development, but it can also position the organisation as a leading entity towards the EU-commission and towards other projects, clusters and stakeholder organisations. Coordinating a proposal process is expensive regarding hours of effort as well as the alternative cost. A large EU-proposal with a consortium consisting of 20 partners could easily take as much as 1000 to 1500 hours of work if you also consider the workload in the grant agreement phase. It is important to realise that even in a large organisation, the project will affect the every-day work for several years. It is also important that the project proposal is written in full alignment with the coordinators over-all strategy as it is easy to underestimate the effort and the extent of a large EU-project. Nevertheless, it may be extremely rewarding for the coordinating organisation.

3.7.2.2 Preparations for EU-funding through financial road-mapping

It is of great importance to address all kinds of funding and financing programs in a structured way, for instance through a financial road-map pathway assessing the three main funding dimensions; the geographic aspect, the grant-amount and the timeframe.

Figure 17: Project Funding Opportunities.

The level of the offered grants is often correlating to its geographic context due to the principle “narrow geographic context/small scale grants/short projects” to “wide geographical context/large scale grants/long projects”. Local and regional support is mainly available through local authorities offering small scale support in short project sprints up to a year. The support is often granted up to half the total project cost, the applying entity must often cover the rest with own resources as in-kind effort. Capacity-oriented regional support is relevant for IRIS partners as it may support organisations to buy services and competence not available the own organisation, for example, support for funding and financing operations towards EU-programs. National support is often distributed by national agencies offering medium size grants in sprints up to a couple of years. The support is divided between national funding initiatives based on political considerations and regional EU-support distributed through national entities. For instance, the European Regional Development Fund is to a large extent distributed through these national governmental entities.

International support is distributed by European and EU entities structured to cover a wide spectra of funding needs from basic research support and research and innovation actions through Pillar 1 and 2 in the Horizon Europe funding scheme, funding entities such as Eurostars, Urban Innovation Action and a set of Joint Undertaking funding structures and large-scale and long-term hybrid funding through European Innovation Fund and the European Investment Bank.

The financial Roadmap should be based on interviews with the applying entity's C-level staff and workshops with key experts within the organisation. The interviews point out strategic information regarding project scope, value chain, project resources, expected impact, relevant keywords, etc.

Once the general scope for the financial roadmap is set, a search for relevant funding can be performed. Writing a proposal is a resource-intensive process regardless of the program the proposal is addressing. The simplest local and national programs will normally claim 40-60 hours of effort, a larger national or

regional proposal may claim at least 200-500 hours of effort and a large international proposal may claim as much as 1500-2000 hours of work for the coordinating entity.

The assessment must be performed according to a relevant set of evaluation indicators. The indicators in turn must be fully aligned with the proposing entity´s over-all strategy and the tactical considerations and decisions for the process the funding is intended to be used for. The following indicators cover most of the information needed to make a full assessment:

Table 6: Example of funding program Evaluation Indicators.

Indicators	Explanation
Effort (T/C-Level)	Estimation of Total, C-level and other expert hours expected to develop a competitive application (h). As many proposal processes are resource intensive, it is crucial to estimate the potential effort needed for each alternative funding or financing opportunity.
Project Volume	Grant contribution (€)
Contribution	Grant contribution of total project value (%)
Success-rate	Estimated success-rate when proposal is lead and process is supported by grant-experts (%)
Competition	Estimated competition in program due to previous experiences (Very High (VH), High (H), Medium (M), Low (L))
Capex/Opex	Does the grant supports Capex (C) and/or Opex(O)
Relevance to Main project	Relevance to main project development (High (H), Medium (M), Low (L))
Relevance to Sub-project	Relevance to sub-project development (High (H), Medium (M), Low (L))
Position	Does the grant build position and recognition (High(H), Medium(M), Low(L)
Start proposal (latest)	When proposal development to be started, in months prior to deadline, to be efficient with time and resources. Latest start of application to be able to be competitive, in months prior deadline (within brackets)
Proposal opening	Predicted opening of proposal (Date)
Project start	Predicted start of project (Date)
Project length	Grant project length in years (y)
Knowledge transfer	Knowledge Transfer from project proposal to other grants (High (H), Medium (M), Low (L))
Potential challenges in program	Other comments by grant consultant
Go/Investigate/No-Go	Recommendation by consultant: Go ahead (Go), Investigate further, if questions remain about grant programme relevance & project eligibility (Investigate), Do not go ahead (No-GO)

Please view Appendix 1-8 for a set of examples of funding opportunities relevant for the IRIS consortium described according to the abovementioned Financial Road-mapping structure.

3.7.2.3 Implementation within the organization

If the funding strategy is not fully implemented within the organisation, or if it is not aligned with the organisations over-all strategy, this will cause obstacles in the executional phase. Furthermore, the obstacles will affect not only the outcome of the funding efforts, but it also risks affecting the outcome

and results of the organisation in a broader perspective: Therefore, securing the resources for the proposal process is obviously an important part of the preparations. If an organisation aims for the coordinating position in a large EU Horizon Europe-proposal, the total effort will easily cover estimated 500 to 800 hours within the organisation depending on the program, the experience level within the organisation and other circumstances. In addition to the estimated time effort, the effort must be spent by personnel resources with adequate and applicable competence for the role. Many proposals are rejected because the proposal core teams expertise is built upon technical experts. Obviously, the technical experts need to be involved but when it comes to development of the Impact section and activities such as capacity building, dissemination, exploitation, communication and the business modelling regarding the projects Key Exploitable Results, there must be a set of other experts available in the organisation.

3.7.3 The proposal phase

The planning process may be described due to five logic and overlapping main proposal workstreams set in the IMCG Proposal Management Process (PMP). The PMP has proven itself as highly efficient in a wide spectrum of programs and is based on an innovation development framework designed by Dr Ian Napier during his professorship at Stanford Research Institute. The Framework has since then been developed for European conditions by Dr Jonas Norrman and Magnus Andersson, also the founders of IMCG Sweden. Every single workstream in the PMP is crucial and at the same time the interaction between the workstreams is just as crucial in the creation of a proposal that are highly competitive in the sometimes extreme competition in the European funding programs:

- WS1 Administrative Coordination
- WS2 Consortium Development
- WS3 Proposal Team Development and Proposal Design
- WS4 Budget Design and Development
- WS5 Demonstrator Development (excluded below)

It is strongly recommended that the PMP and its workstreams are used by IRIS-partners before and under the proposal phase in every large EU-call. Elements of the PMP may also be used in minor proposal processes as the structures will facilitate the work, improve the proposal and in many cases lead to a higher success-rate.

Workstream 1 (WS 1) Administrative Coordination

The administrative coordination can be described as the skeleton binding the various elements of the proposal process together. The Work Stream mainly consists of activities related to the proposals “Part A”, i.e., activities within the European Commission´s Participant Portal. The starting point is registering the proposal in the portal. The coordinator connects the proposal to its Lead Beneficiary (LB) and to the partner organisations and the participants deliver their information into the proposal´s A-forms. This information includes administrative information as well as information regarding for example the participants role in the project and the researchers involved in the project.

The Administrative Coordination Work Stream is monitored on a regular basis, and it is of great importance that the process is executed as fast as ever possible to release resources for other purposes. The Administrative Coordination Work Stream is active during the entire proposal process and ends in a well-structured submission process. The coordinator will be responsible for appointing at least one back-up person with mandate to submit the proposal in the event that the coordinator is unable to do so. It is of great importance to perform a number of pre-submissions during the last week before deadline. The functions of the portal may suffer from overload during the last hours before closing, and it is a good idea to make the final submission the day before the actual submission day.

WS 2 – Consortium Development

Based on the abovementioned value chain assessment, the coordinator must identify a consortium with excellence partners able to reach the objectives and execute all the deliverables, tasks and sub activities planned in the proposed project. A challenge may occur as the Lead Benificiary instead often build the team upon former business relations and partners with an ongoing mutually beneficial collaboration. This may lead to a suboptimization as the consortium - in order to be competitive in the program - must be built upon the intention to create a highly skilled team with true excellence within technical development, business modelling, innovation and system related development, communication, dissemination and exploitation competences. The consortium must be aligned with the potential value creation and the projects impact objectives clearly identifying the roles in the consortium to the projects value chain.

WS 3 - Proposal Team Development and Proposal Design

The main activity in the Proposal Design and Development Work Stream is to form the working teams for the proposal process:

The coordinator team is responsible for the Administrative Coordination Workstream. The team is led by an Admin Coordinator with full access rights to the Participant Portal on the behalf of the coordinating organisation. The Coordinator Team takes full responsibility for the actions within the Participant Portal, securing the over-all proposal eligibility, development and quality management of the A-forms such as descriptions of partner roles, CV:s of the participating expert organisations, uploading of mandatory documents and monitoring

The Technical team is led by the Main Coordinator, supported by the admin Coordinator. The teams' main responsibilities is to define the projects technical objectives, write the Excellence Section of part B, build the Work Packages in the Implementation Section and securing that the projects value chain is aligned with the intentions in the call and the program from a technical point of view.

The Non-technical Team is led by the Main Coordinator, supported by the Admin Coordinator, and manned with experts within communication, business development and exploitation from the partner organisations. The Non-technical team´s main responsibilities is to define the projects non-technical

objectives, write the Impact section of part B and to build the Work Packages related to non-technical achievements within for example dissemination, communication, and exploitation.

The Budget Team is led by the Main Coordinator in close collaboration with partners C-level resources. Once the budget design is set, the team will work in parallel with the Technical and Non-Technical teams in the WP-development to align the budget with the projects over-all objectives. The budget design are set in an early stage in the process and it must relate to the Commissions underlying intentions of the program as well as it must based on the financial eligibility rules of the approached program.

WS 4 – Budget Design and Development

The budget design varies depending on the instructions in the call as well as in the topic but it is important to realise thet the budget is partly constituted by conditions unnafected by the partners intentions. Obviously, a budget design based only on the partners funding needs will lead to a far less competitive proposal than if the budget design is based on a thorough alignment with the funders intentions. In the nineth frame program, a set of budget related changes are implemented in order to lower the administrative burden for the lead beneficiary and for the partners, to standardize the procedures in different programs, avoid common errors and misstakes in reporting and reduce the need for extensiv efinancial reports.

Preferrably, the budget draft is based on a general “budget solidarity distribution methodology” also related to recommendations in the progra. The detailed budget, in turn, is based on every partners effort in the project and if the balance constitutes redistribution of funding from one WP to another, the partners that are active in the WP must take solidaric responsibility and either lower their general effort in the WP or simplify the actions in a taskt correlating to the lower funding.

The response from each partner organization to the detailed budget will clearly show how well the proposal process is implemented towards each partner organization. A successful implementation will be manifested by a smooth budget process, a poor implementation will draw a lot more effort to reach an agreement.

4 The IRIS and Beyond Strategy, including conclusions and recommendations on D3.9

The IRIS and Beyond Strategy consists of a number of recommendations and conclusions aiming to further develop project results and values, hence creating impact beyond project end. The strategy originates and aligns with the objective of D3.9 IRIS Beyond Business Plan, hence the conclusions of the strategy and deliverable are merged in this report. The following is directed to help the Lighthouse cities, follower cities and solutions providers in developing a smart, sustainable city based on IRIS results. This strategy will provide guidance the remaining time of the project, as well as beyond IRIS. The foundation of the strategy is presented above in Chapter 3.

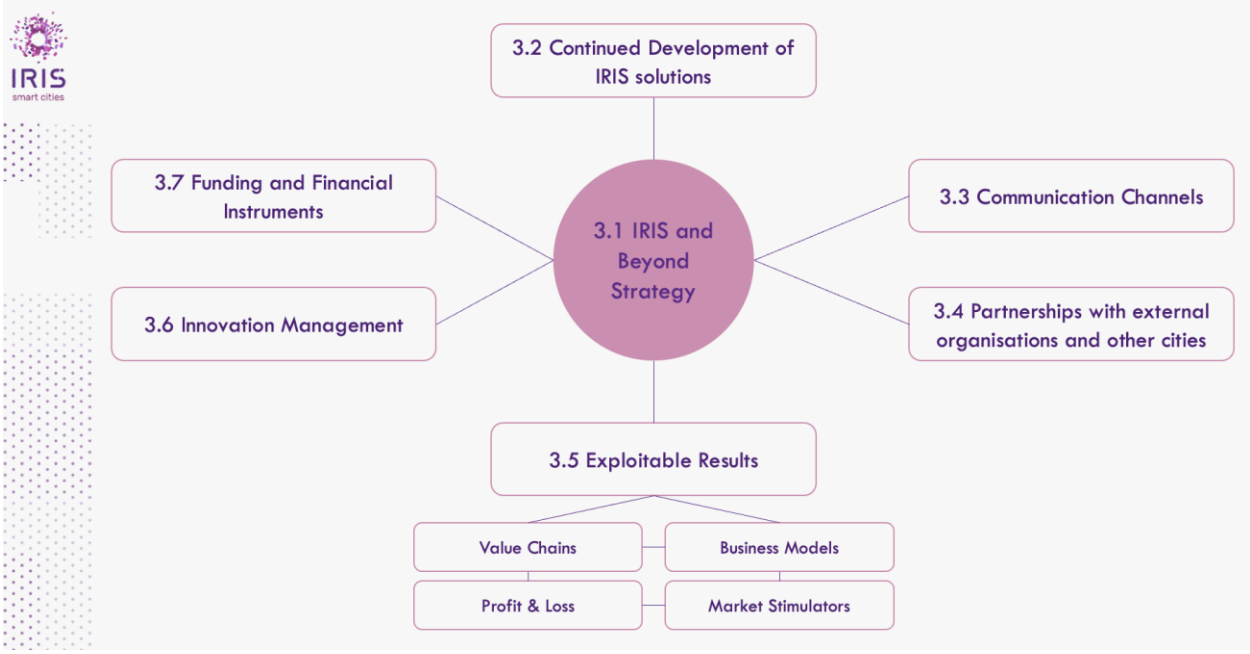

Figure 18: The foundation of the IRIS and Beyond Strategy.

4.1 Continued development of IRIS solutions

In the IRIS project there are solutions at different stages under development. Some are currently being tested (e.g. MaaS), whilst others are being implemented on full-scale (e.g. district heating). Consequently, this brings different prerequisites for the continued development of the respective solution. Based on how the solutions have matured thus far in the project, the following are recommendations for the continued development:

- **Continuously interact with end-users:** Engaging end-users in the process is important for accomplishing user acceptance. No matter how smart a solution is, it will not be used if the end-users don't see the purpose of it. Therefore, it is crucial to regardless of stage engage the actual end-users throughout the process as the solution is accordingly more likely to be customized according to the end-user thus meet the actual needs. This increases the chances for a successful implementation and is a prerequisite for sc
- aling up. An example of this highlighted in the report is the Smart Street Lightning system in Utrecht, which has become a high value-added solution for the district as it was developed together with residents. Additionally, the Minecraft tool in Gothenburg developed together with the children, has received lots of traction from stakeholders.
- **Implement a city centric communication strategy to reach stakeholders:** It is recommended that each city make sure to communicate the results and experience from the IRIS project to all stakeholders in the city. This task should not be underestimated. One end-conference will not be enough. There should be a resourceful communication project which offers training and workshops for all city departments that is stakeholders in the district transformation process. An example highlighted previously is the Energy Storage in

Second-Life Batteries where study visits are continuously taking place in Gothenburg thus attracting key stakeholders.

- **Create market demand:** To up-scale a solution within a district and district by district it demands that you secure that relevant developers know about the new solutions and understand that this is a relevant way to go – to implement the new solutions. Create engagement, ”I can make a difference.” If there is to be a market – there must be a demand. An example highlighted in this report is the Net Zero Building Transformation which has been taken after by the building owner BOEX and is nowadays used as a standard approach in their retrofitting activities.
- **Market mechanisms should be a key activity:** Market design and change of market mechanisms to support system transformation should be a key activity in cities’ innovation management. Cities authorities can design markets using different mechanisms to support competitiveness for business models delivering climate friendly services and products. Most of the demonstrated solutions have a high technology readiness and to roll-out the solution, the city market needs to be designed to support the solution's commercial readiness. That could for instance be through regulations, procurements, and promotion of climate positive technologies. An example of this is the V2G solution in Utrecht, where the ambitions by politicians were to become the first bidirectional city. That is a systematic change at the governance level facilitating the development and implementation of the rapidly growing V2G solution in Utrecht.
- **Cities develop district by district:** Cities cover a large area and include many different actors and activities. A conclusion from the IRIS project is that focusing on developing one city district at a time generates positive feedback loops in engagement, communication, and acceptance. Developing the city district-by-district make focus the efforts to establish infrastructure with sufficient capacity as well as to be specific with new regulations and policies.
- **Enable knowledge sharing:** It is important out of many aspects for a city to facilitate knowledge sharing both within different departments and towards other cities and regions – in Europe and Beyond. By using different forms of organisations, communication channels and forums available for cities all over the world, the key takeaways and learnings from demonstrating a smart city solution can be spread. Even though there might not be a straight-off replication of a solution from one city to another, the concept and the “what not to do” will be valuable. This type of knowledge sharing allows an increasing number of cities being able to contribute to the global climate goals. An example highlighted in the report is the follower city Santa Cruz de Teneriffe that has shown strong interest in following suit in Utrecht solution Teaching the Future.

4.2 IRIS communication channels

It is recommended that each city makes sure to communicate the results and experience from the IRIS project to reach potential stakeholders. This can be done through the well-established communication channels: the project website, showcase website, LinkedIn and Twitter.

In particular the showcase website will be an important platform as the IRIS project terminate. Along with the demonstration of the featured solutions information regarding the solutions and contact details is provided. It is recommended to continuously updated this platform until project termination, as this can be a highly valuable link to potential stakeholders seeking the IRIS project after project end.

4.3 Partnerships with external organisations and other cities

Partnerships with external organizations and interaction with other cities could be a potential lead for knowledge sharing for the continued development of IRIS solutions and uptake by other cities. It is recommended that the cities utilize their networks to a further extent and actively promote the IRIS project's findings and values.

Numerous of the networks mentioned in this report are open to finished Lighthouse projects and will stay as important sources of information and new insights, best practices and lessons learnt, as well as the informal network for further inspiration and information. In addition, acting as a source in matchmaking, notably for expertise, roadmaps and institutional investor network for bankability and financing of solutions.

In particular, “100 Climate Neutral Cities” where both Utrecht and Gothenburg city are selected will be a natural path for continued development in addition to an excellent platform for knowledge transferring between cities. As the IRIS project terminates in 2023, the participation in the initiative will be a continuation of IRIS and outline the work until 2030 and 2050. Further, for the remaining cities not being selected, as demonstrated for Vaasa, is not a barrier. Instead, it can be considered as an opportunity to follow suit, similar to a fellow city.

4.4 Exploitable results

Cities have different possibilities to mitigate the city’s climate impact by affecting the market design to support competitiveness for business models delivering climate friendly services and products. In some cases, a city authority is responsible for a citizen service and can set the technology specifications in public procurement in line with the best available climate technology. For example, public transport. In another case, a city authority can permit the use of properties in a way that supports climate friendly services. For example, permit building a larger building and fewer parking spaces on the property. In other cases, a city authority can support market development by establishing infrastructure and support from city authorities. For example, an electrical grid that supports the development of privately owned electrical grids for flexibility markets in a district.

The demonstrations of integrated solutions have successfully shown that many solutions contribute to reducing climate impact and can compete with traditional solutions if the market conditions are designed in their favor. As a recommendation, each city should develop a exploitation roadmap for each transition track and chosen solutions, which support further exploitation of IRIS results and a successful scale-up on the city market.

Recommendations for an exploitable results roadmap on city level
The city should appoint a transition manager for each transition track. The transition manager identifies all relevant stakeholders and establishes communication with them to present the City Impact Goals in this area. The transition manager invites to meetings/workshop to define value chains and business ecosystems in the city for roll-out of the new climate neutral solutions.

Key actors will tune their business models to fit the increasing demand in the city market for their products and services. The transition manager should support the marketing of key actors in other city markets to make sure a healthy business for the key actor.

The transition manager should analyse the profit and loss in the city market due to the transition to a climate neutral city. Based on the analysis, a communication strategy should be produced to make sure the communication activities both support the transition in line with the City Impact Goals, but also handle criticism from actors on the loss-side. This is especially important if the loss-side actor is a department in the city or a public company under political control.

4.5 Innovation management

The city's innovation strategy will clearly point out what transition the city is focusing on and will also guide when it comes to what smart city solutions will be implemented. For instance, the V2G solutions have turned out to be highly successful in Utrecht as a result of politicians in Utrecht investing interest and support into the solution.

The cities investigated in this report look significantly different, as different cities have different conditions. However, all cities commonly agree that their participation in the IRIS project has helped the city develop their innovation strategy in one way or another. In some cases, it has facilitated the cooperation between actors and in other cases in generating ideas, testing and implementing solutions, leading to better outcomes. However, a common benefit is the knowledge sharing between the Lighthouse cities and the follower cities. It is recommended that these knowledge sharing activities proceed throughout and beyond the project.

4.6 Funding and financial instruments

It is recommended to secure funding and financial instruments. In the IRIS project, there are solutions at different stages under development. Some are currently being tested (e.g MaaS), whilst other are being implemented in full-scale (e.g district heating). Regardless of the stage, there is a general need for funding and financing that can enable and facilitate scaling & replication activities as well as innovation development and capacity building. Many of the IRIS solutions are currently defined as mid-TRL, which in turn means that they are excluded from funding through (mainly TRL9-dedicated) financial investment instruments. This means that many of the IRIS solutions are bound to finance their scaling and replication activities through traditional grant funding. For that reason, section 3.6 focuses on IRIS-relevant funding programs as well as on methods to facilitate the proposal process. By use of the

knowledge presented in section 10, the success-rate within future proposal processes will rise significantly.

Furthermore, there are four main incentives underpinning the decision to approach national or international funding environments. “Need for money” to enable replication or scaling activities might be the overarching incentive but there are a handful of other valuable assets that can be reached through the various available funding opportunities. The four main incentives may be described as either Need for Knowledge, Need for network and collaboration, Need for Partnership and Funding or Need for Positioning and Funding. All of the incentives can be met by actions within the funding and financing environment but not necessarily resulting in grants. Knowledge and networks may be considered as assets as well. Not least in the IRIS project the partners have established valueable relationships providing a great basis for future cooperations. It is recommended that the applying party clearly map out what their incentives are, as well as their desired role in the project.

5 Conclusions on WP3 objectives

In this section preliminary conclusions on the WP3 objectives are listed. The conclusions should be read as a basis for discussions between project partners during the end phase of the IRIS project:

- Develop and exploit 30+ new business models for IRIS Smart City Solutions, of which 5+ bankable solutions are put into practice and 20+ novel ideas incubated.
  Conclusion: The solution suppliers and solution providers have together demonstrated integrated solutions with value chains and individual business models delivering competitive functionality. The city partner should use these results to develop and implement a market design that supports city-wide roll-out.
- Enhance all existing business models.
  Conclusion: The solution providers delivering the solution services to end-user have enhanced their existing business models based on new knowledge from the demonstrations. Business models have been enhanced with new Key partners, Key Activities, Key Resources, Cost Structure and, in some cases, new Revenue Streams.
- Increase innovation management performance of LHs and FCs to business models.
  Conclusion: All the cities have demonstrated improvements within their Innovation Management since D3.6 was written. Commonly, the cities agree that the IRIS project has facilitated the innovation management performance of their city in one way or another.
- Efficiency support the exploitation of European services, solutions and knowledge developed in IRIS to a strong growth market estimated globally at €1.3 trillion in 2020, leading to 20+ official IRIS deployment agreements signed.
  Conclusion: In this report, there are 11 cities outside of Europe demonstrated in which the cities have interacted with through study visits and external organisations and network. However, before the project end, it is reasonable to believe that a level of 20+ cities will be reached through further interaction with networks and organisations discussed in this report.

- Adapting for IRIS already established financial instruments and financing solutions for the cities and service providers
  Conclusion: The WP3 work relates to funding and financial instruments described in D3.7 Financing Solution for Cities and City Suppliers.

6 Comments on project objectives

As an overall conclusion planning beyond IRIS, the project objectives have been reached and can be used as steppingstones going forward towards climate neutral cities.

The project objectives were:

- Objective 1: Demonstrate solutions at district scale integrating smart homes and buildings, smart renewables and closed-loop energy positive districts.
  Comment: The objective has been reached and knowledge is established for city wide roll-out.
- Objective 2: Demonstrate smart energy management and storage solutions targeting Grid flexibility.
  Comment: The objective has been reached and knowledge is established for city wide roll-out.
- Objective 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.
  Comment: The objective has been reached, but city-wide roll-out is challenged by private ownership of mobility solutions.
- Objective 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.
  Comment: The objective has been, but city-wide roll-out need city policy to establish resources and capacity for a sustainable transition.
- Objective 5: Demonstrate active citizen engagement solutions providing an enabling environment for citizen to participate in co-creation, decision making, planning and problem solving within the Smart Cities.
  Comment: The objective has been reached.
- Objective 6: Put in practice bankable business models over proposed integrated solutions, tested to reduce technical and financial risks for investors guaranteeing replicability at EU cities.
  Comment: The objective has been reached and knowledge is established for city wide roll-out.
- Objective 7: Strengthening the links and active cooperation between cities in a large number of Member States with a large coverage of cities within different size, geography, climatic zones and economical situations.

Comment: The objective has been reached and continues in the two cooperation's Scalable Cities and NetZeroCities.

- Objective 8: Measure and validate the demonstration results after a 3-year large-scale demonstration at district scale within 3 highly innovative cities.
  Comment: The objective will be reached before the end of the project and reported to Smart Cities Market Place.

APPENDIX

APPENDIX 1: Funding on EU-level - Horizon Europe

Application effort: Estimated 300-1000 hours,

Grant contribution: +€5-20M,

Competition in program: Medium

Calls relevant to the IRIS partners are opening on a regular basis, the calls are either relevant to projects with a full-system approach or relevant for projects with a sub-system approach. Funding is available for implied research, demonstrations, capex and opex depending on call topic, the program is open, and calls are published on a regular basis:

Table 7: Horizon Europe Indicators.

Indicators	Explanation
Effort on T/C-Level in proposal with coordinating role	Total effort 300-1000 hours for full proposal The estimated effort to be divided between C-level resources and other experts within organization such as Business management, production management and strategists
Project Volume	Grant contribution - €5M - 20M
Contribution	Grant contribution of total project value – 50%
Success-rate	Estimated success-rate when proposal is lead and process is supported by grant-experts - 50%
Competition	Estimated competition in program due to previous experiences - Moderate
Capex/Opex	The grant supports Capex and/or Opex
Position	Potential of building position and recognition – Low
Start proposal (latest)	Proposal development to be started in 6 months prior to deadline to be efficient with time and resources. Latest start of application with remaining chance of being competitive in 3 months prior to deadline
Project length	Grant project length in years: 2-4 years
Knowledge transfer potential	Knowledge Transfer from project proposal to other grants - High

APPENDIX 2: Funding on EU-level - EUREKA Eurostars

Application effort: Estimated 150-300 hours,

Grant contribution: +€5-20M,

Competition in program: Medium

In the current program, EUREKA Eurostars launches annual calls relevant to IRIS partners from now and until end of 2027. The competition in the program is high but there are also great opportunities to reach funding in a longer perspective as the Eurostars offers great opportunities to improve a rejected proposals based on a very extensive and useful evaluation summary report process. The Eurostars project requires collaboration with a partner from another Eurostars country, it is worth to stress that the selection of partners based on project partner must be based on the partner country´s Eurostar Budget volume and policy in order to maximise the opportunities in the evaluation process. The program requires that the development of the product, service or process are ready for market introduction within two years from project ending.

Table 8: EUREKA Eurostars indicators.

Indicators	Explanation
Effort on T/C-Level in proposal with coordinating role	Total effort 150-300 hours for full proposal The estimated effort to be divided between C-level resources and other experts within organization such as Business management, production management and strategists
Project Volume	Grant contribution up to - €5M
Contribution	Grant contribution of total project value – 50%
Success-rate	Estimated success-rate when proposal is lead and process is supported by grant-experts - Medium
Competition	Estimated competition in program due to previous experiences – High
Capex/Opex	The grant supports Capex and Opex
Position	Potential of building position and recognition – Medium
Start proposal (latest)	Proposal development to be started in 6 months prior to deadline to be efficient with time and resources. Latest start of application with remaining chance of being competitive in 3 months prior to deadline
Project length	Grant project length in years: 2-3 years
Knowledge transfer potential	Knowledge Transfer from project proposal to other grants - High

APPENDIX 3: Funding on EU-level - European Regional Development Fund, ERDF

Application effort: Estimated 150-250 hours

Grant contribution: +€10-30M,

Competition in program: High

The ERDF supports and finances programmes with responsibility shared between the European Commission and various national and regional authorities in the EU member states. The responsibility for the administration and management as well as the decision on which projects to finance is delegated to each member state. In 2021-2027, the ERDF funding priorities will be to enable investments to make Europe and its regions more competitive through innovation and support to SMEs as well as to medium-sized businesses. Furthermore, the ERDF will support digitization and digital connectivity, actions making the society greener and more resilient and more based on low-carbon energy solutions. The fund also supports increased connectivity by enhanced mobility. Funds may be used for Capex as well as Opex and are distributed through Local/national, inter-regionally, regionally and locally.

Table 9: European Regional Development Fund indicators.

Indicators	Explanation
Effort on T/C-Level in proposal with coordinating role	Total effort 100-250 hours for full proposal The estimated effort to be divided between C-level resources and other experts within organization such as Business management, production management and strategists
Project Volume	Grant contribution - up to €20M
Contribution	Grant contribution of total project value – 25-50%
Success-rate	Estimated success-rate when proposal is lead and process is supported by grant-experts - 60%
Competition	Estimated competition in program due to previous experiences - Moderate
Capex/Opex	The grant supports Capex and/or Opex
Position	Potential of building position and recognition – Low
Start proposal (latest)	Proposal development to be started in 3 months prior to deadline to be efficient with time and resources. Latest start of application with remaining chance of being competitive in 1 month prior to deadline
Project length	Grant project length in years: 2-3 years
Knowledge transfer potential	Knowledge Transfer from project proposal to other grants - Low

APPENDIX 4: Funding on EU-level - LIFE

Application effort: Estimated 500-800 hours,

Grant contribution: +€5-20M,

Competition in program: Medium

The four LIFE sub-programmes supports the delivery of EU policies in the fields of nature and biodiversity, circular economy, climate change mitigation/adaption and clean energy transition. The sub-programmes are highly relevant to IRIS partners. LIFE aims at engaging SME´s and medium-sized stakeholders as well as other actors such as local and regional public authorities, non-profit organizations and consumers. Projects are co-financed under the LIFE Clean Energy Transition sub-programme in the following five areas of intervention:

Table 10: LIFE indicators.

Indicators	Explanation
Effort on T/C-Level in proposal with coordinating role	Total effort 500-800 hours for full proposal The estimated effort to be divided between C-level resources and other experts within organization such as Business management, production management and strategists
Project Volume	Grant contribution - up to €5-20M
Contribution	Grant contribution of total project value - 50%
Success-rate	Estimated success-rate when proposal is lead and process is supported by grant-experts – 25-50%
Competition	Estimated competition in program due to previous experiences - Moderate
Capex/Opex	The grant supports mainly Opex
Position	Potential of building position and recognition – Low
Start proposal (latest)	Proposal development to be started in 6 months prior to deadline to be efficient with time and resources. Latest start of application with remaining chance of being competitive in 3 months prior to deadline
Project length	Grant project length in years: 2-3
Knowledge transfer potential	Knowledge Transfer from project proposal to other grants - Low

APPENDIX 5: Funding on EU-level - Connecting Europe Facility

Application effort: Estimated 800-1000 hours,

Grant contribution: +€5-20M,

Competition in program: Medium

CEF, Connecting Europe Facility, is a key EU funding instrument to promote growth, jobs and competitiveness through targeted infrastructure investment. It supports the development of high performing, sustainable and efficiently interconnected trans-European networks in the three sectors, namely CEF Energy, CEF Digital and CEF Transport. The three sectors are highly relevant for the IRIS partners as it is an EU funding programme designed to support the implementation of the trans-European networks for energy policy. CEF funding may be used for Capex as well as opex.

Table 11: Connecting Europe Facility indicators.

Indicators	Explanation
Effort on T/C-Level in proposal with coordinating role	Total effort 800-1200 hours for full proposal The estimated effort to be divided between C-level resources and other experts within organization such as Business management, production management and strategists
Project Volume	Grant contribution - €20 to 50 M
Contribution	Grant contribution of total project value – 50%
Success-rate	Estimated success-rate when proposal is lead and process is supported by grant-experts - 50%
Competition	Estimated competition in program due to previous experiences - Moderate
Capex/Opex	The grant supports Capex and Opex
Position	Potential of building position and recognition – Low
Start proposal (latest)	Proposal development to be started in 10 months prior to deadline to be efficient with time and resources. Latest start of application with remaining chance of being competitive in 1 month prior to deadline
Project length	Grant project length in years: 2-4 years
Knowledge transfer potential	Knowledge Transfer from project proposal to other grants - medium

APPENDIX 6: Funding on EU-level - EIC Accelerator

Application effort: Estimated 150-300 hours,

Grant contribution: +€5-20M,

Competition in program: Medium

The Horizon Europe EIC Accelerator replaced the former Horizon 2020 SME Instrument program and aims to support individual Small and Medium Enterprises (SMEs), in particular startups and spinout companies to develop and scaleup game-changing innovations. In some cases, also small mid-caps (up to 500 employees) are supported. The EIC Accelerator provides and combines substantial financial support with grant funding of up to €2.5 million for innovation development costs, investments (direct equity investments) of up to €15 million managed by the EIC Fund for scale up and other relevant costs. In the program, applicants will be asked to demonstrate the need for EU support, i.e, provide evidence that the applying company is not investment ready according to current market risk appetite. The program provides a full blended finance, i.e., it combines a grant and an investment component or consists of an investment component only. A proposal implies that the applicant has or will secure all resources needed to co- finance at least 30% of its TRL 5 to 8 activities and funds for TRL9 onwards. It is designed for companies/innovations that are at an early stage of development, still are subject to key technological market validations for the applicant to commit beyond TRL8.

Table 12: EIC Accelerator indicators.

Indicators	Explanation
Effort on T/C-Level in proposal with coordinating role	Total effort 150-300 hours for full proposal The estimated effort to be divided between C-level resources and other experts within organization such as Business management, production management and strategists
Project Volume	Grant contribution - €0,5 - 10M
Contribution	Grant contribution of total project value – 50%
Success-rate	Estimated success-rate when proposal is lead and process is supported by grant-experts - High
Competition	Estimated competition in program due to previous experiences – Moderate
Capex/Opex	The grant supports Capex and/or Opex
Start proposal (latest)	Proposal development to be started in 6 months prior to dead-line to be efficient with time and resources. Latest start of application with remaining chance of being competitive in 3 months prior to dead-line
Project length	Grant project length in years: 2-3 years
Knowledge transfer potential	Knowledge Transfer from project proposal to other grants - High

APPENDIX 7: EIF Large Scale Projects

Application effort: Estimated 2000-4000 hours,

Grant contribution: +€7,5-150M,

Competition in program: Very High

Innovation Fund is one of the world's largest funding programmes for the demonstration of innovative low-carbon technologies. It provides support for the commercial demonstration of innovative low-carbon technologies, aiming to bring to the market industrial solutions to decarbonise Europe and support its transition to climate neutrality. The support allocated by the EIF will lead to businesses investing in clean energy and industry, alongside boosting economic growth, create local future-proof jobs and aiming at reinforcing the European technological leadership globally. Funding granted from Innovation Fund can be used for investments as well as for operation of the demonstrated innovations. The calls in the program are published once a year, the call opens four months before submission date. Innovation Fund structures applicable to funding and financing activities

From a general perspective, the setup and structure of the Innovation Fund applications may be relevant for funding & financing of scaling and replication activities and its structure itself can serve as a role-model for a very wide set of proposal and application actions addressing a wide number of funding and financing entities:

The IF application is based on a number of reference documents, all together representing processes and knowledge needed in every organization with the intention to either put an innovation on the market or implement an innovation into its own process or business. Submitting a EIF proposal, the applicant must present the following documents:

- A feasibility study (FS)
- A business plan (BP)
- A project implementation plan (PIP)
- Calculations regarding greenhouse gas emission reduction
- An operational capacity description (OC).
- A knowledge sharing plan (KSP)

EIF Large-scale projects are defined as projects with a capital expenditure over €7.5 million. The call topics included breakthrough technologies for renewable energy, energy-intensive industries, energy storage and carbon capture, use and storage. 311 proposals were submitted to the first step of the first call. 70 proposals were invited to step 2, the evaluation process will be executed in Q4 2021 and approximately 5-7 projects focusing on sustainable energy and clean industry innovative investments. The projects will contribute to the green recovery of EU economy and assist in maintaining the momentum in EU journey to climate neutrality.

Table 13: EIF Large Scale Projects indicators.

Indicators	Explanation
Effort on T/C-Level in proposal with coordinating role	Total effort 3000-5000 hours for full proposal addressing "Large Scale Projects". The estimated effort is to be divided between C-level resources, business experts, strategists etc. It is worth to mention that the EIF-related activities in a large extent correlates with regular company innovation project activities.
Project Volume	Grant contribution - up to €200M
Contribution	Grant contribution of total project value - 40-60%
Success-rate	Estimated success-rate when proposal is lead and process is supported by grant-experts - 20%
Competition	Estimated competition in program due to previous experiences - Very High
Capex/Opex	The grant supports Capex and/or Opex
Position	Potential of building position and recognition – High
Start proposal (latest)	Proposal development to be started in 12 months prior to deadline to be efficient with time and resources. Latest start of application with remaining chance of being competitive in 6 months prior deadline
Project length	Grant project length in years: Financial close within 4 years from start, maximum 10 years of following operation
Knowledge transfer potential	Knowledge Transfer from project proposal to other grants - Very high

APPENDIX 8: EIF Small Scale Projects

Application effort: Estimated 500-1500 hours,

Grant contribution: +€2,5-7,5M

Competition in program: Very High

Small-scale projects are defined as projects with a capital expenditure between €2,5M and €7.5M. The budget for the first call had a budget of €100M dedicated for breakthrough technologies in renewable energy, energy-intensive industries, energy storage, and carbon capture, use and storage. The projects funded within the call must focus on innovative, mature technologies that are ready for the market. The first call for small-scale projects addresses innovation projects supporting deployment of key technologies needed to reach climate neutrality and contribution to fulfilment of the Paris agreement.

Table 14: EIF Small Scale Projects indicators.

Indicators	Explanation
Effort on T/C-Level in proposal with coordinating role	Total effort 500-1500 hours for full proposal addressing "Large Scale Projects". The estimated effort is to be divided between C-level resources, business experts, strategists etc. It is worth to mention that the EIF-related activities in a large extent correlates with regular company innovation project activities.
Project Volume	Grant contribution - up to €7,5M
Contribution	Grant contribution of total project value - 40-60%
Success-rate	Estimated success-rate when proposal is lead and process is supported by grant-experts - 20%
Competition	Estimated competition in program due to previous experiences - Very High
Capex/Opex	The grant supports Capex and/or Opex
Position	Potential of building position and recognition – High
Start proposal (latest)	Proposal development to be started in 8 months prior to deadline to be efficient with time and resources. Latest start of application with remaining chance of being competitive in 4 months prior deadline
Project length	Grant project length in years: Financial close within 4 years from start, maximum 10 years of following operation
Knowledge transfer potential	Knowledge Transfer from project proposal to other grants - Very high