GrowSmarter

Transforming cities for a smart, sustainable Europe

Replication Assessment Reports of the Follower Cities

Cork, Graz, Porto, Suceava and Valletta

Report template v.3

1st Final Version, 30 September 2015

Follower Cities of GrowSmarter

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1. Objective

The Follower Cities are committed to preparing for the replication within their territories of the Smart Solutions demonstrated by the Lighthouse Cities. In order to ensure appropriate and effective transfer of knowledge, experiences and Smart Solutions, the Follower Cities will develop a baseline assessment for replication.

To this end, objectives of the Replication Assessment include the following:

- Identify and assess the full potential of replication and up-scaling of Smart Solutions on a city level and for specific districts
- Provide a matrix for Follower Cities to develop their smart city projects through in-depth understanding of concept, approaches, applications, opportunities, challenges, needs, success factors of smart city applications in Lighthouse Cities
- Support related and necessary local smart-city stakeholder engagement
- Support the political and technical capacity development process through mapping the framework conditions for deploying Smart Solutions and identifying opportunities and needs for a knowledge transfer
- Prepare and engage Follower Cities as 'sounding boards' in observing, supporting and evaluating the Lighthouse projects.

2. Parties engaged in the Replication Assessment Report

The Smart City Replication Assessment is prepared by the Follower City Liaison Group. Cork, Graz and Porto will be supported through all activities by ICLEI. Suceava and Valetta will be supported by REC

City of Cork

Lead author: Aidan O'Riordan, Project Leader, City of Cork (aidan_oriordan@corkcity.ie)

Support: Carsten Rothballer, Coordinator, ICLEI Europe (Carsten.rothballer@iclei.org)

Members of Follower City Cork Liaison Group

Cork Smart City Liaison Group			
Name* **	**Role**	**Organisation**	**Sector**
Dirk Pesch	Head of Centre	Nimbus Embedded Systems Research	Research, Academic
Mike Hayes	Senior PM (Energy Efficiency)	Tyndall National Institute for ICT Research	Research, Academic
Tony Day	Director	IERC (International Energy Research Centre)	Research
Kieran Lettice	Cluster Manager	Energy Cork	Multi-sector cluster organization
Darren Reidy	PPN Secretariat	Cork City Public Participation Network	Community, Voluntary
Conor Healy	Chief Executive	Cork Chamber of Commerce	Cross Sectoral Representative
Mary F O'Mahony	Technical Services Manager	ESB	National Energy provider (semi-state)
Mr. Mark Daly	PM Demonstrations	ECars	National eCar Infrastructure coordinator
Mr. David Clements	Transportation Planner	NTA – National Transport Authority	Public
Mr. Hugh Cregan	Director of Transport Investment	Department of Transport, Tourism and Sport	National Government Department
To be identified	Programme Director	Department of Communications, Energy and Natural Resources	National Government Department
Donal Kissane	General Manager	Bord Gais	National Energy provider (semi-state)
James Fogarty	Divisional Manager	Cork County Council	Smart Gateway partner organization
Ronan Murphy	Chairman	IT@Cork	Multi-sector ICT cluster organization
Captain Paul O'Regan	Harbour Master	Port of Cork	Public

City of Graz

Lead author (Follower City of Graz): Christian Nussmueller, Local Project Coordinator (christian.nussmueller@stadt.graz.at)
City of Graz, Executive Office for Urban Planning, Development and Construction, European Programmes and International Cooperation Unit

Support: Carsten Rothballer, Coordinator, ICLEI Europe (Carsten.rothballer@iclei.org)

Members of Follower City Graz Liaison Group
(core group consisting of departments of municipality; group should be extended during the project implementation by members of the Smart City Graz Pilot Project Consortium – see Q5)

- Executive Director for Urban Planning, Development and Construction, Mr Bertram Werle,
- Urban Planning Department, Head of Unit, Mr Bernhard Inninger,
- Environment Department, Head of Unit, Dr. Werner Prutsch,
- Environment Department, Wolfgang Goetzhaber
- Road Management Department, Head of Unit, Mr Harald Hrubisek,
- Road Management Department, Mr Werner Zipper
- Department for Traffic Planning, Head of Unit, Mr Martin Kroissenbrunner
- Department for Traffic Planning, Mr Mark Thaller
- ITG-Informationstechnik Graz GmbH, Managing Direktor, Mr Friedrich Steinbrucker
- Holding Graz - Kommunale Dienstleistungen GmbH, Managing Direktor, Mr Robert Schmied

City of Porto

Lead author (Follower City of Porto): Paulo Calçada, Head of Innovation Unit

Support: Margarida Campolargo, Innovation Unit

Members of Follower City Porto Liaison Group

Fernando Rui Russell Cortez Barbosa Pinto, DMSI

João Sendim, DMVP

João Neves, DivDMVP

City of Suceava

Lead author: Mr. Dan Dura, Project Manager, Suceava Municipality (dandura@primariasv.ro)

Support: Carsten Rothballer, Coordinator, ICLEI Europe (Carsten.rothballer@iclei.org)

Members of Follower City Suceava Liaison Group

- Airoaie Doru, SC Auto Adria SRL, manager@autoadria.ro
- Cojocaru Cristina Elena – Suceava Regional Commissariat – elena.cojocaru@apmsv.apm.ro
- Cordus Carmen - Europan Integration and Development Strategies Office, Suceava Municipality – carmenc@primariasv.ro
- Lucian Harsovschi – Local council of Suceava Municipality – harsovschi@primariasv.ro

- Francu Raluca – SC Relians Corp – raluca.francu@relians.ro
- Gales Stefan – Association Ecological Group of Cooperation –GEC Bucovina – gecbucovina@rdslink.ro
- Greculeac Anca – National College ”Petru Rares” – ancagreculeac@yahoo.com
- Harabagiu Andrei - NGO TRANSIRA – andreihara@yahoo.co.uk
- Lazar Gabriela - Europan Integration and Development Strategies Office, Suceava Municipality – gabriela.lazar@primariasv.ro
- Lungu Lucian – ”Stefan cel Mare” College – cn_stefan@yahoo.com
- Murariu Lucian – Romanian Road Authority, Suceava Agency – murariu_lucian@yahoo.com
- Neamtu Daniela – National Union of the Road Transporters, Suceava branch – suceava@untrr.ro
- Pentiuc Radu – Faculty of Electrical Engineering and Computer Science, ”Stefan cel Mare” University Suceava – radup@eed.usv.ro
- Petrcu Gabriel – Local Transport Authority Office, Suceava Municipality – gabriel.petruc@yahoo.com
- Popescu Mihai – ”Stefan cel Mare” University Suceava – mihap@seap.usv.ro
- Romaniuc Darie – SC Local Public Transport SA Suceava – tpl@suceava.rdsnet.ro
- Rusu Daniela – National College ”Petru Rares” – rusu.daniela@yahoo.com
- Toma Ioan Sorin – National Enviroment Guard – County Commissariat – cjsuceava@gnm.ro
  Zama Anca - Europan Integration and Development Strategies Office, Suceava Municipality – anca.zama@primariasv.ro

City of Valletta

Authors:

Victor Battistino, Senior Manager, Malta National Electromobility Platform (MNEP), City of Valletta, victor.battistino@transport.gov.mt

Alexandra Ellul, Manager MNEP, Transport Malta, alexandra.ellul@transport.gov.mt

Support: Carsten Rothballer, Coordinator, ICLEI Europe (Carsten.rothballer@iclei.org)

Members of Follower City Valletta Liaison Group

- Alexandra Ellul, Manager MNEP, Transport Malta, alexandra.ellul@transport.gov.mt
- Peter Paul Barbara, National Coordinator MNEP, Transport Malta, peter.p.barbara@transport.gov.mt

3. Timeline and replication roadmap

The Smart City Replication Assessment can be understood as living document that is continuously (and at least annually) updated and refined as needed to reflect the latest developments of the potential and framework conditions for the replication of Smart Solutions. Two public reports are foreseen; the first for month 6, the second for month 30. Subsequently, the Replication Assessment will lead to the development of a Replication Plan in month 48.

The Replication Assessment is part of the overall replication roadmap of the Follower Cities of GrowSmarter and can be characterized by the following milestones:

Milestone 0	➢ FC made initial selection of LCs' Smart Solutions for replication
Milestone 1	➢ Establish a multi-stakeholder Smart City Liaison Group
Milestone 2	➢ 1st Replication Assessment for deployment of Smart Solutions
Milestone 3	➢ Establishment of capacity development programme and stakeholder process in FC
Milestone 4	➢ 2nd Replication Assessment for deployment of Smart Solutions
Milestone 5	➢ Development of Replication Plan in FCs
Milestone 6	➢ Up-scaling and replicability Report

4. Structure of the Replication Assessment

The Smart City Replication Assessment consists of the following main sections:

Smart City Replication Profile	➢ Mapping the overall framework conditions and potentials for replication within the city territory
Smart Solutions Selection	➢ Description of replication potential of selected Smart Solutions of LCs within FC
Smart District Replication Profile	➢ Per potential replication site/district: Mapping of district related framework conditions relevant for the replication of the selected solutions
Smart Solutions Specifications	➢ Assessment and adaptation of solutions towards the most effective deployment and integration at site/district level

The assessment needs regular update. The last two district-level sections will need to be repeated for each identified replication site/district foreseen for the deployment of the selected Smart Solutions.

Each section will also identify needs for political and technical knowledge transfer and capacity building for a successful replication on a city and district level.

5. Replication Assessment of the Follower City Cork

5.1 Smart City Replication Profile

Mapping the overall framework conditions for replication within the city territory

Q1 What is the overall replication potential for Smart Solutions until 2020 and beyond?

Cork City is Ireland's most southerly city, the state's second city and the regional capital of Munster. Located on the Atlantic seaboard, the city has long been associated with port activities, given its location in a sheltered protective estuary on the second largest harbour in the world. Cork City Centre is the historic, cultural and commercial heart of Cork and the South West region and its success is fundamental to the well-being of the local and wider Irish economy and to the projection of a vibrant image for the overall city. It has the greatest concentration of employment in the city and an expanding residential base. It is essential that the City Centre continues to develop its role as the key economic driver of the region and withstands the threat of vacancy, dereliction and locational competition heightened by the economic recession.

Cork's evolution as a port town, and City since its Charter in 1185, has been historically connected to its geographical location. A seventeenth century merchant city with closer links to Amsterdam, Bristol and Swansea than Dublin, it developed as a "Dutch" merchant city with a port focus, a trading culture and a built environment to match this role and status. Land reclamation gave the city its Georgian urban extensions, and later Victorian tentacles of housing lined the ridges on both sides of the city providing homes to merchant princes, whose frontages overlook and address the city. Later suburban development was slower until the 1960s onwards, when Cork grew beyond its organic shape, rolling over ridges and hills to the open countryside, subsuming villages into its urban structure.

Today Cork is a well-connected and dynamic small city of 120,000 people and a metropolitan population of 300,000 approximately. It has a big heart and a diverse range of assets, within the city and close at hand, that make it a great place to live and learn and a very appealing place to do business. Capital has been attracted to come to the city since the seventeenth century and more notably since the Ford Factory in the 1920s, and the pharmaceutical and ICT companies that have made Cork their home since the 1980s.

There is a clear commitment in Cork to the pursuit of smart, sustainable and inclusive development for our region with a view to ensuring our ability to continue to compete on a global level into the future. The Cork region is governed by two local authorities, Cork City Council and Cork County Council. The councils regularly collaborate on projects in a number of areas and functions and have developed an initiative for the region called the Smart Gateway. The objective is to combine hard infrastructure, social capital, including local skills and community institutions, and (digital) technologies to ensure the development of Cork as a smart, sustainable and inclusive place in which to live and work, capable of competing with other cities globally.

Cork has been very active in the 'Smart' space already; there are many examples of completed projects and operating services. Cork has many assets in pursuing a 'Smart' agenda: ICT Research and Technology Organisations, strong collaborative history and networks with industry, and a sense of community. Now, the recent research into the Smart Gateway concept and missions to leading Smart Cities in Europe show that significant benefits could be achieved through pursuing the 'Smart' agenda in a more structured way.

Cork has been heavily involved in European initiatives such as the Covenant of Mayors, CIVITAS and POLIS. The Sustainable Energy Action Plan (SEAP) submitted to the Covenant of Mayors outlines a

20% reduction in emissions by 2020. Involvement in these networks has aided in the realisation of the importance of pursuing a smart agenda for Cork and has had a direct influence on the city's development plans[1] and the Cork City Energy Plan all of which clearly align with the replication work which we plan to undertake within the GrowSmarter project.

The European Green Capital Award initiative was launched by the European Commission in 2008 with the objective of recognising cities that are leading the way with environmentally friendly urban living. Cork City has recently applied to the European Commission Environment Directorate to be considered to for the European Green Capital Award (EGCA) for 2017. The application was made by Cork City Council supported by Cork County Council, Energy Cork, ESB Networks and Gas Networks Ireland. Other organisations who contributed to the application included Cork Environmental Forum, UCC, CIT, Irish Water, Cork Airport, Port of Cork and Cork Chamber of Commerce. The application allowed us to showcase the many innovative and very successful green initiatives taking place in Cork and the European Green Capital initiative presented us with an opportunity of documenting these and benchmarking us against other environmentally proactive cities. The bid was unsuccessful, but the Directorate commented a number of our initiatives, particularly sustainable travel in the Park NRide project and the new bike share scheme. The 2015 European Green Capital is Bristol with previous winners including Stockholm, Hamburg, Vitoria-Gasteiz, Nantes and Copenhagen.

The Smart Gateway Initiative envisages a comprehensive suite of underlying enabling technologies across the region to stimulate innovation, give access to open data streams, and create seamless interaction between individual systems – a system of systems. Resident engagement is seen as a key component in this initiative.

There is a range of international factors driving the Smart City agenda. These include challenges like rapid urbanisation, environmental and quality of life stresses, economic competition and positives such as increasing technology capabilities, dramatically reducing costs, the exploding 'internet of things'. Increasing citizen expectations are a significant driving force, in terms of the quality of interaction with government and access to information and services. Through our dedication to the smart agenda we want to position the region to take full advantage of the opportunities that these international changes will present. As the 'Smart' agenda is deliberately pursued in a planned manner over time, we expect specific benefits to include:

- Fuelling and supporting sustainable economic development – driving innovation
- Facilitating job creation – leveraging existing stakeholder activities
- Facilitating citizen involvement and participation
- Promote resource efficiency
- Improving citizen quality of life and services
- Providing an attractive environment for all
- Attracting additional funding

We intend to build on these strong foundations of co-ordination and collaboration on a smart agenda for Cork in order to pursue both national and European funding mechanisms going forward to support our development as a Smart Gateway.

[1] Cork City Development Plan 2015-2021 http://www.corkcitydevelopmentplan.ie/

Q2 How does the "Smart City" approach feed into/connect with your existing local planning processes?

A set of project criteria have been produced which will ensure that all smart city projects align with the current suite of development plans in the region. These include the South West Regional Planning Guidelines[2] and the Cork City and County Development Plans as well as the Cork City Energy Plan 2013. As already mentioned, both Cork City and County Councils regularly collaborate on projects in a number of areas and functions. Within this spirit of collaboration in 2001 the Cork Area Strategic Plan (CASP)[3] was published. The plan sets out a vision for the development of the Cork Gateway to 2020 as a leading European city region which is globally competitive, socially inclusive and culturally enriched. CASP is a non-statutory land use and transportation plan for the greater Cork area. Although CASP is a non-statutory plan many of its elements have been adopted by the statutory South West Regional Planning Guidelines, to which all city and county development plans must adhere.

Given the strong alignment between the principles of Smart and those of sustainable development as laid down in our suite of development plans governing the Cork region, it became clear to the CASP steering committee that pursuing a Smart agenda for Cork simply made sense and was the next step in ensuring our region develops as a sustainable, inclusive globally competitive region going forward.

Q3 Is there a (strategic) plan and organisational structure in place to become a "Smart City"?

The bodies governing the Smart Gateway Initiative are composed of Cork City and County Councils and the Tyndall and Nimbus research centres. The governing body has sought input and advice from representatives across the triple helix during several meetings and at a larger workshop which was organised in order to build the business case for the Cork Smart Gateway Imitative. This document sets out the concept of the Smart Agenda and how it applies to Cork region and how it fits within the policy context, European, national and local. It lists some of the existing Smart assets of the region such as the Metropolitan Area Networks and the Research Centres such as Nimbus and Tyndall. It then describes the vision and objectives for the Smart Gateway initiative as well as exemplar projects to be delivered during the pilot two year period. Finally a funding and governance model incorporating the quadruple-helix for the initiative is proposed. The business case was later adopted by the CASP steering committee.

The Cork Smart Gateway Governance Model is based on the following actions many of which are currently in process:

- Establish a Project Management Office (PMO) with dedicated Co-ordinator & staff
- The PMO will report directly to a steering group made up of the funding stakeholders;
- PMO to be responsible for delivery of objectives within a defined budget
- A memorandum of understanding defining deliverables, schedules of payment, roles & responsibilities in particular addressing all aspects of fiscal transparency and accountability, would be signed by all funding stakeholders at the outset;
- A formal annual review of the workings of the PMO would be carried out by the steering group.
- An annual report would be produced for the steering group and for the CASP committee.

[2] South West Regional Planning Guidelines 2010-2022
http://www.swra.ie/index.cfm/page/regionalplanningguidelines
[3] CASP 2001-2020 http://www.corkcity.ie/casp/strategicplan/

- The domain experts group (currently known as the smart steering group) would continue to meet at least 4 times a year to be kept informed of progress, opportunities for collaboration etc.

A formal report would go to council and to either the PPN (public participation network) or the LCDC (Local community development committee) as appropriate. The establishment of a formal framework for citizen participation is an essential part our smart initiative which we intend to pursue as a priority going forward.

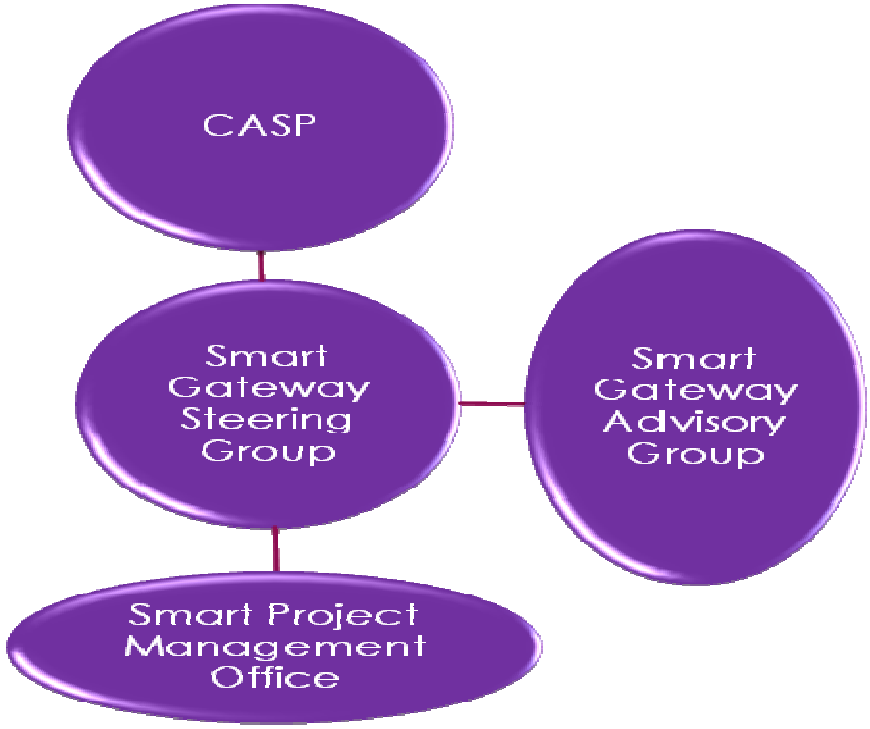


Figure 1: Governance Structure for Cork Smart Gateway

Q4 Are there synergies and/or conflicts of the "Smart City" plan and organizational structure with existing initiatives and their structures within the city?

- *Name and specify synergies and/or conflicts in regards to resources (staff, finance), mandates etc.*

There are many synergies between the Cork Smart Gateway Initiative and existing initiatives and structures within the city. Organisations such as Energy Cork, a multi-sector energy cluster provides opportunities for collaboration and innovation to achieve energy and emission reduction and other climate targets. Cork City and County Councils have established structures for joint initiatives as well as internal organizational groups and initiatives. These will operate in parallel to the Smart Gateway initiative however with representatives on the Technical Advisory Group for the Smart Gateway it is expected that there will be many opportunities for information exchange. As shown and mentioned above the Smart Gateway Initiative was born out of the CASP committee within that overall framework for the strategic development of Cork. The Smart Gateway Steering Group which was set up to drive this agenda included representative from both city and county councils as well as representatives from Tyndall and Nimbus research centres. A memorandum of understanding is currently being drafted which will set out the terms of agreement relating to the governance model of the Smart Gateway Initiative.

The establishment of a Project Management Office (PMO) will be facilitated through the support of each of these bodies. Tyndall and Nimbus will provide and pay for an appropriately skilled person each to support and report directly into the program manager ideally based on site with the Programme Management Office (PMO). Cork city and Cork county councils will also assign staff resources to the PMO on a full time or part time basis.

The Water Services and Systems Innovation centre (WSSI) which is an initiative which was seed funded by both Cork City and County Councils and Cork Institute of Technology is aimed at supporting companies to develop 'Smart' systems and products in the water sector. It is envisaged that this WSSI will be integrated into the working of the Smart Gateway at a time yet to be identified, to take advantage of the synergies which exist between these initiatives.

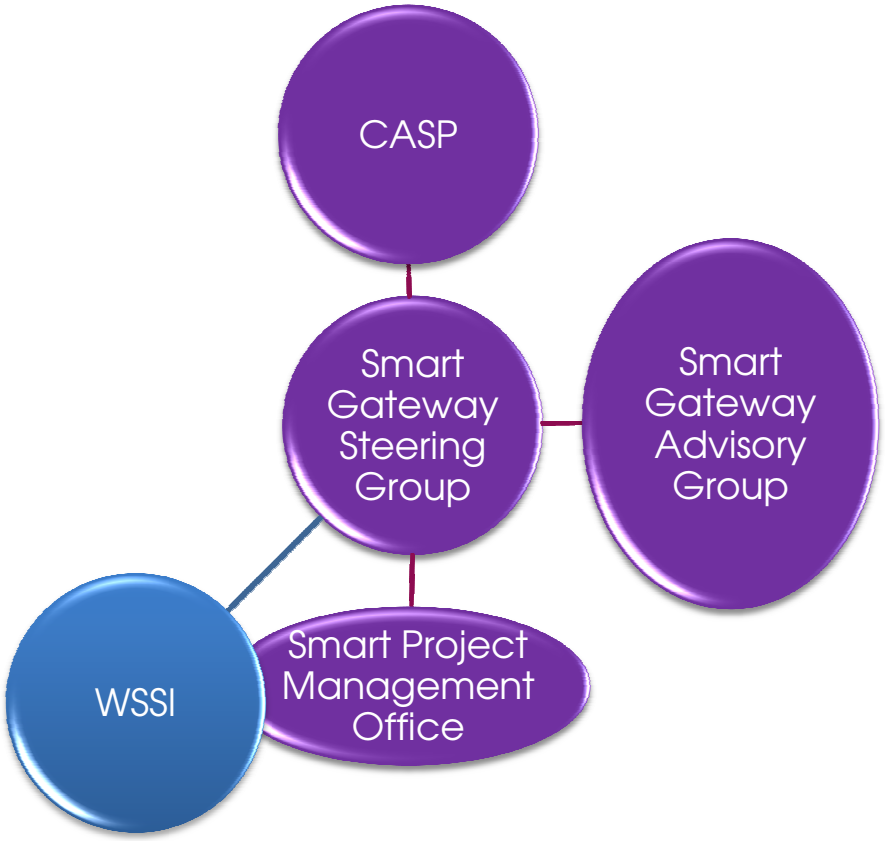


Figure 2: Proposed Integration of WSSI into the governance structure of Cork Smart Gateway

On a broad level both city and county councils as local authorities have a democratic mandate and the Smart Gateway Initiative provides the ideal means of improving resident engagement, connecting the residents with their respective local authorities. It aligns perfectly with our efforts to move towards more evidence based policy making and to ensure that services are delivered in the most resource efficient, responsive and proactive way possible.

In terms of conflicts, Cork City has buildings originating from the Medieval to Modern periods particularly in the City Island area. As such these buildings are in conservation areas and a number of buildings are listed buildings. There could be perceived conflicts between utilising new technologies on listed buildings. Planning exemptions with regard to renewable energy technologies would NOT apply to these buildings. Each planning application would have to be dealt with individually, with no guarantee that the technology would be permitted on the development.

Q5 Which and how are regional and local stakeholders involved in the Smart City strategy and planning process on a city level?

As is clear from the above the Smart City Liaison group contains representatives from across the quadruple helix. It is envisaged that this group will meet on a quarterly basis.

As the process develops we envisage inviting further stakeholders to join the group as relevant and necessary depending on specific subject matter which is being discussed at the time. We are currently involved in the preparation of a project proposal under H2020 which will help us to develop a systematic resident engagement strategy at the very outset of our Smart Gateway journey.

Q6 What are past (<5 years) and current projects that are closely related to the "Smart City" concept?

Cork has a successful track record of implementing 'smart' projects already. There are many examples of both demonstration projects, where new ICT-related technologies have been trialled; and of full deployment projects, where technologies have been rolled out for enduring beneficial use. These projects have been led by one of the Local Authorities, by Nimbus, or by Tyndall, depending on the particular project in question.

These projects have delivered measurable improvements in innovation, support of economic activity, quality of life, and/or performance of the specific systems they address; they represent real progress towards a Smart region. Some of these examples demonstrate the real benefits of the partnership approach between public, private and academic bodies – which is at the core of the 'Smart' agenda.

Some specific examples of 'Smart' assets from projects and initiatives already undertaken in Cork – a far-from-exhaustive list, include the following:

1. **CITY COUNCIL ELECTRIC VEHICLES:**

The **Drive4Zero** is a unique and exciting initiative that aims to promote the use of electric vehicles in Ireland using Cork as a pilot area. This **Drive4Zero** initiative provides a real opportunity to leverage special savings, unique product offerings and a variety of advantages to convince more people that driving an electric car is the right choice for many reasons.

Several people, organisations, companies and groups have come together to make **Drive4Zero** a reality. The initiative has been spearheaded by Minister for Agriculture, Food & Marine with responsibility for Defence, Simon Coveney T.D., who is an electric car driver, electric vehicle (EV) ambassador and a passionate advocate of EVs.

The project team are based at the Science Foundation Ireland Centre for Marine Renewable Energy (MAREI) UCC and are co-ordinating the efforts of the **Drive4Zero** stakeholders and partners. www.drive4zero.ie

2. **REGENERATION OF AREAS OF THE CITY USING SMART SOLUTIONS:**

Cork City Council is redeveloping and regenerating areas of existing social housing. These developments will meet. The highest standards in sustainability and energy efficiency in building construction. One such development in an area called the Glen will see the building of 58No. dwellings and a large community centre; on an existing bus-route. Space heating and domestic hot

water will be provided by a 500kW wood pellet boiler connected to a district heating system. There will also be a solar PV area on the community centre generating 12,000kWh per annum.

The Council has also begun the regeneration of the North West part of the City –Knocknaheeney. This is a €200million project that will see more than 1000 new housing units been built in the next few years.

3. CORK CITY COUNCIL ENERGY PLAN 2013:

Cork City Council has developed a 3 year energy plan for the organisation. The objective of the Plan is to help Cork City Council realize energy savings of 33% in order to meet targets set-down by Government. There is a legal requirement (SI 426) for Public Bodies to reduce their energy consumption by 2020. The Plan focuses on our public building stock and Street Lighting in particular and how we could use existing "smart technologies" to help reduce our overall consumption. The Plan outlines how we will introduce energy efficiency principals in procurement, consider sustainability in all relevant decision making.

4. GENERAL DEVELOPMENT CONTRIBUTION SCHEME:

Cork City Council will apply an exemption or percentage reduction to contribution fees if a new development incorporates a renewable energy system with a capacity up to 0.5MW.
(Larger capacity development will be charged at €1,000 per each 0.1MW above an installed capacity of 0.5MW).

5. ENERGY EFFICIENCY DESIGN OF BUILDINGS IN CORK CITY COUNCIL:

Buildings are a significant contributor to carbon emission globally. The EU has recognized this fact and has drafted up legislation titled the European Performance e Building Directive (EPBD 2010/31/EU). These regulations have been transposed into Irish law. The energy efficiency design for domestic and non-domestic buildings are drafted up by the Department of the Environment, Heritage & Local Government (DOEHLG). Given its relatively mild climate, it is generally considered that Cork City has significant potential to minimise the need for heating through low-energy design. While several factors in low-energy construction lie outside the scope of traditional planning considerations (detailed construction standards are the remit of Building regulations (Technical Guidance Document L))26, there are ways in which the planning process can facilitate and encourage low-energy design, such as building orientation to maximise solar gain and reduce the need for electric lighting. The planning process (particularly pre-application consultations) can also be used as a channel for information provision to both applicants and their agents regarding low-energy design.

6. SCOOT TRAFFIC MANAGEMENT SYSTEM:

SCOOT (Split Cycle Offset Optimisation Technique) is a tool for managing and controlling traffic signals in urban areas. It is an adaptive system that responds automatically to fluctuations in traffic flow through the use of on-street detectors embedded in the road. SCOOT has proven to be a world leader in Urban Traffic Control that typically reduces traffic delay by an average of 20% in urban areas. www.scoot-utc.com

7. NIMBUS RESEARCH CENTRE, CORK INSTITUTE OF TECHNOLOGY:

The Nimbus Centre at CIT is Ireland's research centre devoted to the field of networked embedded electronic systems. We are Ireland's largest 'Internet of Things' (IoT) research centre. Embedded systems are the electronics controlling our cars, appliances and a rapidly increasing number of everyday items. Wirelessly connecting and controlling these items is known as the 'Internet of things'.

Nimbus has 4 divisions: Research, Learning, Trialling and Industry. The 'Industry' division is known as the TEC Gateway.The Centre boasts a range of complementary research and development expertise. The research focus includes wireless sensor and actuator network design and analysis, vehicular and mobile network protocol design and analysis, sensor data fusion, radio localisation systems, embedded hardware design, miniaturisation, reliability analysis, embedded software systems, embedded interaction based user interfaces, cloud based software platforms, and system integration and optimisation tools. www.nimbus.cit.ie

8. TYNDALL INSTITUTE, UNIVERSITY COLLEGE CORK:

Established with a mission to support industry and academia in driving research to market, Tyndall National Institute is one of Europe's leading research centres in Information and Communications Technology (ICT) research and development and the largest research facility of its type in Ireland. Established in 2004 as a successor to the National Microelectronics Research Centre (NMRC founded in 1982) at University College Cork, the Institute hosts over 460 researchers, engineers and support staff, including a full-time postgraduate cohort of 135 students, generating over 200 peer-reviewed publications each year.

With a network of over 200 industry partners and customers worldwide, Tyndall generates around 30M income each year, 85% from competitively won contracts nationally and internationally. Tyndall is also a lead partner in European research programmes in its core areas of ICT, communications, energy, health and the environment worth 44M, including 6M accruing to industry in Ireland (from Framework 7). www.tyndall.ie

9. INTERNATIONAL ENERGY RESEARCH CENTRE:

The International Energy Research Centre (IERC) is an industry led, world-leading, collaborative programme of research and innovation in integrated sustainable energy system technologies. The inclusiveness of the IERC will facilitate the development of Irish Energy Policy and will assist in developing innovative implementations of EU energy goals. www.ierc.ie

10. IRUSE CENTRE, UNIVERSITY COLLEGE CORK :

The Informatics Research Unit for Sustainable Engineering is an inter-institutional research group based at the Environmental Research Institute, U.C.C. and the Department of Civil Engineering, NUIG.

It aims to research and develop integrated knowledge and information frameworks for sustainable engineering design. IRUSE focuses on the building life cycle of both green field and refurbishment projects. http://zuse.ucc.ie/iruse/

11. WATER SYSTEMS & SERVICES INNOVATION CENTRE:

This is an initiative which was seed funded by both Cork City and County Councils and Cork Institute of Technology, and is aimed at supporting companies to develop 'Smart' systems and products in the water sector.

- ITTEC International Trialling of TEchnology Centre – a suite of real-world technology test beds in Cork including Mallow Town
- Mallow 1 Gigabit Fibre Connection
- Metropolitan Area Networks (MANs) – broadband networks in County towns and Cork city
- CCTV networks

Transport for instance is an area where the council have been very proactive. Participation in European projects such as NICHES+, TRENDY TRAVEL and COMPETENCE have resulted in knowledge sharing, commercial partnerships, enhanced mobility in the city and the introduction of best practices in the area of sustainable transport. It has been shown from past European projects that participation in pan European consortiums greatly benefits the Cork region through knowledge sharing. Participation in the EU projects is seen as an important strategic initiative which will assist the council's development of an all-encompassing Smart & Sustainable City. http://nimbus.cit.ie/tec/water-systems-and-services-innovation-centre-launch-read-more/

Q7 Which sites/districts are projected to be developed in the next five/ten years?

There are several sites within the city centre which are projected to be developed over the next five to ten years. We intend to focus the implementation of our smart solutions on these sites within the city centre area. Such sites include the development of an events centre on the site of an old distillery and the redevelopment of an old cinema site into a retail/office development. We see these planned developments as being the catalyst for a number of Smart Initiatives.

The city centre district as chosen for the GrowSmarter replication assessment can be characterised as the majority of the central business district as located on the central island between the 2 channels of the River Lee, to include McCurtain Street to the North. This is considered the heart of Cork City and covers an area of approximately 67 hectares.

Reasoning for selection of the chosen district:

The City centre area will be the major focus for investment, new projects and various strategies in the coming years, as evidenced by the relevant urban plans outlined below. The choice of this area is based on the scope that exists for various smart solutions to be incorporated into projects and initiatives which are earmarked for this district.

Relevant Urban Plans in existence for the District:

Cork City Development Plan 2015 – 2021 (Cork City Council)

The Plan refers to the city centre as a priority development area. As a regional capital and national Gateway city, the success of the City Centre is both a key driver of the sub-region and a key indicator as to the health and prosperity of the metropolitan area.

The City Centre is the symbol of the vibrancy and vitality of Cork City. It contains a diverse range of primary uses (including retail, office, cultural and civic functions), which complement each other and support a range of other services. While there has been significant investment in the public realm and in private sector development in the last decade, the City Centre has faced increasing challenges, particularly during the economic recession.

Core objectives include:

- Maintaining the City Centre as the vibrant 'healthy heart' of the region. A sustainable mix of land uses is a key factor in maintaining and enhancing the vibrancy and attractiveness of the City Centre to business, residents and visitors, while also reducing trip demand by concentrating various functions within the most accessible area. The Plan seeks to build on and enhance the existing mix of uses in the City Centre, and to develop retailing, offices, residential and other commercial uses, public services, and community and cultural facilities to create a dynamic and inclusive atmosphere in the City Centre so that Cork City and region has a 'Healthy Heart' as promoted in the City Centre Strategy 2014.

- Maintaining and developing a City Centre of high quality. Cork City Centre enjoys a unique urban character and sense of place. Its particular combination of streets and spaces, framed by buildings of character and surrounded in the wider context by a natural landscape of sloping ridges and attractive river corridors are integral parts of the Cork City Centre experience. It is important to respect and enhance the city's built and natural heritage and use its distinctive character to inform development schemes of high architectural and urban design quality which are locally distinctive and secure environmental improvements, across the City Centre.

- Easing access to and movement around the City Centre. The City Centre is a key focus for inter-urban and commuter rail transport links throughout the region and country, resulting in a high level of accessibility. It is important to ensure that all people, including business, its customers and its employees can easily access the City Centre to ensure the city's continuing prosperity and growth. To attract inward investment, the City Centre must aspire to having a high quality integrated transport network which will require substantial investment in public transport on an ongoing basis. The City Council will therefore aim to promote improved public transport and better conditions for pedestrians and cyclists, whilst accommodating essential vehicle needs.

Cork City Centre Strategy, FEBRUARY 2014 (Colliers International, Brady Shipman Martin Bjerkne & Co. Cork City Council)

The ambition of this Cork City Centre Strategy is to help deliver a **healthy heart** for the Cork Region and the south of Ireland that helps grow the Irish economy.

The principal objective is to facilitate more **people** working in, living in, shopping in, spending leisure time in, and visiting the city centre. However the significant achievements in the City Centre over the past 20 years should also be acknowledged, specifically the increasing residential population, upgrading of the public realm, new shopping districts and improved public transport and non-car transport modes. This objective going forward requires:

- Development of modern business workplaces;
- The infrastructure for high quality city living, working and visiting e.g. transport, cycling, schools, quality public spaces;
- Development of places for people to live;
- Keeping the retail, leisure and cultural offer fresh and appealing.

City Centre Movement Strategy: Multi-Modal Movement Strategy Report, March 2013 (MVA, Arup, Cork City Council)

The purpose of this strategy is to support the movement of sustainable modes in the city centre. A key objective of the Study is to improve the general vibrancy of Cork City Centre to promote sustained economic growth and to deliver a more attractive environment for shoppers, visitors and tourists.

The key principles of the CCMS include:

- The re-allocation of roadspace on the city centre streets to ensure a more appropriate balance between the different transport modes serving the city and provide travellers to the city with a greater choice of travel mode.
- The management of through traffic within the central city streets, this will act to improve the environment for all users including public transport users, pedestrians and cyclists.

Q8 What are the main areas of interest of the FC in the Smart City concept?

1. **Open Data & Economic Development:**
   We intend to open up all of our cities data over the coming years with a view to becoming a more transparent local authority while at the same time encouraging and promoting economic development.

2. **Promoting resident engagement:**
   We see resident engagement as a key component in our smart city journey. We have an application in process for a H2020 project which aims to produce a software package which will promote resident engagement, analyse data collected and include a policy simulation element to encourage more evidence based policy making. We are also working with a researcher in the International Energy Research Centre (IERC www.ierc.ie) to carry out a series of questionnaires which will examine some of the issues and challenges surrounding increased resident engagement. This will be a key component in providing us with a baseline assessment with regard to promoting resident engagement further.

3. **Improved Service Delivery & Resource Efficiency:**
   Through greater resident engagement and data analytics we aim to improve service delivery and to become more resource efficient.

Mapping of the overall opportunities and needs for a successful replication

Q1 What are the main overall needs of Cork to become a "Smart City"?

The Cork Smart Gateway Initiative has completed its first phase of development and we are now entering phase two of our plans for development. A job specification has been prepared to recruit a programme manager. This is expected to be published in the coming weeks. Both Cork City and County Councils will provide resources to support the programme manager, while Tyndall and Nimbus will provide technical expertise. A draft memorandum of understanding has been drawn up which the four main governing bodies will sign once finalised. A set of smart city project criteria has also been drafted, along with a draft list of initial projects for year one. Further next steps will include an extensive piece of research in conjunction with Long Pham of IERC to provide baseline data in terms of our resident engagement needs. We have several project applications in process relating to the smart city concept, in particular surrounding resident engagement, open government and procurement processes and the interoperability of technologies.

Cork needs to learn from the Smart City experience of the Lead Cities and to make sure that the administrative and political structures are in place to support and promote the Smart City initiative. This in particular will ensure the alignment of existing operational and capital programmes with the objectives of the Smart City initiative. In particular solutions and suggestions related effective engagement with quadruple helix partners can be taken from the LC and other follower cities. We have also seen and wish to develop the value of a comprehensive consistent brand strategy for the Smart City initiative.

Q2 What specific aspects Cork likes to explore with Stockholm, Cologne and/or Barcelona?

Cork has committed to exploring the opportunities for replication presented by 5 of the Smart Solutions specifically

Low Energy Districts

Solution 1: Efficient and Smart Climate Shell Refurbishment

Cork will replicate, as appropriate, within its public buildings and public housing stock a number of the measures identified in the Lighthouse Cities including those related to heat recovery, hot water losses and energetic certification. Within public buildings, as part of a continued programme of improving energy efficiency the city council will replicate initiatives in the area of energy certification, lighting and integration of renewables.

Solution 4: Smart Local Electricity Production and Integration

As part of the continued retrofit of public buildings the city council will replicate where feasible the measures implemented in the area of RES solar energy. The city council may also have an interest in the appropriate deployment of additional wind turbine technologies on civic buildings.

Integrated Infrastructures

Solution 5: Smart Lighting, lampposts as hubs for communication

Cork will replicate relevant measure introduced for sensor control, self controlled and remote controlled LED lighting for pedestrian and cycle paths.

Sustainable urban mobility

Solution 11: Alternative fuel driven vehicles for decarbonising and better air quality

Cork City Council, in the context of a new tender for the provision of the Park and Ride facility, will replicated CNG/EV measures designed to further promote the use of sustainable transport alternatives. It is also an objective of Cork to increase the number of alternative fuel vehicles in its fleet.

Solution 12: Smart Mobility Solutions

Cork City Council will replicate measures to enhance the level of service and options available to the users of sustainable transport options within the city centre, in particular those related to electrical and cargo bike pools and sharing systems. This will be used to support goods distribution in existing Pedestrian Zones.

Q3 What insights and opportunities can your city offer to the LCs and other FCs?

Cork has a history of active participation in European initiatives such as the Covenant of Mayors, CIVITAS and POLIS. Involvement in these networks has had a direct influence on the city's development plans. Transport for instance is an area where the council have been very proactive. Participation in European projects such as NICHES+, TRENDY TRAVEL and COMPETENCE have resulted in knowledge sharing, commercial partnerships, enhanced mobility in the city and the introduction of best practices in the area of sustainable transport in particular demonstrating and promoting:

- *multi-modal travel options*
- *The value of cycling as a means of transport.*

Another European project, Green eMotion demonstrated the value of

- *Deploying Electric Vehicles and Pedelecs to the City Council's fleet*
- *The introduction of a EV charging infrastructure in the city*
- *Establishing policies to support the use of EVs*

It has been shown from past European projects that participation in pan European consortiums greatly benefits the Cork region through knowledge sharing. It is in this context and through Cork's Smart Gateway initiative, which is a progressive collaboration between the Local Authorities, Academic and Research institutes and private sector organisations that we believe that Cork can offer significant insights and knowledge sharing opportunities to the GrowSmarter project participants. These opportunities come in the area of transportation and EV infrastructure as outlines above but also in areas such as embedded systems and ICT owing to the partnerships in place with research centres and their role in the governance of the Smart Gateway project.

Q4 Are there any related events organised by the FC?

Our Energy Cluster[4] here in Cork holds regular breakfast briefings. It is envisaged that we may theme one of these briefings around the subject of smart cities. Furthermore a major solar/pv conference is planned for late October.

Each year in May our IT Cluster, IT@Cork[5] hosts the European Tech Cluster conference which includes information on some of the most up to date available technologies. We would hope that in May 2016 we could collaborate with IT@Cork so that the conference could include a smart city theme.

[4] www.energycork.ie
[5] www.it@cork.ie

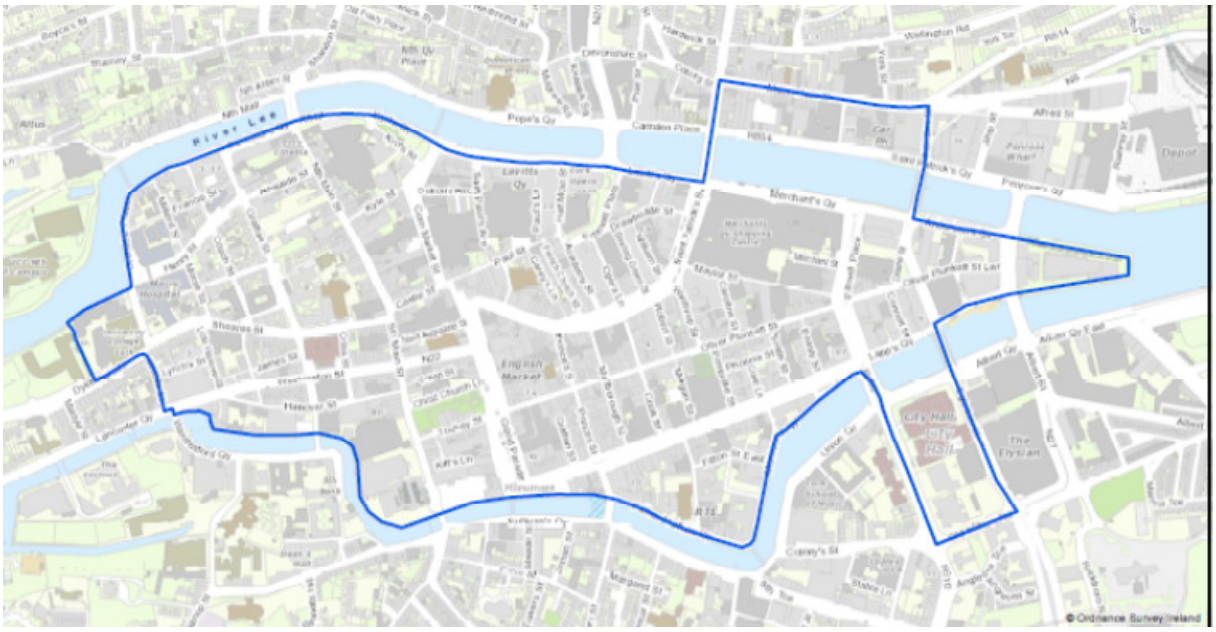
5.2 Smart Solutions Selection

Description of replication potential of selected Smart Solutions of LCs within FC

The table below shows which solutions the Follower Cities plan to replicate.

		Follower Cities				
Area	***Smart Solutions***	*Porto*	*Graz*	*Cork*	*Valetta*	*Suceava*
Housing measures	*1. Efficient and smart climate shell refurbishment*		*X*	*X*		*X*
	2. Smart building logistics and alternative fuelled vehicles					
	3. Smart, energy saving tenants through information	*X*	*X*			*X*
	4. Smart local electricity production and integration with buildings and grid			*X*		*X*
Integrated measures	*5. Smart lightning, lampposts as hubs for communication*	*X*	*X*	*X*		*X*
	6. Waste heat and local heat integration by new business models		*X*			
	7. Smart waste collecting, turning waste to electricity, heat and biogas for vehicles.	*X*				*X*
	8. Big data protocol for saving energy and improving the quality of life	*X*				
Mobility measures	*9. Sustainable delivery*				*X*	
	10. Smart traffic management					*X*
	11. Alternative fuel driven vehicles for decarbonizing and better air quality	*X*		*X*		*X*
	12. Smart mobility solutions		*X*	*X*	*X*	*X*

5.3 Smart City and District Replication



The map above depicts the city centre area of Cork, in which it is proposed that we implement our smart solutions. This district hosts a significant mix of residential and commercial activity and has been identified for development in a number of strategies such as the Cork City Centre Strategy, Cork City Movement Strategy and City Development Plan. The North West of the district contains a number of residential units that may be appropriate for the renovation measures while the South East of the zone contains public buildings identified for retro-fit and potential alternative energy source installations. As a major artery exiting the city the North-most point of the zone will form a significant test bed for the mobility and lighting measures. The City Council is actively collaborating with the residents and traders of Oliver Plunkett Street, running through the centre of the district, with a view to the development of a specific themed quarter given it unique mix of Cork's historic and iconic buildings and businesses. Finally a significant portion of the district has been identified for inclusion in an application for Purple Flag status, an accreditation process for town centres that meet or surpass the standards of excellence in managing the evening and night-time economy.

5.3.1.1 Smart District Replication Profile

Mapping of district related replication framework for selected Smart Solutions

Q1 What are the main characteristics of the district and what is the replication potential?

Population:

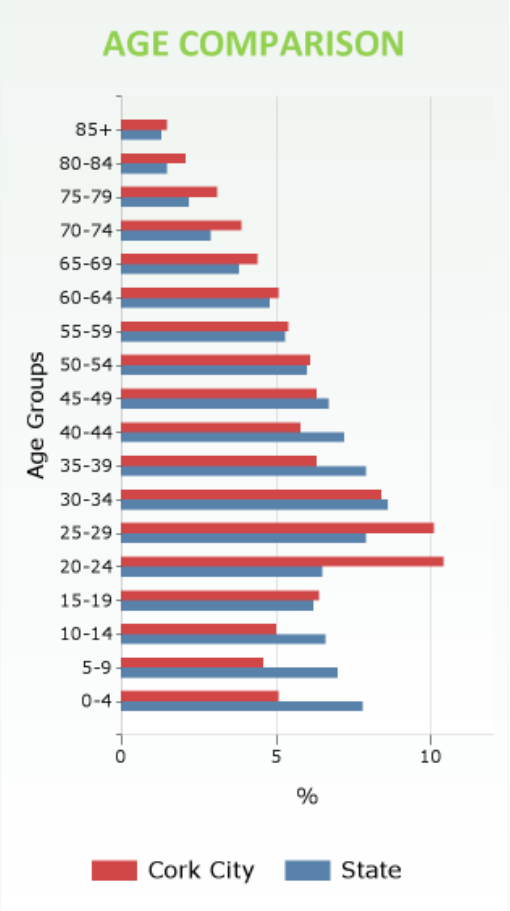
The population of the designated City Centre District is in the region of 2900 based on the 2011 CSO census. A significant number of people would commute to the City Centre area on a daily basis for the purposes of work.

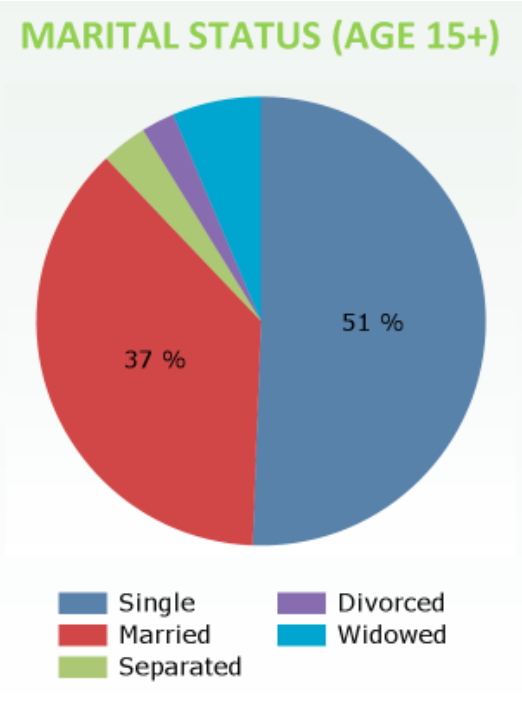
Demography:

According to the CSO area study of Cork City as a whole, the percentage of 0 – 15 year olds was below the national average while those in the 20 – 30 year old bracket were above the national

average. In terms of marital status the study found that over 50% of 15+ year olds were single and 37% were married.

The most popular means of travelling to work was by car accounting for 50.3% of journeys. In addition Non-Irish nationals accounted for 12.5 per cent of the population of Cork City compared with a national average figure of 12.0 per cent. We would expect that figures for the chosen city centre district would be in line with these findings.

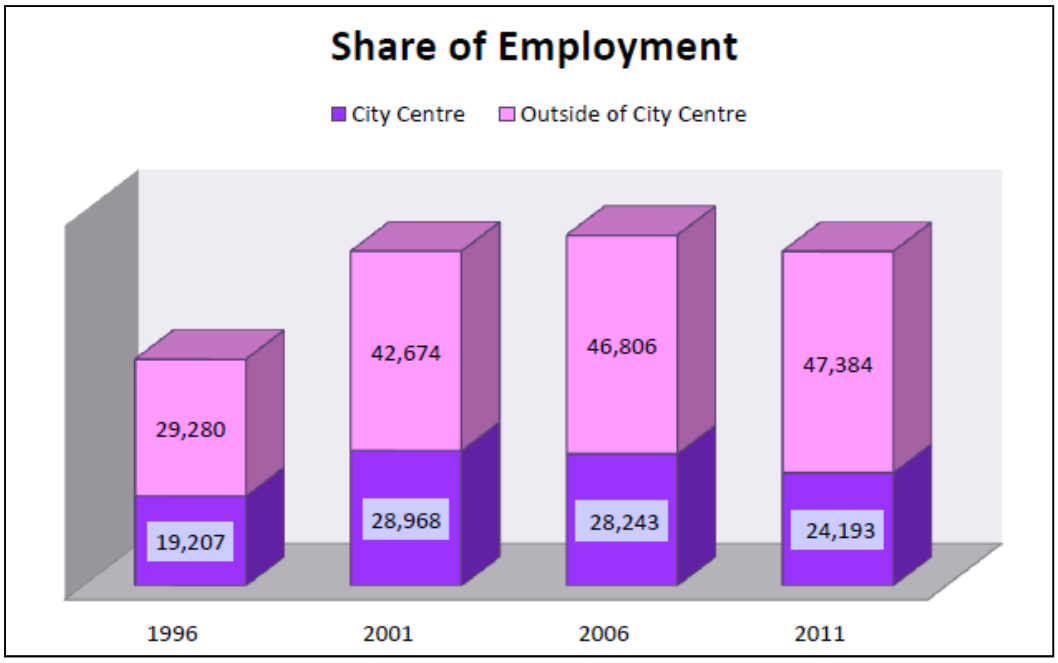




Source: www.CSO.ie

Employment:

The City Centre Sector recorded a total of 24,184 jobs for 2011 and experienced a significant loss falling by 13% over a five year period or 3,502 jobs, compared to 2% (725) fall recorded in the 2006 survey. It appears that there is a growing trend of the City Centre sector losing employment share while outer sectors are gaining employment share. In 2006, 38% of the overall city employment was contained within the City Centre Sector, down from 40% in 2001. That share has since dropped to 34% over a five year period. The drop in the City Centre share has been as a result of both businesses relocating to suburban locations and suburban areas gaining employment as a result of new developments being constructed in recent years. A key objective of the Smart Gateway is to promote economic activity across the region and in particular the city. As the key district of the city it is important that this increased activity translates into improved employment and quality of life prospects for the citizens of the district and beyond.



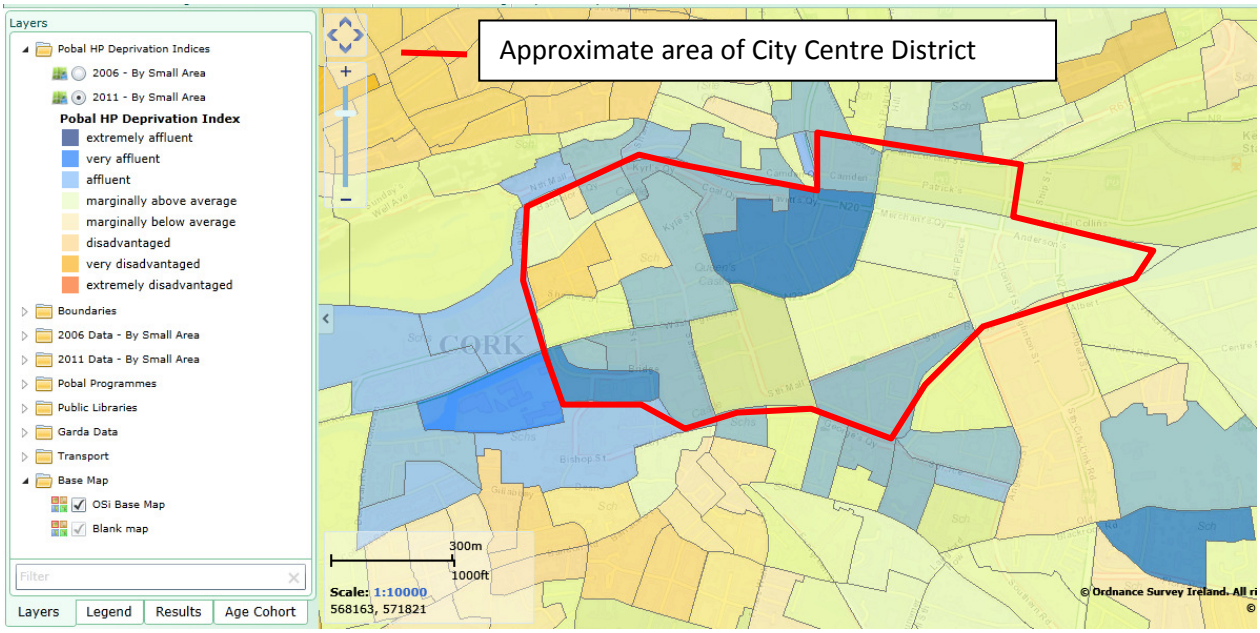
Source: Cork City Employment and Land Use Survey 2011

ACTIVITY	2006	2011	Absolute Change	% Change
ACCOMMODATION AND FOOD SERVICES	3,628	3,623	-5	-0.1%
BUILDING AND CONSTRUCTION	220	127	-93	-42%
BUSINESS AND FINANCE	3,287	2,554	-733	-22%
MANUFACTURING	1,234	925	-309	-25%
PERSONAL SERVICES	1,914	1,130	-784	-41%
PROFESSIONAL SERVICES	6,498	6,096	-402	-6%
PUBLIC ADMINISTRATION AND DEFENCE	3,140	2,826	-314	-10%
RECREATION AND ENTERTAINMENTS	786	677	-109	-14%
REPAIRS	176	88	-88	-50%
RETAIL	5,641	4,717	-924	-16%
TRANSPORT, COMMUNICATION AND STORAGE	744	664	-80	-11%
UTILITIES	246	568	322	56%
WHOLESALE	181	198	17	9%
TOTAL CITY CENTRE	**27,695**	**24,193**	**-3,502**	**-13%**

Source: Cork City Employment and Land Use Survey 2011

Income:

Pobal deprivation statistics indicate that the city centre district contains a mixture of relatively affluent areas with some pockets of marginal deprivation, notable the marsh area to the west and the area around the tip of the island.



Source: Pobal Maps

Economy:

The city centre economy covers a diverse range of business sectors. The main sectors would be retail, food and accommodation, followed by personal and professional services. Other economic sectors would include business and finance, public administration and a small amount of manufacturing. The Cork City Employment and Land Use Survey 2011 provides a breakdown of new jobs by activity (See below).The current strategies for the City Centre as well as the Smart Gateway initiative will look to both increase the opportunities for employment within the district but also look to position the City Centre area to deliver and support more value add activity such as ICT hubs and incubation space.

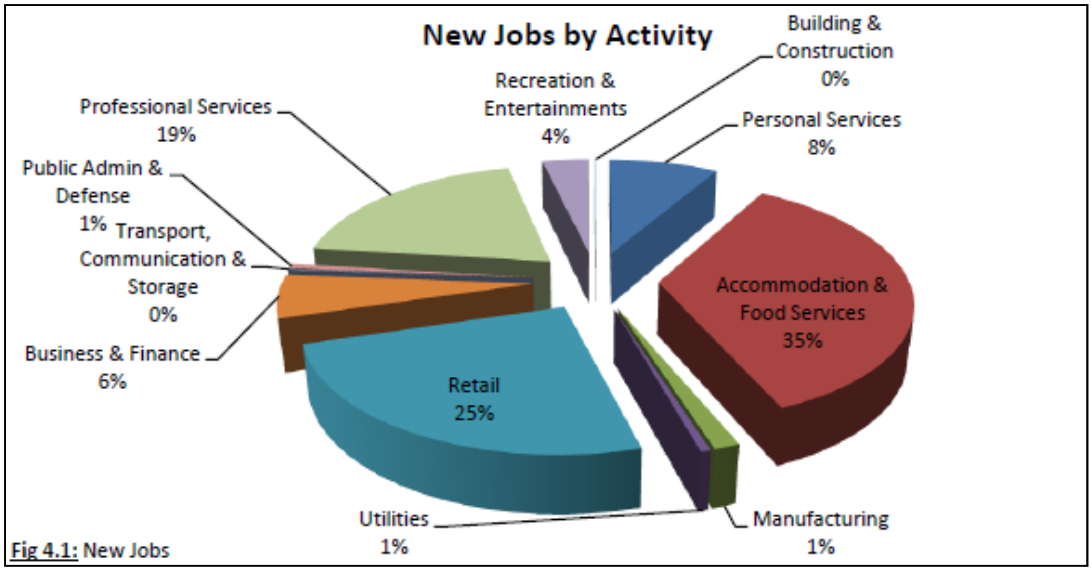


Fig 4.1: New Jobs

Source: Cork City Employment and Land Use Survey 2011

Culture:

The City Centre area represents the largest cultural centre in the region and includes a wide offering including theatres, museums, educational institutions, bars and restaurants. The City centre also plays host to multiple festivals and events throughout the year which draw visitors from a wide catchment area.

Cultural tourism is a key component of urban tourism based upon the arts and heritage characteristics of towns and cities. Cork City has developed its own tourism and visitor economy capitalising on its qualities as a cultural destination and an area of local distinctiveness with the city acting as a gateway and a base for regional tourism. It is one of the oldest cities in Ireland and has a rich archaeological record and a strong medieval history. It addition, it's pre-eminence as a trading centre and maritime merchant port in the eighteenth and nineteenth century created tangible industrial archaeology and historic remains. The Smart Gateway initiative will examine and exploit opportunities to improve the quality of life and environment for citizen and visitor alike, aligning with other strategic initiatives and branding projects.

Q2 Are there synergies and/or conflicts related to the Smart Solutions with the existing infrastructure, socio-economic profile and social acceptance?

- *Name and specify synergies and/or conflicts in regards to existing infrastructure, interests of people, etc.*
- *Name and specify supportive initiatives/projects within the district related to smart refurbishment, energy, integrated infrastructure, mobility, ICT, data management etc.*
- *Please provide an overview of scheduled regular checks and renewals per type of infrastructure in the resp. district.*
- *What future infrastructure and/or projects are planned n the next 5 years that would support the replication of Smart Solutions?*

to be completed after internal discussion process

Q3 How will local stakeholders be involved in the replication of Smart Solutions?

- *What stakeholder groups exist? What are their roles within the district?*
- *What are their main interests/objectives?*
- *Which groups can be supportive, skeptical or blocking?*

to be completed after internal discussion process

Mapping district related opportunities and needs for a successful replication

Q1 What are the main needs/ambitions for becoming a "Smart District"?

- *Related to the district on e.g. political process, planning process, technical capacity building, peer-to-peer and training, organizational structure, stakeholder process, awareness raising, communication and dissemination needs, etc.*

to be completed after internal discussion process

Q2 What insights and opportunities can the district offer to the LCs and other FCs?

- *What can you share? Name and specify topic / existing Smart Solution*

to be completed after internal discussion process

5.3.1.2 District - Smart Solutions Specifications

Adaptation of solutions towards the most effective deployment and integration

List the Smart Solutions you intend to deploy within the selected district and specify by answering the following questions.

to be completed after internal discussion process

Replication of Smart City Solution x

Q1 What is the replication potential of the Smart Solution?

- *Reason for interest / value for money (if not redundant)*
- *key policy and legislation frameworks affecting the solution's development / implementation*
- *Status quo of deployment of solution (e.g. feasibility study available etc.)*
- *Specify area and scope of potential implementation (e.g. deep refurbishment of m^2)*
- *What needs to happen for the Smart Solution to get implemented?*

to be completed after internal discussion process

Q2 What is the business case and do financing opportunities already exist?

- *Describe the current business case for the solution*
- *Describe technological barriers if any*
- *Name potential financing opportunities (European, national, private etc.)*
- *Describe market up-take / expected consumption*
- *Describe future financing model and ownership of Smart Solution*

to be completed after internal discussion process

Q3 What is the potential implementation timeframe?

- *Specify if (already) possible*

to be completed after internal discussion process

Q4 How does the Smart Solution integrate with the existing and future infrastructure?

- *Links to/integration with other measures / Smart Solutions*

to be completed after internal discussion process

Replication needs of Smart City Solution x

Q5 What user / stakeholder involvement is foreseen?

- *What are their main interests/objectives/expectations?*
- *What group(s) can be supportive, skeptical or blocking towards the solution?*

to be completed after internal discussion process

Q6 What are the capacity building needs for the successful deployment of the Smart Solution?

1. *What are the impacts on tenancy arrangements following the implementation of refurbishment initiatives - is there significant increases in rent and how is this impact managed (citizen engagement)*
4. *Will the initiatives around smart local electricity production be introduced city wide or locally, where will solutions such as batteries for RES storage be located*
5. *What funding model will be used to implement the solution but also how will the usage of facilities such as EV charging be controlled and recharged?*
11. *Are the initiatives related to alternatively fueled vehicles part of an overall strategy for the LC and will the local authority be leading the way through an extensive rollout across its own fleet.*
12. *What requirements will be placed on Car Sharing providers to ensure that alternatively fueled vehicles are a significant part of their strategy*

Internal (public administration) and external (stakeholder) capacity building needs and areas of interest for peer-to-peer

1.
   - P to prepare and implement a comprehensive refurbishment strategy
   - S to support the financing and implementation of the strategy
4.
   - P to assess public buildings and housing stock for the deployment of RES and other measures
   - S to support the financing and implementation of the measures
5.
   - P to view solutions such as these in the context of a city wide strategy.
   - S to examine financing and financial re-charging options
11.
   - P to view the solutions in terms of an internal and city wide strategy
   - S to examine options for collaboration in implementation
12.
   - P to view solutions in the context of the City Centre Movement Strategy.
   - S to examine technology and energy and fuel saving option as a financing model.

Indicate, if business dialogues with companies involved in implementation would be useful

It is likely that dialog with companies involved in each of the measure will be useful, however it is too early at this point to begin these discussions.

Q7 What secondary effects do you intend to achieve with the implementation of the smart solution?

- *Specify socio-economic benefits, etc.*

to be completed after internal discussion process

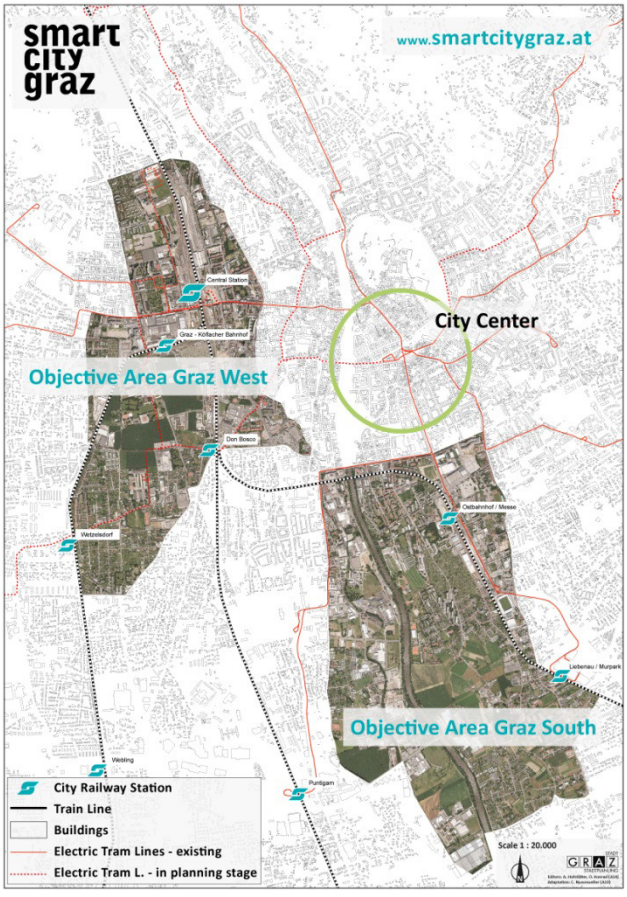
6. Replication Assessment of the Follower City of Graz

6.1 Smart City Replication Profile

Mapping the overall framework conditions for replication within the city territory

Q1 What is the overall replication potential for Smart Solutions until 2020 and beyond?

The Smart City Urban Development Strategy of Graz had been developed since 2010 in the course of the strategy formation project "I live Graz" which was national funded by the Austrian Climate and Energy Fund. It was politically decided on local level by the municipal council midyear 2013.



Within "I live Graz", the vision, guidelines and roadmaps for the Smart City Graz were elaborated using the ZEUS method.

Methodological approach of the Smart City Graz Strategy

The classical approach of improving a situation is to describe the current situation, to analyse strengths and weaknesses and based on this apply changes (continuous improvement). Mostly it gets more difficult to find new improvements as development progresses according to the law of diminishing marginal utility. In other words same efforts lead more and more to smaller successes. This is also the method of "classical urban development".

Based on the current state, driven by interests of investors, citizen, economic, politics, etc. and influenced by (mega-) trends (migration, demographic change, changes in economic situations, etc.) planning activities are implemented in different fields of action, mostly not or too less coordinated. The involvement of relevant actors is mostly carried out too late and sometimes very hesitant. This often leads to opposition against new expediently infrastructural constructions (e.g. streets, wind turbines or hydro-electric power plants). The development of livable cities as a consequence of many individual actions hence can be seen as a lucky coincidence. With the approach described a system could be improved but hardly not changed.

For the methodological approach of the Smart City Graz Strategy on the other hand with the overarching goal of a livable city in the year 2050 the strategic focus lies on systematic innovation based on following principles:

- Urban development should not be limited to the balance of interests between target groups.
- Urban development must be seen as urban policy which should point out potentials and should develop perspectives. It do not have to command majority backing in the first phase

but should have the aim to convince as much as possible by continuous integration of parties concerned.

This approach was already tested in the preceding project „ZEUS“ (Zero Emissions Urban System). Within the framework of Smart City Graz this approach had been extended substantially. The main difference is a modified objective function. While the ZEUS-project was targeting “only” an emission-free urban environment, the Smart City Graz Strategy targets a comprehensively livable Smart City which goes far beyond the waste and emission topic and as well includes important many other material/non material aspects.

Thus the implementation of the Smart City Graz Strategy follows these steps:

1. *Development of ideal visions of a livable city in the year 2050 including several thematic fields and an intermediate target for 2020*
2. *Selection and Definition of suitable smart city indicators to be able to measure the progress*
3. *Development of a roadmap which describes the necessary foci and milestones and the time priorities for the implementation.*
4. *Development of an action plan for the time period until 2020*

I live Graz - Abstract
With its 276.526 inhabitants (01/2015), the Styrian provincial capital Graz bundles the requirements of a university, administrative and economic centre.
The goal: thanks to its high quality of life, by 2050 Graz will probably nearly double its population while using a fifth of the resources. In the course of the project additionally one or two national and international demo projects need to be identified.

The way

In Roadmaps 2020 and 2050 and (adapted) action plans by 2020, concrete measures are pooled together in the five considered areas (region, city, district, quarter and project) and the existing strategies are adapted. To achieve the vision one or two international demonstration projects are being developed.
The area of focus: communication and information transparently conveying information is an essential component of the “I live Graz” project in order to integrate the participating actors and citizens. The way to deal with new technologies needs to be communicated in a comprehensible and target group-specific way.

One result of this strategy process was the designation of two appropriate smart city objective areas one in the western part of the city (“Smart City Graz West”) and one south of the city center (“Smart City Graz Süd”). These areas should become the main focus for Smart City Pilot Project within the first phase of the implementation.

Based on this overall Smart City Strategy, Graz actually aims to match different topics of the strategy with suitable funding schemes on EU and national level.

ENERGY VISION SMART CITY GRAZ
In 2050, the city of Graz finds itself at a sustainable energy equilibrium. The total energy required is produced 100% from the region and from renewable energy sources. This could be energy from run-of-river power plants, biogas, PV, wind-power which could supply smaller areas in a decentralized system. As pointed out this is a very ambitious vision – we are aware that with todays technologies these goal is still unachievable.

Currently (2015) 70% of the energy for the central district heating system of Graz is produced in private owned a coal-fired and gas-fired power plant in a municipality south of Graz (Mellach).

Since the operating company of these plants announced a premature exit from the supply contract with the City of Graz in 2013 a comprehensive search for alternative energy sources began ("Heating Supply Graz 2020/2030" led by the Environmental Department of Graz). Outcome of this strategy process was the fact, that in a short and medium term as compensation for the soon closed plant in Mellach a gas-fired power plant has to be built owned by the municipality ("natural gas as a bridging technology"). Renewables have in a short and medium term only a potential to cover 10% of the whole heating demand of the City of Graz (appr. 1.000 GWh/a).

2050 the citizens of Graz understand the value of energy and use it consciously and efficiently.

Establishment of specific targets for future urban development projects:

- *Reduction of Greenhouse Gas Emissions by 20% (these 20-20-20-targets were primary following the EU-targets; on local level we interpret it currently as improvements on district level with reference to the average across the City)*
- *Increase of the share of renewables by 20 %*
- *Increase of the energy efficiencyby 20%*
- *Reduction of land consumption for buildings and infrastructure*
- *Implementation of compact, energy-optimized building structures*
- *Optimized development of public transport infrastructure – avoidance of settlement patterns which foster motor-driven private transport*

www.smartcitygraz.at

I live Graz - Details

Initial situation/ Description of the City or urban region

268,602 people were living in the city of Graz – Austria's second largest city and capital of Styria province – in May 2013. This corresponds to a population density of 2,058 inhabitants per square kilometre. Together with the surrounding municipalities, around 405,000 people currently have their main place of residence in the Graz region. The long-term trend shows a steady increase in inhabitants. Current forecasts predict an increase to approximately 490,000 inhabitants by 2050. Due to its sheltered situation in a basin, Graz is disadvantaged in terms of climate in winter due to hampered exchange of air in atmospheric inversion conditions. There is particular need for action with regard to carbon dioxide and particulate matter emissions.
The main sources of energy used are distant heating (33%), heating oil (~25%), electricity (~20%) and gas (~15%). Renewable energies amount to ~5%.
At one third, motorised private transport makes up the largest percentage in the modal split, with a slight decrease apparent for the first time in 2008. A continuous increase in bicycles, from 8.3% in 1982 to 16.1% in 2008, can be observed. Public transport shows a slight increase, currently amounting to just under 20%.

The "Mobility Concept Graz 2020" which was approved by the municipal council in 2012 aims to the share of cyclists from 16% to 20% in 2020. An urban traffic planning guideline and specific measures complement this Mobility Concept.

The aim of the "I LIVE GRAZ" project was to work out the vision and strategic principles for the Smart City Graz, to define the appropriate measures, and to initiate the first steps.

Thematic content/ technology areas covered

A total of eight central topics have been processed for the future development of the city of Graz towards the goal of "Zero Emission". Individual indicators were created for the seven specific topics "Economy, Society, Mobility, Energy, Supply/Disposal, Buildings Ecology".
In the eighth, overarching topic – "City" – strategies were elaborated with regard to the future development of the city.
The eight topics are combined in five focal actions in accordance with the options available to a city: Urban planning, Citizen participation and awareness raising, Economic incentives
Legal conditions, organisational development.

Visions developed until 2020/2050

Vision 2020: Graz has established itself as a Smart City with a high level of urban quality of life and as a centre of innovation, technology and services of international standards, ranking among the top ten of Europe's medium-sized cities

Vision 2050: The sustainable city worth living in Graz is a dynamic city with compact development and mixed urban use, with attractive public space and an extremely high quality of life. By rigorously pursuing Smart City strategies and creating a broad awareness, it was possible significantly to reduce consumption of resources and energy and associated pollutant emissions, and to take major steps towards realising a zero-emission city. 100% of energy required in Graz is generated in the region and from renewable sources. As a city of research, qualification and business, Graz is an international touchstone for value creation by means of innovative urban technologies and systems.

Roadmap developed
In the spirit of consistently pursuing these visions, the five focal actions for developing a sustainable city worth living in – the Smart City Graz – are essentially tackled concurrently. The "Smart City Graz" roadmap contains the following two milestones on the road to a completely smart city in 2050:

- *2020 milestone: development of 5 Smart City quarters*
- *2030 milestone: development of a total of 25 Smart City quarters and 5 Smart City districts*

Officially Graz is divided into 17 districts.

The development of an energy-efficient, resource-saving and low-emission city comprises the following guidelines:

Focal action 1: Urban planning
This focal action comprises all tasks of the municipal administration which are relevant for planning and development issues (e.g. urban planning, traffic planning, energy planning, construction planning, open space planning. Main goal is the systematic alignment of all planning and subsequently all implemented construction projects with the vision of the Smart City Graz Strategy for 2050.

- *Infill development of existing residential structures and development of residential brownfield sites before repurposing building land*
- *Promotion of compact and dense development structures connected to existing public infrastructure*
- *Mix of uses (Mobility: a well functioning mix of usages within a urban structure causes short distances in everyday life and finally leads to a sustainable traffic behaviour (modal split). Mixed usages are economic functional and stable as long as minimum built*

densities (1,8 – 2,0) lead to a sufficient number of inhabitants. Increasing housing densities moderately the share of required road space can be reduced up to 25%. A part of this space-saving could be used for public green.

- *Safeguarding and creation of attractive public green and outdoor spaces*

Modification of competition programmes to achieve the target Smart City qualities (indicators)
Focal action 2: Citizen participation and awareness raising:

- *Early involvement of groups affected by planning*
- *Target group-oriented citizen's information and participation*
- *Accompanying district management for district development projects*
- *Promotion of awareness raising for sustainable lifestyle*

Focal action 3: Economic incentives:

- *Efficient handling of resources and public funds*
- *Promotion of research, innovation and development projects in urban development*
- *Private-law quality agreements with investors to implement sustainable urban development measures*
- *Promotion of green economy company set-ups*
- *Initiation of investment funds to finance infrastructure measures*

Focal action 4: Legal conditions:

- *All relevant (provincial) laws encourage the implementation of the Smart City Graz objectives*
- *Municipal regulations supply these legal conditions*

Focal action 5: Organisational development:

- *Commitment to the Smart City Graz policies*
- *Smart City as an interdisciplinary project with clearly defined responsibilities in organisational units and overarching project management*
- *Ongoing communication and transdisciplinary co-operation*
- *The municipal administration of Graz (and its participations) as a model for other stakeholders*
- *Accompanying monitoring and evaluation*

Action plan developed
The catalogue of measures for 2020 provides the following measures for the individual action focuses (selection):

Urban planning

- *Implementation of the Demo project SCP-Graz Mitte*
- *Targeted control of the urban development*
- *Systematically monitoring and ongoing analyses of the Demo project SCP Graz Mitte*
- *Initiation of further Smart City quarters (Living labs)*

Citizen participation and awareness raising

- *Target group-oriented citizen's information and participation with with diverse mix of tools and methods*
- *Accompanying district management for district development projects*
- *Focal campaigns, training and coaching for sustainable lifestyle.*

Economic incentives:

- *Promotion of implementation of Smart City quarters*

- *Promotion of green economy company set-ups*
- *Initiation of investment funds to finance infrastructure measures*

Legal conditions:

- *Urban development agreements with investors governing Smart City target qualities / indicators assume the form of secondary legislation*
- *Elaboration of land planning and legal specifications for future investors in Smart City quarters*
- *Demand for legal amendments by Styria Province, e.g. embodying the Smart City objectives in the Styrian Land Planning Act*

Organisational development:

- *Formation of the municipal core team, an overarching project management team, and set-up of internal municipal communication*
- *Establishment and continuation of co-operation with partners*
- *The city as a model: definition of binding standards*
- *Motivation of all staff in the "Graz House"*
- *Creation of a monitoring and evaluation system for all Smart City agendas (annual report with development of energy use and greenhouse gas emissions)*

Outlook

Due to its cross-disciplinary project approach, the I LIVE GRAZ project has led to new solutions and furthermore to the Smart City Graz strategy.
This strategy is the basis for a smart and comprehensive future-oriented urban development in Graz. Measures planned in the framework of this project will guide our forthcoming work.
First submissions of pilot projects in national and international programs have already been made. In the target area Graz Mitte (Graz Centre), implementation of Smart City pilot projects is intended to enable the application of additional innovative urban technologies and systems and thus trigger the development of the whole district in the direction of a smart sustainable neighbourhood.

STEK 4.0 Stadtentwicklungskonzept Graz, 2013: 1. Principle/§3: "Graz is developing into a Smart City"
(Urban Development Concept – mandatory local regulation: According to the spatial planning law of the Province of Styria the STEK 4.0 is aimed as the overarching planning instrument which outlines the medium and long termed goals of the City of Graz for the next 15 years. The precise land development plan of Graz has to respect the framework of this strategy paper in regard to the dimension of residential areas as well as for other functions or land uses. On the other hand the STEK 4.0 has additionally to respect superior targets of the regional development programme like e.g. priority zones for green infrastructure or settlement development. Due to the fact, that the STEK 4.0 is enacted by the Styrian government as an ordinance the role of it became more important than in the past.)

- *financing and funding opportunities available (European, national , local programmes, private investment etc.)*
    - *national funding by the Austrian Climate and Energy Fund*
    - *as from 2015/16: specific Investment Priority within the national EDRF-programme for capital expenditure projects (e.g. public buildings like schools, etc.) which save carbon dioxide in the framework of Smart City Strategies in Styrian municipalities*

- *urban development contracts between municipality and private investors pre-arranging the co-financing of public infrastructure in pilot development sites (mobility measures, open space, etc.)*
- *etc.*

- *legislation frameworks affecting the solution's development / implementation*
  - *Steiermärkisches Raumordnungsgesetz 2010 (defines legislative planning instruments oft he municipality)*
  - *4.0 Stadtentwicklungskonzept Graz, 2013 (Urban Development Concept – mandatory local regulation for urban development – see description above)*
  - *OIB-Richtlinie 6 - Energieeinsparung und Wärmeschutz (Österreichisches Institut für Bautechnik, 2015)/Austrian Institute of Construction Technology (national standards for energy savings and thermal insulation for buildings as a basis for the application for subsidies for housing construction and refurbishment of the province*
  - *regulations for subsidies for housing construction and refurbishment (province level)*
  - *further regulations/laws for specific topics (mobility, energy, etc.)*

Currently, there are no special fiscal incentives for deep refurbishment:
A major obstacle for Cities like Graz to implement deep refurbishment projects within EU-funding-schemes is the fact that Austria seems to have comparatively high energetic building standards on national level, which constitutes the baseline for the EU-funding of innovative renovation/retrofitting measures within e.g. the Horizon 2020 Programme.
On the one hand, new residential buildings in Austria widely comply with high energy standards. On the other hand, we lack comprehensive refurbishment strategies for building ensembles, on district or even better on city level.
Since energy costs are mostly seen as further offsettings and transitory items (also in the social housing sector) we can see a limited motivation of investors in bearing higher costs for implementing higher standards in refurbishment/retrofitting measures of residential buildings.
Therefore from our point of view at the moment it would be necessary to

a. *to offer attractive financial instruments as well as fundings on EU-level to foster the implementation of highly innovative pilot projects in the refurbishment of (public but also private owned) building ensembles or whole urban districts.*
b. *detach fundings for energy efficiency improvements of refurbishment measures within Horizon 2020 from the national energy standards to give noticeable incentives also to further developed cities and stakeholders to participate in such EU-funding-schemes.*

Q2 How does the "Smart City" approach feed into/connect with your existing local planning processes?

As described above the Urban Development Concept of the City of Graz predetermines the aim to become a Smart City. Other local strategies have to follow this overall mandatory local regulation.
An urban refurbishment strategy should be developed within the next years – this is one of the major reasons for us to take part in the GrowSmarter project. This strategy should tackle both private and municipal buildings as well since the housing stock of the municipality itself is rather limited in comparison to private housing cooperatives.
A communal energy concept (Kommunales Energiekonzept 2020/KEK 2020) was first

elaborated in 1992 and since then it was repeatedly revised. Currently the City of Graz/Environmental department is working on a strategy to secure the supply of district heating within the urban region on a long-term basis (within this process all alternative energy supply options suitable for Graz were evaluated in 2014).
The „Grazer Mobilitätskonzept 2020"/Graz Mobility Concept 2020 consists of three parts: targets, policy paper/directive for traffic planning and a set of implementation measures. In the field of E-Mobility Graz and the surrounding region was chosen as a „model region" to be funded by the Austrian Climate and Energy Fund (www.emobility-graz.at and www.klimaundenergiemodellregionen.at).

E-Mobility- Model Region Graz
Within this national funded project the City of Graz and the surrounding region aims to optimize the regional traffic/transport system and to foster the usage of e-vehicles, cars as well as bikes. Within current urban development projects and urban construction projects (like e.g. the Smart City Graz Pilot Project) these e-mobility measures should be considered too. Goal for the year 2020 is to increase the rate of electric vehicles of new registrations of automobiles up to 15% (baseline: total of new registrations of automobiles 2009: 15.318; 15% = 2.300 e-vehicles per year) and a significant shift towards environmentally friendly means of traffic.
In parallel the expansion of the required charging infrastructure in public areas and in companies will be promoted. Additionally renewable energy sources (e.g. PV) are promoted to supply clean energy for the e-mobility-measures helping to reduce CO2-emissions on regional level.

Other strategies are to be amended.

Q3 Is there a (strategic) plan and organisational structure in place to become a "Smart City"?

A strategic plan to become a "Smart City" based on 8 indicator-sets, which are seen essential for a smart city, has been worked out within the strategy-development process „I live Graz" (2011-2012).

Proposed indicator-sets (to be further developed)

1. Urban planning (Urbane Planung)

Individual indicators on district level (Personenindikatoren - Quartiersebene):

- *User density: individuals per square meter gross floor area (Nutzerdichte: Personen / m² BGF)*
- *Usage intensity for public space: individuals per square meter public space (Nutzungsintensität öffentlichen Raum: Personen / m² öffentlicher Raum)*

Area indicators on district level (Flächenindikatoren -Quartiersebene):

- *density of construction (Bebauungsdichte)*
- *Public Space (collectively used area) – Share of circulation areas/green infrastructure/squares [percentages] (Öffentlicher Raum – Verkehr/Grünflächen/Plätze [% Anteile])*
- *Circulation areas – Share for private car transport/public transport/foot and cycle paths*

(Verkehrs)flächenanteile (Öffentlicher Raum): MIV/ÖV/Fuß- und Radweg [% Anteile]

- *Modal Split [% Anteil]*
- *Consumtion of building space per project: built-up area/ circulation area/open space*
  Bauflächenverbrauch/Projekt: Bebaute Fläche/Verkehrsfläche/Freifläche [% Anteil]
- *Energy efficiency*
  We found out that a major obstacles for external stakeholders like local residential property developers to implement deep refurbishment project are mixed ownership structures in housing estates (majority resolutions pro deep refurbishment) and the obligation to meet the comparatively high energetic building standards on national level as a precondition to become eligible for housing subsidies of the provincial government (financing problem).
  There are no specific standards set on municipal levels – national standards are to be implemented (http://www.oib.or.at/sites/default/files/richtlinie_6_26.03.15.pdf).
- *Energieeffizienz (Dauerleistung/Einwohner) [Watt/J]*
- *Living space per resident*
  Wohnfläche pro Einwohner [m²/EW]
- *development of the total amount of residential areas and circulation areas*
  Entwicklung Siedlungsfläche und Verkehrsfläche (ha)

Cost indicators (Kosten Indikatoren):

- *infrastructure costs per resident*
  Infrastrukturkosten je Einwohner (nach Stadtteilen)
- *costs for social infrastructure per resident*
  Sozialinfrastrukturkosten je Einwohner (nach Stadtteilen)

Other indicators (Sonstige Indikatoren):

- *routes across the site/passageways of foot and cycle paths - mesh size*
  Fuß- und Radwegdurchwegung – Maschenweite
- *proportion of green space for different types of landuse*
  Grünflächenanteil - mind. Werte – Kernstadt/Wohngebiete/offene Bebauung/Industrie [%] (Quelle: Freiraumplanerische Standards)
- *catchment area of public transport*
  ÖV Einzugsgebiet [Hüllkurve] 300m (Kat 1) (Quelle: STEK 4.0)
- *quarters calling for (immediate) action*
  Stadtteile mit Handlungsbedarf ; großen Handlungsbedarf/Handlungsbedarf (Quelle: STEK 4.0)
- *public sport fields per district*
  Bezirkssportplätze pro Bezirk (Quelle: STEK 4.0)
- *catchment area of public gardens and parks*
  Einzugsbereich Parkanlagen [600m] (Quelle: STEK 4.0)

Indicators not yet quantifiable (Noch nicht quantifizierbare Indikatoren):

- *quality of public space and urbanized ground floor zones per built-up area*
  Qualitätsvoller öffentlicher Raum und urbane EG Zonen / bebaute Fläche m² pro Quartier
- *mixed use of urban areas on distict level*
  Nutzungsdurchmischung im Quartier und Stadtteil

- *individual identification with the district*
  Identifikation mit Stadtteil

2. Citizen participation and awareness raising (BürgerInnenbeteiligung und Bewusstseinsbildung)

Citizen participation (Bürgerbeteiligung):

- *total number of participation processes*
  Anzahl der Partizipationsprozesse
- *level of satisfaction with process results*
  Zufriedenheitsquote mit dem Prozessergebnis
- *web-services containing participation tools, information and visualizing of development projects*
  Online--Plattformen für Beteiligung, Information und Visualisierung der Projekte.
- *neighbourhood/district management initiatives accompanying the urban development projects*
  Stadtteilmanagement begleitend zu Stadtteilentwicklungsprojekten

awareness raising (Bewusstseinsbildung):

- *"Ecological Footprint"*
  ökologischer Fußabdruck

Quality of life (Lebensqualität):

- *Model of collecting and analysing data relevant for quality of life within the City of Graz (Lebensqualitätsindikatoren LQI-System der Stadt Graz)*
  11 groups of indicators; representative population surveys all five years; calculation of need for action for all districts as a strategic planning tool for the departments of the municipality

3. Economical aspects (Wirtschaftliche Aspekte)

Using resources and public money effectively by coordinated investment decisions (Effektiver Umgang mit Ressourcen und öffentlichen Mitteln durch abgestimmte Investitionsentscheidungen):

- *Share of budget for municipal Smart City Projects compared to total of the annual construction budget of the City of Graz*
  Budgetmittelanteil Smart City Aktivitäten am städtischen Jahresbudget (Budget für Bau, Förderung und Information)
- *Costs for social infrastructure per inhabitant (district level)*
  Soziale Infrastrukturkosten je Einwohner (nach Stadtteilen)
- *Costs for technical infrastructure per inhabitant (district level)*
  Technische Infrastrukturkosten je Einwohner (nach Stadtteilen)

Promotion of scientific and innovative urban development projects (Förderung von Forschungs-, Innovations- und Entwicklungsprojekten im Bereich von Stadtentwicklung):

- *Number of projects*
  Anzahl der geförderten laufenden Innovations-, Forschungs- und Entwicklungsprojekte für zukunftsfähige urbane Entwicklung

Quality agreements with investors under civil law for a targeted implementation of sustainable urban developmnet measures (Zivilrechtliche Qualitätsvereinbarungen mit Investoren zur zielgerichteten Umsetzung zukunftsfähiger Stadtentwicklungsmaßnahmen):

- *Share of quality agreements compared to the total of urban development projects*
  Anteil von Qualitätsvereinbarungen bei Stadtentwicklungsprojekten

Promotion of attracting „Green Economy"-companies (Förderung der Ansiedlung von „Green Economy" Unternehmen):

- *Share of „Green Economy"-companies and companies with environmental certifications/labels to the total of companies in Graz*
  Anteil der „Green Economy" Betriebe und der Betriebe mit Umweltzertifizierungen an allen Betrieben in Graz

4. Legal framework (Rechtliche Rahmenbedingungen)

Zoning plan (Bebauungsplan):

- *Zoning plan proceedings including Smart City indicator assessment*
  Bebauungsplanverfahren mit Smart City Indikatorenbewertung (Anzahl der relevanten urbanen Bauvorhaben)

Zoning fee (Widmungsabgabe/Mehrwertabgabe):

- *Zoning fee earmarked for the purpose of financing smart urban development projects*
  Zweckgebundener Einsatz der Widmungsabgabe für smarte urbane Projekte

Smart City targets embedded in legislation (Gesetzliche Verankerungen der Smart City Ziele):

- *Number of decisions and regulations taking into account Smart City targets made by the local government*
  Anzahl der erlassenen städtischen Beschlüsse und Verordnungen in Hinblick auf Smart City
- *Interventions to adopt legal frameworks on province and national level*
  Interventionen zur Anpassung gesetzlicher Rahmenbedingungen durch Bund und Land

5. Organisational development (Organisationsentwicklung)

Political commitment and responsibility (Politisches Bekenntnis und Verantwortlichkeit):

- *Share of municipial departments included in Smart City projects*
  Anteil der beteiligten Abteilungen an Smart City Aktivitäten
- *Share of municipial employeed included in Smart City projects*
  Anteil der beteiligten Mitarbeiter/innen an Smart City Aktivitäten
- *Number of Smart City Projects and activities implemented by local administration*
  Anteil der Smart City Projekte und Initativen

Communication and Co-operation (Kommunikation & Kooperation):

- *Number of relevant external stakeholders*
  Anzahl/Anteil der relevanten, externen Kooperationspartner
- *Number of cooperation with other Smart Cities*
  Anzahl/Anteil der Kooperationen mit anderen Smart City Städten (vergleichbarer Größe, ähnlicher Herausforderungen)

City setting a good example (Stadt als Vorbild):

- *Number of exemplary Smart City projects per year*
  Anzahl der Smart City Vorbildprojekte der Stadt pro Jahr
- *Number of employees involved into the forward the motivating process*
  Anteil der Mitarbeiter/innen im Motivationsprozess

Monitoring and evaluation issues (Monitoring und Evaluierung):

- *Number/Share of urban development projects which are checked fort he Smart city indicators*
  Anzahl/Anteil der Projekte (z.B.: Bebauungspläne), bei denen die Smart City Indikatoren überprüft werden

In terms of organisational structure we are currently taking up a process to establish an internal smart city working group including all relevant departments with the aim to set up institutionalized working structures for integrated urban development projects in the framework of the Smart City Strategy. This group should start their work in September 2015.

At the moment the Smart City process is mainly promoted by the Executive Office for Urban Planning, Development and Construction which is also the leader of the PPP-consortium of the "Smart City Pilot Project Graz Waagner Biro". An internal resumption process which should again bring together all relevant units within the municipality with the aim to establish the smart city strategy in all relevant departments (see also Q3 above), will start on 3rd June 2015.

Q4 Are there synergies and/or conflicts of the “Smart City” plan and organizational structure with existing initiatives and their structures within the city?

- *synergies: Urban Development unit and EU-unit are cooperating ideally because they are located within the same department (Executive Office for Urban Planning, Development and Construction)*
- *conflicts: typical vertical structures within the traditional administration system are more than ever confronted with horizontal integrated planning approaches in regard to the Smart City strategy process – this sometimes leads to conflicts;*
  more/specific staff for specific tasks like Smart City strategy would always be ideal; at the moment most of the employees are tackling the smart city-topic beside their basic work load;

Q5 Which and how are regional and local stakeholders involved in the Smart City strategy and planning process on a city level?

"Smart City Pilot Project Graz Waagner Biro" –Consortium (13 national and international partners are taking part in the first Smart City Graz project):

- *Stadt Graz (Consortium Leader)*
- *Holding Graz (implementing mobility measures within the pilot project; 100% owned by the City of Graz)*
- *Energie Steiermark (energy supplier on regional level/province level)*
- *Energie Graz GmbH & Co KG (local energy supplier)*
- *FIBAG - Forschungszentrum für integrales Bauwesen – Hans Höllwart*
- *SFL technologies (private company; investor of the Science Tower subproject; developer and producer of PV-Graetzel cell technology)*
- *AVL List GmbH (AVL is the world's largest independent company for the development of powertrain systems with internal combustion engines as well as instrumentation and test systems)*
- *DI Markus Pernthaler Architekt ZT GmbH (architect and technical support of the smart city pilot project)*
- *Technische Universität Graz (scientific partner)*
- *StadtLABORGraz (NGO; deals mainly with participation issues/stakeholder processes within the pilot project – represent opinions of organised civil society, but also the voice of the anonymous local citizen)*
- *SOT – Süd-Ost Treuhand Gesellschaft m.b.H. (funding/accounting management)*
- *Alfen Consult GmbH (scientific partner)*
- *ECO WORLD STYRIA Umwelttechnik Cluster GmbH (200 companies and research centers are working on the Green- and Cleantech solutions of tomorrow within the Cluster ECO World Styria)*

Smart City Pilot Project Waagner Biro:

- *executive committee/steering board (two times per year): political representatives (town councils), managing directors of the companies within the consortium*
- *Project Steering group (one SCP-Jour Fixe once per month): Consortium Leader City of Graz, work package leader, representatives of all consortium members*

Q6 What are past (<5 years) and current projects that are closely related to the "Smart City" concept?

- *ECR Energy City Graz Reininghaus (http://www.hausderzukunft.at/results.html/id5854)*
  Urban strategies for the new conception, construction, operation and restructuring of an energy self-sufficient city district
  The aim was the development of a valid set of specific values and a guideline as a basis for energy self-sufficient district development. Based on the results, a masterplan (energy-network) for the district Graz-Reininghaus shall be developed. Future-oriented "city-building-blocks" will be implemented as flagships of innovation.
  Lead Partner: Technical University of Graz, Department for urban building; project partner among others: City of Graz, Executive Office for Urban Planning, Development and Construction;

- *ECR Energy City Graz - subproject 3: +ERS - Plus Energy Network Reininghaus Süd*

The multifunctional neighbourhood "+ERS - Plus Energy Network Reininghaus Süd" was realized within the urban planning area of Graz-Reininghaus. The project aims to optimize the energy concept of the single buildings as well as of the building cluster in order to achieve a plus-energy standard within the residential neighbourhood.
(http://www.hausderzukunft.at/results.html/id6854)

- *Act4PPP within the Central Europe Programme (www.act4ppp.eu)*
  Many cities and regions in Europe are increasingly challenged by their responsibilities to provide public services and infrastructure, to offer social housing or to develop brownfield sites etc.. To increase their capacities and the efficiency of public actions they search for private partners for cooperation, joint actions and institutionalised public private partnerships (PPP). ACT4PPP will provide a platform for cities and regions from all over Central Europe to exchange experiences and know-how and assist them in applying more and better targeted public private cooperations.

- *I Live Graz*
  The Smart City Urban Development Strategy of Graz was developed in2010 (in the course of the strategy driven project "I live Graz") and was adopted on a politically level midyear 2013.

- *Other EU-funded programmes/projects in the field of integrated urban development and urban mobility realised by the Executive Office for Urban Planning, Development and Construction of the City of Graz: www.graz.at/eu-urban*

Q7 Which sites/districts are projected to be developed in the next five/ten years?

- *The **"Smart City Pilot Project Graz Waagner Biro"** as the first national funded Smart City flagship project in Austria is intended to be a première, demonstrating new urban energy technologies for a smart zero-emission quarter offering great quality of life. The renovation plan for the Helmut-List-Halle includes the building of an energy plant that will provide the entire city district with carbon-neutral energy. At the same time, the building will offer acoustic insulation for the district. At the heart of the design is the use of "Grätzel" (dye-sensitized solar) cells, which also act as noise protection elements in the glass walls and the roof construction. Within this first implemented Smart City Graz pilot project, the use of innovative technologies allows the majority of the energy demand to be locally generated. Innovative developments in terms of buildings, energy networks and mobility will be linked up to form an urban whole. The integrated holistic planning process involving all relevant players will make smart urban development tangible and come alive. The exchange with national and international partner cities will support learning and reflective processes and further the disseminations of findings and results. (http://www.smartcitygraz.at/projekte-ebene-03-geschichtlicher-abriss/).*
  Possible starting points/aspects relevant for the GrowSmarter project at the moment: Smart, energy saving tenants through information, Smart lightning, lampposts as hubs for communication, Smart mobility solutions;

- *The second Smart City-development site is **Graz Reininghaus**, a huge development site of 100 hectare close to the city centre located on a former brewery area also in the western part of Graz. (http://www.smartcitygraz.at/projekte-ebene-03_graz-reininghaus/)*
  Possible starting points/aspects relevant for the GrowSmarter project at the moment:

energy saving tenants through information, Smart lightning, lampposts as hubs for communication, Waste heat and local heat integration by new business models, Smart mobility solutions;

- *While the Waagner Biro and the Reininghaus development sites are located within the Smart City target area Graz West within the Smart City Strategy there was defined a second target area in the south of the city center (Smart City target area Graz South). This second area is not yet set-up in such a detailed way because potential urban development projects haven't started yet. Smart City target area Graz West is seen as the frontrunner for possible following Smart City developments in Graz.*

Q8 What are the main areas of interest of the FC in the Smart City concept?

- *establishment of smart grids for heat and electricity networks, the coupling of isolated technological solutions to form one urban system, the demonstration of new, city-suitable technologies for sources of renewable energy, the development and project-specific implementation of concrete, smart mobility solutions, the issue of financing the necessary investments and increasing the visibility and strengthening the general public's awareness of and enthusiasm for smart cities.*
- *Smart City Governance & Monitoring approaches on administrational level (urban development)*
- *innovative PPP-financing schemes for Smart City projects ("Städtebauliche Verträge"/urban construction contracts between the municipality and private investors; goal: co-financing of public infrastructure on site by private investors)*

Mapping of the overall opportunities and needs for a successful replication

Q1 What are the main overall needs of the FC to become a "Smart City"?

- *With the Smart City approach Graz intends to grow in a sustainable way and to become a more liveable city in general.*
- *Graz should be developed into a "sustainable place to live and work, boasting a high quality of life".*
- *Goal for the administration is to interconnect and match existing specific strategies of different departments of the municipality for Graz into an integrated system under the roof of the smart city strategy.*
- *This should help to better align planning and other decision processes with the help of an overarching smart city strategy.*
- *New organizational structures (e.g. PPP-consortium, collaboration with NGO´s in participation issues) and new financing models in regard to public services (e.g. zoning fee-models – see also Q3) are tested within the smart city pilot project. The overall requirement is to use public financing for urban development projects more efficient. All smart city measures have to be considered on the bases of cost-benefit assessments.*

Q2 What specific aspects the FC likes to explore with Stockholm, Cologne and/or Barcelona?

- ***Smart Solution 1. Efficient and smart climate refurbishment***

The City of Graz likes to explore with Stockholm, Cologne and Barcelona innovative energetic redevelopment strategies on district/city level, concrete projects/measures and as well innovative financing schemes for implementing such measures.

About one year ago we started a local preparation process to evaluate the potentials in our City to participate to the Horizon 2020-Programme. Within this process we tried to bringing together all relevant municipal units (urban development and building sectors, ICT, mobility, etc.) and as well external stakeholders like non-profit local residential property developers or building physicians. Together with these stakeholders we found out that a major obstacle for Cities like Graz in the field of smart climate refurbishment is the fact that we seem to have comparatively high energetic building standards on national level. These standards also constitute the baseline for the EU-funding of innovative renovation/retrofitting measures within the Horizon 2020-Programme.

- ***From our point of view new residential buildings in Austria widely comply with good energy standards. On the other hand we lack of comprehensive refurbishment strategies for building ensembles, on district or even better on city levels.***
  Since energy costs or expenses for energy are mostly passed on to tenants (as well in the social housing sector) we can see a limited motivation of investors (e.g. housing associations or cooperations) in bearing higher costs for implementing higher standards in refurbishment/retrofitting measures of residential buildings as foreseen in the national standards.

- ***Smart Solution 3. Smart, energy saving tenants***
  Within the Smart City Strategy of Graz first target-group-specific participation actions are foreseen at the moment. The City of Graz aims to gather additional specific know-how from the Lighthouse Cities that should be implemented within existing strategies at first in the Smart City pilot project Waagner Biro. Main question is how to motivate/train tenants to change their everyday behavior using their flat in a more energy efficient way.

- ***Smart Solution 5 Smart lightning, lampposts as hubs for communication***
  A communal smart lightning strategy should be implemented in Graz in the medium term. So far partially the municipality was able to implement and to test new lightning systems for street lighting (e.g dimming on demand, etc.). Graz likes to explore with Stockholm, Cologne and Barcelona experiences made with the implementation of innovative lightning systems on district/city level. Are there strategies to implement innovative control systems for lightning step by step. Are there cost-benefit assessments to learn from?
  Lampposts as hubs for communication: not yet implemented in Graz; which experiences have the lighthouse cities in planning (empty) ducts for additional wiring to be able to use lampposts as hubs for communication and/or charging station for electric vehicles?

- ***Smart Solution 6. Waste heat and local heat integration by new business models***
  Because of the change of global economic parameters the existing long-distance heating grid in Graz is currently disputed. Questions of cost effectiveness and alternative decentralized

district heating solutions are in discussion (e.g. miniature cogeneration plants considering in advance the opportunity for a future expansion option).
New business models for waste heat and local heat integration pilot projects implemented in the Lighthouse cities would be seen as a fruitful input to discuss and to plan further strategic options.

- ***Smart Solution 12. Smart mobility solutions***
  Citizens feedback on traffic plans, direct mobility surveys and mobility monitoring is beside an attractive supply of eco-friendly urban mobility (e.g. intermodal transport hubs; information monitors for public transport within apartments; system of collective garages on district level) foreseen within the local Smart City Strategy for Waagner Biro and Reininghaus district. Graz would need additional knowhow and experiences from the lighthouse cities which could be ideally implemented in existing strategies and future implementing measures.

- *Graz would like to explore within the project how the Lighthouse Cities facilitate the basic understanding of the Smart City approach and as well the approach for integrated/holistic urban development in all relevant stakeholder levels (citizen, politicians, investors, administration).*
- *see also the smart solutions chosen in table 5.2*

Q3 What insights and opportunities can your city offer to the LCs and other FCs?

- model for an economically evaluation of the Smart City pilot projects Graz (currently in finalization – first a local political discussion on the results of this economically smart city evaluation model will be carried out, after this step a possible sharing of this tool within the GrowSmarter project can be discussed internally)
- experiences of developing urban construction contracts between the municipality and private investors

Q4 Are there any related events organised by the FC?

- Urban Future Conference 2016 (www.urban-future.at): March 2-3 2016
  (City of Graz will be a key-partner of the event and will have the opportunity to present the Smart City pilot project there)

6.2 Smart Solutions Selection

Description of replication potential of selected Smart Solutions of LCs within FC

The table below shows which solutions the Follower Cities plan to replicate.

		Follower Cities				
Area	***Smart Solutions***	*Porto*	*Graz*	*Cork*	*Valetta*	*Suceava*
Housing measures	*1. Efficient and smart climate shell refurbishment*		*X*	*X*		*X*
	2. Smart building logistics and alternative fuelled vehicles					
	3. Smart, energy saving tenants through information	*X*	*X*			*X*
	4. Smart local electricity production and integration with buildings and grid			*X*		*X*
Integrated measures	*5. Smart lightning, lampposts as hubs for communication*	*X*	*X*	*X*		*X*
	6. Waste heat and local heat integration by new business models		*X*			
	7. Smart waste collecting, turning waste to electricity, heat and biogas for vehicles.	*X*				*X*
	8. Big data protocol for saving energy and improving the quality of life	*X*				
Mobility measures	*9. Sustainable delivery*				*X*	
	10. Smart traffic management					*X*
	11. Alternative fuel driven vehicles for decarbonizing and better air quality	*X*		*X*		*X*

	12. Smart mobility solutions		*X*	*X*	*X*	*X*

Smart Solutions Graz plan to replicate (according to GA)

Smart Solution 1. Efficient and smart climate refurbishment
The issue of innovative energetic district redevelopment will become strategically relevant in Graz for the next years and will additionally play an important part within our Smart City-Strategy in near future. Thus the City of Graz would especially benefit from innovative energetic district redevelopment know how and as well from ICT-knowhow as expected outcomes of the prepared GrowSmarter project. The both Smart City Districts GRAZ WEST (Waagner Biro, Graz Reininghaus) and GRAZ SÜD defined within the official city development plan have a potential concerning refurbishment of multi-storey-buildings of the 1970ies (energy efficient renovation).
Graz intends to replicate smart solutions in integrating know how from the lighthouse cities in refurbishment strategies which should be developed first for these local Smart City districts; besides innovative financing schemes (PPP) for implementation purposes should be expedited in Graz within the Horizon 2020 Project.

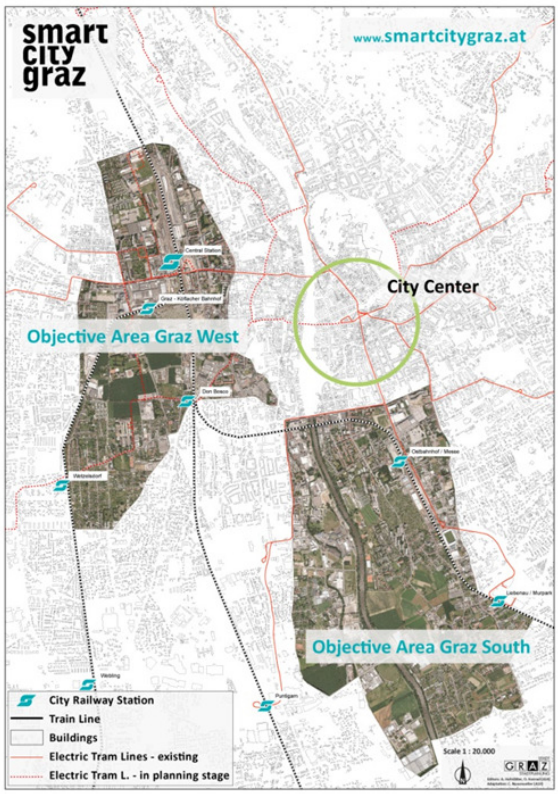
Smart Solution 3. Smart, energy saving tenants
Within the Smart City Strategy of Graz various target-group-specific participation actions are foreseen at the moment. The City of Graz aims to gather additional know how in this field of action from GrowSmarter that should be implemented within existing strategies.

Smart Solution 5 Smart lightning, lampposts as hubs for communication
A communal smart lightning strategy should be implemented in the medium term after the Smart Solutions are tested in the GrowSmarter project. Graz aims to replicate suitable solutions in this field of action integrating them in the currently planned lightning strategy.
Additional knowhow through the GrowSmarter could therefore ideally be taken in account.

Smart Solution 6. Waste heat and local heat integration by new business models
Because of the change of global economic parameters the existing long-distance heating grid in Graz is currently disputed. Questions of cost effectiveness and alternative decentralized district solutions are in discussion (e.g. miniature cogeneration plants considering in advance the opportunity for a future expansion option). As replication measures within the GrowSmarter project the City of Graz plans to set up a local action group gathering local stakeholders from the administration, the energy supplying companies and other relevant sectors as well. After this first step a discussion and a decision-making process will be started to define the main points for a new "waste heat and local heat integration strategy". Subsequently the first steps to implement waste heat and local heat integration pilot projects
could then be defined.

Smart Solution 12. Smart mobility solutions
Citizens feedback on traffic plans, direct mobility surveys and mobility monitoring is beside an attractive supply of eco-friendly urban mobility foreseen within the local Smart City Strategy - additional knowhow which could be implemented in existing strategies would be strongly appreciated and could be seen as a replication measure growing out of the Horizon 2020 project which would have real value for future civic participation processes driven by the municipal administration of Graz.

5.3 Smart City and District Replication



5.3.1.3 Smart District Waagner Biro Replication Profile

Mapping of district related replication framework for selected Smart Solutions

Q1 What are the main characteristics of the district and what is the replication potential?

SMART CITY TARGET AREA GRAZ WEST
The "Smart City Graz"-strategy will be first implemented around Waagner-Biro-Straße in Graz West. This former industrial area near the center of Graz is an important local land reserve that will be developed into a sustainable place to live and work, boasting a high quality of life. National funding of the Climate and Energy Foundation facilitates flagship projects that implement modern technologies, deliver sustainable energy and preserve resources. In addition, a new residential area and a high-quality public space will be created.

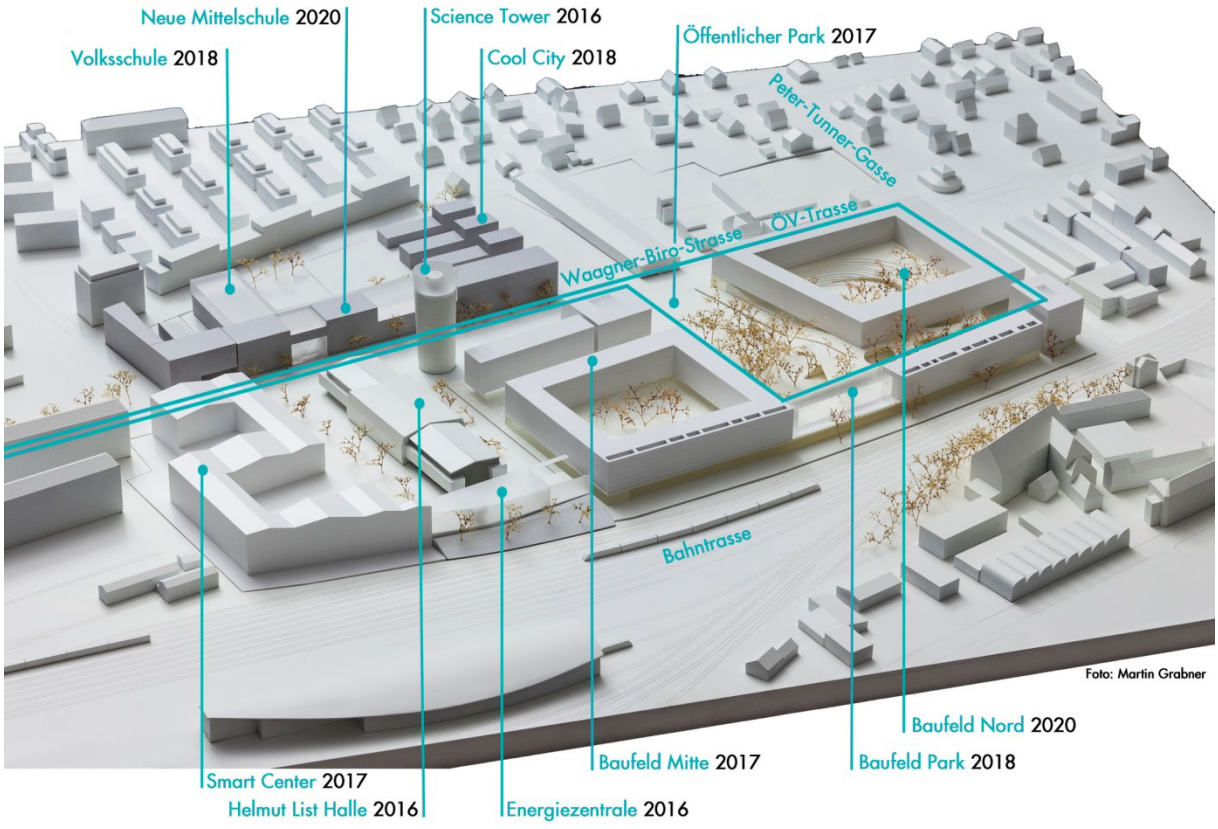
SMART CITY GRAZ WAAGNER BIRO

A new, energy-autonomous city district will emerge in the former industrial area next to the main railway station of Graz, surrounding the cultural venue Helmut-List-Halle.
Energy technologies for the intelligent "Zero-Emissions City" will be used for the first time in Graz. The project components include integrating Grätzel cells and implementing flagship construction (e.g. the research tower), a local energy network and residential and commercial areas with innovative building technologies, sustainable urban mobility and generous open spaces.

KEY FEATURES OF THE PROJECT

- *Realizing the first local energy network*
- *Implementing Grätzel cell technology in building facades*
  One of the core technologies of the Smart City Graz project are Grätzel (dye-sensitized solar) cells. The Science Tower will be enveloped in colored to whitish translucent photovoltaic cells, housed between glass plates. These solar cells imitate the photosynthesis in plant leaves, turning light into electrical current.
- *Science Tower: The cornerstone of Smart City Graz Waagner Biro is the construction of the "Science Tower," by FIBAG and SFL Technologies. The 60-meter-high research tower north of Helmut-List-Halle will house research institutions and feature a publicly accessible rooftop garden.*
- *Meeting Smart City goals through PPP contracts in the energy, mobility, building*
- *technology and public space sectors*
- *Accompanying city district management to involve all actors*

The Smart District Waagner Biro is the first Smart City pilot project in implementation in Graz; as outlined before a strong PPP-consortium under the leadership of the municipality is supporting this project.



all planning processes follow the overall Smart City Strategy and the master plan defined for this district

What financing and funding opportunities exist?

- *national funding by the Austrian Climate and Energy Fund*
- *as from 2015/16: specific Investment Priority within the national EDRF-programme for capital expenditure projects (e.g. public buildings like schools, etc.) which save carbon dioxide in the framework of Smart City Strategies in Styrian municipalities*
- *urban development contracts between municipality and private investors pre-arranging the co-financing of public infrastructure in pilot development sites (mobility measures, open space, etc.)*

Q2 Are there synergies and/or conflicts related to the Smart Solutions with the existing infrastructure, socio-economic profile and social acceptance?

- *Name and specify synergies and/or conflicts in regards to existing infrastructure, interests of people, etc.*
- *Name and specify supportive initiatives/projects within the district related to smart refurbishment, energy, integrated infrastructure, mobility, ICT, data management etc.*
- *Please provide an overview of scheduled regular checks and renewals per type of infrastructure in the resp. district.*
- *What future infrastructure and/or projects are planned n the next 5 years that would support the replication of Smart Solutions?*

to be completed after internal discussion process

Q3 How will local stakeholders be involved in the replication of Smart Solutions?

- *What stakeholder groups exist? What are their roles within the district?*
- *What are their main interests/objectives?*
- *Which groups can be supportive, skeptical or blocking?*

to be completed after internal discussion process

Mapping district related opportunities and needs for a successful replication

Q1 What are the main needs/ambitions for becoming a "Smart District"?

In our point of view the main needs to become a "Smart District" are

11. *the opportunity to form a strong alliance/consortium consisting of private investors, industrial partners, scientific stakeholders/universities, existing residents, local administration and politicians*
12. *a common understanding of the partners in regard to the targets of the collaboration in implementing smart city measures resulting in mandatory contracts/agreements defining rights and obligations within the project*

Q2 What insights and opportunities can the district offer to the LCs and other FCs?

- model for an economically evaluation of the Smart City pilot projects Graz (currently in finalization – first a local political discussion on the results of this economically smart city evaluation model will be carried out, after this step a possible sharing of this tool within the GrowSmarter project can be discussed internally)
- experiences in developing urban construction contracts between the municipality and private investors
- experiences of implementing a test-system for intermodal hubs for public transport with with an emphasis on e-mobility solutions (currently start of implementation phase)
- experiences in large-scale test case of dye-sensitized solar cells within the Smart City Waagner Biro urban development project ("Grätzel-Cells"; Weblink: http://www.g2e.ch as a subsidiary company of the local consortium partner FIBAG and SFL Technologies)

5.3.1.4 District Graz Reininghaus - Smart Solutions Specifications

to be completed after internal discussion process

Smart District Waagner Biro:

Adaptation of solutions towards the most effective deployment and integration

Replication of Smart City Solution

Smart Solution chosen (only No. is used to answer following questions):

1. Efficient and smart climate refurbishment

3. Smart, energy saving tenants through information

5. Smart lightning, lampposts as hubs for communication

6. Waste heat and local heat integration by new business models

12. Smart mobility solutions

Q1 What is the replication potential of the Smart Solution?

- *1: urban refurbishment strategy should be developed in the medium-term; main question how deep refurbishment on district level/level of building ensembles should be financed (currently there is only an object based funding foreseen on province level)*
- *3: energy saving issues should be considered more strongly as well by individuals*
- *5: innovative energy- and cost-saving for public budget*
- *6: existing long-distance heating grid in Graz is currently disputed because of supply security reasons; issues of cost effectiveness and alternative decentralized district heating solutions are in discussion;*
- *12: promoting eco-friendly urban mobility measures is one of the top priorities of Graz because of the need to improve air quality above all in reducing particulate matter.*

Key policy and legislation frameworks affecting the solution's development / implementation

- *1: Urban Development Concept of the City of Graz; Energy and Climate Protection Strategy Graz; Steiermärkisches Raumordnungsgesetz 2010 (defines legislative planning instruments of the municipality); OIB-Richtlinie 6 - Energieeinsparung und Wärmeschutz (national standards for energy savings and thermal insulation for buildings as a basis for the application for subsidies for housing construction and refurbishment of the province; regulations for subsidies for housing construction and refurbishment (province level)*
- *3: Energy and Climate Protection Strategy Graz (Kommunales Energie- und Klimaschutzkonzept für Graz - KEK GRAZ 2020)*
- *5: Energy and Climate Protection Strategy Graz; Energy efficiency Directive 2012/27/EC*
- *6: Energy and Climate Protection Strategy Graz; strategy paper "Heating Supply Graz 2020/2030"*
- *12: „Grazer Mobilitätskonzept 2020"/Graz Mobility Concept 2020; E-Mobility- Model Region Graz Strategy*

Status quo of deployment of solution (e.g. feasibility study available etc.)

- *1: not yet existing*
- *3: diverse information campaigns and online energy saving calculators provided by the environmental department*
- *5: pilot projects Green Light Graz 1+2: modernization of 19.000 spotlights to LED (2005-2010), URBAN PLUS sub-project: Energy-Efficient Intercommunal Street Lightning (2014)*
- *6: strategy paper "Heating Supply Graz 2020/2030"*
- *12: E-Mobility- Model Region Graz (project in implementation)*

Specify area and scope of potential implementation (e.g. deep refurbishment of m^2)

- *1: can not be assessed at the moment*
- *3: Smart District Waagner Biro*
- *5: Smart District Waagner Biro*

- *6: can not be assessed at the moment*
- *12: Smart District Waagner Biro*

What needs to happen for the Smart Solution to get implemented?

- *1: the achievement of developing a specific refurbishment strategy as a part of the smart city strategy; rethinking of allocation of funding for refurbishment measures (increasing attention on innovative refurbishment measures for old buildings; until now new buildings were focused by the relevant social housing cooperatives/private investors/funding bodies on province level)*
- *3: approval of innovative financing models in regard to concrete benefits for the tenants; cost-efficient implementation strategies for the municipality*
- *5: approval of cost-efficient implementation strategies for the municipality*
- *6: necessary consent to new business models from the local energy suppliers (partly owned by the City)*
- *12: some smart solutions are already implemented yet, nevertheless Graz intends to learn more from the project partners*

Q2 What is the business case and do financing opportunities already exist?

no business case/financing opportunities yet

Technological barriers

6: competitive system to existing (high temperature) district heating grid (covering main parts of the town)

Potential financing opportunities (European, national, private etc.)
1: national ERDF-Programme
3: ?
5: national funding schemes by Austrian Climate and Energy Fund
6: ?
12: national funding schemes by Austrian Climate and Energy Fund

Market up-take / expected consumption
not yet known

Future financing model and ownership of Smart Solution
not yet known

Q3 What is the potential implementation timeframe?

not yet known

Q4 How does the Smart Solution integrate with the existing and future infrastructure?

- *1: ideally innovative refurbishment measures for old buildings should enable a transfer of suitable smart city-technologies also to existing urban infrastructure*
- *3: energy saving behaviors of users concern new buildings as well as old buildings*
- *5: smart lightning measures cannot be implemented all over the city at the same time; thus it is necessary to factor in a phased implementation in coordination with the existing lightning system*
- *6: in this field of action in Graz only isolated solutions will be realistic to implement because the existing district heating system is technical designed for higher temperature conditions than state of the art-heating solutions*
- *12: ideally existing mobility infrastructure and initiatives could be complemented with smart solutions of the GrowSmarter-project*

Replication needs of Smart City Solution

Q5 What user / stakeholder involvement is foreseen?

1: amongst others: Technical University Graz, Environmental Department, Urban Planning Department, social housing cooperatives, private investors if possible, funding bodies on province level
3: amongst others: StadtLABORGraz (NGO; deals mainly with participation issues/stakeholder processes within the pilot project), tenants, Environmental Department (have certain experiences with this issue so far)
5: amongst others: Department for urban road administration/lighting unit; Energie Graz as a outsourced service provider for energy and lighting issues; Energie Steiermark as a consortium member of the Smart City Pilot project
6: amongst others: Technical University Graz, Environmental Department and Energie Graz, our local energy service provider
12: amongst others: traffic planning department, e-mobility GmbH as an outsourced division of Holding Graz (municipal economic enterprises)

<u>What are their main interests (I)/objectives (O)/expectations (E)?</u>
Solution 1
I: innovative financing schemes for implementation purposes to convince housing companies and housing associations owning real estate to implement innovative refurbishment measures (e.g. cost-effective retrofit installations of elevators or balconies or barrier-free/accessible ground floor apartments);
O: fostering to create a refurbishment strategy/guideline for the City of Graz in the medium-term
E: to learn from experiences from the lighthouse cities in implementing refurbishment measures (also without the usage of EU-funding or other funding schemes)

Solution 3
I: to learn new (information/educational/didactic) approaches in motivating tenants to optimize their daily energy usage
O: to include such approaches within the participation measures within the Smart City pilot project and perhaps also within other city-wide projects
E: to learn from experiences from the lighthouse cities in implementing such information approaches

Solution 5
I: to get known of innovative approaches in regard to smart lightning, multifunctional lamppost usage (above all financing models for technical upgrades)
O: to use GrowSmarter know how to create new lighting projects
E: to learn from experiences from the lighthouse cities in implementing and financing such measures (also without the usage of EU-fundings or other funding schemes; eg. contracting models)

Solution 6
I: to get known of innovative approaches in regard to waste heat and local heat integration (main problems: only isolated solutions possible in Graz; costs of provide backup systems; new heating approaches are competing directly with existing Business Model of the municipality)
O: to get new ideas and inputs how to combine exiting and new heating systems at city level
E: to be able to get known of heating strategies of lighthouse cities and discuss them on expert level

Solution 12
I: to get known of innovative approaches in regard to smart mobility issues (beside technical solutions as above financing models are relevant for Graz)
O: to learn from experiences from the lighthouse cities in implementing such measures
E: to complement existing pilot strategies with know-how from the GrowSmarter-project

<u>What group(s) can be supportive (SU), skeptical (SK) or blocking (B) towards the solution?</u>
Solution 1
SU: municipal planning departments, environmental dep., dep. of provincial administration level
SK: social housing cooperatives, private investors
B: not yet known

Solution 3
SU: municipal planning departments, environmental dep., Stadtlabor Graz
SK: tenants, local population
B: not yet known

Solution 5
SU: municipal planning departments, environmental dep.
SK: financial department
B: financial department

Solution 6
SU: local scientific community, municipal planning departments
SK: environmental dep., local energy supplier
B: parts of local politics

Solution 12
SU: e-mobility Graz, Holding Graz, traffic planning department, other municipal planning departments
SK: not yet known
B: not yet known

Q6 What are the capacity building needs for the successful deployment of the Smart Solution?

Solution 1: how are the lighthouse cities dealing with strategic refurbishment aspects (city-wide);
are there special incentives for social housing cooperatives, private investors to implement innovative deep refurbishment projects in the three LC?
Solution 3: how are the lighthouse cities dealing with this issue in general – are there city-wide initiatives for energy saving in residential areas?
Solution 5: how are the lighthouse cities dealing with financing of innovative lighting?
Solution 6: how are the lighthouse cities dealing with this topic on a strategic level? What are the general legal conditions and economic parameters for centralized and decentralize district heating systems?
Solution 12: does an overall smart mobility strategy exist in the lighthouse cities; how is the public transport and its further expansion financed?

<u>Internal (public administration P) and external (stakeholder S) capacity building needs and areas of interest for peer-to-peer</u>
Solution 1
P: in terms of municipal refurbishment strategy
S: in terms of financing models

Solution 3
P: in terms of new information strategies
S: -

Solution 5
P: in terms of technological aspects as well as for financing options
S: -

Solution 6
P: in terms of technological aspects as well as for financing options
S: in terms of technological aspects as well as for financing options

Solution 12
P: -
S: in terms of technological aspects as well as for financing options

<u>Indicate, if business dialogues with companies involved in implementation would be useful</u>
1: not yet known
3: not yet known
5: probably useful

6: not yet known
12: probably useful

Q7 What secondary effects do you intend to achieve with the implementation of the smart solution?

Solution 1: positive impact in the field of social housing; cheaper residential rents through saving energy costs (at least on a long term); a shift of interest in refurbishment of old buildings instead of focusing on new building projects; enabling older people to live in their usual environment by implementing more barrier-free/accessible apartments in old buildings; savings of accommodation and care costs;
Solution 3: cheaper housing costs through saving energy costs; effective awareness raising;
Solution 5: better coordination between service providers concerning buildings, ducts and masts
Solution 6: fostering resilience in urban heat distribution systems
Solution 12: reducing CO2 and PM10 and noise emission from urban traffic; rising air quality for Graz

7. Replication Assessment of the Follower City of Porto

7.1 Smart City Replication Profile

Mapping the overall framework conditions for replication within the city territory

Q1 What is the overall replication potential for Smart Solutions until 2020 and beyond?

The city of Porto is the second-largest city in Portugal and one of the major urban areas in Southern Europe. Porto has more than 250,000 inhabitants and it's the centre of a large metropolitan area with more than 1.8 million inhabitants.

In February 2010, the Porto Digital association founders, led by the City Council, launched a new strategic plan, which aimed to foster the development of Porto as a knowledge based city and in which the innovation area has a paramount importance. As the name of the strategy hints, such strategy leverages the investments done by the Municipality since 2005 on a large scale fibre optic backbone and in an advance ICT platform.

Porto has also designed and embraced a policy strategy aiming at implementing measures for the implementation of Smart City principles. Citizen's centred sustainability, energy efficiency, R&D and economic growth are the main areas of interest of the City who started different programmes and projects in those areas. The implementation of this innovative strategy adopted an interdisciplinary approach in which the city well-known strengths are aligned with the excellence of the work developed by the Academia. With the support of reference industry partners, the strategy developed was able to contribute to the creation of hundreds of qualified jobs and to transform the city centre into a place where people, especially young entrepreneurs, are inspired by a new risk culture and integrated in a new multicultural and international ecosystem. As a clear result of this strategy the city is now attracting more people for the city centre, creating new jobs, developing solutions required by citizens, reducing social exclusion, and increasing the city security.

As an example of the impact of the aforementioned strategies, the University of Porto was awarded a grant of 1.6M€ from the FP7 Capacities program, justified by the development of the Porto Living Lab and the expansion of the Centre of Competence in Future Cities of the University of Porto. Also as another example of this strategy 'impact, UPTEC, the Science and Technology Park of University of Porto, won the RegioStar 2013 award in Smart Growth.

Another example is the Porto´s Sustainable Energy Action Plan (SEAP-P), which was created aiming at responding to the commitments assumed under the Covenant of Mayors. The Municipality together with AdEPorto (Agência de Energia do Porto - Energy Agency of Porto) had previously foreseen an Action Plan following the energy diagnosis and CO_2 emissions inventory, the Energy Matrix, published in 2007 with data referred to 2004. The Porto Smart City strategy is fully aligned with the sustainable Energy action plan developed. The interventions in progress reflect this this alignment of strategies. The rehabilitation of the different areas of the city take into consideration the energy efficiency of buildings, the reduction of CO2 emissions and the behavioural transformation of citizens by involving them in the decision making process.

Within the strategy of the city, several initiatives have been undertaken with a special focus on the implementation of the projects in accordance to the Porto´s sustainable strategy. With the support of the designed strategies (essentially based in Porto's Sustainability Strategy of 2009), Porto has been implementing the several projects aiming at addressing sustainability and energy efficiency issues.

As presented in the figures bellow the Porto's SEAP defines an ambitious goals for greenhouse gas reduction in several areas, but foremost important is to highlight that the new smart City Strategy expands this targets to new areas. For instance, the public lighting infrastructure is already being replaced by a LED technology and the end of 2015 at least 10% of the total infrastructure will be replaced.

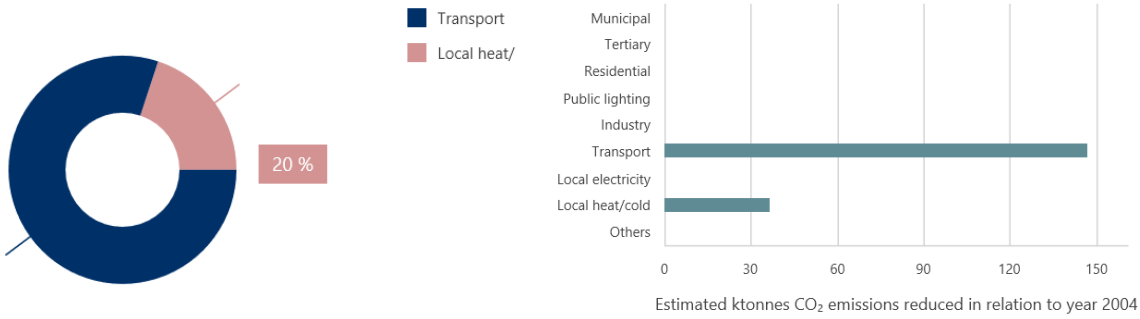


Figure 1 - SEAP - Estimated greenhouse gas emissions reduction in 2020

Promotion of urban rehabilitation of the historic center of Porto, World heritage, contributing to the development and for social and business dynamics of this area of the city. Give the priority to reduce motorized individual transport by encouraging collective means of transport, favouring unequivocally intermodality and creating infrastructure for less polluting forms of transportation, such as bike and enhancement of footpaths. Affirmation of the city of Porto as an "Educator", who values education and correct training of all its citizens as a necessary condition for citizenship. Develop attractive conditions for the reception of advanced services and intensive economic activities, based on the relation to research and development institutions. Boost Porto as a City of Innovation and Science through cooperation platforms between economic agents, business, and research and development entities. Promoting Porto s a sustainable city, in its relationship with the territory in historical aspect, its sustained centrality function, and "brand in the region". The measures directly related to the reduction of CO2 emissions and energy efficient materialize in various interventions such as placing solar panels in social buildings, building refurbishment, creation for the Observatory of Energy and Environmental Sustainability of Buildings, the fleet moved STCP the natural gas.

The structuring of the measures took into account a set of methodological steps guided by energy efficiency criteria and assessed by their potential contribution to the reduction of CO_2 emissions, namely:

- Characterization of Porto´s quantitative and qualitative (electricity, heat, etc.) specific energy needs, in line with the Energy Matrix (2007);
- Integration of energy issues within an urban sustainability framework, as defined in the " Porto's Sustainability Strategy" (2009);
- Identification of the Porto energy carriers (final energy), needed for buildings and their activities; mobility and transport; and general productive activities (industry, commerce, etc.);

- Definition of the final energy options according to useful energy[6]: heat for cooking, domestic hot water and environmental comfort; electricity and fuel for transport; electricity for artificial lighting, appliances, etc. Example are solutions for domestic hot water, representing about 25% of the consumption for a Portuguese average household, with solar systems using natural gas as back up, or the promotion of district heating and cooling networks on natural gas, the cleanest fossil fuel for the paradigm change;
- Assignment of high priority to the demand management and to the access to more efficient technologies. Demand management examples are the improvement gained from higher insulation of either rehabilitated or new buildings, better management of solar gains (shading,...) and public transportation promotion as the alternative that overcomes any individual using energy vehicle. Examples of access to more efficient technologies are the exploitation of the potential intelligent natural lighting; the spread of low consumption, public and interior, artificial lighting; the expansion of very efficient electrical appliances; but, also the perspectives for new urban mobility paradigms. Porto, as other cities in the Europe, is facing a intense change in the mobility sector. New and innovative forms of transportation are appearing every day. The most important new paradigms are related to the use of the electrical car, the implementation of a consistent programme for intermodality in collective transportation and new models such as car sharing or mechanisms such as Uber.

Equally a Local Action Plan was developed in the context of the CSI (City Sustainable Investment) programme (integrated in the URBACT initiative), conceived as to explore European Structural Funds to achieve a smarter city. Amongst the objectives of this Plan, it is important to emphasise the creation of a UDF (Urban Development Fund) specialised in sustainable and affordable projects, and the strengthening of technical training and information improvement.

The Local Action Plan comprises three main actions: Support Fund for the Renovation of Buildings of the Historic Centre of Porto; Technical Assistance; and Pilot Project.

In the constitution of the LAG (Local Action Group), a set of criteria was considered, including the need to include:

- different levels of government: national, local and metropolitan;
- different sectors of activity that were chosen from the diagnosis of the city (this diagnosis was made through a multi-stakeholders analysis with an important participation of the research and academic partners of the city) - the best activities to sustain a process of growth in the future (2014-2020). In the composition of the LAG, a set of principles was considered, namely the need to represent the different areas of activity and the main entities related to the management of the Urban Development Funds (UDFs), including those related to the Europe 2020 strategy. Thus, the LAG of Porto, includes 21 entities and about 50 active members
- representatives of the private sector, public sector and of other forms of organisation;
- entities directly associated with the management of UDFs and the Holding Fund;
- Educational, R&D and training institutions;
- institutions in the Entrepreneurship and SME area;
- active institutions in the social area;
- institutions in the area of mobility.

[6] The portion of final energy which is actually available after final conversion to the consumer for the respective use. In final conversion, electricity becomes for instance light, mechanical energy or heat. (www.euronuclear.org)

The strategy for the city of Porto included, so far the use of different funding's to ensure the valorisation of the city ecosystem. As an example it is important to refer the creation in July 2009 of the JESSICA Holding Fund Portugal (JHFP), with a total amount of 130M€, from which Porto clearly benefitted. Its Investment Committee comprises the Managing Authorities of the five Operational Programmes as well as the Operational Programme for Territorial Enhancement (OPTE) and the Directorate General of Treasury and Finance. The tender process that took place between 2010 and 2011 resulted in the creation of three UDFs run by three separate entities (Caixa Geral de Depósitos, Banco Português de Investimento and Turismo de Portugal) in five regions of continental Portugal. In Porto, there are two operational UDFs, one managed by Banco Português de Investimento and the other by Caixa Geral de Depósitos. 54% of the 20 projects identified until today in the city are related to tourism. Tourism has an element with an important impact In the city transformation. Its significant influence in the cities growth and rejuvenation, given its cross-cutting impact on the society, leads to strong effects on the many aspects of the economic, social, cultural and territorial city life.

Tourism can work, if properly planned and efficiently managed, as a catalyst for a dynamic economic growth and social development in cities by re-building infrastructure, creating jobs, stimulating local business, developing partnerships, creating distinctive local attractions, and others. In these cases innovation is commonly used as a vehicle for developing new products, addressing to existing and new market niches and upgrading the quality of the city services.

In the city, the multiplier effect of JESSICA is of 5 with one Euro of JESSICA investment leveraging five Euros of private investment.

Q2 How does the "Smart City" approach feed into/connect with your existing local planning processes?

As described above Porto has been implementing strategies and plans designed to ensure that it becomes a Smart City. The move towards a Smart City is not the result of a single initiative neither a question of an accumulation of initiatives. The main success factor is a change of mentalities at all levels of the Local Public Authorities and the ability to exploit the articulation of local and regional/national initiatives, mutually reinforcing and creating the relevant scale and impact.

The particular attention given by the Local Authorities to innovation favours and reinforces also the adoption of Smart City concepts as it links the advanced thinking of innovation clusters with the administrative practices.

As an example it could be mentioned is the important attached to the connection between the SEAP-P, the urban mobility plans and the territorial development.

Within the context of the Smart City Plan and organizational structure, several synergies have been articulated although some constrains regarding legislation can be identified. The City, as an energy system or a cluster of energy systems, is not isolated. It is interlinked and part of the North Region and of the Country system, aspect that may bring benefits, such as the contribution to the national renewable electricity program (focussed on the decarbonisation of the electricity mix) put in motion in the last decade. Regarding the electricity mix evolution, REN – Redes Energéticas Nacionais (National Energetic Grid Lines) – draws two expectable evolution scenarios of the national electricity production system in the period 2009-2013 and until 2020 : Reference Scenario2, which includes energy efficiency measures of PNAEE – National Energy Efficiency Action Plan; Efficiency Scenario3 – 20%, assuming a total CO_2 emissions reduction by 20% in 2020, compared to the ones verified in 2005 (in line with the European Union objectives Europe 2020). In the contrext of the city, the main goals of such initiatives and plans are to improve the quality of life of the citizens, contributing to the

city´s actractiveness for social and economical purposes. The aim is to improve economic growth, attract new investements and implement an energy and sustainability framework integrated with the national and European ones. At the same time such plans call upon the Academia to exploit the benefits of ICT based systems such as smart grids. The implementation of pilots and the development and integration of technologies, possible on top of open services platforms, is a path being explored by the Municipality.

As a conclusion, the example of sustainable energy is here provided to illustrate how the integration of the city dimension in national initiatives provides critical mass and the rigth dimension, making the city more attractive and economicaly viable, creating a push/pull mechanism in which technological innovation is triggered in a context of innovation ecosystems of startups that respond to the needs of the public authorities and the expectations of the citizens.

The Porto Municipality has implemented in June 2015 the new Integrated Management Center in the Town Hall. This center brings under one roof the services responsible for Mobility, Municipal Police, Fire department, Civil and Environmental Protection, and its main objective is to contribute to increased efficiency and effectiveness in areas such as street cleaning and waste collection, security and civil protection and traffic control, among others.

The Integrated Management Center is a key step in the creation of the first National City Operator, the municipality is developing, and where the use of collection tools and advanced data analysis, implemented within a "Smart City" concept, will promote an effective "smart" management of the municipal services.

Cities are generating an increasing amount of information from the traffic light systems that can adapt to the dynamic mobility standards, traffic cameras, which more or less automated identify a wide variety of situations in the public highway , environmental sensors, which are now able to give us information in real time and on a scale never before possible. The information generated by these platforms will require an agile management and multi-service, for only in this way can all this information be translated in efficiency gains with clear and objective improvements in services provided to citizens.

With this new management center, and the creation of the City Operator, the City Council intends to put the city of Porto in a new level of integrated management services following its own strategy of innovation and inspired by the best practices.

In addition to the initiatives presented above, the Municipality decided, in 2001, to implement a Monitring system of Urban Life Quality (MSCQL). Running since then, this project has been capable to compile data on the living conditions and wellbeing of the city, monitoring the progress path in severel dimensions. This trend monitoring exercise, which includes the environmental, economic and social level (with crucial impact in the quality of life of the citizens), has been accompanied, over time by a performance comparaison of the Porto metroplotitan area with the reality observed at a national level and with the European Benchmarks. Another component of this project is the mesurement and data collection of the citizens perception about the city quality of life. With these two areas coombined, the city aims at providing a solid support for decision making by deepening the kowledge about the challenges that the city and the citizens face in their dayli lifes. Thus this is a platform provided by the municipality for an easier access to relevant information, to stimulate the debate, to rise collective awareness on several matters and to stimulate collaboration between citizens and local governemnt.

Q3 Is there a (strategic) plan and organisational structure in place to become a "Smart City"?

Porto Municipality has been consolidating the local ecosystem for the creation of a multidisciplinary and cross-sectorial strategy for the implementation of the Smart City concepts.

Within this strategy, Porto Digital, a company owned by the Municipality of Porto, has emerged as one of the main organisation/infrastructure capable of supporting this intervention.

The aim of Porto Digital is to contribute decisively to a structural change in the operating mode of the city, to make it ready to improve and address the challenges. Recognizing the difficulty of this task, four key points were conceived as a goal to achieve measurable results:

- Education - make a qualitative leap in terms of infrastructure to support the use of ICTs in education covering all the way from primary school to university and R & D laboratories.
- Employment - to increase the competitiveness of the business fabric of the city of Oporto and make it more attractive for investment.
- Bureaucracy - reduce inefficiency and bring citizens closer to the public administration.
- Quality of life - improving urban quality of life for residents, workers and visitors to the city of Porto.

Porto Digital will act at several levels, to ensure that citizens, academia, industry and Public Authorities can cooperate, benefit and be active partners in the process of creating a Smarter City. Porto Digital acts therefore at the level of:

- Infrastructure – to allow a generic access to the digital world (looking at digital as a basic services, equivalent to energy, communications, water or sanitation)
- Promotion - enticing real communities to the digital world, looking to its articulation with the real world by producing contents in areas such as scientific, informative, tourist, recreational and cultural
- Accessibility - spreading access points to the Internet and services throughout the city
- e-Government - redesigning administrative processes, exploring the notion of e-citizens and adding transparency to local government
- Sub-sectorial projects - representing an intervention at the level of a sector area (such as employment, economy or culture) aiming at modernizing the economic fabric and increasing competitiveness through business cooperation activities, research and development, investment attraction, increased productivity and increased qualified employment.

Q4 Are there synergies and/or conflicts of the "Smart City" plan and organizational structure with existing initiatives and their structures within the city?

There are many synergies between Porto City, Porto Digital and other entities and initiatives in the field. Organizations such as UPTEC, INESC Porto and others create a multi-sector cluster which provides opportunities for collaboration and innovation to achieve economic growth, to address mobility issues and to improve energy efficiency.

Q5 Which and how are regional and local stakeholders involved in the Smart City strategy and planning process on a city level?

It becomes clear, from the stated above that the local ecosystem being induced by the City of Porto includes a significant number of partners which are representatives of the local and regional dimensions.

The stakeholders involved in this process include the structure described below.

The governing bodies of the Municipality of Porto are the City Council (the executive office) and the Municipal Assembly (deliberative body). Porto Digital will, as described above, act in different domains to ensure the cooperation between the stakeholders of the city.

As an example of other stakeholders involved from the City side, the urban regeneration plans in the city centre are managed by Porto Vivo, SRU - Sociedade de Reabilitação Urbana da Baixa Portuense, S.A. (Society of Urban Rehabilitation of the Centre of Porto); the Integrated Management Centre will play an important role in the strategy; and APOR (Agência para a Modernização do Porto – Agency for Porto´s modernization) is a partner which creates synergies for better cooperation between public and private entities and promotes the upgrading and modernization of the urban, industrial and business fabric of the city.

The aim, and very much the reality, is to involve all the relevant stakeholders from the local ecosystem considered important for such developments. Those stakeholders are from the academia side, such as the University of Porto, the Polytechnic of Porto, from the research side, such as INESC Porto, and from the entrepreneurial side, such as UPTEC.

Q6 What are past (<5 years) and current projects that are closely related to the "Smart City" concept?

In the last 5 years Porto has been part of several projects that are very relevant in the Smart City domain and in coherence with the Political strategy to transform Porto into a Smart city.

- Enter.Hub - European Network exploiting Territorial Effects of Railway Hubs and ***their Urban Benefits***

  The Enter Hub project aims at:

  - Supporting and promoting a global vision of transport and territorial development, considering mobility, transport networks and in particular the TEN-T as a European backbone in terms of connections and interaction but also in terms of territorial development;
  - Promoting sustainable, common and easily available transport systems all over Europe, to make cities and regions more accessible, more attractive and more competitive;
  - Sharing practices and using an exchange and learn approach in order to enrich their common and strategic vision of future Europe at different territorial scales, also in view of the new financial programming period 2014-2020, concerning urban and infrastructures development.

- CIVITAS – ELAN – Mobilising Citizens for vital cities:

  The mayors of the cities of Ljubljana, Gent, Zagreb, Brno and Porto have agreed to a common mission statement “To ‘mobilise’ our citizens working with them to develop clean mobility solutions for vital cities, ensuring health and access for all.”

  As a policy-driven project, CIVITAS-ELAN will make significant contributions to major global, EU and national policy processes. In responding to citizens’ needs, CIVITAS-ELAN has identified 18 common headline objectives for each CIVITAS policy field:

  - Increasing energy efficiency
  - Using alternative fuels
  - Cleaning up vehicle fleets (electric, hybrid, integrated strategies)
  - Implementing effective, high quality mobility solutions

- Planning intermodal infrastructure with public participation
- Charging for access
- Managing public space and access
- Improving mobility management
- Making walking and cycling more attractive
- Establishing a mobility dialogue with the citizens
- Developing integrated & target-group specific safety/ security strategies
- Increasing road safety
- Improving security in PT
- Implementing flexible mobility services
- Rationalising freight distribution
- Giving priority to clean modes
- Enhancing traveller information & ticketing
- Introducing telematics for clean modes.

- Future Cities: Porto Living Lab

  The Future Cities Project aims to turn Porto into a smart city, a living lab, by providing it with a wide range of sensors and communication equipment, thus creating the conditions for future research and development using advanced technologies for data collection through mobile platforms, wireless communication and large-scale information processing. This living lab enables the development of research in areas such as sustainability, mobility, urban planning and information and communication technology.

  As in all Living Labs the main methodological approach is based on open and user centered innovation: the pilots and experiments already accomplished (e.g. with taxis, buses) show how important has been for the city to adopt such a methodology as potential future solutions benefit from an early validation and adoption by citizens.

- CSI Europe:

  Porto Vivo, SRU participates in the project "CSI Europe: City Sustainable Investment in Europe - asking financial instruments work for cities", which aims at analysing the role of financial instruments in the planning of sustainable urban development. Some concrete results deserve a lot of credit, namely in the context of urban revitalisation.

- Scale up Porto:

  The project ScaleUp Porto emerges as an initiative that aims to stimulate the Innovation ecosystem targeting existing high growth and high potential businesses and giving them access to opportunities in the area of financing, skills and customers.

  The Municipality of Porto has already carried out several initiatives in the area of entrepreneurship and innovation with the objective of consolidating the city ecosystem of

innovation, fostering employment, economic development, internationalisation and the well-being of citizens.

Q7 Which sites/districts are projected to be developed in the next five/ten years?

The district areas of intervention for the next 5 to 10 years are mainly identified by the ARU (Areas of urban Rehabilitation) defined by the Porto Municipality. There are 7 ARU created in the Porto City which aim at addressing different issues all around the urban area.

- ARU do Centro Histórico do Porto

The ARU of the Historical City Centre is the first of seven ARU to be created in accordance to the provisions of RJRU (Regime Jurídico de Reabilitação Urbana – Legal System for Urban Rehabilitation) which provides that municipalities must, within 5 years from the date of entry in effect of this law, implement a strategy for urban rehabilitation of the SRU areas (Sociedade de reabilitação urbana – Society of urban rehabilitation), converting them into one or more ARU (área de reabilitação urbana – area of urban rehabilitation).

- ARU dos Aliados

The Aru of Aliados, consists of an urban fabric which suffered a profound transformation since the late nineteenth century. This transformation gave Aliados a prominent role at a city and regional level, as this location is considered the administrative, economic and civic center of the city. The concentration of services and activities on this site, translated into an emptying of their housing function. According to the last population census (2011) there were registered less than thousand and a half residents, which corresponds to a density lower than the average. However, in recent decades, due to the relocation of several activities, especially those related to the financial sector, public and private investments in transport infrastructure and urban regeneration, touristic activities and others, the area of the Aliados has been reversing this trend and is also the aim of the ARU contribute to this recovery.

- ARU do Bonfim

This ARU is characterized by its morphologically homogenousness, due to the urbanizing process that began in the mid-nineteenth century. Traditionally this area included a wide variety of uses, ranging from the housing through the existence of small industrial units, commercial spaces and services. However, this area has suffered in recent decades a gradual abandonment process for its population, leaving the elderly.

- ARU da Cedofeita

The ARU Cedofeita is a territory resulting of an urban structure designed in the late eighteenth and early nineteenth century and was gradually filled in during the following centuries. Traditionally it includes a mix area of housing, commerce, services and several higher education institutions.

- ARU de Miragaia

The area included in this ARU is a scenic drive and very characteristic and striking the city. The touristic potential of this area is evident by the presence some of the most emblematic gardens of Porto. There are also many public buildings and collective use equipment located

in its ARU, such as the Customs building, the Santo António Hospital, the Library Almeida Garrett and even the Pavilion Rosa Mota. There are some narrow residential fringes and rehabilitation initiatives, thus, it is intended with this ARU give a new framework and encouragement to these initiatives, creating for such, tax benefits of Municipal levels, complementing already provided for in the Statute of Tax Benefits to support urban regeneration.

- ARU da Lapa

The ARU da Lapa is characterized by a urban fabric formed from the nineteenth century, The urban fabric and its buildings, and the existence in this place of a diversified commercial offer, supported by some services and facilities, are more than enough reasons to make this highly attractive region in housing terms, and evidence of this is the fact that it has the highest population density of the city (102 res. / ha, Census 2011).

- ARU de Santos Pousada

Along with the residential area, there are still, in this ARU, many old industrial buildings (now emptied of that function and in an advanced state of degradation), urban voids and old workers blocks. It is therefore an area with a discontinuous urban fabric, which fall within built-up areas of considerable size, as those remaining industrial units are now abandoned, and whose recovery and destination are factors to take into account when drawing up a strategy for rehabilitation and revitalization of this part of town.

- ARU de Campanhã

This ARU covers part of the parishes of Bonfim and Campanhã, comprising an area of approximately 112ha. Despite the problems of physical degradation and socio-economic vulnerability that persist in this urban area of the city there is a set of urban transformation opportunities that, once implemented, may significantly contribute to the revitalization of the eastern part of the city, which is the specific goal of this ARU.

All these areas, due to their particularities aim at addressing different challenges and implementing several solutions that include mobility, energy, refurbishment, ICT and others.

According to the goals of the project, the needs of intervention and the evolution of each programme (ARU), the selected District for intervention is the Campanhã area. This area of intervention will be characterized more in detail bellow.

Q8 What are the main areas of interest of the FC in the Smart City concept?

As stated above, the urban strategies for smart city and sustainable development include projects and programmes which, in some cases are already being implemented. In this context it is important to highlight projects such as Porto Living Lab (Future Cities) in which the main areas of intervention are already identified. In this case, the creation and promotion of a local ecosystem, working as a Living Lab plays an essential role in the entire field. The Porto Living Lab is the result of a long term partnership between the Porto Municipality and University of Porto, with strong support of the Industry and relevant partners.

The Porto ecosystem, developed in the last years aims at turning Porto into a Smart City, by:

- Providing it with a wide range of sensors and communication equipment, thus creating the conditions for future research and development using advanced technologies for data collection;
- Implementing solutions for Smart governance and monitoring. Several initiatives are already in place and more are being programmed for administrative simplification and participatory governance;
- Increasing visibility and public awareness for different fields such as sustainability, mobility, urban planning and information and communication technology;
- Promoting energy efficiency through refurbishment, innovative technological solutions and community participation;
- Increasing the usage of alternative energies (solar , biomass , geothermal) in order to reduce the dependency for the classic energy sources (coal, petrol)
- Supporting companies at different stages, from start-ups to scale-ups and stimulating public and private investments;
- Implementing integrated solutions for mobility, through the creation of integrated infrastructure and mobility and urban planning. Implementing the electro mobility and sustainable urban transportation and traffic.
- Separating waste collection and recycling implementing measures for citizen behaviour transformation
- Innovative PPP financing schemes for Smart City Projects.

Mapping of the overall opportunities and needs for a successful replication

Q1 What are the main overall needs of the FC to become a "Smart City"?

The goal of Porto City in becoming a Smart city is to create the conditions to develop into a sustainable, attractive ecosystem for citizens to live and work. With the Smart City approach Porto aims at differentiating itself from other cities by becoming an example to follow and promoting innovative solutions to address the city and citizens challenges. In order to do so, Porto identified some needs essentially related to new support organizational structures (being addressed currently), integrated and horizontal planning and the consolidation of the strategies and ongoing projects. The main needs of the city are related to the strategy and projects mentioned above:

- development of a consistent communication infrastructure, related to the fibre infrastructure, transformed into a city network Platform for smart sensoring, management and informed decision making with the citizens participation;
- creation and further development a management infrastructure of the operational model, based on the ongoing implementation of the integrated Management center;
- Selection and further enlargement of the range of milti-stakeholders involved in the implementation of the Smart Cities strategy;
- Strenghten the European and internacional partners network in order to promote knowledge exchange and economic growth.

Q2 What specific aspects the FC likes to explore with Stockholm, Cologne and/or Barcelona?

Taking into consideration the goals and initiatives undertaken by the City of Porto, there are several aspects of cities like Stockholm, Cologne and Barcelona which can be adapted to this local reality. The implementation of measures to improve energy efficiency for example through refurbishment and

rehabilitation, as the experience of Barcelona. The fact that it is an industrial agglomeration with much experience in Smart solutions can give additional know how for the Porto city, traditionally with an industrial background.

Stockholm appears as a city to be followed, mainly for the mobility and communication solutions. As stated above the communication and sensoring is an important area of intervention for the Porto City. Thus not only the measures already in place, but the ones issued from the GrowSmarter project in Stockholm should be used, replicated and adapted to the Porto City.

The main areas of interest of the City of Cologne for the replication process in Porto is the integration of technical and social infrastructures to improve de quality of life.

Q3 What insights and opportunities can your city offer to the LCs and other FCs?

The City of Porto can offer the knowhow and knowledge exchange, acquired in the implementation of several projects within the Smart City strategy, in projects such as Future Cities. The creation of a Living Lab in Porto makes it an important hub for experimentation and testing.

Porto has, also a history of active participation in initiatives not only at a National level, but also at an European level in initiatives/projects such as Urbact, Covenant of Mayors. Its role is especially important while contributing for the design of strategies at a regional and national scale. One of the main assets of these collaborations is the definition and important transformation of the transportation network of the Porto and northern region with the redefinition of the Metropolitan Area of Porto.

As Porto´s innovation ecosystem is growing and consolidating based on progressive collaboration of public and private entities, Local Authorities, Academia, Research institutions giving significant insights and new opportunities for quality projects and partnerships.

Q4 Are there any related events organised by the FC?

There are several events and initiatives organized by and with Porto City which are related to the Smart Cities strategy of the Municipality. The more relevant initiatives aim at having an impact in several target groups, corresponding to the local ecosystem and including the academic sector, the entrepreneurial sector, the research sector, but also the citizens who are invited to actively participate in order to stimulate awareness and civic participation.

The Future Cities project has, in addition to the project itself, regular events, conferences and workshops, promoting the smart cities and living labs concepts and helping its application (http://futurecities.up.pt/).

The Desafios Porto, as stated above, a project aiming at motivating the citizens participation and the new solutions creation to address city wide issues, has planned regular events to support the initiative, during the several phases of the project. In addition to awareness, these events support the project implementation (http://www.desafiosporto.pt/).

The Porto Innovation Hub initiative has a strong and regular agenda of events organized to promote the ideas exchange between the innovation ecosystem of the city and the dissemination of the results of innovative processes and products within the City of Porto (http://www.portoinnovationhub.pt/).

All of these events/initiatives have already started and will have several editions in the next years. Together with other relevant events promoted not only by the Municipality, but also by the local stakeholders create several opportunities for the discussion and transformation of at the City scale.

7.2 Smart Solutions Selection

Description of replication potential of selected Smart Solutions of LCs within FC

The table below shows which solutions the Follower Cities plan to replicate.

		Follower Cities				
Area	***Smart Solutions***	*Porto*	*Graz*	*Cork*	*Valetta*	*Suceava*
Housing measures	*1. Efficient and smart climate shell refurbishment*		*X*	*X*		*X*
	2. Smart building logistics and alternative fuelled vehicles					
	3. Smart, energy saving tenants through information	*X*	*X*			*X*
	4. Smart local electricity production and integration with buildings and grid			*X*		*X*
Integrated measures	*5. Smart lightning, lampposts as hubs for communication*	*X*	*X*	*X*		*X*
	6. Waste heat and local heat integration by new business models		*X*			
	7. Smart waste collecting, turning waste to electricity, heat and biogas for vehicles.	*X*				*X*
	8. Big data protocol for saving energy and improving the quality of life	*X*				
Mobility measures	*9. Sustainable delivery*				*X*	
	10. Smart traffic management					*X*
	11. Alternative fuel driven vehicles for decarbonizing and better air quality	*X*		*X*		*X*
	12. Smart mobility solutions		*X*	*X*	*X*	*X*

Smart Solutions Porto plan to replicate (according to GA)

Smart Solution 3. Smart, energy saving tenants

Almost 18% of the Porto's population leaves in social neighbourhoods, which makes it a top priority in the Municipality strategies. In order to increase the quality of life and the sustainability in social neighbourhoods, the City of Porto has invested more than 160M€ in the refurbishment of buildings in the last 10 years. The City Council will replicate, within its social neighbourhoods infrastructure, a number of the measures identified in the Lighthouse cities. Namely, in the smart and energy savings, the city council is expecting to use the developed solutions to help more than 12000 tenants in the city' social neighbourhoods to reduce their energy consumption.

Smart Solution 5. Smart lightning, lampposts as hubs for communication

The city council is building an infrastructure using the public furniture such as traffic lights and lamppost, to install low energy communication equipment and a distributed sensing infrastructure. This infrastructure is developed using a "Zero site" concept in which all the spots could be shared by several companies and partners, such as Telcos or R&D institutions. In partnership with the University of Porto the city council has installed already 6 sites. The city council expects to use the project results to increase the number of sites with this concept to more than 60 new sites.

Smart Solution 7. Smart waste collecting, turning waste to electricity, heat and biogas for vehicles

Porto already produces 40GWh of energy by burning the non-recycled garbage, which represents two times the energy used in the lighting infrastructure. The City Council plans to use the solutions developed among the measures within this smart solution in the GrowSmarter to increase these results by developing new garbage management infrastructure.

Smart Solution 8. Big data protocol for saving energy and improving the quality of life

The Porto Living Lab is the result of a long term partnership between the Porto Municipality and University of Porto, with strong support of the Industry. Porto Living Lab aims to turn Porto into a smart city, a living lab, by providing it with a wide range of sensors and communication equipment, thus creating the conditions for future research and development using advanced technologies for data collection through mobile platforms, wireless communication and large-scale information processing. In this context the City Council plans to replicate the Big Data protocol developed in GrowSmarter as a reference protocol for the Porto Living Lab infrastructure.

Smart Solution 11. Alternative fuel driven cars for better air quality in cities

In the follow up of the ambitious target defined to reduce the CO_2 emissions the city council is defining a new mobility plan in each it will promote low CO_2 emission fuels, such as bio-gas. The city council will replicate the validated solutions developed in GrowSmarter in this context.

5.3 Smart City and District Replication

There are several sites and areas in the city centre that are programmed to be developed over the next years as described above. The aim is to focus the implementation of smart cities solutions on these previously identified areas. Within those areas the main focus goes to Campanhã and Bonfim which were the object of a new strategy, ARU Campanhã (Área de Reabilitação Urbana de Campanhã). In the areas identified the main goals are to create a sustainable development based in the opportunities that they present, namely in what concerns an integrated infrastructure, smart refurbishment, mobility and energy, together with a special concern related to social innovation and the creation of a local identity.

5.3.1.5 Smart District Replication Profile

Mapping of district related replication framework for selected Smart Solutions

Q1 What are the main characteristics of the district and what is the replication potential?

In the case of Porto, and due to the characteristics of the identified Smart Solutions areas (see chapter (5.2 – Smart solution selection), the aim is to make the interventions as broad as possible. It is important, when considering the data collection that the area of intervention includes, as much as possible, different contexts within the city to make its analysis and consequent strategy implementation as efficient and replicable as possible. Having said that, and thus including a large area of the city as part of the district, Porto city has an elected area of priority intervention as described below.

Priority area of intervention:

The eastern part of the Porto City is a priority area of action of the current Municipal Executive, to create conditions for territorial and social cohesion of the City and its harmonious and sustainable development.

The Master Plan (Plano Director Municipal) of Porto, currently in effect, includes as one of its strategic objectives the reduction of existing urban disparities, underlining the need to develop efforts in fields such as equity on the location of public investments, social and territorial cohesion by

the adding value to currently troubled territories. Although with a strong focus on social housing, the goal does not fail to equate several other dimensions of territorial social cohesion, in particular those that refer to the existence of major imbalances of urban development at city level and the prevalence of both physical and social degradation in specific territories.

Urban area and Population:

The delimitation of the intervention zone covers an area of approximately 8.13 square kilometres, with a number of 32,659 inhabitants. This area is characterized by challenges related to water resources with high pollution issues, old industrial zone, important social challenges, but also very positive opportunities such as the fact that it is the largest mobility hub in the city and the fact that it contains important heritage sites.

Urban Context:

An Urban Rehabilitation Plan was developed for the area of Bonfim and Campanhã consisting of the restructuring of space for sustainable development of the intervention area.

The Campanhã railway station, the main external rail link to the city is in the centre of this area of intervention. The surrounding territory of this important transport infrastructure currently shows a combination of problems related to the sharp deterioration of many buildings, lack of quality of the public space, weak economic and cultural vitality and strong social vulnerability, which cannot be fought with measures of isolated sectorial policy.

The development of transport, including the construction of bridges over the Douro, contributed to the continuity of the great urban transformations over the 20th century, of this area marked by very strong industrial presence of which there are still some traces. In recent decades, and following the developments of the Portuguese cities, the eastern side of the city, experienced a strong deindustrialization process. This trend has become more evident from the 80s of last century, when many units were closed and transferred to municipalities in the periphery.

Employment:

In the past decade, there has been an intensification of this phenomenon, and employment in manufacturing industries located in the Porto area decreased by more than 7,000 jobs between 2003 and 2012. A significant part of the hand labour still depended, until very recently, of this sector, is located in the east area of the City. Difficulties in finding new employment opportunities arise and were further aggravated by the global problems at national level which contributed to substantially worsen unemployment rate, which in the case of Campanhã already exceeded 24% of the active population 2011.

The parish of Campanhã concentrates almost half of social housing in the city of Porto. To register the large concentration of population at risk of poverty, with households affected by unemployment, large families without livelihoods and social problems.

In this territory a variety of advantages and opportunities can be recognize easily vis-a-vis those who are, today, desirable conditions for sustainable urban development, in particular: very favourable internal and external connectivity; local heritage values and symbolics able to design a new local identity; environmental and landscape features; large deactivated plants and urban voids with potential installation of new functions and activities; and significant number of buildings of interest to rehabilitate.

There is a clear need to design and implement an integrated intervention strategy for this area of the city. A strategy which promotes the local assets and capital gains, by successfully facing the

challenges that the socio-economic development faces in order to improve the living conditions and citizen's well-being, leveraging one that is intended to be a process of transformation of the whole eastern part of Porto.

Q2 Are there synergies and/or conflicts related to the Smart Solutions with the existing infrastructure, socio-economic profile and social acceptance?

To be completed when information is available

Q3 How will local stakeholders be involved in the replication of Smart Solutions?

The local stakeholders of the district will be selected and responsibilities will be defined within the first period of this project. Nevertheless, the stakeholders involved in the city transformation and mentioned in Q5, will play an essential role, according to each area of expertise, in the development and application of the solution.

Mapping district related opportunities and needs for a successful replication

Q1 What are the main needs/ambitions for becoming a "Smart District"?

Porto City smart city strategy aims at developing a dynamic (smart) city management framework, supported by a state of the art ICT infrastructure (sensors, actuators and middleware). This new framework will follow a “Data Driven Decision Making” approach which will allow the political and management body to define public policies and services perfectly tuned with the city needs. The Porto Smart City strategy aims also at allowing a dynamic adjustment and re-alignment of services and policies as new events are detected and processed.

As presented above, the smart city strategy is the basic framework for the public policies development. By applying a horizontal and multi-sector approach this framework will contribute to foster the development of vertical policies on specific fields such as Energy, Urban Mobility, Environment, etc.

The main needs identified are related to the large scale planning of the interventions foreseen, which will imply a scale that LCs have already tested and implemented. Awareness raising and behavioural transformation will be considerable challenges that the City will face.

Q2 What insights and opportunities can the district offer to the LCs and other FCs?

As stated above, in order to address the needs of the city to become a Smart City, and taking into consideration the solutions selection for implementation, the area of intervention can be considered as a large area of the city. Thus all the interventions already happening and impkemented in several parts of this area can be used for knowledge sharing. In addition to this, the District can offer the LCs a platform for experimentation at a urban scale in a different context from the one they have.

The ongoing projects in smart mobility and smart traffic management, which will be further developed within the context of this project can be used to inspire new approaches in other cities.

5.3.1.6 District - Smart Solutions Specifications

Adaptation of solutions towards the most effective deployment and integration

To be completed when information is available

Q1 What is the replication potential of the Smart Solution?

To be completed when information is available

Q2 What is the business case and do financing opportunities already exist?

To be completed when information is available

Q3 What is the potential implementation timeframe?

To be completed when information is available

Q4 How does the Smart Solution integrate with the existing and future infrastructure?

To be completed when information is available

Replication needs of Smart City Solution

Q5 What user / stakeholder involvement is foreseen?

To be completed when information is available

Q6 What are the capacity building needs for the successful deployment of the Smart Solution?

To be completed when information is available

Q7 What secondary effects do you intend to achieve with the implementation of the smart solution?

To be completed when information is available

8. Replication Assessment of the Follower City Suceava

8.1 Smart City Replication Profile

Mapping the overall framework conditions for replication within the city territory

Q1 what is the overall replication potential for Smart Solutions until 2020 and beyond?

The north-east Romanian city of Suceava (population about 107,000), one of Romania's oldest settlements, has been the capital of Suceava County since 1388. Suceava lies 450 km from Romania's capital Bucharest, on a main European highway. The government is making efforts to improve the region's transport network as part of a broader urban regeneration using EU Cohesion Policy grants. Figuring on UNESCO's World Heritage List, Suceava is home to orthodox monasteries and churches, and a 14th century castle. The local industry is based on glass and wood manufactories, textiles and construction materials.

Suceava faces the combined challenges of increased motorised traffic, and stringent European environmental and energy targets. The municipality, which owns the local public transport company, has already taken part in initiatives to encourage sustainable urban mobility, including the CIVITAS II (2005-2009) Smile Project, and MIDAS (2006-2009), part of the Intelligent Energy for Europe's STEER Programme.

In 2013 Suceava Local Council approved a Sustainable Energy Action Plan (SEAP) regarding energy efficiency and implementation of project regarding increase of alternative usage at local level, implementation of the electro mobility concept. The main objective of SEAP is to reduce the greenhouse gas emissions by at least 20% by 2020 and to promote the investments carried out within Suceava Municipality which can lead to an efficient use of energy by improving the existing energy performance or the development of constructions, installations, equipment and technologies enjoying high energy efficiency, including feasible renewable energy sources.

SEAP is the methodology according to which Suceava Municipality will reach its objectives by 2020, using the results of BEI (Baseline Emission Inventory) in view of identifying the best fields of action and the best existing opportunities in order to meet the local objective of reducing CO_2 emissions. SEAP defines the concrete reducing measures, together with the time frames, assigned responsibilities and estimated budgets.

SEAP should be considered a communication and promotion tool for the decision-makers, baseline tool for implementation. SEAP should not be regarded as a rigid document, as

circumstances change and, as the ongoing actions provide results and experience, it may be necessary to revise the plan on a regular basis.

SEAP concerns measures within the competence and reach of local authorities. Therefore, local authority is expected to play an exemplary role and consequently to take outstanding measures related to the local authority's own buildings and facilities, vehicle fleet, producing energy from renewable sources, urban mobility etc.

According to the Sustainable Energy Action Plan, Sustainable Urban Mobility Plan and Local Development Strategy in the next 20 years the municipality will have to focuses on the following fields (no prioritization):

- Buildings and facilities (municipal, residential and tertiary buildings, public lighting);
- Transport (municipal fleet, public, private and commercial transport);
- Centralized heating system – using renewable resources ;
- Local energy production (solar heating installation and solar photovoltaic modules, high-efficiency cogeneration, biomass fuel heating installations);
- Urban planning (strategic urban planning, sustainable mobility urban planning, development of local regulations to support sustainable constructions);
- Procurement (local energy-efficiency regulations, local regulations on the utilization of renewable energy sources);
- Electric vehicles (private and public) and electric busses for public transport
- Communication (technical assistance and consulting services, financial support and subsidies, information and awareness campaigns, training sessions);
- Waste management (selective collecting, recycling).

Suceava municipality would like to benefit from the available existing funding opportunities – ERDF , national and regional funds (For example, central governmental funds for rehabilitation of public buildings or a possibility to access regional funds by forming an association of at least 2 municipalities for funding and implementation of common projects), private and public – in order to continue the implementation of the energy efficiency measures at local level (620 mil Eur available at the regional level for the period 2014 -2020, 85 % from the EU and 12% from the national budget):

Q2 How does the "Smart City" approach feed into/connect with your existing local planning processes?

In 2013 we finalized the Sustainable Energy Action Plan (SEAP) and in 2015 the Suceava Sustainable Urban Mobility Plan was finalized and presented to the local stakeholders, decision makers and members of the Local Support Group.

The main objectives of the actions included in the above mentioned documents will be:

- Correlating the local energy framework with the national and European ones;
- Better life quality;
- General contribution to town's attractiveness;
- Increased attractiveness for trade and industry;
- Supporting economic growth;
- Attracting investments;
- Compliance with the European and National Policies on Climate Changes

Therefore the Grow Smarter Project will be an unique opportunity for Suceava Municipality to have access of different practical solution and best practice experience transfer which will sustain local efforts for becoming a " Smart City " .

Q3 Is there a (strategic) plan and organizational structure in place to become a "Smart City"?

The is a strong willingness and political support at local level for implementation of the smart measures in order to become a SMART City but for the moment we cannot say that there is a specific structure at local level that is mainly involved and responsible for this issue

Q4 Are there synergies and/or conflicts of the "Smart City" plan and organizational structure with existing initiatives and their structures within the city?

No.

Q5 Which regional and local stakeholders are involved in the Smart City strategy and planning process on the city level and how?

In the past 5 years the Urbact Support Local Group (USLG) was involved in the designing process for the local strategies and plans concerning energy efficiency at local level, sustainable development and mobility as well.

USLG is a consultation only body, meaning the group can only provide ideas and feedback from the perspective of a different stakeholder, but they can also influence their own institutions, companies and groups. Their ideas and documents are presented to the local council for approval and future implementation.

The Suceava ULSG has been meeting since early 2010 to discuss the challenges and opportunities associated with enabling electro-mobility It has provided an opportunity for the diverse stakeholders involved with a particular issue, to come together, identify issues of concern and seek ways to overcome them. With representatives from local authorities, local private companies, NGOs, local media, local retailers, electricity generators/distributors and retailers as well as academic institutions and private consultancies, the ULSG has provided a focused approach to looking at the challenges while incorporating the experience of other European partner cities, in developing an approach that can be taken forward in Suceava and Romania also.

Usually the meeting took place 4 to 6 times per year as a regular basis and of course anytime when the municipality intent to design a local strategy and a public consultation is not only requested but recommended.

Our intention is to continue the cooperation within this group during the Grow Smarter implementation phase.

Q6 What are past (<5 years) and current projects that are closely related to the "Smart City" concept?

The Suceava Municipality implemented between 05.2012 – 11.2012 phase I and 12.2013 – 12.2015 phase II the project “Sustainable Urban Markets” that was co-financed by the European Union through the European Regional Development Fund, under the Interregional Cooperation Programme URBACT II. – www.urbact.eu/urbanmarkets

The budget allocated to the Romanian partner was 5.437,50 Eur for Phase I and 61.124,39 Eur for Phase II, of which 80 % is co-financing from the European Union , while 20 % are national contribution (of which 13 % budget State and 7% local budget).

The main objective of the project were : demonstrate the catalytic effect that urban markets have in the major thematic areas that generate sustainable growth: regeneration of the historic city centre, the development of economic activities with low CO2 emissions, the promotion of local entrepreneurship and stimulating employment .

The Suceava Municipality was partner in the URBACT project called ”Electric Vehicles in Urban Europe” EVUE which lasted from December 2009 - May 2010 (development phase) and July 2010 – December 2012 (implementation phase) . www.urbact.eu/evue

The budget allocated to the Romanian Partner was of 12.500 Eur for development phase and 38.945 Eur for implementation phase, of which 80 % is co-financing from the European Union , while 20 % are national contribution (of which 13 % budget State and 7% local budget).

The EVUE project was focused on identifying and implementing the framework and infrastructure required that will enable electric vehicles to become the preferred mode of choice in urban areas. By directly targeting a major source of air and noise pollution in our cities, it was hoped to improve the lives of all citizens and ensure that urban areas mitigate their negative environmental impacts as efficiently as possible.

„Electric Vehicles in Urban Europe” EVUE II in which Suceava Municipality was partner was implemented between December 2013 – March 2015.

The budget allocated to the Romanian Partner was of 43.000 Eur of which 80 % is co-financing from the European Union, while 20 % are national contribution (of which 13 % budget State and 7% local budget).

Electric Vehicles in Urban Europe (EVUE II) focused on the development of integrated, sustainable strategies and dynamic leadership techniques for cities to promote the use of electric vehicles. Urban initiatives to encourage the public and business to use EV's contributed to EU clean air and car fleets targets, making cities more attractive and competitive. Between 2009 and 2015, nine cities across Europe: Beja, Katowice, Frankfurt, Lisbon, London, Madrid, Oslo, Stockholm, Suceava and Zografou, supported by the URBACT programme, worked together to share knowledge and experience of how EVs can be implemented in the urban environment under the EVUE project.

“Electromobility-electric vehicles for a green municipality” project co–financed (80 %) by the Government of Switzerland through the Swiss-Romanian Cooperation Programme.

The project budget of 3.112.490 CHF (2.563.511 Eur) will be used (in the second part of 2015) in order to implement the electro mobility concept. In this project the following activities will be conducted :

- Purchase of electric vehicles for Suceava Municipality fleet: 11 vehicles, 2 vans, 1 sweeping machine, 1 tanker
- The installation of charging infrastructure for electric vehicles: 14 standard charging points, 14 fast charge points, 56 parking spaces for electric vehicles (in public car parks, underground car parks, residential areas)
- Acquisition of 10 electric bicycles and their charging system (equipped with photovoltaic panels 5KW)

- Finally, the amount of 225.000 RON is designated for developing a technical-economic documentation that will be used to obtain the grant for the project "Environmentally friendly public transport system interurban"(purchase a total of 40 electric buses for public transport)

"**Modern and efficient public lighting management in Suceava Municipality".**

The project budget is 6.417.314 CHF from which 5.238108 CHF are Swiss Govern grant .In the next 18 month we will replace all the 3816 existing old light units from Suceava city with units that use light sources with LED technology and in the same time a telemanagement system of the lighting units will be implemented .This project will conduct to an important reduction of energy consumption and CO2 emissions.

In the past 5 years in Suceava there were construction works for rehabilitation of 380 apartments (structure, heating system) in order to reduce the waste of energy and to improve energy efficiency using 0,864 million Eur.

Starting from 2013 in Suceava, through a PPP , a new city power plant is functional , using only biomass, provided both heating for the entire city and energy . This project is considered to be a starting point for increasing the production of green energy at local level. 2011 was the starting point of a major waste management project at county level. This project includes transfer stations for waste, a new landfill with biogas production plant, modern systems for environment protection and separate recycling facilities – 2,3 mil Eur - ERDF funds. For the moment Suceava city is working of a tender documentation for the waste management supplier at local level .This will be a 7 year contract that will include facilities for separate waste collection in order to increase the level of waste recycling at local level and to reduce the consumption of raw materials.

Other already implemented projects:

- Rehabilitation of 55 %of the city heating transport system (isolation, pipe lines, transfer points) – 102 km and 28 PT - in order to reduce the lost energy into the system - own funds
- Rehabilitation of the public lightning system - 24 km of network , replace the old lamps with new and energy saving ones and implementation of a tele management system in order to reduce the energy consumption and increase the efficiency - 1,2 mil Eur project ERDF funds
- Rehabilitation of 26 km of city streets in order to reduce the traffic congestion and increase the number of PT passengers (including 10,5 km of bikes lanes)- 8,7 mil Eur ERDF funds
- Construction of a 164 underground parking facility in the city center together with the rehabilitation of the main city center pedestrian area in order to create facilities for reduce traffic congestion , traffic emissions and encourage walking instead of driving - 11,4 mil Eur - ERDF funds

Q7 Which sites/districts are projected to be developed in the next five/ten years?

Future projects to be implemented:

- Rehabilitation of public lighting system - replacement of the all lamps with LED ones for the entire city - reduce the energy consumption - 3,2 mil Eur, Swiss funds - 2015
- electro mobility for the city - 15 EV's and 28 charging points also 10 electric bikes in order to promote electro mobility - 2 milion Eur, Swiss funds - 2015
- 30- 45 electric busses to replace the existing diesel ones for the PT company - ERDF funds - 2016
- Rehabilitation of the educational infrastructure (in order to reduce the energy consumption) and also 200 apartments - till 2020, ERDF funds
- establish a photovoltaic panels grid for own municipal needs - ERDF funds till 2018
- Implementation of a metropolitan area PT system with intermodal points and transfer facilities in order to reduce the traffic emissions
- New city belt for the metropolitan area in order to divert the heavy traffic from entering into the city
- Rehabilitation of the main city markets (including introduction of energy saving systems, recycling facilities and mobility plans for freight (URBACT Programme 2007-2013 and ERDF).

Q8 What are the main areas of interest of the FC in the Smart City concept?

We would like to:

- Reduce the energy consumption and increase energy efficiency (public buildings – schools , high schools but also private ones)
- Reduce traffic emissions and impact against environment and peoples (sustainable traffic development and management)
- Increase the usage of alternative energies (solar , biomass , geothermal) in order to reduce the dependency for the classic energy sources (coal, petrol)
- Implement the electro mobility concept (electric vehicles , charging points , electric busses and bikes)
- Implement the sustainable urban transportation and traffic (car sharing , park and ride)
- Separate waste collection and recycling (for the moment the recycling percentage is quite low at local level and we would like to improve these numbers with specific measures including actions for changing the people’s behavior)

Mapping of the overall opportunities and needs for a successful replication

Q1 What are the main overall needs of the FC to become a "Smart City"?

The Suceava Municipality has been involved in sustainable projects for local development since 1998. Most of them were funded through European grants but there are also local and central budget ones.

In the past 12 years a few documents were produced at local level with actions that concerns sustainable development and energy efficiency: Local Development Strategy 2007 – 2014, Local Integrated Development Plan – 2010, Local Actions Plans – trough URBACT Programme, Sustainable Energy Action Plan – 2013 with specific measures related to energy efficiency.

There is a strong political support at local level for implementation of measures that will allow Suceava to become a Smart City.

In the past 12 years millions of Eur (both from European grants and local budget) were invested in : streets rehabilitation , waste water plan and network rehabilitation , construction of underground parking places , rehabilitation of city public lighting system , construction of municipal power plans (using only biomass for energy and heating production) , rehabilitation of apartments buildings , purchasing of electric vehicles and installation of charging points ,rehabilitation and creation of new green areas , bikes lanes ,new regional waste collection system , new environmentally friendly municipal landfill ,traffic lights rehabilitation ...

There is still a strong demand of investments at local level needed for achievement of the overall objective: become a smart city.

A very important aspect was the transfer of best practice and knowledge from European city partners in several domains from sustainable traffic management to separate waste collection and recycling.

The Suceava Municipality has the willingness and also the experienced staff for implementation of future smart measures at local level.

Q2 What specific aspects the FC likes to explore with Stockholm, Cologne and/or Barcelona?

We do expect to be able to learn more about the introduction of measures that conduct to improve energy efficiency and for this reason we would like to transfer the best practice and experience from the city of Barcelona , not only for the rehabilitation of the residential and municipal buildings but also in being able to develop facilities at local level for " technological parks " for companies which will invest in new green technologies in order to develop the local market and to create new jobs .

This measure together with the production of energy from the new power plant (using only biomass) is going to replicate the experience from the lighthouse cities regarding reduction of energy

consumption (by using LED lighting for public lighting system) and production increasing the green energy production at local level.

In connection with the smart waste collecting, turning waste to electricity, heat and biogas for vehicles our expectation is to be able to transfer the experience from city of Stockholm mostly in connection with separate waste connection , recycling facilities and production of " green energy " by using biomass and reduce the dependency of the conventional sources.

Our goal in this project is to transfer the best practice from Stockholm mainly in connection with the cycling facilities and traffic management and before these in connection with alternative solution for public transport (biogas or electric buses) in order to increase the number of passengers, reduce the car dependency, avoid traffic congestion and change people's behavior regarding mobility habits.

Our expectations from this new project are directly linked with the possibility of learning from the experience of the lighthouse cities in domains that are connected with the "green city "concept.

For example having in mind that in the next 3 years Suceava City will start the implementation of the electro mobility concept at local level we expect that the participation in this project will facilitate the transfer of best practice that Stockholm has in the field of electric vehicles, charging points and facilities for electric vehicles.

The aim of Suceava city measures is to replicate the lighthouse city experience (Stockholm in this case) in order to substitute the car in other trips, that are less regular and more individual.

Our goal is to offer different and alternative solutions completing the existing public transport network like bike pools, e-bikes, EV-pools.

Q3 What insights and opportunities can your city offer to the LCs and other FCs?

We do have experience in :

- Rehabilitation of the public lighting system (with significant reduction of energy consumption and CO2 emissions)
- Urban sustainable mobility – bikes lanes , improve the local public transport accessibility
- “Green and sustainable energy production “ – central heating system is connected to the main power plant that use only biomass
- Rehabilitation of apartments blocks (increase energy efficiency)
- Rehabilitation of the central heating network – pipes and transfer centers

Q4 Are there any related events organised by the FC?

A local meeting with the representatives from the Regional Development Agency and USLG members in order to start the implementation of a local cluster for promotion of E-Mobility. However, no concrete events are planned at this point.

8.2 Smart Solutions Selection

Description of replication potential of selected Smart Solutions of LCs within FC

The table below shows which solutions the Follower Cities plan to replicate.

		Follower Cities				
Area	***Smart Solutions***	*Porto*	*Graz*	*Cork*	*Valetta*	*Suceava*
Housing measures	*1. Efficient and smart climate shell refurbishment*		*X*	*X*		*X*
	2. Smart building logistics and alternative fuelled vehicles					
	3. Smart, energy saving tenants through information	*X*	*X*			*X*
	4. Smart local electricity production and integration with buildings and grid			*X*		*X*
Integrated measures	*5. Smart lightning, lampposts as hubs for communication*	*X*	*X*	*X*		*X*
	6. Waste heat and local heat integration by new business models		*X*			
	7. Smart waste collecting, turning waste to electricity, heat and biogas for vehicles.	*X*				*X*
	8. Big data protocol for saving energy and improving the quality of life	*X*				
Mobility measures	*9. Sustainable delivery*				*X*	
	10. Smart traffic management					*X*
	11. Alternative fuel driven vehicles for decarbonizing and better air quality	*X*		*X*		*X*
	12. Smart mobility solutions		*X*	*X*	*X*	*X*

5.3 Smart District Replication

As Suceava city is actually a medium size one we do consider that all the city area (52 km^2) could be named as a “replication district“.

Nevertheless, based on the last 10 years process of transformation, we will nominate the “Centru“ district as the replication one for this project .

5.3.1 Smart District “ Centru “ Replication Profile

Mapping of district related replication framework for selected Smart Solutions

Q1 What are the main characteristics of the district and what is the replication potential?

The main information related the Centru district are:

- Population is about 25.000 , but with the main public offices and private business located here , we can add a number of 2000- 5000 commuters per day
- The population structure here is about 37 % over 60 years, 47% in the category 25 to 60 years and 16% younger than 25 years of age.
- The main public institutions buildings (from local and county level)are located in the district , together with a lot of banks , shops , central market , supermarkets ,schools and high schools , restaurants , hotels

- Employment is mainly state 45 % – for public institutions and 55 % private sector
- The most important culture objectives are located here (including XV century monasteries and castle) the largest green areas are also here , the main leisure area and the only one 100% pedestrian street are here

There is a mixture of old apartments building (build in 1950 to 1980), new offices and shopping buildings (build after 1998) and a residential area with small old houses, most of them well preserved.

This specific document mentioned specific measures to be implemented in the district in order to improve the quality of life : rehabilitation of the old apartment buildings , of the lighting system , of the green areas , introduction of bikes lanes , extension of the pedestrian area , implementation of electro mobility concept , vehicle access restriction , increase the public transport accessibility.

In the past 15 years there were a lot of investments in rehabilitation of the district (streets, water and sewage network, public lighting, central heating system), traffic management and mobility efficiency.

There is still a strong demand of investments, mainly for the old apartment's buildings, for energy efficiency projects, efficient and smart climate refurbishment, smart waste collection, mobility management, sustainable delivery, smart lighting and alternative fuel driving vehicles.

Having in mind that this district includes the city centre there are still problems to be addressed in the field of traffic pollution reduction, delivery of goods, traffic management, smart local energy production including alternative sources of energy.

The district was included in the Local Sustainable Development Strategy in the Sustainable Energy Action Plan but also has its own Development Urban Plan created in 2013.

This specific document mentioned specific measures to be implemented in the district in order to improve the quality of life : rehabilitation of the old apartment buildings , of the lighting system , of the green areas , introduction of bikes lanes , extension of the pedestrian area , implementation of electro mobility concept , increase the energy efficiency , vehicle access restriction , increase the public transport accessibility.

ERDF funding are available for the period of 2015- 2020 also local and central budget funds could contribute to district development.

In the next 5 years Suceava Municipality would like to invest in projects for:

-rehabilitation of the second part of the city castle , rehabilitation of the main green area , replacement of the existing lamppost for public lighting (with LED technology) , increase energy efficiency in private and public buildings ,installation of charging points and EV's , electric buses

for local public transport system , alternative fueled vehicles for goods delivery ,smart mobility solution (access restriction , extension of the pedestrian area).

Q2 Are there synergies and/or conflicts related to the Smart Solutions with the existing infrastructure, socio-economic profile and social acceptance?

Q3 How will local stakeholders be involved in the replication of Smart Solutions?

We do have a Local Support Group created in 2009 for the EVUE URBACT project and we do expect that the group will continue to be active and involved in Grow Smarter project also. The group has representatives from public institutions , private companies , local producers , NGO ‘s , university , consultancy companies , citizens associations ,schools and high schools .This group was responsible also for production of the Local Action Plans and we will invite also other potential members to join our local group (private companies mainly) .

During the performing of the Sustainable Development Strategy there were meetings with citizens and district private companies.

The main interest is the sustainable development of the district, the reduction of traffic pollution, increase the quality of life, reduce unemployment and create a better environment for the young generation and for future private investments in the district.

We do expect to have a potential big interests from the young generation and possible few skeptical ideas and reaction from the oldest part of the inhabitants.

Q1 What are the main needs/ambitions for becoming a "Smart District"?

The main challenge is to secure adequate funding scheme that can allow us to move on from the already planned actions and measures to the real implementation of them.

Awareness raising and people consultation will be the main challenges for the local authorities in the difficult process of “smart measures “implementation phase.

Q2 What insights and opportunities can the district offer to the LCs and other FCs?

- EV’s implementation – as we will be the first Romanian city with electro mobility concept implemented (EV’s , electric bikes , charging points and electric busses) we think that we can share our experience with other city partners - alternative fuel driving vehicles
- Sustainable delivery – we would like to implement the " zero emissions " products concept - as we would like to encourage local producers (food , crafts) to increase the bio production and to

deliver the products by using "zero emissions " vehicles - especially to local markets located in the city centre.

5.3.2 District “Centru “ - Smart Solutions Specifications

Adaptation of solutions towards the most effective deployment and integration

Smart Solutions the city of Suceava intends to deploy within the selected district and specify by answering the following questions:

- Efficient and smart climate refurbishment
- Smart energy saving tenants trough information
- Smart local electricity production
- Smart lighting
- Smart waste collection Smart traffic management
- Alternative fuel driven vehicles
- Smart mobility solution

Replication of Smart City Solution

Q1 What is the replication potential of the Smart Solution?

There is a strong political support at local level for implementation of measures concerning energy efficiency. Also the citizen’s level of awareness regarding the positive impact of the energy efficiency measures is quite high and it is expected to increase in the next period of 5 to 15 years , so the people’s support to measures like the one in the project is it expected to be at a medium to high level .In the past 10 years our experience of working with local stakeholders shows that there is a significant support for investments that could contribute to reduce the environmental impact of human activities.

The local development strategies, regional, national and European policies encourage and support local authorities in the implementation process for energy efficiency measures. The environmental impact of almost all actions undertaken by our local public authority is quantifiable and also taking into consideration not only because of “ fashionable behavior “ reasons but for the fact that immediate and adequate actions are needed in the process of improving the quality of life into the city.

For few of the mentioned measures we do have FS available:

Efficient and smart climate refurbishment

Smart local electricity production

Smart lighting

Smart waste collection

Smart traffic management

Alternative fuel driven vehicles

The main problem is of course financing resources for implementation of smart measures, but we are confident that the existing ERDF opportunities will allow us to fulfill our objectives.

Potential implementation:

Solution 1: Efficient and smart climate shell refurbishment

In the past 5 years in Suceava there were construction works for rehabilitation of 380 apartments (structure, heating system) in order to reduce the waste of energy and to improve energy efficiency using 0,864 million Euro –(central govern not reimbursable funds) .

For the moment we are working for the technical documentation necessarily for ERDF funding for rehabilitation the educational infrastructure (in order to reduce the energy consumption and improve energy efficiency – heat recovery and green energy production) and also for 200 apartments - using ERDF funds. It is expected that till 2020 these projects will be implemented.

The central market will be rehabilitated: Introduction of utility systems (especially lighting and heating) using alternative, renewable power sources. The rehabilitation process already started with construction works of the structure (walls and main roof).

Solution 3: Smart, energy saving tenants through information

In the next 4 years the Suceava Municipality is planning to develop pilot Home Energy Management Systems for public buildings (schools, cultural centers, apartments buildings) in order to promote among public servants, children and citizens “smart energy behavior “that is expected to conduct to reduction of energy consumption, friendly attitude to environment and also test the citizens availability to implement future measures concerning energy efficiency improvement.

“Green education” of peoples and especially young people by means of promotion ,public information campaigns ,invention projects and by setting up a class curricula within school programs for professional trainings

Solution 4: Smart local electricity production and integration with buildings and grid

Local strategies and development plans include measures to increasing the local dependency on renewable electricity and for this reason in the next few years the following actions will be implemented:

- establish a photovoltaic panels grid for own municipal needs - ERDF funds till 2018
- photovoltaic panels will be installed in 2015 in order to provide the amount of energy necessarily for the charging station for the electric bikes (co –financed (80 %) by the Government of Switzerland through the Swiss-Romanian Cooperation Programme)
- rehabilitation of the Bazaar Commercial Centre (own by Suceava Municipality) – the main commercial building will be rehabilitated in order to increase the usage of daily lights , to reduce the waste of energy and also geothermal underground pumps will be introduced in order to provide the necessarily amount of heating by using alternative sources of energy . (co –financed (80 %) by the Government of Switzerland through the Swiss-Romanian Cooperation Programme)
- rehabilitation of the main city markets (including introduction of energy saving systems, recycling facilities and mobility plans for freight (ERDF).
- establish of several photovoltaic panels grid for own municipal needs (including energy production facilities for schools, high schools and private housing) - ERDF funds till 2018

Solution 5: Smart lighting, lampposts as hubs for communication

In the past 3 years in Suceava we successfully finalized the rehabilitation of the public lightning system - 24 km of network , replace the old lamps with new and energy saving ones and implementation of a management system in order to reduce the energy consumption and increase the efficiency - 1,2 mil Eur project ERDF funds.

In 2016 we are planning to extend this measure at the entire town level by implementing the project for rehabilitation of public lighting system - replacement of the all lamps with LED ones for the entire city in order to reduce the energy consumption - 3,2 mil Eur - (co –financed (80 %) by the Government of Switzerland through the Swiss-Romanian Cooperation Programme).

Through this project 893 existing old lampposts will be replaced with new one (LED technology) in the Centru district. There will be also an implementation of a telemanagement system that will allow the Municipality to manage the utilization of the public lighting system in order to reduce the energy consumption and to minimize the environmental impact.

Solution 6: Smart waste collecting, turning waste to electricity, heat and biogas for vehicles.

Starting from 2013 in Suceava , through a PPP , a new city power plant is functional , using only biomass, provided both heating for the entire city and energy. This project is considered to be a starting point for increasing the production of green energy at local level.

2011 was the starting point of a major waste management project at county level.

This project includes transfer stations for waste, a new landfill (with biogas production plant and modern systems for environment protection and separate recycling facilities – 2, 3 mil Eur - ERDF funds.

For the moment Suceava city is working of a tender documentation for the waste management supplier at local level .This will be a 7 year long contract and will include facilities for separate waste collection in order to increase the level of waste recycling at local level and to reduce the consumption of raw materials.

In the next 6 years Municipality would like to continue the development of the existing separate waste collection – increase the level of recycling with 25 – 20 % till 2020. Special facilities (bins , advertising) will be located in the district area with the main purpose of increasing the waste recycling .there will be specific actions undertaken with local retailers , supermarkets and producers for the development of facilities (locations but also incentives) for separate waste collection and recycling – especially plastic bottles and paper

Solution 7: Smart charging of electrical vehicles

The Suceava Municipality secured in 2013 a 3.112.489,61 CHF grant contract co –financed (80 %) by the Government of Switzerland through the Swiss-Romanian Cooperation Programme.

It is expected that in the second part of 2015 the grant contract will be signed and the implementation of the measures should begin in early 2016.

Through this contract there will be available funds as follow:

- 1.578.684,1 CHF for purchasing of 15 electric vehicles(12 vans and 3 electric sweepers vehicles) for Suceava Municipality fleet.

68.900 CHF for stimulating the use of electric vehicles by:

Setting up an infrastructure including 28 charging points in public places, out of which 14 standard charging points (SCP) and 14 fast charging points (FCP), selected based on the area of interest, the technical possibility to carry out the electric energy connection and to obtain property of land where the works are set to be undertaken

Implementing a bike charging and renting system (e-docking) for 10 electric bikes;

Energy autonomy by implementing renewable energy sources to feed the electric bike charging system - 1 photovoltaic charging system for bikes;

618.225.6 CHF for 1 infrastructure corresponding to the pilot electro-mobility system carried out in Suceava Municipality that means: install of charging points for electric vehicles - at least 28; parking spaces for electric vehicles - at least 56; bike-charging and sharing centres in Suceava Municipality - at least 1; photovoltaic systems in Suceava Municipality -at least 1

Through this project there will be local and national dissemination activities in order to increase the number of electric vehicles used by private owners and public institutions, to increase the number of charging points.

There will be also activities related to development of local and national markets for car dealers and companies responsible for charging points installation. Suceava Municipality will implement the car sharing concept for EV's and will develop public dissemination campaigns in order to change public behaviour and perception regarding EV's and to increase the number of EV's both of local and also national level.

- 40 electric busses will operate into the district in the next 6 years
- Procurement of alternative (electrical) vehicles required for market administration, transport and merchandise distribution activities, as well as for citizens / consumers.

  One interesting idea is to create the " zero emissions " products - as we would like to encourage local producers (food , crafts) to increase the bio production and to deliver the products by using "zero emissions " vehicles - especially to local markets located in the Centru district.

Solution 10: Integrated traffic signal management

The Suceava Municipality expresses the intention to apply for ERDF funds for implementation of a metropolitan public transport system (by sending an official letter of intent to Regional Development Agency). This new project will include electric busses , intermodal points and transfer facilities (park and ride) and also system monitoring and controlling traffic signals an time providing real time information to users on traffic conditions in order to reduce the traffic emissions and impact against environment and public health , to reduce traffic congestion and energy consumption (especially conventional fuels).

The Centru district that is located in the city centre is the main hub for the local public transport will benefit from the implementation of this project. It is expected that there will be an increase of the PT attractively, the number of passengers will increase and there will be a reduction of the private cars traffic volumes in the city centre.

Solution 11: Alternative fuel driven cars for better air quality in cities

For the action Implementation of a local public transport with electric buses and establish measures to encourage the use of electric public transport means the Suceava Municipality secured in 2013 200.000 CHF as part of a 3.112.489,61 CHF grant contract co –financed (80 %) by the Government of Switzerland through the Swiss-Romanian Cooperation Programme. This amount will be used (in 2014) for performing the Feasibility Study and Technical Documentation which will allow the Municipality to apply for a funding scheme trough ERDF in order to implement the electro mobility

concept for public transport (purchasing of 30- 40 electric buses and charging facilities for local public transport company).

Also we have to mention here that Suceava will be starting from 2016 the first Romanian city with an electro mobility project implemented (municipal electric vehicles, electric bikes and charging points).

The city centre roads infrastructure will be rehabilitated, with a 25% extension of the existing pedestrian " zero emission " area , there will be access restriction regulation for this area located in Centru district and only EV's will have permanent access .

Solution 12: Citizen engagement for smarter use of road space

The City Urban Plan is under a redesigning process and one of the new innovative parts of this study will be an Urban Mobility Plan (for public and private companies, public transport, measures for encouraging alternative ways of travelling) . Based on the conclusion from this plan we will be able to start the implementation of other new innovative mobility projects at local level.

Car and bike pools in integrated mobility solutions

The new municipal EV's will be used for promoting the car pooling concept among public servants, citizens and private companies starting from 2016.

In 2013 we finalized the construction of 10,5 km of cycling lanes into the city centre (using ERDF funds) ad in 2015 other 4,6 km will be finalized (as part of another ERDF funding project for rehabilitation of the city road infrastructure).

The construction of a 164 underground parking facility in the city center together with the rehabilitation of the main city center pedestrian area in order to create facilities for reduce traffic congestion , traffic emissions and encourage walking instead of driving - 11, 4 mil Euro - ERDF funds was accomplished in 2013.

The electric bikes which will be available in Suceava from 2015 will be used for promotion of this alternative way of traveling (among citizens and tourists) as a rental system will be developed at local level.

Q2 What is the business case and do financing opportunities already exist?

Currently our municipality has already finished several technical documentation (strategies, feasibility studies) for the implementation of the proposed measures. For almost all of them implementation request a technical execution project and these documents are not available yet.

For the measures like: EV's, charging points, rehabilitation of the public lighting system, extension of the pedestrian "zero emission area", rehabilitation of the streets infrastructure and of the main

central market we do have already secured the grant contracts, the technical documentations are available and in the second part of 2015 we will expect to sign the agreement for construction works.
For other measures like: introduction of electric busses, establish of solar panels, rehabilitation of the municipal buildings and apartments buildings our municipality intention is to apply for ERDF funding.
In this case we do expect that, soon after the application calls will be open – July 2015, we will start the process of preparation the technical documentation, we will prepare the requested documents and will apply for ERDF funding in 2016.
Usually, if successful, the evaluation period is 6 -9 months, so 2017 could be the starting point for projects implementation.
Even we mentioned the ERDF funds as the main source for financing our local proposed measures there need to be also a substantial (up to 15 %) contribution from local budget and we do expect to have access also on central budget for the next 5 – 10 years .
Regarding technological barriers, as concepts like electric vehicles, charging points, solar panels are quite new and less developed at local and national level, we do expect to have few problems during the implementation phase. In the same time we do count on our previous experience from other European projects that created the premises for transfer of best practice and knowledge from more advanced city partners around Europe.
We do expect that the implementation of the smart measures (especially electric vehicles, charging points, alternative energy production and waste recycling) will determine a development of local and national market for the companies that are dealing with these innovative and new technologies. Also we do expect that this new technologies will determine the development of the local jobs market with benefits not only at local but also on regional and national level.

Q3 What is the potential implementation timeframe?

Probably next 5 -15 years.

Q4 How does the Smart Solution integrate with the existing and future infrastructure?

The smart proposed solution will be integrated with : local cycling and walking infrastructure ,the underground parking places , already rehabilitated part of the public lighting system ,the existing implemented measures for increase energy efficiency for apartments buildings (reduce energy consumption ,central heating using biomass for heat and energy production), rehabilitation of the central market and other public buildings , local sustainable mobility measures (access restriction , EV's implementation),separate waste collection and recycling system .

Replication needs of Smart City Solution

Q5 What user / stakeholder involvement is foreseen?

- We do have a Local Support Group created in 2009 for the EVUE URBACT project and we do expect that the group will continue to be active and involved in Grow Smarter project also. The group has representatives from public institutions, private companies, local producers, NGOs, university, consultancy companies, citizens associations, schools and high schools. This group was responsible also for production of the Local Action Plans and we will invite also other potential members to join our local group (private companies mainly).
- During the performing of the Sustainable Development Strategy there were meetings with citizens and district private companies.
- The main interest is the sustainable development of the district, the reduction of traffic pollution, increase the quality of life, reduce unemployment and create a better environment for the young generation and for future private investments in the district.
- We do expect to have a potential big interests from the young generation and possible few skeptical ideas and reaction from the oldest part of the inhabitants.

Q6 What are the capacity building needs for the successful deployment of the Smart Solution?

Our main inters is to find out more information, best practice example or any suggestions from the leading cities, about:

- How is it working the process of getting the political approval for a new investment with some innovative technologies like the smart measures?
- Any already successful " recipes " for implementation of a smart measure would be very useful for a city like Suceava which already expressed the wiliness of becoming a smart city
- We do expect to be able to learn more about the introduction of measures that conduct to improve energy efficiency and for this reason we would like to transfer the best practice and experience from the city of Barcelona , not only for the rehabilitation of the residential and municipal buildings but also in being able to develop facilities at local level for " technological parks " for companies which will invest in new green technologies in order to develop the local market and to create new jobs
- One of our smart measures is in connection with the lighthouse cities measures like Home Energy Management Systems that will be installed in a pilot residential and municipal building, visualizing and manage energy consumption.
- City of Stockholm and the measures to be implemented in this project is a very reliable example of a " state of the art " example for mobility management and actions to avoid traffic congestion

and to reduce traffic emissions .Our goal in this project is to transfer the best practice from Stockholm mainly in connection with the cycling facilities and traffic management and before these in connection with alternative solution for public transport (biogas or electric busses) in order to increase the number of passengers, reduce the car dependency , avoid traffic congestion and change people's behaviour regarding mobility habits

- The aim of Suceava city measures is to replicate the lighthouse city experience (Stockholm in this case) in order to substitute the car in other trips, that are less regular and more individual.
- Our goal is to offer different and alternative solutions completing the existing public transport network like bike pools, e-bikes, EV-pools.

We consider that a successful preparation of the follower cities for replication of the smart measures involved meetings with both representatives from the public sector (procurement, technical, economic and design) and with representatives from the private sector (consultancies, constructors, car dealers, retailers, providers for technologies and equipment).

Beside of these we consider that future links between local private sector and the same one from the lighthouse cities could contribute to development of local and European market but in the same time could facilitate the implementation and transfer of smart measures to the follower cities.

Of course that the site visits to a power plans or a recently refurbished neighborhood could be useful for us but in the same time we do consider that there is a strong demand in a cooperation between follower cities which can benefit each other and also provide necessarily technical support during the replication of smart measures process .

Q7 What secondary effects do you intend to achieve with the implementation of the smart solution?

Implementation of the new smart technologies (such as EV's and alternative energy sources) could contribute to the development of local job market, increase the quality of life in the district, make the area more attractive for new business and reduce the environmental impact.

9. Replication Assessment of the Follower City Valletta

9.1 Smart City Replication Profile

Mapping the overall framework conditions for replication within the city territory

Q1 What is the overall replication potential for Smart Solutions until 2020 and beyond?

Energy Mix

DIRECTIVE 2009/29/EC to improve and extend the greenhouse gas emission allowance trading scheme of the Community

- 23% share of allowances to be auctioned by Member States

DECISION No 406/2009/EC on the effort of Member States to reduce their greenhouse gas emissions to meet the Community's greenhouse gas emission reduction commitments up to 2020

- +5% GHG Emissions compared to 2005 Levels

The Government of Malta is committed to switch from heavy fuel to natural gas for the generation of electricity. In this regard, the Government has taken a number of measures to diversity the energy mix and the energy sources. Malta was connected to the European energy grid on the 24th March 2015, as the electricity interconnector (connecting Malta to Sicily) was put in operation and the

Maltese grid was synchronised with the Italian grid for the first time. The project was officially inaugurated on the 9th April 2015. On the same date, the Marsa Power Station (located along the Valletta Grand Harbour and which operated on heavy fuel oil) was taken out of service permanently.

Moreover, a Combined Cycle Gas Turbine (CCGT) plant and a Liquifi ed Natural Gas (LNG) facility will be built. The CCGT (approx 215 MW) is a high-effi ciency power plant powered by natural gas which will be sourced from the LNG plant. The LNG facilities will also supply gas to the existing 144 MW Diesel–operated power plant, known as the BWSC plant, which will be converted to run on natural gas. It is expected that Enemalta (the sole energy provider for the Maltese islands) shall start receiving its first gas- fired electricity by June 2016. This new energy source is expected to reduce Malta's dependency on electricity generated through oil-fi red sources.

Furthermore, Government is also working on a connecting Malta to the trans-European Natural Gas Network via an approximately 155 kilometre pipeline in Sicily to deliver natural gas for the generation of electrical power. This project is currently at feasibility study stage and is looking into the future demand for gas, security of supply, competitiveness, sustainability, and identifying those aspects that qualify it as a Project of Common Interest (PCI).

In terms of the Valletta Region, certain actions have been undertaken which target the geographical area as the two districts with the highest recorded emission levels. Three projects have specifically target the Valletta Region:

- The 'Vertical Connections Project' has improved the accessibility of the city through the installation of a vertical lift, facilitating connectivity between the lower part of Valletta to the highest upper main point, adopting a cleaner transport technology. The direct beneficiaries of the project include the local population of Valletta and the Grand Harbour area and the Crusie Liner incoming tourists.

- The 'PORT-PVEV Project' tackled the renewable energy theme by providing for the installation of solar power generation systems at port administration buildings and within port areas. The pilot actions aim to realize joint innovative interventions to guarantee reducing energy consumption into the ports and their public facilities. The project allowed an Italian-Maltese exchange of solutions to increase the eco-efficiency of the ports with the diffusion of sustainable and energy-saving practices for sea transport. In particular, the following actions were taken:

  - ✓ Identification of physical interventions to be implemented in the port area and a high level strategic environmental assessment to evaluate ex-ante the actual and future environmental efficiency in the port and hinterlands.
  - ✓ Feasibility study on the provision of renewable energy to power berthing vessels to include drafting of local port plans to identify the best location for a shore supply pilot targeting heavily polluting ships in harbour.
  - ✓ Installation of PV panels on identified buildings (Transport Malta Head Office) in respective port areas.
  - ✓ Installation of Photo-voltaic powered Vehicle Recharging Car Ports.
  - ✓ Installation of normal and fast vehicle recharging infrastructure.
  - ✓ Purchase of 13 electric vehicles which replaced and added on the current fleet of Transport Malta Port Activities

  The project has achieved a total of 185 tonnes of CO2 emission savings within the region.

- The 'D-Air Project' which focused on the Airport (located barely 7km from Valletta Centre and within in the Southern Harbour District) Carbon Footprint, on which an Implementation Plan has been developed, listing measures focusing on surface transport accessing the airport and airport operations. If implemented the Plan will result in 39,000 tonnes of CO2 emissions saved.

- Affecting positively the Valletta Port and its surrounding regions, as well as affecting the country on a national scale, the Marsa Power Station (located along the Valletta Grand Harbour and which operated on heavy fuel oil) was taken out of service permanently after Malta was connected to the European energy grid on the 24th March 2015. This also saw the electricity interconnector (connecting Malta to Sicily) put in operation and the Maltese grid was synchronised with the Italian grid for the first time.

- Moreover, on a national level, a Combined Cycle Gas Turbine (CCGT) plant and a Liquefied Natural Gas (LNG) facility will be built. The CCGT (approximately 215 MW) is a high-efficiency power plant powered by natural gas which will be sourced from the LNG plant. The LNG facilities will also supply gas to the existing 144 MW Diesel–operated power plant, known as the BWSC plant, which will be converted to run on natural gas. It is expected that Enemalta (the sole energy provider for the Maltese islands) shall start receiving its first gas- fired electricity by June 2016. This new energy source is expected to reduce Malta's dependency on electricity generated through oil-fi red sources.

- Furthermore, Government is also working on a connecting Malta to the trans-European Natural Gas Network via an approximately 155-kilometer pipeline in Sicily to deliver natural gas for the generation of electrical power. This project is currently at feasibility study stage and is looking into the future demand for gas, security of supply, competitiveness, sustainability, and identifying those aspects that qualify it as a Project of Common Interest (PCI).

Renewable Sources of Energy

DECISION No 406/2009/EC on the effort of Member States to reduce their greenhouse gas emissions to meet the Community's greenhouse gas emission reduction commitments up to 2020

- 20% RES of Total Energy Used

As of 2010, Malta had planned to achieve its 2020 renewable energy targets through a number of identified major projects of solar, wind and waste to energy combined heat and power plants. However, studies highlighted significant environmental concerns surrounding the proposed wind farm projects. Furthermore, attempts to tap NER300 funds for the development of a floating wind farm were also unsuccessful. As a result, renewable energy will be generated from a higher number, but smaller capacity sources of renewable energy distributed across the Maltese Islands. Priority is given to deployed technologies, mainly solar photovoltaic systems and solar water heating.

Investment in PVs is being incentivised through grants and attractive feed-in tariff s. Schemes financed through national and ERDF funds have been launched to assist domestic households. The scheme launched in May 2013 was taken up by March 2014 and resulted in the installation of circa 23MWp of PV systems, generating around 37GWh/ year. By the end of February 2015, 8331 households benefitted from this grant. The industrial and commercial sectors as well as non-profit organisations have been assisted through ERDF funds, whilst Local Councils could tap national funds. The Government is banking on tapping new ERDF funds to further incentivise the deployment of PVs

within the domestic and commercial sector. In fact, the Operational Programe for ERDF and Cohesion Fund for 2014-2020 published in March 2015, re-extends the scheme until 2020.

Smart meters are being installed for every electricity consumer, with the aim of changing consumer behaviour through information on energy consumption. By the end of February 2015, nearly 94 per cent of meters were installed.

Transport

DECISION No 406/2009/EC on the effort of Member States to reduce their greenhouse gas emissions to meet the Community's greenhouse gas emission reduction commitments up to 2020

- 10% of TRANSPORT FUELS GENERATED FROM RENEWABLE ENERGY SOURCES

In order to promote the use of biofuels, a biofuel substitution obligation has been imposed on importers/wholesalers of fuel for the transport sector. The obligatory share for 2014 is equal to 4.5 per cent. In 2013, the RES share in road transport was 4.04 per cent (pending audit) and the provisional figure for 2014 is 4.54 per cent.

Other measures aimed at reducing the impact of transport on climate change and air quality are in place.

An Annual Circulation tax has been introduced by Government whereby all vehicles registered with the Authority for Transport in Malta shall pay a fee according to the vehicle specifications and age. The tax is applicable to all petrol and diesel engine vehicles and is calculated according to the age of the vehicle, specifications and its PM emissions.

Schemes are also in place aimed at reducing the number of old motor vehicles from the road while promoting the use of clean and energy efficient vehicles as a way to contribute towards the reduction of traffic generated pollution and improvement of air quality levels. A grant scheme to incentive the purchase of new, category M1 motor vehicles (passenger vehicle with a seating capacity of up to eight passenger besides the driver) is aimed at reducing the number of old motor vehicles from the road and thus reducing air emissions. Subject to various conditions, the grant varies between €700 and €900, is given upon the purchase of a new M1 motor vehicle that qualifies for the grant scheme whilst at the same time de-registering a vehicle in the same category.

Grants for converting combustion engine vehicles to run using LPG/Autogas are available for Category M1 vehicles. Such converted vehicles benefit from a reduction of 10% on the amount of CO_2 which is either reflected in a reduction on the amount of the annual circulation fee or a reduction on the amount of registration tax upon registration, depending when the vehicle was registered.

Moreover, a grant of €4,000 is given to persons/ NGOs and businesses registering an electric car and €1,500 to those registering an electric quadricyle. The grant increases from €4,000 to €5,000 in cases of persons/ NGOs/Businesses registering a Battery Electric Vehicle (M1, N1 or L7e categories) while at the same time opting to de-register another internal combustion engine propelled vehicle which is at least 10 years old from the year of its manufacture. The scheme is also open to both new and second hand Battery Electric Vehicles which should not exceed 12,000 km on the odometer and would not be more than 24 months old.

DIRECTIVE 2014/94/EU on the deployment of alternative fuels infrastructure

- Recharging points should be established taking into account the number of electric vehicles estimated to be registered by the end of 2020 in each Member State. As an indication, the appropriate average number of recharging points should be equivalent to at least one recharging point per 10 cars" For Malta, the target of BEVs registered by 2020 is 5000, therefore a total of 500 charging points are to be installed on the road network by then

Besides the promotion for the use of electric vehicles in Malta and facilitation of market entry and penetration of the latest technologies being introduced on the European and International markets, the Government has also embarked on a phased approach to install the necessary infrastructure to compliment the use of these vehicles.

With respect to the deployment of public electric vehicle charging network, Government has adopted this phased approach such as to make sure that the deployment is carried out in a manner to benefit from the continuous developments taking place in the field of electric car charging infrastructure as well as the developments of the vehicles themselves.

An Action Plan specifying the manner of deployment of both the charging infrastructure and the continuous entry into the market of battery electric vehicles has been published by Government in November 2013. Entitled the Malta National Electromobility Action Plan, the document identifies 22 projects earmarked to facilitate the deployment of 500 charging points and 5000 electric vehicles. Most of the projects are earmarked for EU funding, be it ERDF, CF, and centralized EU funding programmes.

The Action Plan, however, also covers the deployment of alternative technologies for transport such as hydrogen propulsion and related infrastructure.

References:

- Malta National Reform Programme, Ministry of Finance, April 2015
- Budget Document 2015, Ministry of Finance, November 2014
- Malta National Electromobility Action Plan, Ministry for Transport and Infrastructure, November 2013
- Programming of European Funds for Malta, Operational Programme I (ERDF-CF), Ministry for European Affairs, March 2015

Q2 How does the "Smart City" approach feed into/connect with your existing local planning processes?

Currently, Transport Malta is in the process of developing a National Transport Strategy (NTS) and Transport Master Plan (TMP) covering all relevant transport modes (land, public transport, maritime, and aviation) for the short, medium and long term. Through the National Transport Strategy, Government will develop a vision of where Malta wants to be in the long term and the strategic direction required to get there. This exercise is the first fully comprehensive look at all transport modes, and also the inter-modality for both freight and passenger transport.

This is being carried out in parallel with the new Strategic Plan for the Environment and Development (SPED) which is being drawn up by the Malta Environment and Planning Agency (MEPA) which plan strictly deals with land planning issues.

Moreover, further to the EU Commission's Communication entitled 'Together towards competitive and resource-efficient urban mobility' Transport Malta sought to introduce the concept of urban planning at a local and regional level. So far, such planning has always taken place at a national level, which shouldn't be surpirising considering Malta's size. However, there are certain benefits to be had if each local council, or groups of local councils within the same region, were to take a deeper level of resonsibility and interest in the medium to long-term development of their locality.

To promote the concept of sustainable urban mobility planning, as part of the events held in Malta during the 2014 European Mobility Week, Transport Malta launched a SUMP Award. The Award consisted of a competition between local councils for the best SUMP proposal, whereby the winning Local Council was awarded a cash grant to implement a number of measures indicated in the proposed plan. The Award was used to introduce Local Councils to the concept of thinking on what needs to be done in their localities as well as serve as an incentive for Local Councils to start exploring different forms of funding to implement the measures indicated in the SUMP, including private public partnership arrangements and participation in EU funded projects.

A set of criteria were set as guidelines for the SUMPs, therefore Local Councils had to make sure that their SUMP includes Environmental related criteria such as contribution to the improvement of air quality and mitigation of climate change, energy efficiency and the use of Renewable Energy Sources; Planning Criteria such as better use of public spaces; and Transport related criteria such as better use of road space, modal shift and use of non car modes, further pedestrianisation as well as improvements in accessibility and road safety. The concept was received well by local councils, and further efforts are being made to expand the SUMP concept further.

Q3 Is there a (strategic) plan and organisational structure in place to become a "Smart City"?

Currently, no such plan is in place for the city of Valletta.

However, although not particularly related to the smart city concept as defined in this document, Malta is in the process of building a SmartCity® which us an off shoot of the Dubai based Smart City.

This is being developed along the east coast of Valletta and its main objective is to house smart technology.

SmartCity Malta (SCM) is the first European outpost of this SmartCity Global method of business townships, creating a network of opportunities for knowledge based companies.

It will have the most advanced and reliable ICT infrastructure available in Malta today. Through progressive implementation of technology and services, SmartCity Malta has developed its proprietary ICT infrastructure concept to meet the technical demands of mission critical digital operations.

Environment Sustainability comes with:

- Rainwater harvesting and storm water management
- Use of water efficient landscaping
- Use of solar photovoltaic paneled LED lights and energy efficient LED street lighting
- HVAC LED optimization and VRV system
- Heat recovery wheels
- Limited glazing in build environment
- Appropriate metering to meet energy end use.

Q4 Are there synergies and/or conflicts of the "Smart City" plan and organizational structure with existing initiatives and their structures within the city?

The Smart City Concept fits well as a means of getting the Valletta Region on track to address the environmental and sustainable transport targets.

Financial resources are lacking however, to implement long term measures in this regard leaving dependence for the implementation of these measures on PPP arrangements and EU funded projects were possible.

Q5 Which and how are regional and local stakeholders involved in the Smart City strategy and planning process on a city level?

The main stakeholders include:

- Ministry for Transport and Infrastructure
- Ministry for Finance and Investment
- Ministry for Sustainable Development, the Environment and Climate change
- Ministry for Energy and Health

- Transport Malta
- Malta National Electromobility Platform
- Malta Resources Authority
- Malta Environment and Planning Agency

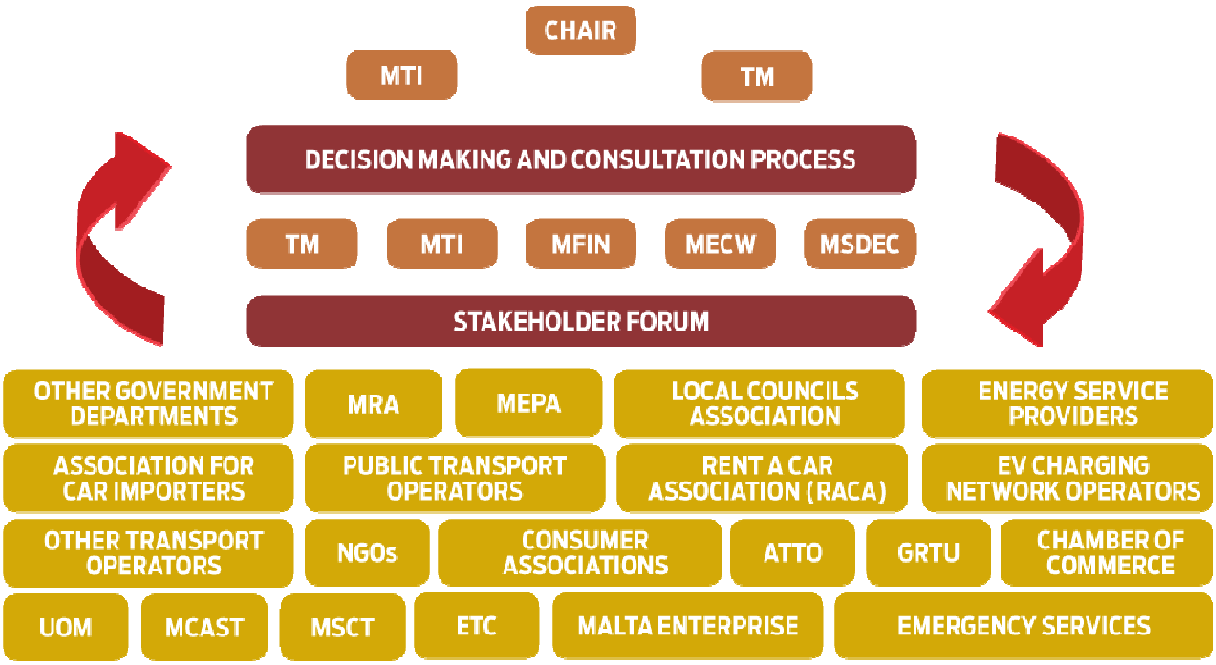
- Valletta Local Council
- Local Councils Association

- Energy Service Providers

- Association for Car Importers
- Rent a Cab Association
- EV Charging Network Operators

- Consumer Associations
- General Retailers and Traders Union
- Chamber of Commerce

Organizational structure of the stakeholder forum:



Q6 What are past (<5 years) and current projects that are closely related to the "Smart City" concept?

Vertical Connection - Better accessibility through innovative and cleaner transport (2009 – 2013): Funded through ERDF, the vertical connections project connects the lowest part of Valletta and the highest point of the City through the installation of a lift. The lift facilitates accessibility to the centre of the City and the waterfront where the Valletta Gateway Terminal and the Valletta Cruise Port are situated, guaranteeing modal shift adopting a cleaner transport technology.
MODUS (2010 -2015): Funded under ERDF, the MODUS project strives to mitigate negative trends in Maltese transport by making public transport more efficient and reliable. This is done through various measures that will minimize road congestion and make public transport more attractive, including the introduction of accessible Bus Interchanges connecting public transport routes together and facilitating commuters' shift between routes; launch of two Park and Ride facilities; Extension and introduction of new bus priority lanes; Introduction of an Intelligent Transport Management System that will allow Transport Malta to monitor the traffic situation on all Maltese roads in real time, all day, every day. The system will enable TM to respond quickly to congested areas and divert traffic to alternative routes. The real-time traffic monitoring offered by the system will also allow TM to respond to accidents as they occur as well as any other incidents that happen on roads, such as flooding. TM will also be able to alert and deploy the personnel necessary to handle the situation at hand without any delay, while diverting traffic in real time using Variable Message signs at key locations.

DEMOEV (2010 – 2014): funded under Life+, the DemoEV demonstration project introduces EVs in Malta (24 in total) to be used and tested by volunteers ranging from households to SMEs. The

vehicles' feasibility, efficiency, charge autonomy and design are demonstrated to the general public over 12 months with the aim of expanding the use of green transport. The project also introduces the concept of public charging points (90 in total) installed at different strategic points on the road network to be used by EV owners within the general public.

PORT-PVEV (2012 – 2015): funded under the OP Italy-Malta 2007-2013, this project contributes towards energy efficiency improvements in port operations and the attainment of carbon neutral road transport within the Valleta port area (Grand Harbour and Marsamxetto Harbour) and the respective port areas and hinterlands. This has been done through the deployment of 13 full electric vehicles to be used and demonstrated by Port Authority officials during port operations activities; the installation of fast charging points within Port Authority premises; installation of PV panels on Port Authority Premises; installion of solar charging stations to test and demonstrate carbon neutral road transport.

D-AIR (2012 – 2014): Funded under INTERREG IVC, the D-AIR project contributes to convert airports into environmentally sustainable transport hubs. The project deals with two main elements of airport operations that fall under the competence of public authorities and bodies, namely; surface accessibility to airport zones and carbon neutrality for airport operator activities. Based on the studies and exchange of best practices completed during the lifetime of the project, the end result is an Implementation Plan which has been endorsed by national decision making bodies and which will be followed as guidelines to future policy after the termination of this project in order to create a truly decarbonized airport region.

STREETS (2012 – 2015): Funded under Italy-Malta 2007-2014, the STREETS project contributes towards the strengthening of efficiency, sustainability and integration within a joint transport system aiming at an improved internal (Maltese road network) and external (Malta to Sicily transport) accessibility and competitiveness. The main result provides a contribution to overcoming the current bottlenecks identified within and between Malta and Sicily in strong connection to inadequate land and air infrastructures, logistics and commercial services. This project thus provides the basis for better accessibility through an eco-friendly transport system.

MEDNET (2012 – 2015): Funded under MED Programme, the MEDNET project establishes a network of Mediterranean port authorities and transport experts – on a long-term basis – focusing on the exchange of experiences concerning port and custom procedures and the simplification of clearance of vessels and cargoes. This is expected to enhance the common understanding of such procedures and promote the introduction of information systems to ports and potentially other intermodal nodes. As part of the MEDNET project TM has commissioned a detailed study which serves as a Masterplan to be implemented by Transport Malta to effectively prepare the way for the implementation of the National Single Window - a directive which aims at the harmonization of port procedures, limiting unnecessary bureaucracy and facilitating administration at the port area.

Q7 Which sites/districts are projected to be developed in the next five/ten years?

Being the centre for administration, business and transport – including the international airport, both the Grand Harbour and the Marsamxetto Harbour which cater for cargo shipment, cruise landings and the Malta-Sicily ferry, as well as the main land transport hubs – the Valletta Region is the main focal point for development over the medium and long term.

Projects planned for implementation include:

- Pilot projects and relevant studies on the use of hydrogen energy for transport
- E-bike sharing projects and schemes focusing on better accessibility within urban centres for tourists and residents

- E-car sharing projects targeting tourists and commuters
- Developing a Regional SUMP for Valletta
- The improvement of harbour ferry and water taxi landing sites within the Grand Harbour and Marsamxetto harbours to encourage modal shift from congested roads to the sea while better connecting ferry landing sites at Valletta, Sliema and Cottonera together as well as with other modes of public transport through ITS infrastructure
- The introduction of last mile delivery of goods using clean and energy efficient vehicles within the Valletta City
- Extending the Modus project to increase the role of ITS on the national network, particularly within the urban centres, to focus on road safety and intermodality

Q8 What are the main areas of interest of the FC in the Smart City concept?

Smart Solution 11:

To build on the electric vehicle charging point network implemented through the DEMOEV project with which forty-five charging pillars have been installed nationwide in Malta, Government will continue the deployment of additional 400 charging points. Current pillars are dual-point, meaning that as of 2014, ninety charging points have been available for public use.

Furthermore, as part of the PORT-PVEV project, additional charging points and solar charging stations have been installed in and around the Valletta port area. Each solar charging station can house up to 4 vehicles at any given time, adding the national charging point network by an extra 11 points for public use. Solar Charging points are being installed together with batteries in order to store energy generated on site by the solar station and use it to charge vehicles directly; thus making available and demonstrating carbon neutral transportation.

In order to manage the various public charging points, a monitoring platform for the existing charging points is already in place which specifically covers the forty-five pillars that have been installed as part of the DEMOEV project.

However, the setup of a national e-platform is planned. This will connect current and future charging points and enable their remote management and monitoring while ensuring interoperability and the competitively of the charging infrastructure on the national transport network. The e-platform must cover the entire island since focusing the remote monitoring on specific isolated regions within the road network would not generate economies of scale.

As stated above, as part of the EU Directive on Alternative Fuels Infrastructure, and in accordance with the targets indicated in the Malta National Electromobility Action Plan, Malta is bound to install a total of 500 charging points nationwide by 2020. This, coupled by the drive to encourage the take up of electric vehicles particularly by the commercial sector – namely, economic operators with sizeable vehicle fleets – the interoperability, monitoring and management of the different charging systems is a high priority for the Government.

As stated above, within the Valletta Region, several electromobility projects will merge over the coming five years. To this effect, Transport Malta is very interested to learn from the experience of other cities on how charging infrastructure for electric vehicles can be effectively managed to provide the best service to its users, maintain an open, competitive market, including different propulsion technologies, while leaving the least possible negative impact on the electricity grid.

Through its participation in the development of Solution 11 and the development of its Replication Plan, Transport Malta aims to achieve the following:

- Identification of the locations where future charging points should be installed in the Valletta region (which encompass the Inner and Outer Harbour Regions);
- Roll out plan (including timeframes) of the charging infrastructure installation;
- Funding and financing options to support this investment;
- Stakeholders to be involved;
- Type of infrastructure to be installed (keeping in mind evolving technologies and demand);
- Identification of a suitable e-management system for the existing and future infrastructure to be deployed.

Smart Solution 12:

Malta will look at the actions implemented with respect to car sharing, be it conventional car sharing, electric car sharing as well as e-bike sharing (PEDELEC) in specific urban cores.

The studies and knowledge-gathering exercise to be conducted by Transport Malta during the GrowSmarter project on these vehicle sharing platforms is essential before Transport Malta can attempt to carry out an actual pilot project in Malta, especially since there has so far been no experience with car sharing of any form in Malta.

E-Car/Car Sharing and e-bike sharing are both included in Malta's National Electromobility Action Plan and hence are of top priority both for the Transport Authority and the Government. These will further contribute towards the promoting of additional modes of transport, in the case of PEDELEC and addressing traffic congestion problems in specific urban cores by developing the concept of vehicle sharing.

Through its participation in the development of Solution 12, Transport Malta aims to achieve the following:

- Identification of the locations from where future e-Car/Car sharing and e-bike sharing services may be offered;
- Type of infrastructure to be installed (keeping in mind evolving technologies and demand);
- Roll out plan (including timeframes) of the infrastructure installation;
- Funding and financing options to support this investment;
- Stakeholders to be involved;
- Identification of a suitable e-management system for e-Car/Car/e-bike sharing system.

The Smart Solutions which Transport Malta will be following and studying as part of GrowSmarter merge three technologies; BEVs (e-bikes, electric quadricycles and electric vehicles), vehicle charging systems and vehicle sharing software and management systems. The integration of BEVs with vehicle sharing technologies can potentially increase the utility of vehicle sharing by reducing some barriers to the use of BEVs and increasing the amount of prospective users, while merging vehicle sharing software with vehicle charging stations allows for a comprehensive, space saving solution which may create hubs where electric vehicle owners may charge own cars as well as share public vehicles with interested users. Such a solution would be ideal for Malta where parking space is such a limited commodity.

The GrowSmarter project will allow Transport Malta to better understand the various options of monitoring and managing charging infrastructure which is intended for public use. Considering the authority's current development of the MODUS project and, more specifically, the implementation of the Intelligent Management Transport System (ITMS) forming part of the same project, the opportunities that GrowSmarter offers could not have come at a better time.

A remote management system that manages various electric car charging points is currently in place. It is operated by a private operator and caters for the 90 points which have been installed as part of the DEMOEV project. However, the operational costs for the management of these 90 points are astronomical and it is in the National interest for Transport Malta to find a more economical way of monitoring these points, especially when considering that since the end of the DEMOEV project, a further three solar charging stations have been constructed as part of the PORT-PVEV project. Moreover, since the new Solar Charging Stations do not form part of the DEMOEV project, they neither form part of the management and monitoring system catering for the initial 90 points.

As stated above, the current 101 points are only the beginning, and at least another 399 points must be available on Maltese roads by 2020. All new points must be monitored and managed if the public is to be provided with an efficient and effective service. On the other hand, segmenting the system between various private operators will not provide the best comprehensive solution, while at the same time, private operators should not be deterred from bidding to operate segments of the system in order to maintain a healthy level of competiveness, ensure the best technology on the market at the right prices.

In order to solve this problem, a Government operated, umbrella management platform must be created to which all the separate segments of the network are connected. This will allow standardisation, deter abuse, and ensure a seamless service no matter the type of infrastructure and respective operator.

Moreover, in order to ensure the best level of monitoring, the umbrella platform must be connected to the ITMS and monitored from the Central Hub which is to be housed at Transport Malta and manned on a 24/7 bases. Herein lies one of the main opportunities which GrowSmarter offers as the project will not only study the best technological solution which is most adapted to offer the needed monitoring service, but it will also offer the right solution of how such a monitoring system can best be connected to the ITMS. ITS in Malta is currently at its infancy stage, therefore now is the best time to develop the service with the right solutions that meet the country's needs. With ITS being such a new experience for the island's transport managers, learning from the wider experiences offered by countries such as Cologne and Stockholm will offer Malta a well of know-how and ensure that Transport Malta has the right guide on which to plot its own system.

Through the sharing of best practice and knowledge gathering exercise made possible by GrowSmarter, Transport Malta will also look at funding options which will be used as guidelines for Transport Malta when it comes to contracting the monitoring service and connecting such solutions to the ITMS. The funding options will also be studied in terms of financing the deployment of the remaining 399 charging points to be installed on the national network, as well as financing the vehicle-sharing systems.

Mapping of the overall opportunities and needs for a successful replication

Q1 What are the main overall needs of the FC to become a "Smart City"?

Answered in Section 5.3.1.1. below.

Q2 What specific aspects the FC likes to explore with Stockholm, Cologne and/or Barcelona?

Refer to Q8 above.

Q3 What insights and opportunities can your city offer to the LCs and other FCs?

Malta can serve as a large laboratory due to its geographical particularities. Moreover, the size and the uniqueness of the Capital City particularly the fact that it is surrounded by fortifications, while hosting high residential, administrative and commercial concentration, the Island presents an interesting challenge to make the same city 'Smart'. If the Valletta Region can implement smart solutions successfully, other such small cities may follow.

Q4 Are there any related events organised by the FC?

The Malta National Electromobility Platform organizes and annual conference in which local and international stakeholders involved in electromobility are brought together. The conference showcases concept technologies in the electric vehicle market, different charging solutions, invites speakers experts in the field and provides a forum for discussions where the experts, members of the industry and public bodies can trash out permanent issues.

The Conference also helps the public understand the advantages of electromobility and other means of green transport in comparison with conventional private mobility. The Car Culture is very heavily embedded within the public mind, and the annual conference is one of the main events where efforts are made to transform the car culture into sustainable mobility.

9.2 Smart Solutions Selection

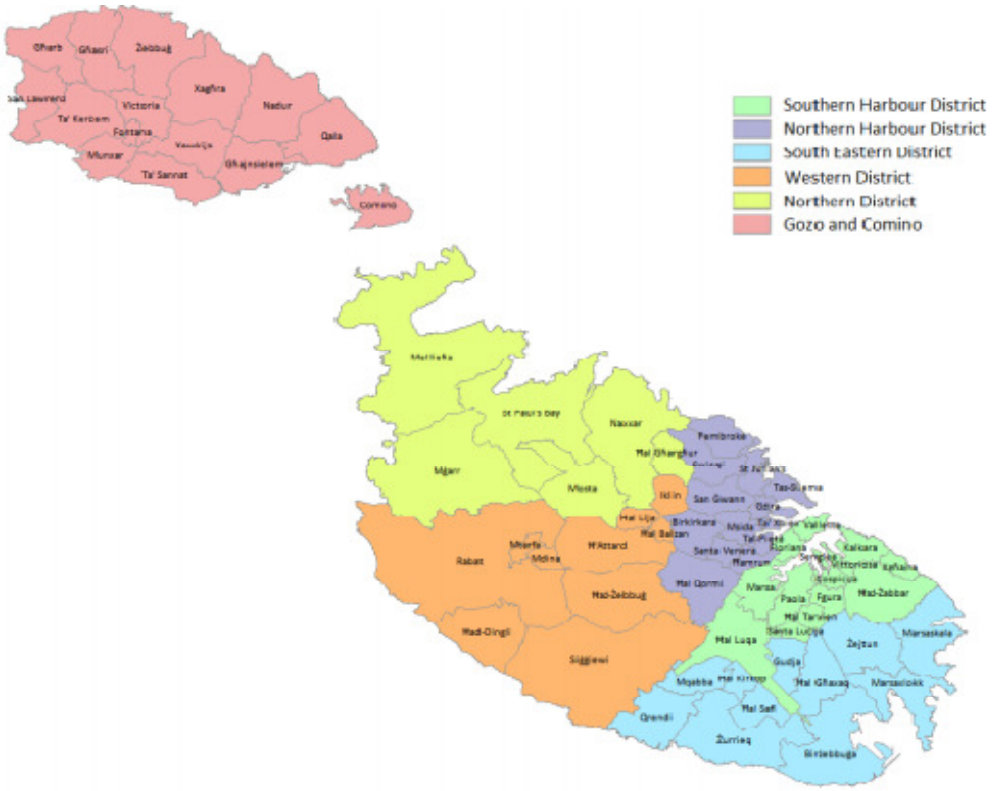
Description of replication potential of selected Smart Solutions of LCs within FC

The table below shows which solutions the Follower Cities plan to replicate.

		Follower Cities				
Area	***Smart Solutions***	*Porto*	*Graz*	*Cork*	*Valetta*	*Suceava*
Housing measures	*1. Efficient and smart climate shell refurbishment*		*X*	*X*		*X*
	2. Smart building logistics and alternative fuelled vehicles					
	3. Smart, energy saving tenants through information	*X*	*X*			*X*
	4. Smart local electricity production and integration with buildings and grid			*X*		*X*
Integrated measures	*5. Smart lightning, lampposts as hubs for communication*	*X*	*X*	*X*		*X*
	6. Waste heat and local heat integration by new business models		*X*			
	7. Smart waste collecting, turning waste to electricity, heat and biogas for vehicles.	*X*				*X*
	8. Big data protocol for saving energy and improving the quality of life	*X*	*X*			
Mobility measures	*9. Sustainable delivery*					
	10. Smart traffic management					*X*
	11. Alternative fuel driven vehicles for decarbonizing and better air quality	*X*		*X*	*X*	*X*
	12. Smart mobility solutions		*X*	*X*	*X*	*X*

5.3 Smart District Replication

The Districts with the highest potential for Replication of Smart Solutions are the Northern Harbour and Southern Harbour Regions – shown in purple and green in the map below. These two districts form the Valletta Region and together are acting as Follower City to this project.



5.3.1.7 Smart Districts Replication Profile

Mapping of district related replication framework for selected Smart Solutions

Q1 What are the main characteristics of the district and what is the replication potential?

Southern Harbour District:

Area:	26.17 Km^2
Population:	79,438
Population per Km^2:	3,035
Demography:	Males: 39,575 Females: 39,863
Employment:	29,561 persons aged 15 and over who are employed

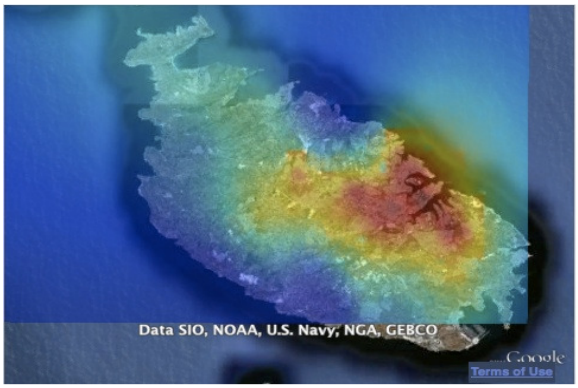
Major Transport Hubs: Malta International Airport (TEN-T Core Network); Grand Harbour (TEN-T Core Network) including the Valletta Cruise Port; Valletta Gateway Terminal, Malta-Sicily ferry landing site and Valletta and Cottonera ferry landing sites; Valletta, Marsa, Fgura Bus Interchange Termini.

Northern Harbour district:

Area:	24.02 Km^2
Population:	120,449
Population per Km^2:	5,014
Demography:	Males: 59,335 Females: 61,114
Employment:	50,110 persons aged 15 and over who are employed
Major Transport Hubs:	Marsamxetto Harbour including the Sliema Ferry landing site; Sliema, St Julian's Bus interchange termini

These two districts have the highest potential for replication since they house the most prominent transport, administrative and commercial hubs, as well as being the most densely populated districts on the island. Development done in these districts is felt by the highest per capita population, while due to their density, they are the districts most in need of improvement.

Traffic congestion is rampant in these districts. From Air Quality data gathered periodically by the Malta Environment and Planning Agency (MEPA), depicted in the map below, it is evident that these two districts are in the line of fire when it comes to poor air quality – due to the high level of road traffic congestion, emissions within the port areas and the airport.



Poor air quality not only affects the quality of life of the population – these two districts alone house 47.88% of the entire Maltese population – but also historical infrastructure located in the area which deteriorate from acid rain and the dirty air. Valletta, the three cities of Cottonera and Fgura are four cities surrounded by 4-century old bastions which form a major role in the Maltese national heritage.

As the Maltese population feels the effects of poor air quality and rampant traffic congestion, so do tourists who throng to these two districts annually. 90% of tourists who visit Malta, also visit Valletta, while 64% visit Sliema – located across the harbour from Valletta. Of the 1,520,828 tourists who visited Malta in 2014, 492,207 where cruise passengers who landed in the Valletta Cruise Port – these numbers are staggering when keeping in mind that Malta's residential population amounts to 417,432 residents.

Moreover, Sliema, Gzira, St Julian's and Valletta house the main tourist resorts on the island.

As stated above, the districts also house the main transport hubs, therefore in solutions that generate potential for intermodality, vehicle-to-infrastructure communication, green modes of public transport and ITS, these Districts hold the greatest potential for replication and improvement.

National Transport Strategy

The NTS, scheduled to be published at the end of 2015, will set the policy and framework for transport in the Maltese Islands and will develop a vision and pathway for transport to/from and within Malta up to 2050. A Strategic Environmental Assessment (SEA) will be undertaken as part of the development of the Transport Master Plan.

The Transport Master Plan will consider all transport sectors including land transport, ports and ferries, public transport and air transport; for areas of particular intervention, and will include detailed sector action plans. The Transport Master Plan will contain a priority list of transport infrastructure projects and policy measures to be implemented between 2014-2024.

Budget Document 2015

The 2015 Budget Document sets the policy and planning schedules for 2012. Of relevance within this document are the following:

At a national level, the development of Solar Farms are encouraged as solar power is the main source of renewable energy available to Malta. In fact, these are supported by the Operational Programme for ERDF and Cohesion Policy 2014 – 2020 which supports funding for development of solar farms.

In the meantime, however, the 2015 Budget Document states that in collaboration with the Planning Authority, a solar farm policy will be drafted to regulate sizeable installations of solar panels with the aim of minimising any negative impact on the environment.

Solar Farms are also encouraged on a smaller scale; the Government, through the Malta Resources Authority, has launched additional schemes for the installation of photovoltaic panels and solar water heaters for households, as well as initiatives to encourage efficient use of energy.

The 2015 Budget document reiterates on the investment to continue being done in ITS for transport and improvements in the cycling infrastructure. Within the document, Valletta is mentioned as a specific area of focus.

Major infrastructural projects incorporated in the document include the Kappara flyover – a section of arterial road which connects Valletta to Sliema; reconstruction of the Aldo Moro arterial road which connects the Southern Harbour District with the Southern District; pedestrianisation works in Valletta City and in the Cottonera three cities.

National Electromobility Action Plan

Published in 2013, the strategy notes the importance of electric mobility and its relevance to land transport in Malta and Gozo. The Government of Malta has set an indicative target of 5,000 electric

vehicles uptake by 2020. To meet this target, the Action Plan lists 22 projects to be implemented by 2020. The projects are planned at a national level, however since tourism and transport infrastructure are geographically focused in the two districts under review, the majority of the project will be focused in these areas.

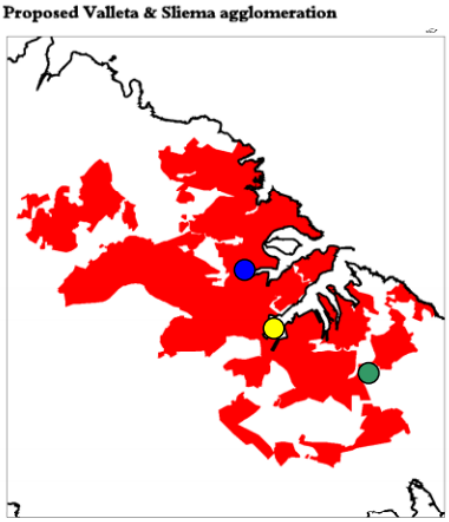
Projects include:

- Building of a Hydrogen Fuel station
- E-car Sharing for Hotels
- Studies into light rail and monorail
- Public Transport Routes for electric buses
- Carbon Neutral Transport infrustructures

Air Quality Plans and Measures

Published in 2010 by MEPA, this document is aimed to act as policy guidance to reduce daily average PM_{10} concentrations in ambient air in the Maltese agglomeration. The measures contained in this document are proposed for the major sources of PM_{10} in the Maltese Islands, more specifically the construction industry, power generation and traffic.

In its measures, the document focuses on the Valletta (Southern Harbour) and Sliema (Northern Harbour) agglomeration as it is the zone in exceedance.



Malta agglomeration and location of PM_{10} measuring stations

With respect to power generation, the measures contained in this document are conditions already set out and legally binding.

With respect to the road transport sector, national data shows that this sector is the major contributor to the exceedance of PM_{10} concentrations in ambient air.

Measures proposed for the road sector include, but are not limited to, the facilitation of carpooling and car sharing, restrict circulation of public buses falling in the Euro 3 category and lower (implemented by 2011), improvement of Valletta Park and Ride (extended to Marsa and Pembroke), improvement of cycling infrastructure, reform of the Valletta Controlled Vehicle Access system, measures to encourage local car dealers to promote the sale of cleaner technology vehicles (under implementation since 2013).

This document is currently being updated by MEPA in consultation with Transport Malta.

Funding varies between national, cohesion policy and ERDF, other Centralised EU funding projects and PPPs.

Q2 Are there synergies and/or conflicts related to the Smart Solutions with the existing infrastructure, socio-economic profile and social acceptance?

Synergies exist particularly with the projects planned over the coming five years as described in Q1 above.

Q3 How will local stakeholders be involved in the replication of Smart Solutions?

When it comes to the implementation of all sorts of infrastructure on public land, the Malta Environment and Planning Authority must be consulted since all permits are issued from said authority. The Authority will check that relevant impact studies are in place and that no major negative impacts will result; both on the environment, air quality and the road network; as a result of the development in question.

When the infrastructure is particularly relevant to the generation of energy from renewable resources the Malta Resources Authority will also be consulted extensively.

The Malta Tourism Authority will be consulted when it comes to implementing infrastructure and equipment in areas of high tourism value and when it comes to implement measures that may impact the flow of tourism.

All Local Councils within the selected districts will be kept on board throughout the consultations.

Consumer organizations, the General Retailers and Traders Union and the Chamber of Commerce will be consulted when measures may impact the market.

The Ministry for Finance and the Ministry for European Affairs will be consulted on matters related funding and resources, in terms of the latter Ministry, consultations will occur when the project is targeting EU funding.

Mapping district related opportunities and needs for a successful replication

Q1 What are the main needs/ambitions for becoming a "Smart District"?

- Awareness Raising communication and dissemination needs to be targeted at the general public, vehicle users and the business community. Awareness raising is very important considering that the solutions are dealing with technologies which are new and concepts (car/bike sharing) which are non-existing on the island.
- Public consultation is also essential to help in the fluid development of the political and planning process which would enable the implementation of these solutions
- Making evident that these solutions have been successful in other cities would greatly help the political process (and the politicians) to accept the proposals being put forward
- peer-to-peer and training would definitely help in the successful implementation of these solutions

Q2 What insights and opportunities can the district offer to the LCs and other FCs?

Deployment of electromobility and ITS is still in its infancy in Malta, however, despite of the fact that the concept was introduced in 2012, major strides have already been made, both in the level of infrastructure already implemented as well as governmental incentives and policies to promote the technology. There is potential, therefore, for lessons to be learnt from such a small island in these areas.

5.3.1.8 District Northern Harbour/ Southern Harbour - Smart Solutions Specifications

Adaptation of solutions towards the most effective deployment and integration

- Solution 11: Alternative fuel driven vehicles for decarbonizing and better air quality
- Solution 12: Smart Mobility Solutions

Both Solutions target the deployment of electromobility; one in terms of the infrastructure to be made available for Alternative Fuels while the other targets car/bike sharing which Malta plans to implement using electric cars and pedelecs. Therefore, answers below apply to both solutions.

Replication of Smart City Solution 11 - Alternative fuel driven vehicles for decarbonizing and better air quality

Q1 What is the replication potential of the Smart Solution?

Due to the size and topography of the island, coupled with the lack of other natural resources, electromobility, especially when energy is attained from solar power, can be the key for Malta to reach its 20-20-20 targets and achieve clean and sustainable urban transport.

The environmental legislation and the targets thereof – including the Effort Sharing Decision which limits Malta's GHG emissions up to a 5% increase when compared to 2005 levels – are what has prompted the introduction of electromobility in Malta back in 2010 and the several measures aimed at its implementation since then.

However, one of the main legislative drivers for the selection and development of this Solution is Directive 2014/94/EU which states that at least 1 charging point per 10 electric vehicles deployed on the road must be installed by 2020.

In terms of the deployment of electric vehicles on the road, Malta's target is at 5000 EVs on the road by 2020 – therefore by the same year 500 charging points must also be installed on the national network. In order to meet the targets embedded in this Directive, the transport authority needs to learn from best practices developed by other countries and follow said practices as guidelines to implement an effective and efficient charging network.

Studies into charging solutions and infrastructure have been done through two pilot projects implemented between 2010 and 2015, both of which have proved that electromobility is a feasible solution for the topographical and climatic conditions found in Malta.

The projects have tested the concept with households, SMEs, NGOs and public entities and the electromobility was found to work in all circumstances.

Moreover, the pilot projects have facilitated the way for electromobility to break into the local market and have started to slowly change the public mind-frame that was so negative towards electric vehicles until a few years ago.

For Solution 11, demonstration on how the uptake of electric vehicles can be speeded up through an integrated approach combining better charging facilities, information to help effect the choice of vehicles' users and buyers and the use of these vehicles in the different mobility measures.

With this in mind, there is great potential for implementation in the Valletta Region. With 100 charging points currently in place and another 400 planned for implementation by 2020, there needs to be synergies in the monitoring of these points; planning as to the most strategic locations for implementation; impact analysis on the electricity grid and possibilities for solar charging stations.

Moreover, with a target of 5000 vehicles deployed by 2020, it is of utmost importance for Malta to learn from other cities how best to encourage (also in terms of Marketing and Public Information Strategies') vehicle uptake and replacement of combustion engine vehicles.

Further promotion of the concept: vehicle users need to understand 'what is in it for them' before they can be convinced to make the switch; the concept of e-Car and e-bike sharing is completely new for Malta. Therefore, rigorous promotion needs to take place prior, and in conjunction with, the launch of the service.

More enforcement supported by legislation: Enforcement on two tiers: existing and new charging points need to be kept free for actual EV users to re charge vehicle batteries. However enforcement needs to take place on a more general level including restriction of high polluting vehicles from urban cores; more rigorous taxation on high polluting vehicles etc.

Further subsidies need to be made available by government to incentivize vehicle users to replace old polluting cars with clean, energy efficient ones.

General decrease in prices for electric vehicles and related technologies would definitely help local EV uptake.

Q2 What is the business case and do financing opportunities already exist?

An Action Plan specifying the manner of deployment of both the charging infrastructure and the continuous entry into the market of battery electric vehicles has been published by Government in November 2013. Entitled the Malta National Electromobility Action Plan, the document identifies 22 projects earmarked to facilitate the deployment of 500 charging points and 5000 electric vehicles. Most of the projects are earmarked for EU funding, be it ERDF, CF, and centralized EU funding programmes.

The cost of vehicle batteries and the wider distribution/availability of EV charging infrastructure are major barriers.

The Operational Programme for ERDF and Cohesion Policy has earmarked funds for sustainable mobility. These can be used to implement the infrastructural works necessary to implement both solutions.

Market uptake so far has been slow. With only 80 electric vehicles on the road as of Q1 2015, there are long strides to be made. However, Government incentives for the purchase of both electric

vehicles and pedelecs, are definitely helping users to replace their vehicles. In January, 2015, €200,000 where made available in incentives. By May 2015, this whole sum was taken up by EV buyers; including members of the business community owning large fleets who are being encouraged to switch parts of their fleets to electric.

So far this is seen as a government-owned initiative since it is very difficult to achieve economies of scale in such a small country when considering that the demand is still so low.

Q3 What is the potential implementation timeframe?

The time frame envisaged is between 2016 – 2020.

Q4 How does the Smart Solution integrate with the existing and future infrastructure?

The Smart Solutions which Transport Malta will be following and studying as part of GrowSmarter merge three technologies; BEVs (e-bikes, electric quadricycles and electric vehicles), vehicle charging systems and vehicle sharing software and management systems.

Merging vehicle sharing software with vehicle charging stations allows for a comprehensive, space-saving solution which may create hubs where electric vehicle owners may charge own cars as well as share public vehicles with interested users. Such a solution would be ideal for Malta where parking space is such a limited commodity; especially in cities like Valletta and Sliema, where added to high population density, narrow streets and high urbanisation make public space very limited.

Replication needs of Smart City Solution 11

Q5 What user / stakeholder involvement is foreseen?

Apart from the Malta Environment and Planning Authority, the Malta Resources Authority, The Malta Tourism Authority, all Local Councils within the selected districts, Consumer organizations, the General Retailers and Traders Union and the Chamber of Commerce, the Ministry for Finance and the Ministry for European Affairs, the main stakeholders are the residents living in the districts under consideration as well as commuters travelling to the area daily since they will be the main beneficiaries of any solution implemented.

Having said that, this same group of residents' stakeholders is also the one who is likely to be most skeptical. Since the concept being promoted is still so new, much promotion and incentives need to be undertaken for the initiative to be accepted.

Q6 What are the capacity building needs for the successful deployment of the Smart Solution?

Anything to help us successfully meet the targets in electromobility would help, this would include:

- How deployment of charging infrastructure can best be planned both in selecting locations for implementations as well as in avoiding negative impacts on the electricity grid;
- Which technological solutions work best;
- How the private sector can be involved to share in the costs and operation;
- How best to design the systems – charging infrastructure and car/bike sharing – to keep operational costs as low as possible;

- how to engage the public to ensure favourable take up.

Recognized capacity building needs and peer-to-peer areas of interest include a knowledge building in relation to the above listed points. In addition, a business dialogue with companies involved in implementation is deemed as desirable and useful.

Q7 What secondary effects do you intend to achieve with the implementation of the smart solution?

- Improvement in air quality and the quality of life of citizens
- Mitigation of climate change by minimizing the negative effects of transport
- Improvement in accessibility by offering alternative modes of transport and encouragement of intermodality

Replication of Smart City Solution 12 - Smart Mobility Action

Q1 What is the replication potential of the Smart Solution?

In the context of *Electromobility* as a key for Malta to reach its GHG targets (especially when considering that 16% of GHG is emitted from transport) Malta will look at the actions implemented by the Lighthouse Cities with respect to vehicle sharing solutions, be they conventional car sharing, electric car sharing as well as e-bike sharing (PEDELEC) in specific urban cores. This is of great interest also when one remembers that Malta has a ratio of 4 vehicles per 5 citizens and this is making private transport both uneconomical and highly polluting.

- 2008/50/EC = Ambient Air Quality and Cleaner Air for Europe Directive
- 2002/49/EC = Environmental Noise Directive
- 2009/46/EC = GHG emissions to increase by only 5% compared to 2005 levels

Studies through two pilot projects implemented between 2010 and 2015, have both proved that electromobility is a feasible solution for the topographical and climatic conditions found in Malta. The projects have tested the concept with households and with SMEs and the solution was found to work in both circumstances.

E-Car/Car Sharing and e-bike sharing are both included in Malta's National Electromobility Action Plan (MNEAP) and hence are of top priority for Government and hence for Transport Malta. These solutions should further contribute towards the promotion of additional different modes of transport (in the case of pedelecs) whilst also addressing traffic congestion problems in specific urban cores by developing the concept of vehicle sharing.

In respect to Solution 12, *GrowSmarter* plans to launch a range of different solutions completing the existing public transport network, including bike pools, cargo bikes, e-bikes, EV-pools and improved shuttling to bus hubs, and improved taxi service thus providing the choice of the best option for each individual trip.

Having re-launched an improved public transport service in 2015, the implementation of sharing solutions would boost in parallel the new bus service and would greatly assist in encouraging the much needed modal shift. Car and e-bike sharing systems have great potential to cater as feeder routes to the main bus routes and to encourage intermodality also between bus and ferry, using the shared electric car/ bike to transfer passengers between one terminal and another.

The concept of e-Car and e-bike sharing is completely new for Malta. Therefore, rigorous promotion needs to take place prior and in conjunction with the launch of the service. Further promotion of the concept needs to address the fact that vehicle users have to understand and accept 'what is in it for them' before they can be convinced to make the switch.

More enforcement supported by legislation needs to be set in place - existing and new charging points need to be kept free for actual EV users to re charge vehicle batteries.

General decrease in prices for electric vehicles and related technologies would definitely help local EV uptake both by private individuals and private companies to start offer the e-sharing services.

Q2 What is the business case and do financing opportunities already exist?

Understandably, the Valletta Grand Harbour Region is the main hub of the Island in respect to Central Government and Corporate Private Business. This includes also a rather densely populated urban settlement as well as the Island's main air and maritime connection with the outside world. Thus the exceptionally high level of traffic generated in and around the Valletta Grand Harbour Region has a direct influence on the economic turnaround and this in itself requires immediate action since saturation point is fast approaching. It therefore follows that direct action towards the mitigation of transport generated congestion (as well as GHE's) will have a positive direct impact on the general economy of the region and the island. Car Sharing facilities aim at reducing the number of vehicles as well as the number of trips (ie reduce traffic) carried out in the particular region of operation.

Government functionaries are the principle target population which such measures can address. Instead of having the numerous vehicles running around with one or two passengers at a time, groupage transport through vehicle sharing will obviously make such an activity more cost effective, less time consuming and in turn also less polluting. This in itself also means that the various Government entities will spend less capital funds on vehicle purchase for their own departments and instead utilize these saved funds in other positive productive investments. Our target is to get a 25% reduction of government entities' generated traffic within the region.

At present, there is no infrastructure set up which would support e-car sharing. Therefore, in order to introduce the service, stations need to be constructed from scratch along with the identification and implementation of the right smart solution that would monitor the service.

Moreover, the cost of vehicle batteries and EV infrastructure is a major barrier, especially considering that Transport Malta is considering the service using only electric vehicles.

The Operational Programme for ERDF and Cohesion Policy has earmarked funds for sustainable mobility. These can be used to implement the infrastructural works necessary to implement both solutions.

When it comes to car and bike sharing, it is believed that initial uptake would be more popular with tourists, however, with the right promotion and marketing in conjunction with the right enforcement against polluting vehicles, the initiative has the potential to become a popular one.

Government functionaries' thoroughfare is also a major 'client' of this system. We will be aiming at establishing a system which will commit a number of central entities based in the region to team up and use the service and this will also serve to help boost the marketing thrust which we are planning to unfold once the project starts.

So far this is seen as a government-owned initiative since it is very difficult to achieve economies of scale in such a small country when considering that the demand is still so low.

Q3 What is the potential implementation timeframe?

For this solution, the time frame envisaged is from 2016 to 2020.

Q4 How does the Smart Solution integrate with the existing and future infrastructure?

The two solutions selected (11 and 12) integrate well together. The Smart Solutions which Transport Malta will be following and studying as part of GrowSmarter merge three technologies - BEVs (e-bikes, electric quadricycles and electric vehicles), vehicle charging systems, vehicle sharing software and the management systems for all.

The integration of BEVs with vehicle sharing technologies can potentially increase the utility of vehicle sharing by reducing some barriers to the use of BEVs and increasing the amount of prospective users. Merging vehicle sharing software with vehicle charging stations allows for a comprehensive, space-saving solution which may create hubs where electric vehicle owners may charge own cars as well as share public vehicles with interested users. Such a solution would be ideal for Malta where parking space is such a limited commodity; especially in cities like Valletta and Sliema where added to high population density, narrow streets and high urbanisation make public space very limited.

Replication needs of Smart City Solution 12 - Smart Mobility Action

Q5 What user / stakeholder involvement is foreseen?

The main stakeholders are:

- the residents living in the districts under consideration, although this same group of stakeholders are also the ones who are likely to be most skeptical. Since the concept being promoted is still so new, much promotion and incentives need to be undertaken for the initiative to be accepted.
- commuters travelling into the area daily since they will be the main beneficiaries of any solution implemented;
- tourists visiting the highly cultural districts surrounding the Grand Harbour region;
- central government departments and employees therein.

Q6 What are the capacity building needs for the successful deployment of the Smart Solution?

Anything to help us successfully meet the targets in electromobility would help, this would include:

- How deployment of charging infrastructure can best be planned both in selecting locations for implementations as well as in avoiding negative impacts on the electricity grid;
- Which technological solutions work best;
- How the private sector can be involved to share in the costs and operation;
- How best to design the systems – charging infrastructure and car/bike sharing – to keep operational costs as low as possible;

- How to engage the public to ensure favourable take up.

Recognized capacity building needs and peer-to-peer areas of interest include a knowledge building in relation to the above listed points. In addition, a business dialogue with companies involved in implementation is deemed as desirable and useful.

Q7 What secondary effects do you intend to achieve with the implementation of the smart solution?

- Improvement in air quality and the quality of life of citizens.
- Mitigation of climate change by minimizing the negative effects of transport.
- Improvement in accessibility by offering alternative modes of transport and encouragement of intermodality.
- Less traffic congestion leading to a more cost effective central administration.