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"Smart Cities and Communities" as Innovation Hubs

Success Stories & Best Practices from the European Project REMOURBAN

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Steinbeis-Edition

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The Authors

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Preface


Source: private

Innovation is vital to European competitiveness in the global economy[1]. Therefore, the European Commission stimulates and strengthens the innovation capacity of Europe, expecting the projects funded under the Framework Programme for Research and Innovation "Horizon 2020" to not only develop, test and validate but also ensure market deployment. This finally leads to the market uptake of project results such as new solutions, products, services, processes or business models. "Smart Cities and Communities (SCC)" projects funded under Horizon 2020 are great examples for a successful market deployment of exploitable results. Projects under this smart city theme provide practices for a cross sectoral approach focusing on the smart integration of energy, mobility and Information and Communication Technologies and for a multi-stakeholder approach, bringing together small and medium enterprises, large enterprises, research and technology organisations as well as local authorities. Experience has shown that Smart Cities and Communities are excellent innovation hubs for involved stakeholders as well as for the region they are located in.

If your organisation – let it be a small and medium enterprise, a large enterprise, a municipality or a research organisation – seeks innovation and market entry, this booklet aims at helping you to understand the possibilities that EC-funded projects can offer. Best practices and success stories identified and shaped by Steinbeis-Europa-Zentrum in the framework of the Smart Cities and Communities project REMOURBAN, funded under the Framework Programme for Research and Innovation "Horizon 2020", are presented following the customer journey approach.

Jens Bartholmes

Policy Officer DG ENERGY European Commission

1 https://ec.europa.eu/growth/industry/innovation_en

1 Introduction

"The secret of change is to focus all of your energy, not on fighting the old, but on building the new."
Socrates

1.1 General Introduction

The European Framework Programme for Research and Innovation "Horizon 2020" (H2020) supports and focuses on research and development as well as on innovation covering a multitude of topics at the forefront. A great number of these topics deepen the research, engaging Research and Technology Organisations (RTOs), universities and businesses. There are also considerable opportunities for funding the implementation of new business ideas and for their introduction to the market, thus directly targeting businesses. One of the shared goals of all projects funded under H2020 is to ensure a deep and sustainable impact in Europe and beyond.

Experience has shown that SCC projects have a great innovation potential that benefits a large set of SCC stakeholders coming from businesses, science or society and from various sectors. Therefore, SCC projects can be considered as an innovation hub for cities and regions. REMOURBAN, one of many projects funded under H2020, is a case study presenting best practices for any smart city project, irrespective of its funding.

To reach this goal, a profound innovation management is needed, which is called "exploitation" in European projects. Exploitation stands for the repeated and optimised use of the results generated in a project (for further research, commercial purposes, new developments, upscaling...). The main goals of exploitation in these projects are:

- To enable the process of open innovation (defined as the use of purposive inflows and outflows of knowledge to accelerate internal innovation, and expand the markets for external use of innovation, respectively) [2].
- To support businesses in planning the market-uptake of their solutions generated within the European project.
- To generate maximum impact by looking at the potential of exploitation not only focusing on single project partners but also on the consortium as a whole, meaning different types and sizes of organisations working together on common solutions. This generally ensures the optimisation of solutions and the development of the most suitable business models for the existing market.
- To identify the opportunity to create new business structures e. g. spin-offs, joint ventures.

Steinbeis-Europa-Zentrum (SEZ) has developed an exploitation methodology to ensure these above-mentioned goals. This booklet presents the outcome of the exploitation activities lead by SEZ in the SCC project REMOURBAN.

The outcomes are presented as best practices following a "customer journey" approach outlined in chapter one. In chapter two, the activities delivered by the consortium partners following the exploitation methodology developed by SEZ are described. In chapter three, the outcomes, results, best practices and success stories of businesses and their products as part of REMOURBAN are presented.

1.2 REMOURBAN – The Project

REMOURBAN aims to design and validate a sustainable Urban Regeneration Model (URM) in the Lighthouse Cities of Nottingham (UK), Valladolid (Spain) and Tepebaşı/Eskişehir (Turkey), while maximising its replication

2 Chesbrough, H. (2003), *"Open Innovation: The New Imperative for Creating and Profiting from Technology"*, Harvard Business School Press

potential in two Follower Cities, Seraing (Belgium) and Miskolc (Hungary). The consortium covers 22 project partner organisations including large enterprises, Small and Medium Enterprises (SMEs), start-ups, Research and Technology Organisations (RTOs), universities and public administrations from seven countries.

The URM is a methodological guide for cities to accelerate their transformation into the smart city of the future. Such a goal is achieved by selecting the most adapted solutions (technical or non-technical) implemented in REMOURBAN or elsewhere. This model takes into account the current situation of the respective city and estimates the impact of the suggested solutions. It also enables to define an implementation plan, to support this implementation and to monitor the results obtained.

These solutions address energy, mobility and ICT, but also non-technical aspects such as citizen engagement and financial aspects to improve the quality of life in European cities. The resulting urban renovation strategy includes citizen engagement to ensure social acceptance, avoid a rebound effect and make citizens its very cornerstone. The URM also features new business models for city renovation and strategies to address non-technical barriers and help public administrations and local governments understand their goals and objectives and evaluate the progress in making their cities smarter and more sustainable environments.

During its five years duration, the REMOURBAN consortium implemented, monitored and validated several solutions in the three Lighthouse Cities. The following three results have particularly promising exploitation potential:

- Low Temperature District Heating Model (see 3.2.1)
- ICT Platform (see 3.2.2)
- Urban Regeneration Model (see 3.2.3)

These solutions are described in detail in chapter 3.2. For more details, please visit the project website: http://www.remourban.eu

2 The Steinbeis-Europa-Zentrum Exploitation Methodology

The present section gives an overview of the **Steinbeis-Europa-Zentrum Exploitation Methodology**[3], an exploitation and market deployment strategy that is the backbone of a successful innovation management in SCC projects. This methodology has been developed over the seven past years by SEZ and implemented and moderated by SEZ in REMOURBAN.

Five steps can be defined, which are listed and briefly described below. The first four steps are based on **exploitation and market deployment**. The fifth step is based on **dissemination**, dealing with the diffusion of the scientific and technical information arising from the project results to professional stakeholders interested in using the project's technical outcome.

All five steps are first explained on a general level. The REMOURBAN specific implementation of these steps is illustrated in italic letters hereafter.

- **1st step – Setting the Collaboration Framework:** In order to provide a structure to support planning, outline the shared commitment and reinforce the common goal, the collaboration framework should be set at an early stage of the project. The framework should include the Consortium Agreement, Intellectual Property (IP) management guidelines and exploitation action plans.
  During the grant preparation phase, a Consortium Agreement was set up to agree on IP management, future exploitation and dissemination of results. At the beginning of the project, an exploitation strategy was developed, covering REMOURBAN's planned project results, potential exploitable results as well as the identification of background knowledge related to the project and exploitable results.

3 CITyFiED Innovation Management Guide, A case study on the exploitation of smart city solutions in the European Smart Cities and Communities Project CITyFiED, ISBN 978-3-95663-213-6 (2019)

- **2nd step – Examination of the potential project outcomes:** The project and exploitable results primarily listed in the proposal need to be reviewed regarding their exploitation potential (commercial, academic, etc.). For the planned and jointly developed project results ownership claims, the linked Intellectual Property IP (related to background and project results) as well as potentially arising IP conflicts between project partners, need to be detected and solved. All partners need to be informed on the general IP management rules in H2020.
  In REMOURBAN, via a webinar, the general IP rules of H2020 projects were explained. This enabled the partners to clearly define the IP they claim to have with the different results of REMOURBAN project as well as the related duties and rights. This webinar was then followed by bilateral discussions and finally an exploitation workshop. The partners had the opportunity to exchange and agree in relation with the various exploitable project results and the partners' IP claims hereof.

- **3rd step – Value Proposition and Introduction to the Business Model:** The value proposition creation is a critical issue during the innovation management process. The business model design process helps consortia to clarify and test business model assumptions, to evaluate and update business model documentation and to develop comprehensive business models. Review of the funding and financial facilities, risk assessment and a contingency plan and an internal mediation on IP issues are similarly important actions that should be considered in this step.
  Via workshops, partners with different perspectives – SME, large industry, academia, etc. – discussed the definition of the functions, main values and Unique Selling Propositions (USP) of the selected results. The Business Model Canvas Methodology was applied for this step.

- **4th step – Market Situation Analysis:** Activities, such as the continuous comparison of the situation of targeted markets for promising exploitable results, are important to plan, prepare and ensure the future exploitation plan and market deployment. This comparison sets the basis for the elaboration of an exploitation strategy. This step includes research and analysis of the target market, competitors, business challenges and consortium's competitive state of the market.

Reusing the knowledge gathered during the previous exploitation workshops and collecting answers from the partners through exploitation questionnaires in relation to the market analysis, an interactive exploitation workshop was implemented enabling the partners to define the selected exploitable results, perform the SWOT analysis, identify their environment, their estimated cost and price and to indicate the main criteria to be taken into consideration for an effective market analysis. These exploitation workshops were also supported by desk research and interviews to verify and confirm the results obtained.

- **5th step – Dissemination of the results:** Dissemination means the diffusion of the scientific and technical information to potential users. Therefore, these activities are essential for the successful exploitation of the project results. Among dissemination actions, two categories may be distinguished. First, setting up a dissemination and communication plan, marketing with presentation/distribution of dissemination material, networking with other projects/businesses, workshops/seminar/webinars for potential end users are the most used actions in the collaborative projects. Secondly, further activities are e. g. marketing with demonstrators, participation in matchmaking events, and generation of partnership agreements with future technology/business cooperation partners, etc.
  A year after the beginning of REMOURBAN, a clear framework called dissemination cascade was released. This plan describes the different phases, from the set-up of dissemination agreements with crucial enablers connected to several contacts interested in specialised information about the project results of REMOURBAN. Then the development of cooperation profiles to establish synergies thanks to the Enterprise Europe Network and also information packages to forward to enablers and the realisation of webinars to deepen on major exploitable results and generate exchanges, the participation to several specialised events (brokerage events, exhibitions, workshops, ...).

In REMOURBAN, the following exploitaiton activities were realised:

Exploitation activities:	Number
Exploitation Plan for the project	1
Exploitation Workshops (implemented in the cities of Nottingham, Stuttgart, Madrid, Tepebaşı, León and Miskolc)	6
IPR Webinar to introduce the main IP issues that project partners have to be aware of	1
IP Audit Report which identified 141 IP assets and how they interrelate with each other: 93 Backgrounds (BGs), 43 Exploitable Results (ERs) and 5 Key Exploitable Results (KERs)	1
Market Analyses (one per KER)	5
IP Strategies (one per KER)	5
Exploitation Strategies (one per KER)	5

During REMOURBAN, the following dissemination activities were carried out:

Dissemination activities:	Number
Information Packages to present in a visual and summarised way the main characteristics of a selection of solutions generated within the project.	15
Webinars to communicate how the different solutions demonstrated during the project have been implemented in each Lighthouse City, which had a total of 108 live attendants and were viewed 242 times in the YouTube Channel of the project.	6
Webinars to market the KERs of the project which gathered a total of 49 attendees and which were viewed 113 times in the YouTube Channel of the project.	3
Cooperation Profiles have been prepared together with those project partners willing to have their solutions uploaded to the Partnership Opportunity Database (POD) of the Enterprise Europe Network (EEN) which has a worldwide reach. Among them we count: 7 Technology Offers, 3 Technology Requests and 1 Business Offer.	11
Issues of our bi-annual report for project partners "Exploiting opportunities through Enterprise Europe Network" which summarises the most interesting EEN Cooperation Profiles uploaded by other companies, public organisations, universities and/or research centres.	7

All these exploitation and dissemination activities enabled us to reach the following impact:

Impact generated:	**Number**
Multipliers or enablers from all over Europe sent us their agreement to distribute the Information Packages that best fit the interests of their stakeholders among their communication channels. Like this, the 21 solutions presented in each Information Package had a greater outreach, which, in turn, increases their chances of a successful market deployment.	72
Expressions of Interest were received by the project partners who presented their solutions through our Information Packages, EEN Cooperation Profiles and webinars.	216
Exploitation Claims expressed before the end of the project showing the interest of one project partner to exploit the exploitable result (ER) owned by another project partner.	92
Access Rights Requests sent by one project partner to another.	9
Contracts signed following the project.	3

3 REMOURBAN Success Stories & Best Practices

An SCC project like REMOURBAN gathers different types of organisations with different expectations for the project and its benefits. This section presents the pains and gains of each main type of organisation (SMEs, large enterprises, RTOs, local authorities) for EU projects in general and best practices from REMOURBAN in particular. The table below shows the type of organisations involved in the development of the three most promising exploitable results in REMOURBAN.

	Low Temperature Heating Network	**ICT Platform**	**Urban Regeneration Model**
SME	Nottingham Energy Partnership (NEP), Sasie	OLCSAN, XERIDIA	Demir Enerji, OLCSAN, XERIDIA, InfoHub, NEP, YOURIS, ENERGON
Large Enterprise			IBERDROLA, ACCIONA, GMV, Officinae Verdi, Veolia
RTO	Nottingham Trent University (NTU)		CARTIF, NTU, Anadolu University, Steinbeis-Europa-Zentrum
Municipality	Nottingham City Council		Nottingham, Tepebaşı, Valladolid, AREBS, Miskolc Holding

Table 1: Main Exploitable Results in REMOURBAN and related organisation per type (Source: Own representation)

3.1 Gains and Pains of Stakeholders Regarding Exploitation and Dissemination in Smart Cities and Communities Projects

Most of the stakeholders engaged in H2020 SCC projects are facing the following challenges and reporting the following benefits:

Stake-holders	Main pains				Main gains				
	Feel not concerned	Meaning of exploitation	Needing help of other departments	IPR related fears	Generate synergies	Overcoming IP conflict	Market-uptake support (financing, planning…)	Internationalisation	Creation of new legal company structure
SME		X			X	X	X	X	X
Large Enterprise		X		X	X	X			X
RTO				X	X	X	X		X
Municipality	X	X	X		X		X		X

Table 2: Main pains and gains related to exploitation and dissemination per type of project partner organisation during SCC projects (Source: Own representation)

These gains and pains are not specific to SCC projects funded under H2020 but for any project, independently on its financing.

In the following paragraph, a short presentation of the gains, pains and interviews related to each type of partner is presented.

3.1.1 Small and Medium-sized Enterprises (SMEs)

SMEs see in SCC projects an attractive and useful way to reach their goals. These projects offer them the possibility to work in an international environment with experts from various fields, allowing fruitful discussions and enhancing the innovation process. Specifically, the H2020 fund covers a large part of the costs related to the innovation / business idea that is developed or tested in the project, thus reducing their own risks.

Pains

By nature, SMEs are mostly focused on one business idea and are not familiar with H2020 projects and the structure and rules in an EC funded project. Experience has shown that there is a great need to explain during the preparation of the proposal the exploitation process, its outcomes and benefits for SMEs. Questions like: "What exactly is exploitation?", "What are related interests?" or "How can SMEs benefit most from their participation in the project?" need to be discussed.

At the start of the project, around eight months after the submission of the proposal, SEZ explained the concept of exploitation (with a document for the consortium and several presentations during meetings, webinars and telephone conferences) to introduce SMEs to the exploitation method and to give an overview of the different activities, their logical progression and their outputs for SMEs.

Gains

The SMEs see in these exploitation activities a way to benefit from the expertise of a project partner for developing a well-established exploitation strategy, taking into account IP Management (overcoming potential IP conflicts or closely managing these), the analysis of the market, a determination of the most adapted business model, a rough business case and a marketing strategy.

But also, as a very first marketing step to be supported in the dissemination of "their" solution developed within the project. Developing new synergies for future cooperation at an international level thanks to the consortium itself, the project partners' networks and by interlinking the project with the EEN is a clear additional benefit for SMEs. The project partner that is leading the exploitation activities (SEZ for REMOURBAN) also supports SMEs in benefitting from additional financial support from either the EU or other sources and developing with other partners suitable structures to further develop their innovation potential (spin-off, joint ventures...).

Success Story / Best Practice

Source: Roberto Vidal

Interview Roberto Vidal, Xeridia

"Xeridia is a Spanish IT services company providing consultancy, implementation and support, with extensive experience in the field of software lifecycle management and development. Within REMOURBAN, Xeridia has demonstrated a 'global ICT monitoring platform' especially designed and deployed to cover the needs of the project, namely gathering monitoring data coming from the three demonstration sites in order to convert it into smartness and sustainability indicators.

At the beginning of the project, I had some difficulties to figure out what was meant by exploitation and what it would bring to my business. However, very soon within the project, our partner responsible for exploitation, SEZ, clarified this topic to me. The following activities and dynamic workshops gave me the opportunity to exchange ideas with the other partners related to the solutions developed and ask questions in order to be able to market these solutions and avoid any conflict with the other partners.

At the beginning, we identified one promising product, our ICT Platform, clarified the relevant IP issues, developed a market analysis, a business case and finally, prepared an exploitation strategy.

We identified another promising solution (helping the cities to assess their index of sustainability or smartness and support them in their improvement) that we developed with other partners of the consortium. We desired to clarify its IP relationships. Thus, our exploitation partner organised a supplementary workshop and invited the other organisations related to this solution. Thanks to this workshop, we rapidly reviewed the interests and the prospective of these results and agreed on the IP conditions enabling the market uptake of this solution. The promotion of our ICT platform thanks to the development of Information Packages, the organisation of a recorded webinar, the research of synergies in Europe and beyond were also organised.

To summarise, the exploitation activities really boosted our preparation to the market uptake of our ICT Platform and it never missed an opportunity to support our organisation in clarifying the most pressing questions and organise the market uptake of our solution."

3.1.2 Large Enterprises

Smart cities have become an inevitable market for energy, transport and ICT companies. Such large-scale projects allow to improve, monitor and validate the implementation of innovative solutions with relevant stakeholders and local authorities. International and EU-funded projects enable to identify if there is a market in new countries and to acquire new customers. They also benefit from a good reputation and are followed by a wide and diverse audience. These reasons make SCC projects very attractive to large enterprises.

Pains

Although large enterprises usually have a dedicated legal or innovation department responsible for managing projects with large international consortia,

large enterprises are sometimes not fully aware of what exploitation is and how to comply with the framework governing it within H2020. Thus, the need is very similar when it comes to support and explanations as described with respect to SMEs.

However, during the preparation of the proposal, the Consortium Agreement and the implementation of the project, IP Management in H2020 projects as an example of projects with a large consortium trigger numerous questions and doubts within large enterprise representatives. A clear exchange and dialog is therefore necessary to avoid and overcome IP conflicts and misunderstandings. The Steinbeis-Europa-Zentrum Exploitation Methodology explained earlier in section 2 therefore ensures a smooth common understanding and agreement.

Gains

The benefits of SCC projects for large enterprises are manifold: the generation of synergies and partnerships with other consortium partners in order to extend and complement their own solutions, the support in the clarification of IP management related issues and the support in the development of structures for a further exploitation of their solution.

Success Story / Best Practice


Source: Pablo Rivas Salmon

Interview Pablo Rivas Salmon, GMV

"GMV is a Spanish technological business multinational group providing integrated systems, specialised products and services covering the whole life cycle. These range from consultancy and engineering services up to the development of software and hardware, the integration of turnkey systems and operational backup. In the scope of the REMOURBAN project, GMV has developed

a system to monitor electric vehicles, track their location and status (power consumption, battery status) and measure the efficiency of the vehicles.

In the REMOURBAN project, SEZ has played an outstanding work in the assessment of background and results, in order to define an appropriate way to exploit the outcomes of the project. The exploitation methodology applied is very well structured and enables to cover systematically the different topics related to market uptake and IP, including interactive workshops involving different project partners which could exchange their approaches or share their views taking the appropriate management of IP into consideration at any moment."

3.1.3 Research and Technology Organisations (RTOs)

The concept of a "Smart City"[4] is relatively recent, even if it brings together several existing research areas (urban geography, sociology, statistics, business, finance, technical...). Scientific research to increase the efficiency and acceptance of smart city innovation is required. The international and large SCC projects represent a perfect innovation lab attracting RTOs for the development and adaptation of new research.

Pains

RTOs are usually very well informed and experienced in the exploitation process within H2020 projects. Their issues related to exploitation are often connected to IP management and the importance of a reliable and structured monitoring and clarification methodology.

Gains

RTOs benefit from the exploitation methodology by developing synergies with other consortium partners during the project, the support in the definition of a clear strategy for the market uptake of potential solutions (from the market

4 https://www.sciencedirect.com/topics/computer-science/smart-city-concept

analysis, the Business Models, related financing to the exploitation strategy) and the development of sustainable structures for further exploitation.

Success Story / Best Practice

Source: Miguel Ángel Garcia Fuentes

Interview Miguel Ángel Garcia Fuentes, Fundacion CARTIF

"CARTIF is a Spanish horizontally integrated technology centre specialised in offering global solutions to companies to improve their processes, systems and products, their competitiveness and to create new business opportunities. Its disciplinary teams work in five areas of knowledge that correspond to different economic and technological sectors: industry, energy and environment, construction and infrastructures, agro-food and health and quality of life.

Our Energy Division at CARTIF has developed, together with other partners, a replicable Urban Regeneration Model in the framework of an EU-funded project. This methodology defines a holistic process for urban transformation with a joint approach in the fields of Sustainable Buildings and Districts, Sustainable Urban Mobility, and Integrated Infrastructures and Processes.

With SEZ in the consortium, we have the benefit of a real expert for exploitation ready to support the project at any stage and during any situation of the project. Between their very structured methods and their interactive and professional workshops, IP management and the market uptake of promising results are ensured. Their yearlong experience in EU projects and specifically in SCC projects enables them to address precisely and effectively the difficulties and needs of the consortium partners related to these topics.

We structured this project with the development of an Urban Regeneration Model (URM) with which each activity and each partner were connected.

SEZ supported the exchanges and work together with its workshops related to IP relationships definition, market analysis and exploitation strategy. They also enabled to clarify potential IP conflicts and made sure that the interests of each partner were taken into consideration. We at CARTIF, as several other partners, will further work on this URM and use it to make more cities become smart."

3.1.4 Local Authorities

The core of smart city projects is the implementation of innovation for making cities smarter. From the development of transversal structures connected with different departments of the city to the development of ambitious projects with experts, those projects are at the focus of local authorities for increasing their city's competitiveness and attractiveness.

Pains

For several reasons such as lack of knowledge related to the meaning of exploitation, absence of commercial perspectives, and also seeing the project as a goal in itself with implementation of solutions for a district, local authorities usually feel not concerned by exploitation. To them, exploitation also rather seems to be a matter of other departments in the local authorities that are not in contact with the representative for the project.

Gains

Local authorities benefit from the exploitation methodology through the participative workshops and activities offering the possibility to develop synergies with the partners of the consortium, such as feedback on the implementation of solution in other cities, development of new services to the citizen or exchange on more flexible offer processes, thus fully benefitting from the projects and the expertise gathered. Local authorities benefit also from exploitation strategies such as market analysis, business models, finance supports and roadmaps and sustainable exploitation structures.

Success Story / Best Practice


Source: Owen Harvey

Interview Owen Harvey, Nottingham City Council

"Nottingham, as one of the major cities in the East Midland, is situated 130 miles north of London. It has a population of 305,000 and became Britain's Smartest City for Energy in 2017[5]. Already in 2010, Nottingham City Council developed a City 2020 Energy (and Carbon) strategy which was adopted by cross party consensus. The strategy covered domestic, commercial, public and industrial infrastructure, energy saving, energy generation and transport.

The project REMOURBAN and the support of its exploitation partner SEZ enabled the different solutions that have been implemented to define their market uptake and to disseminate these solutions, which has been valuable for the city of Nottingham.

Today, for example, Nottingham Trent University and Prof. Anton Ianakiev are considered as experts for Low Temperature District Heating Design in the UK and this is thanks to an implementation made during REMOURBAN. All these implementations and plans we developed, following or in accordance with the project REMOURBAN, placed the city of Nottingham at the top of the smart city movement in the UK."

5 http://www.mynottinghamnews.co.uk/nottingham-named-britains-smartest-city-for-energy/

3.2 REMOURBAN Exploitable Results – Case Studies

Within REMOURBAN, thanks to the Steinbeis-Europa-Zentrum Exploitation Methodology, numerous project results were identified, and several were detected as being exploitable and promising. In the following section selected jointly developed exploitable results which were the most promising and interesting for the project partners are presented.

3.2.1 Urban Regeneration Model

The forecasts are that the combined effects of urbanisation, together with the world's overall population growth, will add 2.5 billion people[6] to current urban populations by 2050[7], thus almost 66% of the global population would be urban. This trend puts smart and sustainable urban development amongst the top priorities.

The Urban Regeneration Model (URM) offers a holistic and integrated solution to this problem, jointly in the energy, ICT and mobility sectors. The proposed approach goes from planning to implementing through three levels:

- *Integrated Urban Planning:* the starting point is a detailed city diagnosis and a set of strategic goals and their prioritisation defined by the cities.
- *Action Plans:* different technical and non-technical solutions to be potentially implemented in the cities.
- *Implementation Plans:* detailed plans with the tasks to be fulfilled and the necessary resources.
- *Evaluation:* the impacts of the specific solutions are assessed allowing to know the degree of accomplishment of the strategic objectives defined.

6 http://www.who.int/gho/urban_health/situation_trends/urban_population_growth_text/en/
7 http://www.un.org/en/development/desa/news/population/world-urbanization-prospects-2014.html

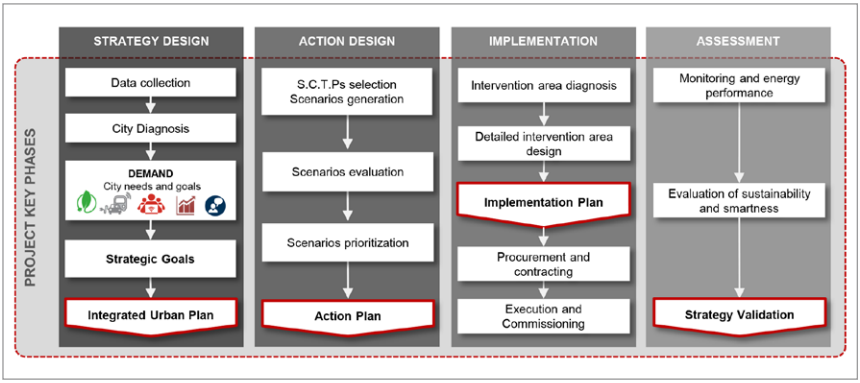

Figure 1: Urban Regeneration Model (Source: CARTIF)

Goals

The main goals of the URM are to:

- integrate the knowledge and information coming from the different smart city projects regarding the technical and non-technical solutions they have implemented.
- have a standardised and replicable approach.
- validate the implementation methodology used.

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3.2.2 Low Temperature District Heating Model

From the 375 GWh heat generated by the Combined Heat and Power (CHP) plant in Nottingham, 144 GWh were used for heat distribution and 60 GWh for electricity production. This means that 171 GWh of valuable heat energy resource were unused and wasted.

Among the various schemes which could be implemented to reuse that energy, the city of Nottingham chose to start the first large scale 4. generation district heating system of the UK based on the Low Temperature District Heating (LTDH) model developed by Nottingham Trent University. This project result enabled the design and implementation of a cost-effective LTDH system in Sneinton (Nottingham's demonstration site within REMOURBAN).

Figure 2: Eastcroft Incinerator in Nottingham (Source: © Stephen Richards [cc-by-sa/2.0])

The technological innovation (specifically regarding the thermal insulation) of the last decades enabled to reduce the temperature level of the transfer fluid used in the DH system between 50°C and 60°C (and become a LTDH system) which is enough to heat low energy buildings[8]. This decrease offers many advantages and improves consistently the energy efficiency of the DH system.

This LTDH system can be implemented in different situations presented below:

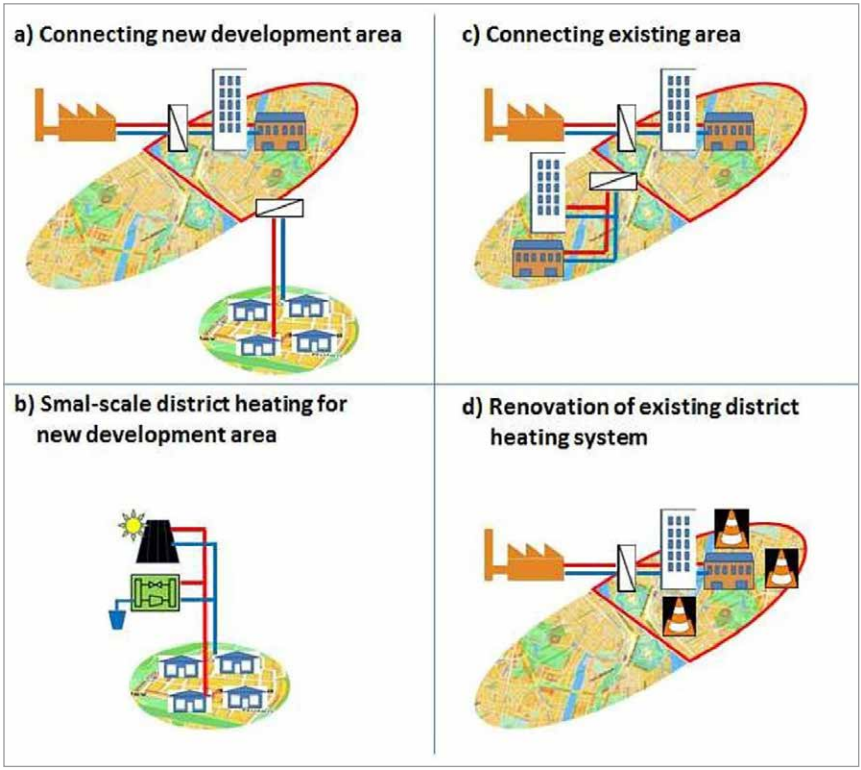

Figure 3: Examples of application of LTDH (Source: Danish Energy Agency[9])

8 Alessandro Dalla Rosa The Development of a New District Heating Concept, 2012

9 Guidelines for Low-Temperature District Heating, a deliverable in the project financially supported by the Danish Energy Agency in the R&D programme EUDP (Energiteknologisk Udviklings- og Demonstration Program): "EUDP 2010-II: Full-Scale Demonstration of Low-Temperature District Heating in Existing Buildings", April 2014

In Nottingham, the LTDH flow is drawn from the return pipe of the main district heating with the medium-temperature water travelling back to the CHP for reuse. Figure 3 shows the approximate planned route of high to low temperatures infrastructure to connect the four maisonette blocks with a total of 94 properties in the demo site to meet the demand of space heating and DHW. The LTDH provides a primary flow temperature at approximately 50 °C to 60 °C and return temperature approximately at 30 °C, which are much lower than usual and result in lower transmission losses.

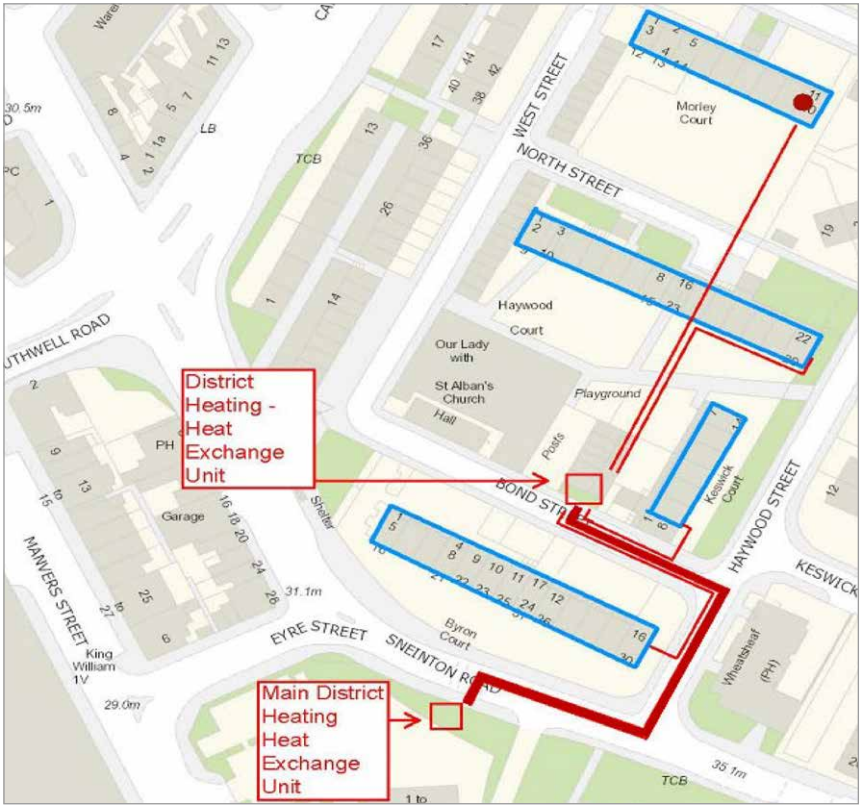

Figure 4: LTDH network planning map in REMOURBAN project (Source: Nottingham Trent University)

Goals

The opportunity to use the return flow from the existing high temperature network rather than extending high temperature supply has presented Nottingham with a cheaper and more effective proposition for heating residential homes without the need for high pressure, high temperature resilient infrastructure (requiring expensive steel tubes instead of cheaper plastic tubes usable for a LTDH system). Due to the lower flow temperature, the network heat loss is reduced by 75% compared to the present district heating systems. This makes the LTDH systems economically more sustainable and competitive for modern well-insulated, low energy buildings[10] or significantly improved, retrofitted properties.

Expected results for the system:

- To give clarity on the feasibility:
  - to connect to an existing district heating network,
  - to use lower grade materials on the secondary connection at a reduced cost.
- To assess the ability to increase the efficiency of district heating.
- If proved, this could allow to implement more connections using this method, based on the current hydraulic capacity of the existing infrastructure.
- Based on current working practices, more energy may be extracted from the network. This is subject to risk evaluation of available stand-by plant capacity.
- This may lead to an implementation of buffer storage and solar thermal systems to reduce temperatures for existing properties on the district-heating scheme for future extensions and the refurbishment of other non-traditional housing of the local region and beyond.

10 Alessandro Dalla Rosa The Development of a New District Heating Concept, 2012

Householders benefit from:

- an improved internal climate with a faster heating response time,
- higher comfort levels (due to the more even temperature distribution),
- and reduced maintenance.

The increased control levels provide:

- A better interface with the heating system
  - allowing the user to have more control
  - and feedback from the system to enable better utilisation of the system.
- Billing is simpler for both user and provider.
- Energy use is accessible remotely in real time.
- Users are able to see what is being used in their property and are able to tailor their use accordingly.

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3.2.3 ICT Platform

The development of ICT in the last century led to a tremendous increase of production, exchange and consultation of data. Considering the value of this data, ICT Platforms have been built to collect, analyse and present this information. These ICT Platforms first used for some restricted or private uses are now entering the unrestricted public sector of cities.

Goals

The ICT Platforms developed in REMOURBAN are information management tools enabling the realisation of smart cities. Within the project, two types of platforms have been developed: first, one local at the city scale and second, another one collecting and comparing data from different local platforms.

Gathering and analysing the different data coming from the city specifically regarding energy and mobility, the ICT Platform delivers the relevant information in order to:

- improve the use of energy (direct surplus to the district/building needing it reduce waste),
- improve the mobility within the city,
- inform the citizens of dangers (earthquake, health risks,...),
- inform the citizens about worthwhile alternatives (free parking slots or electric charging station, car sharing or public transport instead of private car for example in case of congestion,...).

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4 Conclusion

Smart Cities and Communities (SCC) projects are gathering different types of organisations (SMEs, large enterprises, RTOs and local authorities) from different sectors (energy, mobility, ICT). The novelty of this topic, the solutions implemented, and the cross-sectorial work done place such projects in the innovative category.

However, such innovative projects need to be supported by a structured exploitation methodology. First, the IP flows need to be identified and followed in order to avoid potential conflicts for the various innovative solutions implemented. Then, to increase the exchanges between the participants and to generate further innovations, but also to enable and to accelerate the market uptake of solutions, applying this methodology is crucial. This ensures the positioning of SCC projects as Innovation Hubs.

These projects offer not only innovative solutions to be implemented at city scale, and to rapidly bring these to the market but also to generate additional local innovative activities. Hereby the city increases its competitiveness and dynamics. It also exceeds the initial expectations of the participating organisations not only profiting from the planned implementation but also from new potential activities arising from cooperations.

The example of REMOURBAN presented within this best practice booklet is therefore a good example for an SCC project as an Innovation Hub.

5 Appendix

Key definitions

In order to provide a unified terminology, to explain the natural progress of the phenomenon under investigation and to present an integrated way of looking at the issue, the authors provide the following conceptual framework.

Results

Any tangible or intangible **output** of the action such as data, knowledge or information, whatever their form or nature, independent of whether they can be protected. In other words, results are the output generated during the project, which can create impact during and/or after the funding. Reusable and exploitable entities (inventions, products, services) or their necessary components/by-products (knowledge, technology, processes, networks).[11]

Communication

Strategically planned process that starts at the outset of the action and continues throughout its entire lifetime, aimed at **promoting** the project, its actions and its results. Communication requires strategic and targeted measures to inform about the action and its results, reaching a multitude of audiences, including the media and the public, possibly engaging in a two-way exchange.[12]

Dissemination

Public **disclosure and sharing** of the results via appropriate means (other than resulting from protecting or exploiting the outcomes), including scientific publications in any media. Dissemination denotes a **transfer** of knowledge

11 Scherer, J. (2018). Making the Most of Your H2020 Project Boosting the impact of your project through effective communication, dissemination and exploitation. [ebook] European IPR Helpdesk, p.10. Available at: https://iprhelpdesk.eu/sites/default/files/EU-IPR-Brochure-Boosting-Impact-C-D-E_0.pdf [Accessed 8 Feb. 2019].

12 Ibidem

and results to specialised groups that can make further use of it (e. g. scientific community, industrial partners, policy makers).[13]

Exploitation and the EU obligation to exploit the results

Each beneficiary must take measures aiming to ensure the **further utilisation** of the project results (up to four years after its completion, either directly or indirectly, in particular through transfer or licensing) by:

- reusing them in further research activities (outside the action),
- developing, creating or marketing a product or process,
- creating and providing a service,
- using them in standardisation activities.

The goal is to effectively make use of the project results through scientific, economic, political or societal exploitation routes aiming to turn the general research and innovation means/actions into concrete values and impacts for society (notion not restricted to commercial use only).[14]

Business model

A conceptual structure supporting the viability of a product/service and explaining how a solution provider/owner operates, makes money and how it intends to achieve its goals. It describes the rationale of how the owner of a product/service creates, delivers and captures the value in each economic, social, cultural or another context[15].

13 Ibidem
14 Ibidem
15 Geissdoerfer, M. (2017). The Cambridge Business Model Innovation Process. Procedia Manufacturing. p. 262–269.

Market deployment (uptake)

Market deployment (uptake) is understood as a transfer of the solution into a commercial product intended for market launch.

Replicability

It refers to transportation of the results from a pilot case to other geographical areas. If a pilot was proven to work in one community or region, it can be exported to others (taking into account that the boundary conditions may differ from those in the piloted community or region).

Enterprise Europe Network

The Enterprise Europe Network helps businesses innovate and grow on an international scale. It is the world's largest support network for SMEs with international ambitions. The network is active in more than 60 countries worldwide. It brings together 3,000 experts from more than 600 member organisations, all renowned for their excellence in business support. More information: https://een.ec.europa.eu/

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Fernando Barrientos works as a legal and innovation consultant since 2010. He advised public agencies and private firms from Latin America and Europe in the areas of environmental law and innovation management. The latter with a strong focus on the management of intellectual property assets and technology transference in the framework of international research cooperation funded under the Horizon2020 and INTERREG programs. He prepares, coordinates and moderates webinars, workshops, brokerage events and surveys either to gather key data to feed the innovation management process, and/or to facilitate technology transfer agreements between research and industry and/or to do the marketing of the innovative solutions developed within the projects where he is active. He also supports the preparation of Market & Technology Watch Analysis, Business Models, Business Cases, Market Deployment plans, prepares IP Audits, IP Strategy reports, as well as progress, technical and financial reports. Since September 2015, he works in Germany and since 2017, he is part of the staff at Steinbeis-Europa-Zentrum. Fernando Barrientos was trained in Law with deepening in Environmental Law and Conflict Management at the University of Buenos Aires, Argentina. Afterwards, he obtained a dual Master's degree in European Studies with Innovation & Political Ecology as core areas from the European-University of Flensburg and the University of Southern Denmark.

Valerie Bahr is a senior project manager since 2004 and a team manager since 2011 at Steinbeis-Europa-Zentrum, an independent economic entity within the Steinbeis Foundation. She provides consultancy in business development and innovation strategies to SMEs in the field of energy technologies with a special focus on Smart Cities and Communities. She supports organisations in international cooperation, cross-border technology transfer, conception and coordination of project proposals, IPR advisory services, and ensures the process of exploitation towards market deployment in EU projects, including

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Related Links

CARTIF Technology Centre: https://www.cartif.es/en/home/

Enterprise Europe Network: https://een.ec.europa.eu/

Grant Agreement No. 646511: https://cordis.europa.eu/project/id/646511

Horizon 2020: https://ec.europa.eu/programmes/horizon2020/en

Nottingham City Council: https://www.nottinghamcity.gov.uk/

Nottingham Energy Partnership: https://nottenergy.com/

Nottingham Trent University: https://www.ntu.ac.uk/

Ölcsan: http://en.olcsancad.com/

REMOURBAN project: http://www.remourban.eu/

Steinbeis-Europa-Zentrum: https://www.steinbeis-europa.de/

Urban Regeneration Model booklet: http://www.remourban.eu/kdocs/1975506/REMOURBAN_UrbanRegenerationModel_2020.pdf

Veolia Group: https://www.veolia.com/en

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Smart Cities and Communities projects are innovation hubs for Enterprises, Research and Technology Organisation and Local Authorities they gather. REMOURBAN is one of the "Smart Cities and Communities" projects funded under the European Framework Programme for Research and Innovation Horizon 2020 and can be considered as case study and best practice for any smart city project independently of its funding.

This booklet presents the outcome of the exploitation activities in the "Smart Cities and Communities" project REMOURBAN, having applied the Steinbeis-Europa-Zentrum exploitation methodology and market deployment strategy. It also describes to which extent Enterprises, Research and Technology Organisations and Local Authorities can benefit from such a methodology.

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