

## DELIVERABLE 7.3a: FOLLOWER CITY REPLICATION PLAN CITY OF CORK

### WP 7 – REPLICATION

Graz



Porto



Suceava



Cork



Valetta



### Follower Cities of GrowSmarter

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## 1 Objective

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

The objectives of this Replication Assessment and Implementation Plan include:

1. Identify and assess the full potential of replication and up-scaling of Smart Solutions on a city level and for specific districts
2. Provide a matrix for FCs to develop their smart city projects through in-depth understanding of concept, approaches, applications, opportunities, challenges, needs, success factors of smart city applications in LCs
3. Support related and necessary local smart-city stakeholder engagement
4. 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
5. Identify and select key actions needed to implement and replicate the GS smart solutions on a city/district level.
6. Define a replication plan for the selected GS smart solutions in accordance to city priorities and to address city sustainability challenges.

## 2 Engagement of parties for Assessment and Replication

The Assessment Report and Replication Plan has been prepared by all GS FC. The cities of Cork, Graz and Porto are supported through all activities by ICLEI while Suceava and Valetta are supported by ICLEI and REC.

The different stakeholders that are supporting the assessment and future implementation of smart solutions in the city of Cork include:

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## Members of Follower City Cork Liaison Group

### INTERNAL (Cork City Council)

- Ann Doherty, Chief Executive
- Ruth Buckley, Head of ICT & Business Services
- Brian Cassidy, Senior Executive Engineer–Housing
- Seamus Coughlan , Senior Engineer–SPED
- Claire Davis , Cork Smart Gateway
- James Goulding , Executive Engineer– Environment
- Anthony Holmes, General Foreperson– Housing
- David Joyce , Director of Environment & Recreation
- Michéal Lyons, Executive Engineer
- Paul McGuirk , City Centre Co–ordinator SPED
- Conor O’Leary, Senior Executive Engineer–Housing
- Aidan O’Riordan, Programme Manager–ICT
- Adrienne Rogers, Head of Enterprise
- John Walsh, Energy Manager
- Jeremy Ward, Senior Executive Planner–SPED
- Ian Winning, Senior Executive Engineer–Roads

### EXTERNAL

- Dirk Pesch, Head of Centre– Nimbus Embedded Systems Research
- Mike Hayes, Senior PM (Energy Efficiency)–Tyndall National Institute for ICT Research
- Tony Day, Director– IERC (International Energy Research Centre)
- Kieran Lettice, Cluster Manager –Energy Cork
- Darren Reidy, PPN Secretariat–Cork City Public Participation Network
- Conor Healy, Chief Executive–Cork Chamber of Commerce
- Liam Ring, Technical Services Manager–ESB
- Mr. David Clements, Transportation Planner– NTA (National Transport Authority)
- Donal Kissane, General Manager–Bord Gais
- James Fogarty, Divisional Manager–Cork County Council
- John Forde, Economic Development–Cork County Council
- Caroline O’Driscoll, Chairman– IT@Cork
- Captain Paul O’Regan , Harbour Master –Port of Cork



### 3 Timeline and replication roadmap

The Smart City Replication Assessment and Plan can be understood as a living document which 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 and Implementation Plan is part of the overall replication roadmap of the Follower Cities (FCs) of GrowSmarter and can be characterized by the following milestones:

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



## 4 Structure of the Replication Assessment and Implementation Plan

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

- |  |   |
|--|---|
| <b>Smart City Replication Profile</b>      | <ul style="list-style-type: none"><li>• Mapping the overall framework conditions and potentials for replication within the city territory</li></ul>   |
| <b>Smart Solutions Selection</b>           | <ul style="list-style-type: none"><li>• Description of replication potential of selected Smart Solutions of LCs within FC</li></ul>   |
| <b>Smart District Replication Profile</b>  | <ul style="list-style-type: none"><li>• Per potential replication site/district: Mapping of district related framework conditions relevant for the replication of the selected solutions</li></ul>          |
| <b>Smart Measure Specifications</b>        | <ul style="list-style-type: none"><li>• Assessment and adaptation of measures towards the most effective deployment and integration at site/district level</li></ul>  |
| <b>Replication Plan for Smart Measures</b> | <ul style="list-style-type: none"><li>• Definition of activities and actions required for the replication and future implementation of the specific smart solutions on a city and district level.</li></ul> |



## 5 Replication Assessment – City of Cork

### 5.1 Smart City Replication Profile

#### 5.1.1 Mapping the overall framework conditions for replication within the city territory

##### *5.1.1.1 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 and Climate Action Plan (SEAP) submitted to the Covenant of Mayors outlines a 40% reduction in emissions by 2030. 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<sup>1</sup> 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

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<sup>1</sup> Cork City Development Plan 2015-2021 <http://www.corkcitydevelopmentplan.ie/>



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 negatives – rapid urbanisation, environmental and quality of life stresses, economic competition; and positives – 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:

- I. Fuelling and supporting sustainable economic development – driving innovation
- II. Facilitating job creation – leveraging existing stakeholder activities
- III. Facilitating citizen involvement and participation
- IV. Promote resource efficiency
- V. Improving citizen quality of life and services
- VI. Providing an attractive environment for all
- VII. 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.



### *5.1.1.2 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<sup>2</sup> 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)<sup>3</sup> 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.

Cork 2050 is a joint submission by Cork County Council and Cork City Council to the National Planning Framework. It is a whole of Cork proposition presenting an evidence-based strategy for maximising the unique capacity of Cork to complement Dublin. Cork 2050 also positions Cork as a driver of growth internationally on behalf of the State and will deliver balanced regional growth through collaborative leadership.

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.

### *5.1.1.3 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 of University College Cork and Cork Institute of Technology respectively. 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

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<sup>2</sup> South West Regional Planning Guidelines 2010-2022

<http://www.swra.ie/index.cfm/page/regionalplanningguidelines>

<sup>3</sup> CASP 2001-2020 <http://www.corkcity.ie/casp/strategicplan/>



business case for the Cork Smart Gateway Initiative. 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 including 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:

1. Establish a Project Management Office (PMO) with dedicated Co-ordinator & staff
2. The PMO will report directly to a steering group made up of the funding stakeholders;
3. PMO to be responsible for delivery of objectives within a defined budget
4. 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;
5. A formal annual review of the workings of the PMO would be carried out by the steering group.
6. An annual report would be produced for the steering group and for the CASP committee.
7. 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.



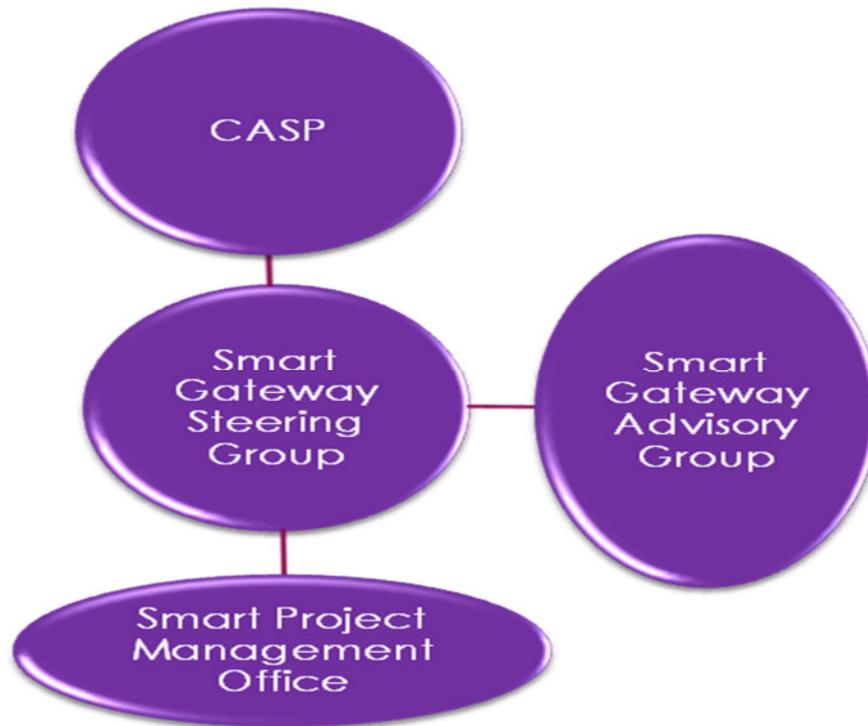


Figure 1: Governance Structure for Cork Smart Gateway

*5.1.1.4 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 the Cork Smart Gateway Initiative and existing initiatives and structures within the city. Organisations such as Energy Cork, a multi-sector energy cluster and IT@Cork, a multi sector ICT cluster, provide opportunities for collaboration and innovation to achieve energy and emission reduction and other climate targets while at the same time seeking opportunities for further ICT enabled enhancements in citizen quality of life and engagement. 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 has been agreed and signed by Cork City Council, Cork County

Council, Nimbus Research Centre at CIT and Tyndall National Institute and this sets out the terms of agreement relating to the governance model of the Smart Gateway Initiative.

The establishment of a Project Management Office (PMO) is 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.

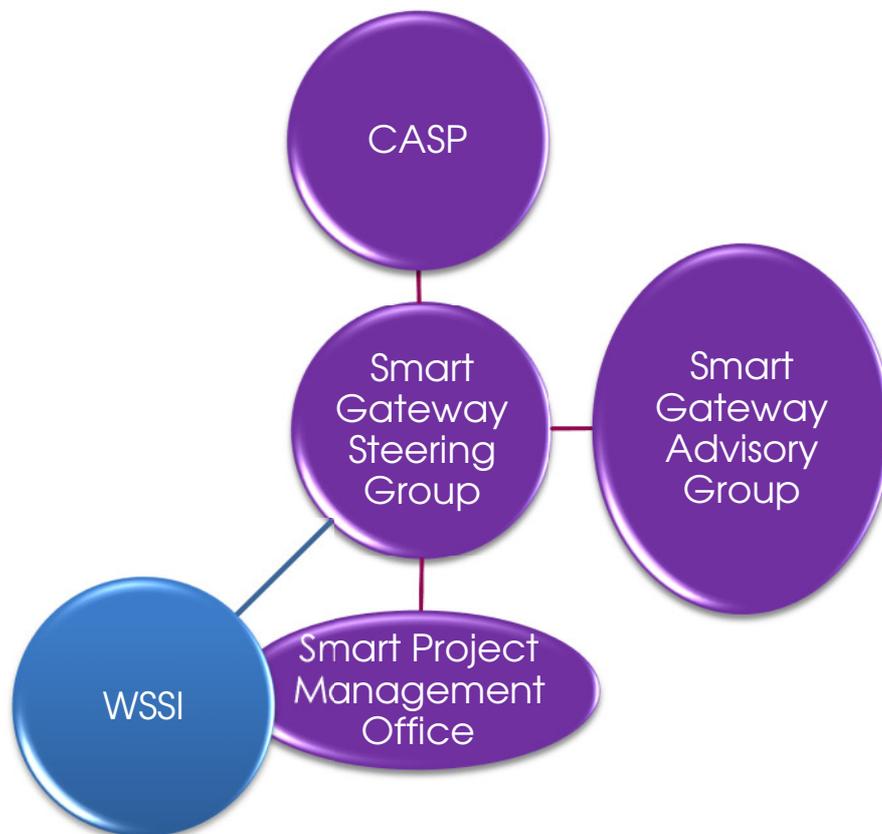


Figure 2: Proposed Integration of WSSI into the governance structure of Cork Smart Gateway

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.

#### *5.1.1.5 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 and will act as both a Technical Advisory Group for the Cork Smart Gateway Initiative as well as the Smart City Liaison Group for the project.

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. One of the first initiatives delivered by Cork Smart Gateway was a comprehensive citizen engagement survey and business survey which yielded a number of interesting results to help shape future planning and initiatives.

#### *5.1.1.6 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. 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:

- **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](http://www.drive4zero.ie)

- **GREEN eMOTION PROJECT – Cork City Council Electric Vehicles Fleet**

Cork City Council deployed a number of electric vehicles, including 3 Pedelecs, on the corporate fleet all of which was funded on the Green eMotion EU Project. The feedback by users has been very positive and the EVs continue in daily use without any difficulty to deliver significant energy savings.

The Fire Department of Cork City Council purchased an EV van with the support of Green eMotion and fitted out the vehicle for use as a ‘Cardiac First Responder’. The EV is marked up in the distinctive Fire Brigade Livery with Emergency Blue Lights and is regarded as ideally suited to this niche application. The unique profile has highlighted the viability of EVs for robust operations in the urban environment.

“The Green eMotion Project – preparing the future of European electromobility” was completed in 2015 by a consortium which consisted of more than 40 partners from



industry, the energy sector, electric vehicle manufacturers, and municipalities as well as universities and research institutions. ESB ecars, Cork City Council and Codema were the lead Irish partners.

The project has defined and demonstrated a European framework that connects all electromobility stakeholders for a seamless, cost-efficient, and interoperable electromobility ecosystem. The Green eMotion Internet site (<http://www.greenemotion-project.eu/>) shows a short project summary on the starting page. A link to the Green eMotion Result Report that summarises the main findings is also available for public access.

- **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 58 No. 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 - Knocknaheeny. This is a €200million project that will see more than 1000 new housing units been built in the next few years.

- **CORK CITY COUNCIL ENERGY PLAN 2013**

Cork City Council has developed a multi 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.



- **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).

- **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))<sup>26</sup>, 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.

- **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](http://www.scoot-utc.com)

- **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](http://www.nimbus.cit.ie)

- **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](http://www.tyndall.ie)

- **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](http://www.ierc.ie)



- **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/>

- **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/>

- **DIGITAL STRATEGY FOR CORK**

Cork City Council is undertaking to develop a collaborative Digital Strategy for the digital transformation of Cork City with key stakeholders in the region. Following



the European Commission Digital Cities Challenge Programme, the stakeholders involved have identified a mission and a number of supporting vision statements to start this process. The next phase of work will help to identify the key strategy elements of the strategy, associated projects and responsible bodies. The broad mission and ambition statements are below:

**Mission: To make Cork the connected city – Innovative, inclusive and incredible**

Based on the vision that the stakeholders need to all buy into the one mission, everyone has a part to play and need to be bound by joined up thinking on Digital Transformation

**Vision Statements**

- **To nurture and incentivise people to use open data in creative, innovative and sustainable ways**  
Focus on identifying the data that is desired by citizens and organisations  
Recognise that open data provision requires ongoing resources and needs to reflect demand
- **To develop specific programmes and incentives to generate awareness generally for digitisation and specifically in different industries**  
Education and support about the benefits and opportunities of digitisation needs to be targeted at different industries. Eg. digitisation in retail will be different from digitisation in a food company.  
Focus on lifelong learning in Digitisation is key – Digital learning is for everyone
- **To create the ‘cutest commuters’ in Ireland through an open and intuitive transport ecosystem**  
Create a connected transport ecosystem that links suppliers and users of transport services  
Creating an open source hub with all transport data which is data that citizens want  
Enable diverse communities and encourage people to share data related to transport
- **To Develop World Class interconnected infrastructure**  
Basic infrastructure needs to be at 100% Eg. Broadband access for everyone in the city. Appropriate infrastructure needs to be identified and future proofed. The infrastructure should underpin and facilitate connected communities



- **INSTALLATION OF ENVIRONMENTAL SENSORS**

Cork City Council has installed a number of environmental sensors in the city to help provide real time information about the city. Currently there are sensors monitoring real time water levels of the River Lee at Anglers Rest and the Lee Road and this data is available via [data.corkcity.ie](http://data.corkcity.ie) and is also shared through the [corkdashboard.ie](http://corkdashboard.ie).

Recently the City Council installed a number of environment sensors on a main transport artery of the city as part of a pilot project with Johnson Controls. These sensors monitor Carbon Monoxide, Nitric Oxide (NO), Nitric Dioxide (NO<sub>2</sub>), Sulfur Dioxide (SO<sub>2</sub>) [Calibrated] (High Accuracy), Particle Matter (PM<sub>1</sub> / PM<sub>2.5</sub> / PM<sub>10</sub>), Atmospheric Temperature, Humidity and Atmospheric pressure and Luminosity. The accuracy of these sensors are being validated at present and once the reliability of the data has been confirmed the data will be shared through the data dashboard and open data portal.

- **CORK- OPEN DATA DASHBOARD**

Researchers from Maynooth University have launched a new online resource that will let citizens, businesses and policy makers access information about the city in an unprecedented way. The Cork Dashboard allows users to monitor a huge range of public data at a glance – from real-time traffic and weather information to air quality and crime levels – all in one place and free of charge. You can visit the Cork Dashboard at [www.corkdashboard.ie](http://www.corkdashboard.ie).

The Cork Dashboard is a product of the Building City Dashboards Project based in National Centre for Geocomputation in Maynooth University. The project was created in partnership with Cork Smart Gateway, Cork City Council and Cork County Council and was funded by Science Foundation Ireland.

The website draws information from a number of data providers including the local authorities, Transport Infrastructure Ireland, the Central Statistics Office and a number of government departments. The number of real-time, interactive maps and data-sets will give users the ability to track changes in Cork as they happen. While the potential applications for the Cork Dashboards will be as varied as the people that use it, below is a list of some of the more common applications that the Building City Dashboards Project team expect to see:



**Cork Citizens:** Individuals can use the Dashboard to plan their commute, to compare property prices and planning permission information and even report issues such as broken street lights and potholes to local authorities.

**Public Officials:** The Dashboard collates a huge number of data sets that will give public officials a valuable and up-to-the-minute insight into Cork life, allowing them to review vital statistics such as prevalence of crime, health data and pollution levels, making city planning more efficient and effective.

**Foreign Direct Investment:** By providing visual representations for cost of living and economic performance, the Dashboard will be a valuable tool both for companies who are considering investing in Cork and for advocacy groups like the IDA.

**Tourism:** The amount of information available on the Cork Dashboard will let potential visitors plan their trip with greater ease and in more detail than ever before, allowing them to check transport options, hotel availability and bathing water quality on Cork beaches.

Over the next two years, the amount of data available on the Dashboard will expand to allow for even more monitoring services to include, for example, the ability to quickly assess areas for flood risk.

The Dashboard will further be developed in time to allow users self-identify as policy-makers, private citizens, law enforcement, etc., and to interact with the data in virtual and augmented reality.

- **SUSTAINABLE CLIMATE AND ENERGY ACTION PLAN 2018**

As part of the Covenant of Mayors (COM) commitment, Cork City Council has committed to preparing this Sustainable Energy & Climate Action Plan (SECAP) within 2 years of becoming a signatory, and has also committed to reporting every 2 years on the implementation of the mitigation and adaptation actions that are outlined herein.

The COM commitment will play a key enabling role towards the long-term commitment of Cork City Council to transition to a Low Carbon Society and Economy.

The main objectives of this SECAP are as follows:

- ~ To promote adoption of a greater width & depth of energy efficiency measures within the City
- ~ To reduce energy poverty



- ~ To create employment opportunities in the local economy in the areas of energy efficiency & renewable energy projects
- ~ To enable greater capacity building within all sectors of the local community
- ~ To enable increased visibility & awareness of the required roles & responsibilities of local stakeholders towards meeting National & European climate change objectives.

This document sets out to establish a framework within which strategic national and local targets on energy & energy related carbon emissions can be addressed in a Sustainable Energy Action & Climate Plan. The objectives of the plan are primarily under the topic of Energy Efficiency & Conservation.

A total of 24 no. Mitigation Actions are identified to enable achievement of the required 40% CO<sub>2</sub> emission target by 2030. These Actions are further categorized into actions required over the 2018–2022, 2018–2026 & 2018–2030 periods – this has been done to reinforce the criticality of early & ongoing progress if the stated emission reduction target of 40% is to be met.

The 40% emission reduction target, and related Mitigation Actions, are onerous and require an unprecedented commitment from all relevant stakeholders. Partial or total failure to deliver on the required actions will, at best, lead to significantly higher abatement costs in later years – at worst, it will likely contribute towards a national failure to deliver on the binding commitments of the Paris Climate Agreement.

However, this Sustainable Energy & Climate Action Plan also presents many economic & social opportunities. In particular, the SECAP provides an ideal opportunity for Cork City to be an exemplar in the decarbonization of the local & national economies. The majority of the Mitigation Actions are highly investible and will lead to significant employment opportunities in the construction and service sectors. There are also multiple social co-benefits for the citizens of Cork City in terms of increased disposable incomes and health & well-being.

- **CITIZEN ENGAGEMENT SOLUTIONS**

As part of the Cork Smart Gateway Initiative researchers from the International Energy Research Centre (IERC), hosted in Tyndall National Institute, undertook a number of surveys which invite Cork people to have their say in Cork's future development.



The 'CorkCitiEngage' team is rolled out surveys in schools, door-to-door and online, which gave people a chance to express their views on their participation in public issues, digital skills, and use of public infrastructure. The purpose of the survey was to gather information on how people currently engage with public policy and decision-making in Cork. The survey used an innovative and original 'smart' approach which uses crowd-sourced information gathered by student volunteers going door-to-door and an additional online survey. The crowd-sourced methodology was an experiment to shed light on the possibility of sharing risks, resources, and expertise when carrying out this type of research.

In addition to the public survey, an online survey link was sent to secondary schools and youth reach centres to get a younger perspective on engagement with public policy. A separate survey link was distributed to local government officials in Cork City Council and Cork County Council to indicate the baseline level of public engagement in Cork. The results of the survey have been used to help identify and prioritise 'Smart' initiatives for Cork.

- **SMART ENERGY MANAGEMENT THROUGH ENERGY BILL PLATFORM – ENERGY ELEPHANT**

Cork City Council uses the Energy Elephant Platform which is linked to all Cork City Council's big energy users within the corporate building stock. It is linked to monthly meter readings which help generate 'accurate' bills and energy usage to facilitate good energy management. The system helps generate reports to aid energy review and management.

- **SMART ELECTRICITY MANAGEMENT**

Solo Energy has teamed up with Cork City Council to install a groundbreaking energy storage system at Ballyvolane Fire Station. It's hoped that the project will save taxpayers up to €1,500 per year in energy consumption as cheaper night-rate electricity from the battery or storage system will be used to offset periods of high consumption when electricity costs more.

Cork-based Solo Energy, in collaboration with ESB Networks, is rolling out a network of distributed energy storage systems at a number of private and public buildings as



part of this SEAI-funded research project called 'eStore'. As part of the project, Cork City Council will prioritise solar energy generation over using grid electricity.

The storage system will also take pressure off the wider electricity grid as the fire station will have reduced demand at peak times as it will have electricity in storage. The operation of such a network will be the first of its kind for the power system in Ireland. Last year, Cork City Council installed 42 solar PV panels on the roof of Ballyvolane Fire Station. The system currently offsets approximately 17% of the buildings electricity consumption and eliminates 4500 kg of CO<sub>2</sub> from the atmosphere every year.

The eStore project involves the installation of 'behind-the-meter' battery storage devices, in some instances together with solar panels, at several locations and amongst different customer types. Solo Energy is developing a cloud-connected software platform to control this network of batteries across the grid – enabling customers to get more from their solar PV systems and to access low-cost electricity at off-peak times.

#### *5.1.1.7 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.

Following significant public consultation and representation and input from local and national politicians the multi phased plan has commenced and will significantly transform the city experience for all in the coming years

## 5.2 Smart Solutions Selection

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

Area	Smart Solutions	Follower Cities				
		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
	Big data protocol for saving energy and improving the quality	X				



	of life					
<b>Mobility measures</b>	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 Cork plan to replicate (according to GA)**

Activity participating in the Lighthouse Project will help the local authority to meet its emissions and energy reduction targets. The Sustainable Energy Action Plan (SEAP) submitted to the Covenant of Mayors outlines a 20% reduction in emissions. On top of this the National Energy Efficiency Action Plan requires a 33% energy efficiency improvement by all public bodies, a 20% reduction in GHGs and a 33% share for renewable electricity generation. The Lighthouse Project has been earmarked as an initiative that will help the local authority meet these targets. Cork City Council have previously implemented a number of initiatives in the city and plan to further develop the region as a Smart and Sustainable City.

Actions in relation to the GrowSmarter smart solutions:

#### ***1. Efficient and Smart Climate Refurbishment***

The city council is currently undertaking a deep retrofit programme of civic buildings including insulation, boiler replacement and active controls and energy efficient lighting. As part of the EPB directive the city council are required to upgrade the energy rating of its housing stock. Therefore City of Cork plan to replicate measures from smart solution. The City Council will replicate, within its public buildings and 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 renewable. Funds will be made



available for Cork City Councils own funds along with additional funding from SEAI (Sustainable Energy Authority Ireland)

#### ***4. Local Electricity Production and Integration***

As part of the above retrofit the city council may have an interest in the appropriate deployment of wind turbine / solar PV technologies within civic buildings. 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. Funds will be made available for Cork City Councils own funds along with additional funding from SEAI.

#### ***5. Smart Lighting, lampposts as hubs for communications***

The city council has installed photocell technologies across its lighting stock to drive a reduction in energy usage. The City Council will replicate the measures implemented for sensor controlled, self-controlled and remote controlled LED lighting for pedestrian and cycle paths. Funds will be made available for Cork City Councils own funds along with additional funding from NTA (National Transport Authority) on an existing 5 year programme of works within the City.

#### ***11. Alternative fuel driven cars for better air quality in cities***

The local public transport operator is currently trialling the operation of a CNG bus. The city council is currently conducting a trial of a CNG van as part of its fleet. The city council has shown a commitment to sustainable transport through the on-going use of EVs as part of its operational fleet. 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. Funds will be made available for Cork City Councils own funds along with additional funding from NTA.

#### ***12. Smart mobility solutions***

Free parking spaces are currently provided in city car parks for those taking part in certain car sharing initiatives. A city bike scheme is scheduled for introduction in Q3 of 2014. 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. Funds will be made available for Cork City Councils own funds.



### 5.2.1 Smart Measure Selection

The table below specifies which smart (bundle of) measures within the 12 solutions each FC plans to replicate.

SC Measure	Measure title	Follower City Cork
<b>Low Energy Districts</b>		
<b>Solution 1 – Efficient and smart climate shell refurbishment</b>		
1.1 – Energy efficient refurbishment of the building	Energy efficient refurbishment of residential buildings – Stockholm	
	Climate shell refurbishment – Cologne	X
	Energy quality assurance – Stockholm	X
	New adaptative control and regulation techniques for heating systems – Barcelona	
	Re-build an industrial site: Ca l’Alier – Barcelona	
	Efficient and smart climate shell and equipment refurbishment – Barcelona	
	Efficient and smart climate shell refurbishment of residential buildings – Barcelona	X
	Efficient and smart climate shell and equipment refurbishment of tertiary buildings – Barcelona	X
	Energy efficient swimming pools – Barcelona	
<b>Solution 2 – Smart building logistics and alternative fuelled vehicles</b>		
2.1 Integrated multimodal transport for construction materials	Construction consolidation centre – Stockholm	
<b>Solution 3 – Smart, energy saving tenants</b>		



3.1 Active House/Home energy management system/Smart home system	Home Energy Management - Cologne	
	The Active House - Stockholm	
	An Open Home Net - Stockholm	
	Hubgrade - Energy Saving Centre - Stockholm	
	Adaptive Temperature Control System - Stockholm	
	Home Energy Management System (HEMS) - Barcelona	
	Virtual Energy Advisor - Barcelona	
	Dynamic Pricing Models - Barcelona (Stochastic Model of Appliances Energy Consumption)	
<b>Solution 4 - Local renewable energy production and integration</b>		
4.1 Virtual power plant	Residential Estate Management - Cologne	
4.2 Smart energy and self-sufficient block	Smart Energy & Self-Sufficient Block - Barcelona	X
	Building Energy Management System (BEMS) to minimise consumption of fossil fuels and electricity - Barcelona	
<b>Integrated infrastructures</b>		
<b>Solution 5 - Smart lighting, lampposts and traffic posts as hubs for comm.</b>		
5.1 Smart streetlighting	Smart LED streetlighting - Stockholm	X
5.2 Combined electrical charging and street lighting poles + wifi	Combined electrical charging and street lighting poles + Wifi-to-grid connection - Barcelona	X
	Combined electrical charging and street lighting poles + Wifi-to-grid connection - Stockholm	
5.3 Smart meter information analysis and actuators	Smart Meter information analysis and actuators - Barcelona	X
<b>Solution 6 - New business models for district heating and cooling</b>		
6.1 Open district heating with feed-in of waste heat	Open district heating - Stockholm	
6.2 District heating and cooling rings	District heating rings - Barcelona	
6.3 Smart local thermal districts	Smart local thermal districts - Barcelona	



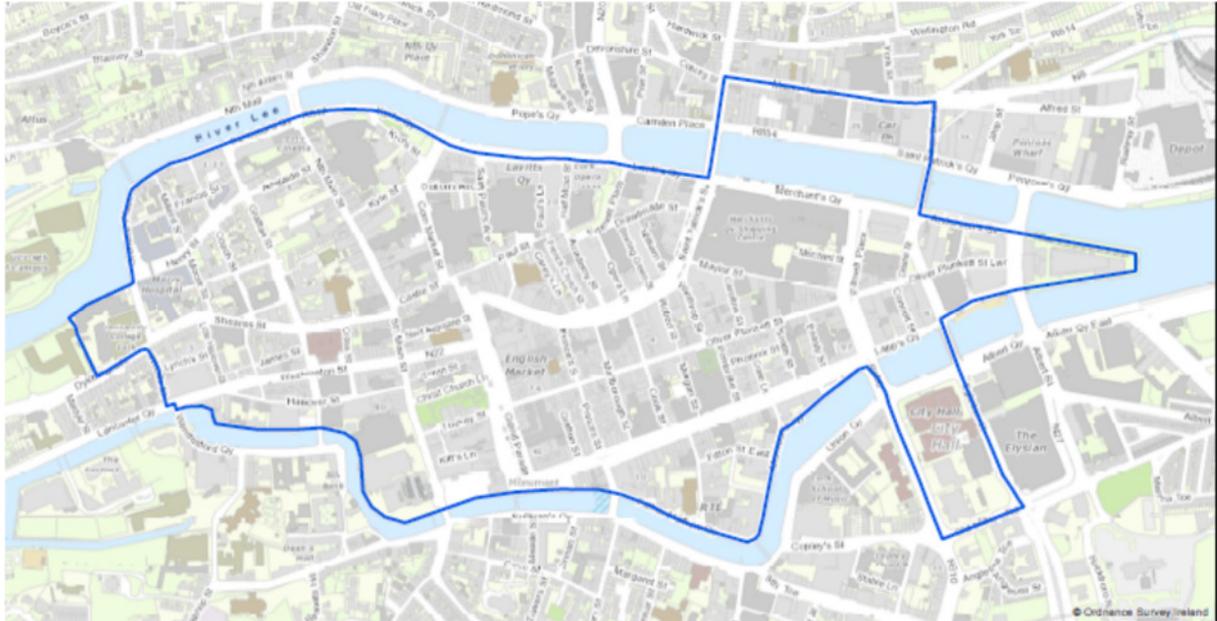
<b>Solution 7 – Smart waste collection , turning waste to energy</b>		
7.1 Optical sorting of waste	Smart waste management – Stockholm	
7.2 Introduction of AWCS		
7.3 Waste collection statistics for individual households/businesses		
<b>Solution 8 Big open data platforms</b>		
8.1 Big consolidated open data platform	Big consolidated open data platform – Stockholm	
	Big open data platform – Barcelona	
	Urban Cockpit – Cologne	
	Urban Traffic – Cologne	
	Urban Environment Cologne	
8.2 Urban models		
8.3 Semi-automatic instance mapping		
8.4 Integration of sensor and heterogeneous data in standard data format	Integration of sensor data in a uniform in standard-driven data format – Barcelona	
8.5 Sustainable connected lighting to enhance safety and mobility		
<b>Sustainable Urban Mobility</b>		
<b>Solution 9 – Sustainable delivery</b>		
9.1 Integrated multi-mode transport for light goods	Communal service boxes for sustainable deliveries – Stockholm	
9.2 Micro-distribution of freight	Micro distribution of freight – Barcelona	
<b>Solution 10 – Smart traffic management</b>		
10.1 Traffic management through MFD	Smart traffic signals – Stockholm and Barcelona	
10.3 Travel demand management		



10.4 Traffic control systems for passenger vehicles		
10.5 Traffic signals synchronised to prioritize movement of goods		
<b>Solution 11 – Alternative fuel driven vehicles</b>		
11.1 Developing charging infrastructure	Normal charging infrastructure for electric vehicles – Stockholm	X
	Fast charging infrastructure for electric vehicles – Stockholm and Barcelona	X
	eTanKE – Cologne	
	Vehicle to X (V2X) Charging for EVs – Barcelona	
11.2 E-mobility management system		
11.3 Charging infrastructure for electric tricycles for micro-distribution		
11.4 Refueling facilities for alternative heavy duty fuels	Alternative fuels for heavy duty vehicles – Stockholm	
11.5 Smart guiding to alternative fuel stations and fast charging		
11.6 Small distributed CNG grid	Small distributed CNG grid – Barcelona	
<b>Solution 12 Smart mobility solutions</b>		
12.1 Green parking index	Green parking index – Stockholm	
12.2 Electrical and cargo bike pool		
12.3 Mobility hub	Mobility Hub – Cologne	X
12.4 Electrical and conventional car sharing		X
12.5 Conventional/PHEV/CNG vehicle sharing fleets		
12.6 Smart taxi stand system	Smart taxi stand system – Barcelona	

## 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 including air quality monitoring and the development of a mobility hub. 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 its 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 Smart District Replication Profile

#### 5.3.1. Mapping of district related replication framework for selected Smart Solutions

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

#### **Population:**

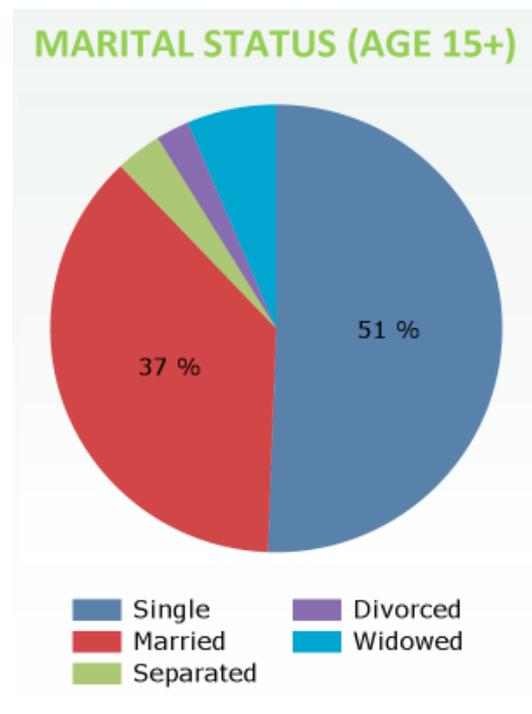
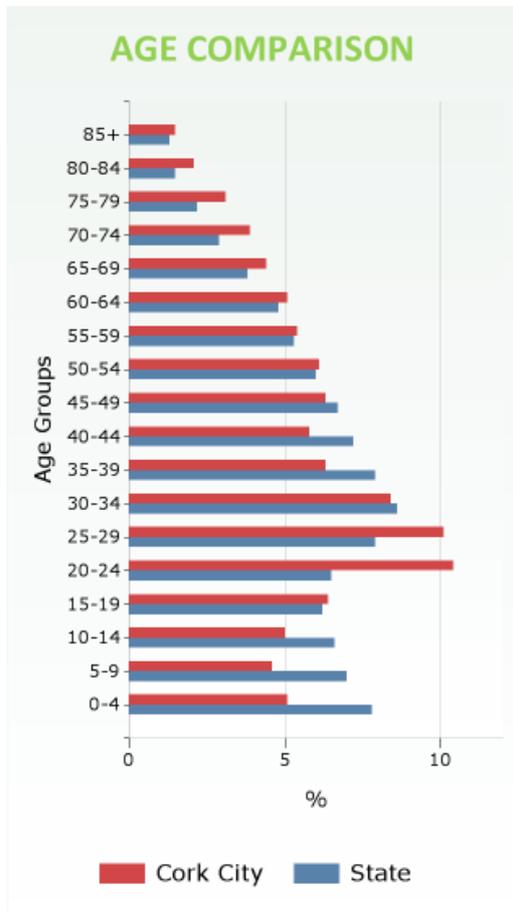
The population of the designated City Centre District is in the region of 2900 based on the 2011 CSO census. A significant number of people would commute to the City Centre area on a daily basis for the purposes of work.

#### **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.



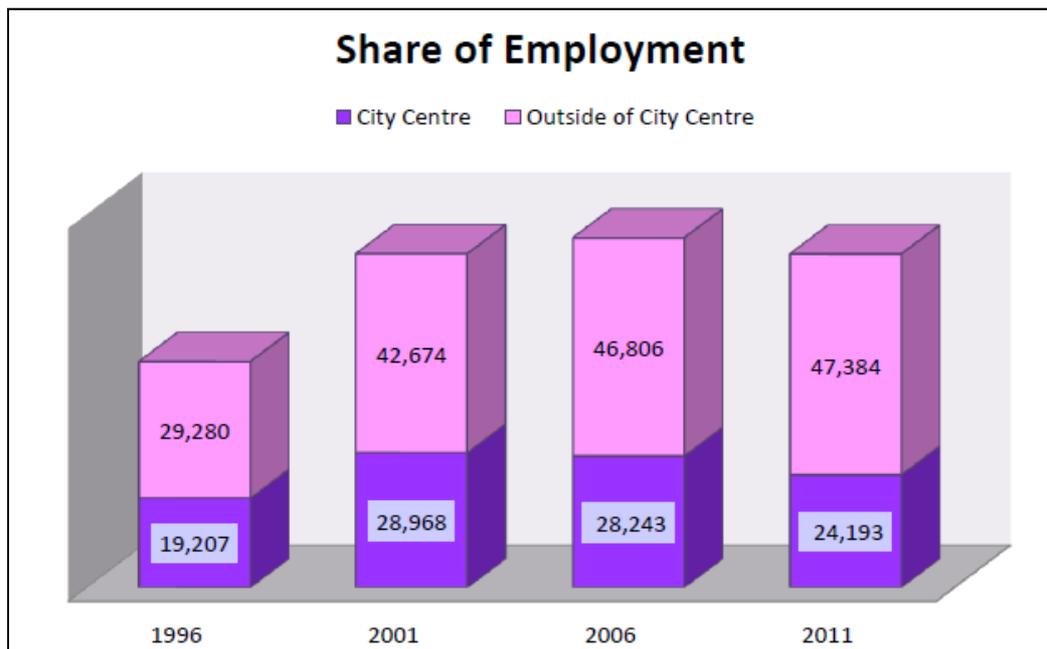


Source: [www.CSO.ie](http://www.CSO.ie)

### 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

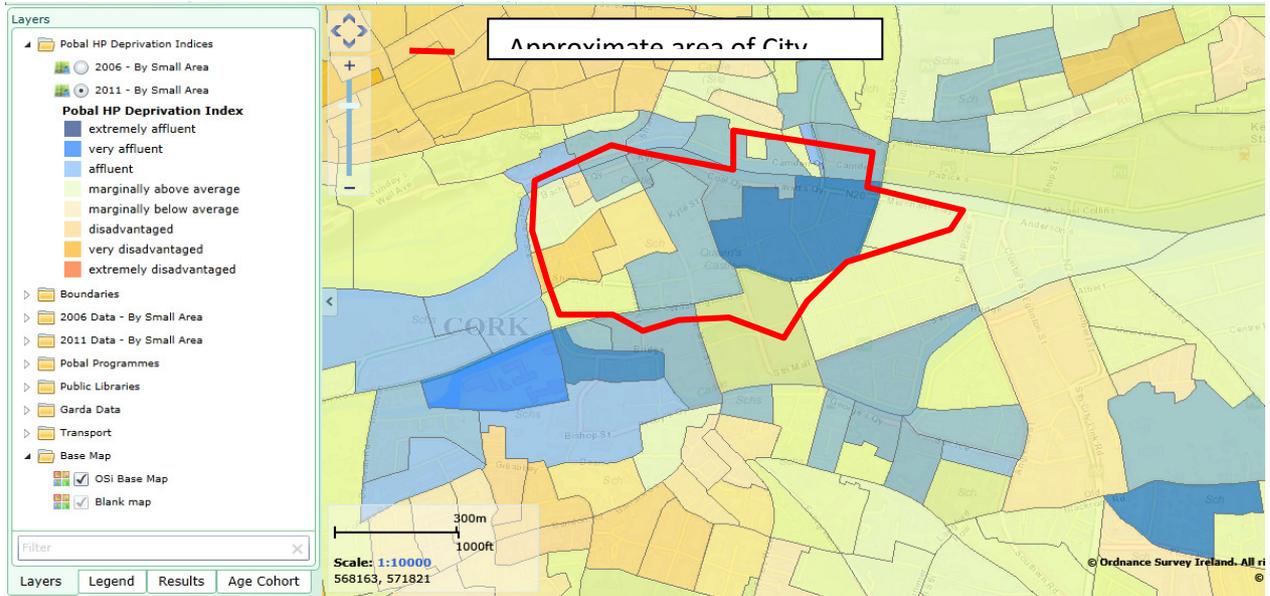
ACTIVITY	2006	2011	Absolute Change	% Change
ACCOMMODATION AND FOOD SERVICES	3,628	3,623	-5	-0.1%
BUILDING AND CONSTRUCTION	220	127	-93	-42%
BUSINESS AND FINANCE	3,287	2,554	-733	-22%
MANUFACTURING	1,234	925	-309	-25%
PERSONAL SERVICES	1,914	1,130	-784	-41%
PROFESSIONAL SERVICES	6,498	6,096	-402	-6%
PUBLIC 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%
<b>TOTAL CITY CENTRE</b>	<b>27,695</b>	<b>24,193</b>	<b>-3,502</b>	<b>-13%</b>

Source: Cork City Employment and Land Use Survey 2011

### Income:

Poal 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.

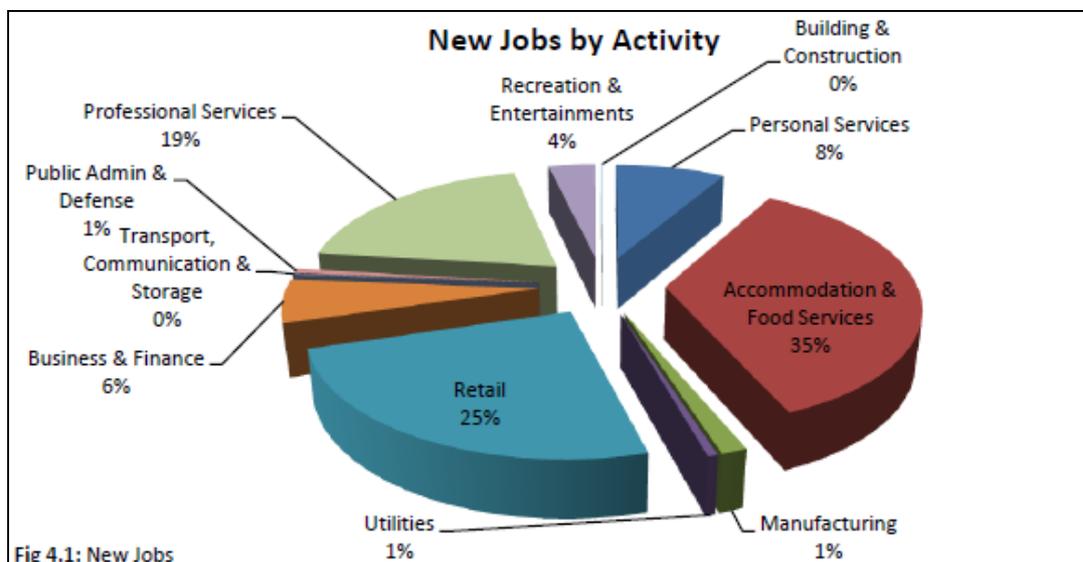


Fig 4.1: New Jobs

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. In addition, its 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.

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

Street lights form part of the existing infrastructure that the City council has ownership of. That means this infrastructure can be harnessed to be utilized for other implementations such as environmental monitoring for example. Equally, other infrastructure can be used in much the same way including traffic poles/lights. There has been much comment internally and with city stakeholders on how best to utilise the resources we have already in the city. There is some conflict in terms of the weight of sensors and the legislative requirements for street lighting columns, which sets weight restrictions on light poles. The brightness of LED lights can be an issue for citizens who live close by and are impacted upon by the brightness of retrofitted LED's.

Monitoring of monitoring devices is key to ensure they are not tampered with in any way and potentially CCTV can be used as a deterrent, however residents may object to the use of CCTV impacting upon their privacy rights.

Conflict may arise where Housing maintenance of the City council who are trying to upgrade the energy efficiency of the social houses, and the tenants themselves who may object to the new measures. This can be counteracted by prioritizing engagement with the tenants prior to the work commencing.



With regard to Local Electricity management solutions, the installation and prioritization of electricity through renewable sources e.g. solar panels and battery storage can have a negative impact on the national grid due to increased electricity demand at a large scale.

Addressing any issues around socio economic acceptance will be addressed through education and public engagement with our customers. Equally through ongoing engagement with our stakeholders in SME's and other businesses across the city environs, we aim to ensure all synergies and conflicts are addressed at this level, in a bid to pre-empt and take necessary actions.

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

Through stakeholder involvement in statutory structures such as the City Public Participation Network and the Local Community Development Committee. Also through collaboration opportunities promoted by the Smart City Liaison Group and Wider Technical Advisory Group of the Cork Smart Gateway initiative. There are also a number of plans which reference some of the solutions being replicated and which go through a formal consultative process such as the Local Community and Economic Plan.

Equally the citizen engagement survey and the business survey undertaken in 2016 provide significant insights into citizen and business expectations but also the preferred communication content and methodologies.

Cork City Council engages with city stakeholders in a number of ways including:

- Formal Consultation Processes
- Online engagement using the online consultation platform
- Town Hall Meetings with key stakeholder groups
- Communication and information via traditional and online methods

Appropriate consultation methodologies have been utilized as part of the replication process depending on the replication activity and the stakeholders involved. For example: some of the smart energy efficiency building shell refurbishment replication activities are undertaken in city council owned residential properties which require significant engagement with residents in the properties.



## 5.4 Smart Measures Specifications

### Progress towards replication of measures/measure bundles within the selected districts

*Q1 What is the replication potential of the Smart Measure(s)?*

#### **Replication Measures**

*Solution 1: Energy and Smart Climate Shell Refurbishment*

*Solution 4: Smart Local Electricity Management*

*Solution 5: Smart Street Lighting*

*Solution 11: Alternative Fuel Driven Vehicles*

*Solution 12: Smart Mobility Solution*

#### 5.4.1 Replication of GrowSmarter Solutions

##### *Solution 1*

*The potential for replication of the Low Energy District solutions is significant owing to a number of obligations, commitments and corporate objectives including:*

- *Their added value e.g. reducing carbon emissions, GHGs, Fossil fuel dependency*
- *Improve the quality of life and health outcomes for the residents*
- *Requirement to comply with initiative and policies such as Paris Accord, EU directives, Ireland Climate Change Strategy, Reducing Fuel Poverty*
- *Development of Works Specifications and measures to replicate smart measures in old housing stock*
- *Approximately 500 apartments will undergo deep retrofit measures between now and 2020*
- *Finance needs to be allocated in order to ensure implementation*



<b>Theme:</b>	<b>Low Energy District</b>
<b>Smart Solution:</b>	<ul style="list-style-type: none"> <li>• <b>Smart Building Shell Refurbishments</b></li> </ul>
<b>Replication Committed:</b>	<b>Yes</b>
<b>Measures</b>	<b>Update</b>
Climate Shell Refurbishment (Social Housing)	<ol style="list-style-type: none"> <li>1. Sunview apartments (32 units)</li> <li>2. Sarahville Place (9 units)</li> <li>3. Wolfe Tone St. 4 x apartment blocks (36 units)</li> <li>4. Fabric upgrade program Phase one complete – 6,500 units receiving attic and/or cavity wall insulation</li> <li>5. Deep Retrofit 46 houses in 2017 (BEC Acheme)</li> <li>6. Deep Retrofit 56 houses in 2017 (BEC and SEC Scheme)</li> <li>7. Work has commenced on the design of the deep retrofit of 200 houses to be completed in 2019</li> </ol>
Energy Quality Assurance	<p>Deep Retrofit project commenced on 129 apartments in 14 blocks.</p> <p>Consultants engaged, air tightness tests carried out and energy efficiency gains calculated</p>
Rebuild of an Industrial Site Ca L'alier	
Efficient and smart climate shell and equipment refurbishment: 200 unit apartment building	<p><b>Ard bhaile/Gleanamoy lawn (social housing)</b> underwent a “deep retrofit” in <b>2016</b>. 197 Houses/Apartments received Air-to-Air Heat Pumps and Low Energy Bulbs. The local community centre received a 12kW air-to-Water heat pump, LED lighting upgrade, HW pipe insulation and Cavity Wall Insulation under Better Energy Community (BEC) scheme 2016. The projected combined energy savings are 2.9GWh. 54 Additional apartments will be retrofitted in 2017. Measures include heatpumps</p>



	for remaining units, LEDs and windows and doors upgrades
Efficient and smart climate shell and equipment refurbishment: tertiary buildings	<p><b>Leisureworld public swimming pool Bishopstown</b> upgraded all the existing lighting fittings to LED in 2016. This is a Pay as You Save model. (PAYS). All the lighting was replaced with no capital provided upfront. The initial cost of the LED lights will be paid from the savings accrued over a 5 year timeframe.</p> <p><b>Cork City Central Library</b> will undergo a major energy efficiency upgrade in 2017. The Library will replace an old boiler and central heating system with an efficient Air to Air Heat Pump. The library will also install LED Lighting Upgrade a Solar PV array Projected Savings 285,785 kWh ~ <b>30% onsite energy usage</b></p> <p><b>Leisureworld public swimming pool Bishopstown</b> to install 2 x High Efficiency Boiler Upgrade &amp; 4 new Pumps , Works will be complete by Aug 17 ,Projected Savings <b>887,000kwh ~ 20% of onsite energy usage</b></p>
Efficient and smart climate shell refurbishment: residential buildings	Sarahville place, Sunview Fairhill (Passive Rainwater Harvesting System)
<b>Commitments:</b>	<p>Cork City Council has commenced a project in conjunction with seven other regions in Europe to Intense Carbon reduction measures through community engagement (Interreg Europe INTENSIFY project).</p> <p>Cork City Council is advising the Interreg North Sea Region INDU–ZERO project on industrialising the Deep Retrofit process.</p>
<i>Replicate within Public Bldgs / housing stock measures including heat recovery,</i>	Insulated hot water cylinder fitted to over 1000 houses,



<p><i>hot water losses, energy certification. CCC will replicate energy efficiency, lighting and integration of renewables into Public Bldgs. Make available funds from CCC funds with additional SEAI funding.</i></p>	<p>Over 5000 houses have received a Building Energy Rating Certificate,</p> <p>All retrofitted houses fitted with CFL/LED lighting. Funding received from CCC, DHPCLG, SEAI, Sale of energy credits. Photovoltaic cells fitted in community centre in Ard bhaile/Glennamoy. Geothermal fitted in library in Tory top Road and New Civic Offices to heat water.</p>
<p><b>Additional Measures:</b></p>	
	<p>Passive rainwater harvesting system fitted to 32 ap. This system apartments in Sunview, Fairhill</p>

#### 5.4.2 Replication of Solution 4 – Smart Energy & Self-Sufficient Block

*The renewed activity in capital programmes along with energy saving commitments opens up the opportunity to incorporate smart local electricity management solutions*

<p><b>Theme:</b></p>	<p><b>Low Energy District</b></p>
<p><b>Smart Solution:</b></p>	<ul style="list-style-type: none"> <li>• <b>Smart local electricity management</b></li> </ul>
<p><b>Replication Committed:</b></p>	<p><b>Yes</b></p>
<p><b>Measures</b></p>	<p><b>Update</b></p>
<p>Residential Estate Management</p>	
<p>Smart Energy and Self Sufficient Block</p>	<p><b>Ballyvolane Firestation</b> deployed a 10.5kW solar PV system onto Ballyvolane Firestation. The project involves connecting 42 solar PV panels to a string-invertor. The DC electricity. Inverters convert the DC electricity to alternating current (AC) electricity, which is the type used by consumed by the Firestation. It is predicted that this will save 24,000kWh per annum – approx 15%. In 2017, CCC teamed up with Solo</p>



	Energy to install a “state of the art” battery storage system at Ballyvolane Fire Station. The aim of the project is to improve the above figures through increasing solar PV and self-consumption within the building whilst also testing provisions of grid services to ESB Networks.
Building Energy Management System	
<b>Commitments:</b>	
<i>Replicate in retrofit of public bldgs measures in area of RES solar energy. Consider deployment of wind turbine technologies in civic buildings. Make funding available using CCC funds along with SEAI additional funding.</i>	
<b>Additional Measures</b>	

<b>Theme:</b>	<b>Low Energy District</b>
<b>Smart Solution:</b>	<ul style="list-style-type: none"> <li>• <b>Smart local electricity management</b></li> </ul>
<b>Replication Committed:</b>	<b>Yes</b>
<b>Measures</b>	<b>Update</b>
Residential Estate Management	
Smart Energy and Self Sufficient Block	<b>Cork City Library</b> , in the second half of 2017, CCC carried out a deep energy retrofit of the City Library under the SEAI Better Energy Community (BEC) scheme. The retrofit consisted of replacing the old heating system with an air-to-air heat pump, installation of roof mounted Solar PV and LED Lights. The quality of the building was improved along with energy savings. Estimated annual energy savings of approx €17,500.
Building Energy Management System	
<b>Commitments:</b>	
<i>Replicate in retrofit of public bldgs</i>	



<i>measures in area of RES solar energy. Consider deployment of wind turbine technologies in civic buildings. Make funding available using CCC funds along with SEAI additional funding.</i>	
<b>Additional Measures</b>	

### 5.4.3 Replication of Solution 5 – Smart LED streetlighting

#### *Solution 5*

*The requirement for a significant upgrade of the city’s lighting stock to meet energy reduction targets as well as the remedial work required on the infrastructure itself provides the opportunity to incorporate additional measures and functionality.*

<b>Theme:</b>	<b>Integrated Infrastructures</b>
<b>Smart Solution:</b>	<ul style="list-style-type: none"> <li>• <b>Smart Street Lighting</b></li> </ul>
<b>Replication Committed:</b>	<b>Yes</b>
<b>Measures</b>	<b>Update</b>
Smart LED street lighting	A series of ‘Pilot’ Centrally Managed Systems, CMS for Dimming & Trimming of lighting have been implemented. However, LED lighting using factory set profiles is the preferred method at present.
Streetlights as wifi to grid connectors and electrical chargers	Options for these use cases under consideration. The Commission for the Regulation of Utilities, CRU has issued a Directive which proposes the sale of the EV Charge Point network as against continued ESB ecars ownership.
Smart meter information analysis and actuators	Options for these use cases under consideration in the context of the National Programme of Energy Efficient street lighting upgrades on which Cork City Council is an active participant.
<b>Commitments:</b>	
CCC to replicate measures for sensor controlled, self controlled and remote controlled LED lighting for pedestrians	Options for these use cases under consideration and are being proposed as options at design stage for Capital



<p>and cycle paths. Funding will be made available from CCC as well as additional NTA funding on 5 yr programme of works for city.</p>	<p>schemes.</p>
<p><b>Additional Measures</b></p>	
<p>SMART Sensors</p>	<p>Cork City is putting in place pilot projects to test SMART Sensor applications.</p> <p>The first of these projects involves the installation of two banks of sensors on the City's SMART Street (MacCurtain Street) to measure a number of parameters including air borne pollutants, luminosity, humidity and pressure. These sensors will be linked wirelessly to the City Council's Open Data platform giving members of the public direct access to live or near live data. Should this pilot prove successful funding will be sought to roll this system out across the City Centre.</p> <p>The selection and deployment of SMART Cities measures has been included, as an option, in the next Cork City Movement Strategy, CCMS Consultans Brief and Contract to be considered for MacCurtain Street, in particular.</p>
<p>Public Lighting: LED Street Lighting Pilot Schemes</p>	<p>Schemes comprising 1,350 lanterns approximately being in excess of 10% of the total inventory has been undertaken in such a way as to inform further investment to deliver an improved asset by removing the most degraded equipment. The LED lighting upgrade featuring Dimming Profiles was completed successfully to deliver a 40% reduction in the electrical demand on those routes as well as achieving an estimated 10% energy reduction on the</p>



	overall lighting inventory. The upgrade to LED lighting now includes St. Patrick's Street and Grand Parade in the city centre.
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#### 5.4.4 Replication of Solution 11 – Normal charging infrastructure for electric vehicles

##### *Solution 11*

*The provision of a comprehensive charging infrastructure as well as the introduction of alternative fueled vehicles to the City Council fleet is a significant priority for the city.*

<b>Theme:</b>	<b>Sustainable Urban Mobility</b>
<b>Smart Solution:</b>	<ul style="list-style-type: none"> <li>• <b>Alternative Fuel Driven Vehicles</b></li> </ul>
<b>Replication Committed:</b>	<b>Yes</b>
<b>Measures</b>	
eTankE electric charging	ESB ecars are the operator for 'Rapid' Charge Points, CPs at key interchanges. The Commission for the Regulation of Utilities, CRU has issued a Directive which proposes the sale of the EV Charge Point network as against ESB ecars ownership.
Fast charging infrastructure for EVs	Cork City Council facilitated the installation of on-street EV 'Fast' Charge Points by ESB ecars as the national operator of the EV charging network.
Standard speed charging infrastructure for EVs	Installation of CPs in multi-storey car parks has been completed & proposed additional CPs with payment system for Park+Ride to be considered in the longer term.  Distinctive on-street signage has been designed and deployed to cater for the enforcement of Parking Bye-laws to restrict the duration of stay at EV Charge Points and allow proper turnover and



	access.
Renewable fuels for heavy duty vehicles	Gas Networks Ireland, GNI are installing a network of CNG refuelling stations to include another facility located at Little Island, County Cork. In the context of GrowSmarter, examples of CNG fuelled HGVs being used for waste collection being linked to the production of Biogas, will be brought to the attention of the Environment Department. Cities that have declared a commitment to CO2 reductions and Clean Air programmes have highlighted very successful CNG fuelled HGV deployments.
Vehicle to grid charging (V2X)	To be considered on future Smart Cities project proposals
<b>Commitments</b>	<b>Update</b>
In the context of a new tender, consider provision of Park & Ride facility, replicate CNG/ EV measures. Increase number of alternative fuel vehicles in its fleet.	The provision of fleet vehicles for the operation of the Black Ash P+R is now undertaken as part of a NTA licenced route. Bus Éireann operate the service funded by the NTA. Discussions are ongoing with the National Transport Authority, NTA in relation to the arrangements implemented in the context of CCMS.
Trial operation of CNG bus, and trial of CNG Van. Ongoing use of EV's as part of CCC fleet	City Council's fleet to be reviewed with a view to possible deployments of EVs. Roads & Transportation manage the procurement of the City Council fleet and a significant target of 15 EVs out of a total of 78 vehicles in the small van category has been proposed for inclusion in the next Tender Specification.
Replicate CNG/ EV measures. Funds will be made available using CCC funds along with some NTA funding	In the mean time, the Transportation Division participated with Energy Cork on the preparation proposal package for the "Ireland's Greenest Bus Fleet" IGBF initiative promoting CNG as an



	alternative fuel for busses as submitted to the NTA.
<b>Additional Measures</b>	

#### 5.4.5 Replication of Solution 12– Mobility Hub

##### *Solution 12*

*The promotion of measure aimed at ensuring more effective, efficient and an environmentally friendly mobility infrastructure is high priority for the city*

<b>Theme:</b>	<b>Sustainable Urban Mobility</b>
<b>Smart Solution:</b>	<ul style="list-style-type: none"> <li>• <b>Smart Mobility Solutions</b></li> </ul>
<b>Replication Committed:</b>	<b>Yes</b>
<b>Measures</b>	<b>Update</b>
Green parking index	
Mobility hub	
Smart taxi stand system	
<b>Commitments:</b>	
Replicate measures to enhance level of service and options available to sustainable transport options in city centre, especially relating to Electrical and cargo bike pools and sharing systems . This will be used to support goods distribution in existing Pedestrian zones.	Cork City Council participated on the Green eMotion EU Project on electromobility which finished in 2015. The knowledge gained informed policy, including deployment of Pedelecs and EVs on the Council’s fleet. We now have some very good local examples of staff members using the Pedelecs for site inspections to street lighting, fibre optic sites, VMS signs and RTPI at bus stops. The driver of one of the Kangoo EV vans, our UTC System Inspector, has also opted to use a Pedelec for city centre trips in connection with traffic signal junction controller duties.
Free parking spaces currently provided in city car parks for those involved in some car sharing initiatives. Public Bike Scheme	Public Bike Scheme operated on behalf of NTA continues to function very successfully in Cork. An additional PBS Station facility has been deployed at Kent Railway Station and an extension westwards to include the CUH and CIT



	are under consideration by the NTA.
Enhance service and options to users of sustainable transport in city centre, especially electrical and cargo bike pools and sharing systems. Funds to be available from CCC own funds.	Secure Bicycle Parking has been identified as an issue and discussions are ongoing with – Cyc-lok – a particular system manufacturer with a view to facilitating the deployment at UCC, Kent Railway Station and a suitable city centre location. Secure bicycle parking has been included in the next Cork City Movement Strategy, CCMS Consultants Brief as a facility to be considered and implemented as a Smart Cities measure.
<b>Additional Measures</b>	
	Transportation Division, Cork City Council won the ITS Ireland Award 2016 for “Contribution to ITS implementation and deployment in Ireland”. The submission provided an overview of the ITS measures which included the renewal of street lighting along the route. The ITS measures incorporating bus priority & traffic signal control on the cycle track optimised operations on the UCC to City Centre scheme.

*Key Local and National Policies include*

- 1. Paris Accord, EU directives, Ireland Climate Change Strategy, Reducing Fuel Poverty*
- 4. Paris Accord, EU directives, Ireland Climate Change Strategy, Reducing Fuel Poverty, City Development Plan*
- 5. Paris Accord, EU directives, Ireland Climate Change Strategy, Reducing Fuel Poverty, City Development Plan, City Centre Strategy*
- 11. Paris Accord, EU directives, Ireland Climate Change Strategy, Drive4Zero, City Centre Strategy, City Centre Movement Strategy*
- 12. City Centre Movement Strategy, Green eMotion,*



#### 5.4.6 Other Potential Solutions

<b>Theme:</b>	<b>Low Energy District</b>
<b>Smart Solution:</b>	<ul style="list-style-type: none"> <li>• <b>Smart energy Saving Tenants</b></li> </ul>
<b>Replication Committed:</b>	<b>No</b>
<b>Measures</b>	<b>Update</b>
Home Energy Management	
The Active House	
An Open Home Net	
Hubgrade Energy Savings Centre	
Home Energy Management System	<ol style="list-style-type: none"> <li>1. Ard bhaile Glennamoy Lawn: Hand Held devices used to control use of energy.</li> <li>2. Lakelands Crescent: 82 houses fitted with Climate energy control and savings device.</li> <li>3. 96 houses had gas boilers replaced with air to water heat pumps and solar panels with hand held controls.</li> </ol>
Virtual Energy Advisor	
Dynamic Pricing Models	
<b>Commitments</b>	Energy and environment measuring and monitoring system to be purchased and installed in a number of social houses. System to be portable so as to act as an aid to solving problems.
<b>Additional Measures</b>	

<b>Theme:</b>	<b>Integrated Infrastructures</b>
<b>Smart Solution:</b>	<ul style="list-style-type: none"> <li>• <b>Smart Waste Collection</b></li> </ul>
<b>Replication Committed:</b>	<b>No</b>
<b>Measures</b>	<b>Update</b>
Automated waste collection, monitoring and reuse	
<b>Commitments</b>	<b>N/A</b>
<b>Additional Measures</b>	



<p>SMART Compactor Bins</p>	<p>Given the subsurface geomorphologic composition of the tidally influenced river deposited marsh sediments which underlie the City of Cork the installation of subsurface waste handling infrastructure is particularly problematic. As such Cork City is looking to find surface mounted solutions. We are thus piloting SMART bins which have a number of key features:</p> <ul style="list-style-type: none"> <li>Internal mechanical compaction mechanism delivering up to 5 time the capacity in the same physical space</li> <li>Solar Powered so no need for additional power infrastructure</li> <li>Intelligent features e.g. automated notifications via wireless communications methods when the bin is nearing capacity</li> </ul>
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<b>Theme:</b>	<b>Integrated Infrastructures</b>
<b>Smart Solution:</b>	<ul style="list-style-type: none"> <li>• <b>Big Data Management</b></li> </ul>
<b>Replication Committed:</b>	<b>No</b>
<b>Measures</b>	<b>Update</b>
Urban Cockpit	
Urban Traffic	Real time parking availability at car parks notified on Cork Open Data server
Urban Environment	
Big consolidated open data platform	
<b>Commitments:</b>	<b>N/A</b>
<b>Additional Measures</b>	

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

**Solution 1**

Each measure will be integrated into the wider city council capital expenditure programme and as such will be subject to the preparation of a comprehensive business case and application for national and, in some cases, European funding.



The business case includes measures to support:

- Better Health outcomes and quality of life for residents, reduced fuel bills reduced incidence of fuel poverty.
- Prolonged life of housing stock

Assembly Regional Operational Southern Program 2014 – 2020 as a potential funding opportunity amongst others

The ownership of the solutions will be vested in the residents.

#### *Solution 4: Smart Local Electricity Management*

The scale of project replication in terms of initial capital requirements. Funds could be made available from Cork City Council's own funds along with additional funding from SEAI. Determining factors will be based on the business case and the return of investment on a project by project basis which will determine the progression of similar projects as part of our scaled replication plan. Explore possibility of Public Private partnership investment model, and examine new sustainability business models.

#### *Solution 5: Smart Street Lighting*

Funds are available to upgrade our street lighting infrastructure with LED's and Cork City Council has to date replaced 15% of its lighting stock with LED's and we aim to continue to upgrade the remainder of our stock as funds become available. We have undertaken a number of pilots to examine the payback from dimming and trimming and remote control of lighting, and future implementations will be based on feasibility studies and return on investment. Funds will be made available from Cork City Councils own funds along with additional funding from SEAI and Central Government.

#### *Solution 11: Alternative Fuel Driven Vehicles*

Cork City Council have limited influence over the strategic direction of the local public transport operator. Through our Local Energy Cluster, Energy Cork, Cork City Council supports an increase of Alternative fuel driven vehicles, and through our Roads & Transportation Dept, the City Council will facilitate these vehicles where possible. Indeed, all new large scale planning applications, should be required to provide EV parking and EV charging points provide parking and EV charge points e.g. 10% of the car park space will have charge points

#### *Solution 12: Smart Mobility Solution*



Engaging with multiple transportation providers will be key to developing our multi modal transport hubs; we would hope to replicate the hub that already exists in our train station and continue to support multi modal transport. A key challenge in Cork is reducing the number of sole occupancy vehicles travelling through Cork City, work is ongoing with our Transportation Dept to prioritize buses, pedestrians and cyclists through our main street. Ongoing engagement is critical with the business owners to ensure the success of this measure.

#### *5.4.6.2 Q3 What are the main challenges and barriers related to the measure(s)?*

##### *Solution 1.*

*There are few technology barriers to be overcome to deliver on the objectives of the measures. However the scale of project replication could be a challenge to economic replication. The strict rules around procurement can cause some challenges as can traditional cultural attitudes towards initiatives such as district heating schemes. Financial and other resources can be ongoing challenge to replication.*

##### *Solution 4.*

*There are few technology barriers to be overcome to deliver on the objectives of the measures. However the scale of project replication could be a challenge to economic replication*

##### *Solution 5.*

*Few technological barriers. However the sourcing of funding at an economical level to replace the infrastructure across the city is a challenge*

##### *Solution 11.*

*Funding of innovative measures. Limited influence over the strategic direction of the local public transport operator.*

##### *Solution 12.*

*Funding of innovative measures beyond proof of concept. Limited influence over the strategic direction of the local public transport operator.*



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

*Solution 1, 4, 5.*

*These solutions will be integrated with the current and future City Council capital programme. Measures and solutions that impact on house construction and retro-fit are particularly relevant at this time owing to the recognized acute shortage of suitable accommodation within the district and wider city.*

*Solution 11*

*The solutions will be promoted across the organization, influencing fleet procurement and wider promotion of alternative fuel vehicles. We will also seek to influence the decision making process of the NTA.*

*Solution 12*

*Incorporate smart mobility solutions into future service provision*

*5.4.6.4 Q5 What user / stakeholder involvement is foreseen?*

*Solution 1, 4, 5.*

*Local resident groups, political representatives and industry  
SEAI, DHPCLG, CCC, Southern Assembly*

*Solution 11, 12*

*Local resident groups, political representatives and industry  
SEAI, DHPCLG, CCC, Southern Assembly  
Public Transport operator, National Transport Authority*

*5.4.6.5 Q6 What is the potential implementation timeframe?*



*Solution 1, 4, 5, 11, 12*

*3 to 5 years*

#### **5.4.7 Replication needs of Smart City Measure(s)**

*5.4.7.1 Q7 What do you need to know for the successful deployment of the Smart Measure(s) beyond the GrowSmarter factsheets?*

**Solution 1, 4, 5, 11, 12.**

Regular communication on each sub solution or projects including technical specification, lessons learned and issues raised by stakeholders



## 6 GrowSmarter Replication Roadmap

### 6.1 Replication plan of measure Low Energy Districts/ Smart Building Shell Refurbishment

#### 6.1.1 Summary of Implementation activity

The Southern Assembly is the Managing Authority for the Southern and Eastern Regional Operational Programme 2014–2020; it focuses on five main areas:

- Strengthening Research, Technology and Innovation
- Information and Communications Technology Infrastructure
- SME Competitiveness
- Support the shift towards a low-carbon economy
- Sustainable Urban Development

The objective of Priority 4: Support a shift to a low carbon economy is to improve energy efficiency in the housing stock. Cork City Council has implemented a number a number of smart building shell refurbishment measures explored in GrowSmarter using funding schemes offered as part of this priority activity. In particular the City Council took advantage of the following schemes.

**Better Energy Warmer Homes Scheme:** The objectives of the scheme are to improve the energy efficiency of the private households and in the process reduce greenhouse gas emissions and the expenditure on heat energy. Other secondary objectives are to improve health and well-being, while reducing the incidence of fuel poverty.

**Social Housing Retrofit:** The principal objective of the retrofitting proposal is to meet Ireland's commitments in relation to carbon emissions reductions and energy reduction targets for 2020. Implementation of energy efficiency measures in buildings will make a significant contribution to Ireland's carbon emissions reduction targets and energy reduction targets for 2020. The frameworks within which these measures are being implemented are provided by the recast Energy Performance of Buildings Directive and Energy Efficiency Directive.

Energy savings in buildings will contribute 45% of Ireland's total energy savings targets for 2020. The energy retrofitting of buildings in the private and public sector hold the greatest potential for energy savings.

It is intended that this retrofitting proposal will fully meet the stringent requirements and ambitious targets of the Energy Efficiency Directive.



Secondary objectives of the retrofitting proposal include:

- Stimulating employment generation within the construction/energy retrofitting sector. This measure will support some 4,167 jobs, taking account of both direct and indirect jobs, over the implementation period;
- Demonstrating the importance of public sector bodies leading by example as required by the Recast Energy Performance of Buildings Directive and the Energy Efficiency Directive.

In line with the Paris Accord, Cork City Council aims to continue to replicate solutions under smart building shell refurbishment over the long term until all 9,000 social housing units have been upgraded.

### 6.1.2 Phase 1: Preparation of the implementation framework

Objective: Set the basis for a successful implementation of the measure.

Indicative timeframe	Description of key activities	City departments/offices involved
	<p>- <b>Policy and regulatory screening:</b> name the potentially required adaptations of local/regional policy and regulatory frameworks; which may influence project development.</p> <p><b>EU Level</b> <i>Energy Efficiency Directive (2012)</i></p> <p>A 2016 update of this Directive establishes a set of binding measures towards helping the EU to reach a 30% energy efficiency target by 2030. National measures to be adopted include the following:</p> <ul style="list-style-type: none"> <li>~ Energy distributors/sales companies to drive 1.5% energy savings per year through energy efficiency measures</li> <li>~ Public sector to procure energy efficient buildings, products &amp; services</li> <li>~ Governments to carry out energy efficient renovations to at least 3% of the buildings they own/occupy per year</li> <li>~ Easy &amp; free access to energy data to be provided to energy consumers</li> <li>~ Incentivize energy audits for SME's</li> <li>~ Mandatory energy audits for large companies</li> </ul> <p><b>Renewable Energy Directive</b></p> <p>A 2016 update of this Directive requires the EU to fulfill at least 27% of its total energy needs with renewables by 2030.</p>	<p><b>e.g. urban planning, environment etc.</b></p>



### *EU Climate & Energy Framework*

This Policy sets the following 2030 targets (from 1990 levels):

- ~ At least 40% GHG emission reductions (binding)
- ~ At least 27% share for renewable energy (binding)
- ~ At least 27% improvement in energy efficiency (endorsed)

### *National Level*

#### *Climate Action and Low Carbon Development Act (2015)*

This is the first ever climate legislation in Ireland and provides a statutory basis for the national objective of transitioning to a low carbon economy by 2050. It enshrines the commitment of the State to GHG mitigation and adaptation measures as well as providing approval for the plans underpinning this transition, namely the National Mitigation Plan and National Adaptation Framework

#### *Ireland's Transition to a Low Carbon Energy Future 2015-2030*

This White Paper sets out the framework to guide energy policy to 2030, with the long-term vision of reducing GHG emissions by 80%-95% by 2050 (compared to 1990 levels). The Plan envisages the Citizen being at the center of the required energy transition: the change "from passive consumer to active citizen" and citizen engagement are key principals of this Plan.

#### *National Energy Efficiency Action Plan (NEEAP4) 2017-2020*

NEEAP4 sets a target of 20% improvement in energy efficiency by 2020 & a more ambitious target of 33% in respect of the public sector. It sets out the scale of energy & emission savings achieved per sector by 2016 and projects the levels of savings envisaged by 2020 under various scenarios. It also sets out details of measures & programs that will deliver towards the savings targets in each sector.

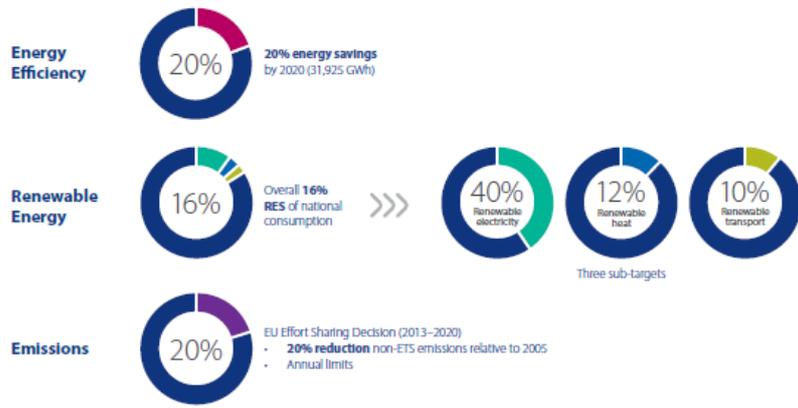
#### *National Mitigation Plan 2017*

This first whole-of-government plan sets out the multiple measures required across several Government Departments to enable the required transition "to a low carbon, climate resilient and environmentally sustainable economy by 2050". In particular, it sets out measures to facilitate the decarbonization of electricity generation, built environment, transports and agriculture/forestry/land use.

#### *National Renewable Energy Action Plan 2010*

This sets out national targets in respect of the share of energy from renewable sources to be consumed in transport, electricity and heating/cooling in 2020.





National Headline Energy & Emissions Targets Source: Ireland’s Energy Projections, 2017 (SEAI)

Regional Level: South West Regional Operations plan as described above.

### Local Level

#### Cork City Development Plan 2015-2021

This is the main strategic planning policy document for the city of Cork and is set within the framework provided by the National Spatial Strategy 2002-2020 & South West Regional Planning Guidelines 2010-2022. It has also been prepared having regard to a number of policies/guidelines including the National Climate Change Strategy 2007-2012 & The National Climate Adaptation Framework.

*“The vision for Cork City over the period of this Development Plan and beyond is to be a successful, sustainable regional capital and to achieve a high quality of life for its citizens and a robust local economy...”*

#### GOAL 4

##### PROMOTE SUSTAINABLE MODES OF TRANSPORT AND INTEGRATION OF LAND USE AND TRANSPORTATION

At the national level there is a mandate to reduce emissions caused by fossil-fuelled transport, to reduce use of the private car for commuting and to increase journeys by public transport, walking and cycling. These objectives are central to the land-use and transport strategies in this plan and as well as having the significant societal benefits of a better quality environment can also give health benefits and cost-savings to the individual citizen. Achieving national targets is a long term objective which will require a move to more sustainable land use planning and a significant upgrade to public transport in the greater city area. This strategic goal is particularly addressed in Chapter 5. Transportation.

#### GOAL 6

##### TACKLE CLIMATE CHANGE THROUGH REDUCING ENERGY USAGE, REDUCING EMISSIONS, ADAPT TO CLIMATE CHANGE AND MITIGATE AGAINST FLOOD RISK

A key aim of the Plan is to reduce emissions that lead to global warming through sustainable energy usage in transport and buildings. It also aims to mitigate and adapt to the challenges of climate change such as the increased risk of flooding, through the design, layout and location of appropriate land-uses. This is particularly addressed in Chapter 12. Environmental Infrastructure and Management and Chapter 16. Development Management.



	<ul style="list-style-type: none"> <li>- <b>Stakeholder’s roles definition:</b> The replication is lead by Cork City Council but also includes the following stakeholders. The Southern Assembly, the Department of Housing, Planning and Local Government, Sustainable Energy Authority of Ireland, housing tenants, residents groups and the City Council, implementation organisations e.g. construction firms, contractors etc.</li> </ul>	
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### 6.1.3 Phase 2: Project inception planning, performance and finance

Objective: Outline key structural aspects for the measure’s implementation.

Indicative timeframe	Description of key activities	City departments/ offices involved
	<ul style="list-style-type: none"> <li>- <b>Governance designation:</b> The housing maintenance department in Cork City Council is the lead group responsible for the replication of these solutions. The implementation team will be lead by this group and will also include a number of the stakeholders listed above depending on the scheme and operational requirements of the different projects.</li> <li>- <b>Targets and goals setting (short- to long-term):</b> The replication measures support the implementation of the SECAP which aims for a medium depth retrofitting of all social houses by 2040. This is funding dependent and Cork City Council is taking a phased approach to this target.</li> <li>- <b>Technology and infrastructure planning:</b> The smart building shell refurbishment will include a selection of the following activities depending on the type of smart building shell refurbishment activity and the type of property. Building shell upgrades including Cavity Wall Insulation, Heat pump, LED lighting upgrade, Attic Insulation, installation of PV cells, monitoring equipment etc.</li> <li>- <b>Definition of key performance indicators (KPIs)</b> KPI – number of square meters of social houses/apartments retrofitted, BER rating improvement, energy performance, alternative sources of energy installed</li> <li>- <b>Cost-benefit analysis:</b> Rated CO2 reductions Rated energy performance improvement</li> </ul>	



	<ul style="list-style-type: none"> <li>- <b>Business and financial model definition:</b> Community partnerships are explored in addition to partnerships with other public entities .The financial model is dependent on the funding source which is often a mix of national and European</li> </ul>	
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#### 6.1.4 Phase 3: Political approval and stakeholder engagement

Objective: Obtain and maintain political and stakeholder commitment for the implementation.

Indicative timeframe	Description of key activities	City departments/ offices involved
	<ul style="list-style-type: none"> <li>- <b>Political commitment:</b> There is strong political commitment from the Council regarding the upgrading of social houses. There is also strong support from social housing tenants, some of whom experience fuel poverty and understand the benefits of energy efficiency upgrades. There is also support at the national level to provide funding for this purpose.</li> <li>- <b>Strategic intermediaries:</b> As listed about there are a number of strategies at European, National, Regional and Local level that support the City Council’s work in the area of improving energy efficiency.</li> <li>- <b>Public participation and citizen engagement:</b> As listed in the stakeholder groups, resident groups and local tenants are very important stakeholders. Cork City Council endeavours to work closely with the affected groups in advance of the work, during the implementation and after the completion of work.</li> <li>- <b>Capacity building of city staff:</b> Cork City Council staff are already proficient in upgrading homes to increase their energy efficiency. Some additional knowledge regarding the measuring and monitoring systems and the installation of renewables will be delivered by the groups contracted to deliver the works.</li> </ul>	



### 6.1.5 Phase 4: Project implementation

Objective: Plan the effective implementation of the defined measure.

Indicative timeframe	Description of key activities	City departments/ offices involved
	<p><b>Procurement model:</b> The model used is multiple mini-competitions utilising established framework panels.</p> <p><b>Contract negotiation and management:</b> The contract awarding procedure will be agreed by an experienced team in the housing maintenance department with assistance from the finance department if required. The team will follow the rules laid out as part of national procurement process legislation. The contract will include specific requirements for payments, schedule of work and penalties to try to negate the risk of the contract. The Housing Maintenance team manage the contracts on behalf of the city council.</p>	

### 6.1.6 Phase 5: Monitoring and progress evaluation

Objective: Plan the monitoring, evaluation and reporting of the implementation of the measure.

Indicative timeframe	Description of key activities	City departments/ offices involved
	<ul style="list-style-type: none"> <li>- <b>Project monitoring:</b> Cork City Council Housing Maintenance Department is responsible for the project monitoring. The project will be monitored throughout the implementation of the activity.</li> <li>- <b>Project evaluation:</b> The project is evaluated in two ways. Firstly, there is a post work Building Energy Requirement certificate that is completed by an independent body to reflect the improvements. Secondly, the improvement in building performance is established post works to indicate the impact of the project.</li> <li>- <b>Internal and external reporting:</b> Reports are required to inform the funding bodies of the implementation of work. Internal reports to the director of housing on progress and also to the CE are required. The tenants are also communicated with regarding the improvements that have been made. In the future it is hoped that more citizen</li> </ul>	



	engagement and communication reporting will be possible.	
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## 6.2 Replication plan of measure Low Energy Districts/ Smart Local Electricity Management

### 6.2.1 Summary of implementation activity

Cork City Council in Partnership with Northside Community Enterprise (NCE) has secured funding for the installation of a solar photovoltaic (PV) system for Ballyvolane Firestation.

The grant fund of 40% was provided by the Sustainable Energy Authority of Ireland (SEAI). The aim of the system is to reduce the running costs, protect against energy price increases and reduce the Firestation's carbon footprint. The flat roof of the building has been identified as highly suitable for a PV system. A 10.92 kWp system was designed and the cost was calculated for the project. It is estimated that the PV system would produce 9,691 kWh/year. The estimated payback of the system is 7 years and the return on investment is 17%. The system consists of 42 individual 260 Wp Conergy Modules connected to an SMA three phase inverter and mounted on a German manufactured mounting system specifically designed for flat roofs. The total PV module area is 69 m<sup>2</sup>.

The installation also includes an online monitoring solution which allows the PV plant to be monitored remotely from anywhere with an internet connection via PC, mobile phone or smart device. The system was installed by solar company – Solar Electric based in Killanne, Co. Wexford.

### 6.2.2 Phase 1: Preparation of the implementation framework

Objective: Set the basis for a successfully implementation of the measure.

Indicative time frame	Description of key activities	City departments / offices involved
	<p><b>Policy and regulatory screening:</b> name the potentially required adaptations of local/regional policy and regulatory frameworks; which may influence project development.</p> <p>EU Level <i>Energy Efficiency Directive (2012)</i></p>	



A 2016 update of this Directive establishes a set of binding measures towards helping the EU to reach a 30% energy efficiency target by 2030. National measures to be adopted include the following:

- ~ Energy distributors/sales companies to drive 1.5% energy savings per year through energy efficiency measures
- ~ Public sector to procure energy efficient buildings, products & services
- ~ Governments to carry out energy efficient renovations to at least 3% of the buildings they own/occupy per year
- ~ Easy & free access to energy data to be provided to energy consumers
- ~ Incentivize energy audits for SME's
- ~ Mandatory energy audits for large companies

#### *Renewable Energy Directive*

A 2016 update of this Directive requires the EU to fulfill at least 27% of its total energy needs with renewables by 2030.

#### *EU Climate & Energy Framework*

This Policy sets the following 2030 targets (from 1990 levels):

- ~ At least 40% GHG emission reductions (binding)
- ~ At least 27% share for renewable energy (binding)
- ~ At least 27% improvement in energy efficiency (endorsed)

#### **National Level**

##### *Climate Action and Low Carbon Development Act (2015)*

This is the first ever climate legislation in Ireland and provides a statutory basis for the national objective of transitioning to a low carbon economy by 2050. It enshrines the commitment of the State to GHG mitigation and adaptation measures as well as providing approval for the plans underpinning this transition, namely the National Mitigation Plan and National Adaptation Framework

##### *Ireland's Transition to a Low Carbon Energy Future 2015-2030*

This White Paper sets out the framework to guide energy policy to 2030, with the long-term vision of reducing GHG emissions by 80%-95% by 2050 (compared to 1990 levels). The Plan envisages the Citizen being at the center of the required energy transition: the change "from passive consumer to active citizen" and citizen engagement are key principals of this Plan.

##### *National Energy Efficiency Action Plan (NEEAP4) 2017-2020*

NEEAP4 sets a target of 20% improvement in energy efficiency by 2020



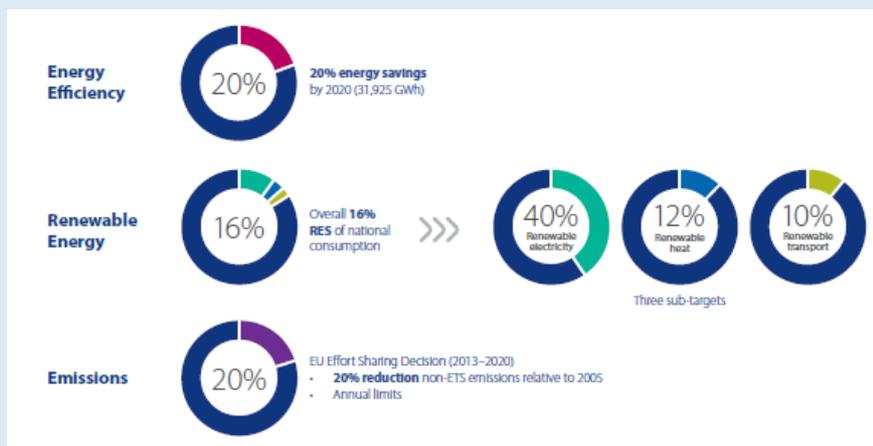
& a more ambitious target of 33% in respect of the public sector. It sets out the scale of energy & emission savings achieved per sector by 2016 and projects the levels of savings envisaged by 2020 under various scenarios. It also sets out details of measures & programs that will deliver towards the savings targets in each sector.

#### *National Mitigation Plan 2017*

This first whole-of-government plan sets out the multiple measures requires across several Government Departments to enable the required transition “to a low carbon, climate resilient and environmentally sustainable economy by 2050”. In particular, it sets out measures to facilitate the decarbonization of electricity generation, built environment, transports and agriculture/forestry/land use.

#### *National Renewable Energy Action Plan 2010*

This sets out national targets in respect of the share of energy from renewable sources to be consumed in transport, electricity and heating/cooling in 2020.



National Headline Energy & Emissions Targets Source: Ireland’s Energy Projections, 2017 (SEAI)

#### Local Level

##### *Cork City Development Plan 2015-2021*

This is the main strategic planning policy document for the city of Cork and is set within the framework provided by the National Spatial Strategy 2002-2020 & South West Regional Planning Guidelines 2010-2022. It has also been prepared having regard to a number of policies/guidelines including the National Climate Change Strategy 2007-2012 & The National Climate Adaptation Framework.

*“The vision for Cork City over the period of this Development Plan and beyond is to be a successful, sustainable regional capital and to achieve a high quality of life for its citizens and a robust local economy...”*

	<p><b>GOAL 4</b> <b>PROMOTE SUSTAINABLE MODES OF TRANSPORT AND INTEGRATION OF LAND USE AND TRANSPORTATION</b></p> <p>At the national level there is a mandate to reduce emissions caused by fossil-fuelled transport, to reduce use of the private car for commuting and to increase journeys by public transport, walking and cycling. These objectives are central to the land-use and transport strategies in this plan and as well as having the significant societal benefits of a better quality environment can also give health benefits and cost-savings to the individual citizen. Achieving national targets is a long term objective which will require a move to more sustainable land use planning and a significant upgrade to public transport in the greater city area. This strategic goal is particularly addressed in Chapter 5. Transportation.</p>	
	<p><b>GOAL 6</b> <b>TACKLE CLIMATE CHANGE THROUGH REDUCING ENERGY USAGE, REDUCING EMISSIONS, ADAPT TO CLIMATE CHANGE AND MITIGATE AGAINST FLOOD RISK</b></p> <p>A key aim of the Plan is to reduce emissions that lead to global warming through sustainable energy usage in transport and buildings. It also aims to mitigate and adapt to the challenges of climate change such as the increased risk of flooding, through the design, layout and location of appropriate land-uses. This is particularly addressed in Chapter 12. Environmental Infrastructure and Management and Chapter 16. Development Management.</p>	
	<ul style="list-style-type: none"> <li>- <b>Stakeholder’s roles definition:</b> The replication includes the Energy Office, Cork City Council, Sustainable Energy Authority of Ireland (SEAI), Ballyvolane Fire station, North side community enterprise (NCE) and Solo Energy and ESB Networks on the distributed storage side.</li> </ul>	

### 6.2.3 Phase 2: Project inception planning, performance and finance

Objective: Outline key structural aspects for the measure’s implementation.

Indicative timeframe	Description of key activities	City departments/ offices involved
	<ul style="list-style-type: none"> <li>- <b>Governance designation:</b> The Energy Office, Cork City Council, Ballyvolane Fire station and NCE with SEAI were involved in the governance of the work to install the solar PV on the roof of the fire station. Solo Energy was involved in the governance of the distributed energy storage system aspect of the replication.</li> <li>- <b>Targets and goals setting (short- to long-term):</b> Reduction of 4,500 kg of CO2 from the atmosphere every year. Replication of this solution in other areas is under consideration as part of the long term Climate Action measures described in the policy documents listed above in addition to the SECAP for Cork City.</li> </ul> <p style="text-align: center;"><b>Technology and infrastructure planning:</b></p> <ul style="list-style-type: none"> <li>- The replication involved the installation of a distributed energy storage systems at Ballyvolane Fire station which</li> </ul>	



	<p>will prioritise solar energy generation over using grid electricity.</p> <ul style="list-style-type: none"> <li>- In addition Cork City Council and NCE with SEAI installed 42 solar PV panels on the roof of Ballyvolane Fire Station. The project involved the installation of ‘behind-the-meter’ battery storage devices to work together with the solar panels.</li> <li>- This system is connected to a cloud-connected software platform to control the batteries across the grid – enabling customers to get more from their solar PV systems and to access low-cost electricity at off-peak times.</li> <li>- <b>Definition of key performance indicators (KPIs)</b> KPI – % of electricity consumption off set by renewable each year; Number of kg of CO2 eliminated from the atmosphere each year; Cost savings per year.</li> <li>- <b>Cost-benefit analysis:</b> The cost benefit analysis is part of the tender specification and selection process of the installation of the solar panels. It is part of SEAI criteria for funding projects for the distributed storage element.</li> <li>- <b>Business and financial model definition:</b> Community partnerships are explored in addition to partnerships with other public entities .The financial model is dependent on the funding source which in this case primarily from National Funds.</li> </ul>	
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#### 6.2.4 Phase 3: Political approval and stakeholder engagement

Objective: Obtain and maintain political and stakeholder commitment for the implementation.

Indicative timeframe	Description of key activities	City departments/ offices involved
	<ul style="list-style-type: none"> <li>- <b>Political commitment:</b> There is strong political commitment from the Council and listed stakeholders</li> <li>- <b>Strategic intermediaries:</b> As listed about there are a number of strategies at European, National, Regional and Local that support the City Council’s work in the area of improving energy efficiency.</li> </ul>	



	<ul style="list-style-type: none"> <li>- <b>Public participation and citizen engagement:</b> Cork City Council in addition to other stakeholders involved widely publicised this activity and it was also featured on a TV programme called 10 things to know which had a large national viewing audience</li> <li>- <b>Capacity building of city staff:</b> The Energy Office in Cork City Council is continuously upgrading Public buildings. In recent years it has also worked on large scale upgrades in a leisure centre, libraries and other public buildings. Knowledge regarding the working of smart technologies for smart electricity management was gained from Solo Energy while working on this project but additional education and learning is required to build internal capacity of distributed storage systems and smart electricity management.</li> </ul>	
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#### 6.2.5 Phase 4: Project implementation

Objective: Plan the effective implementation of the defined measure.

Indicative timeframe	Description of key activities	City departments/offices involved
	<ul style="list-style-type: none"> <li>- <b>Implementation plan:</b> Specific implementation plan based on the SEAI funded project.</li> <li>- <b>Procurement model:</b> The model used open procurement for the PV panels. The distributed storage was a pilot project funded by an SEAI project.</li> <li><b>Contract negotiation and management:</b> The contract awarding procedure will be agreed by an experienced team in the energy office with assistance from the finance department. The team will follow the rules laid out as part of national procurement process legislation. The contract will include specific requirements for payments, schedule of work and penalties to try to negate the risk of the contract.</li> </ul>	

#### 6.2.6 Phase 5: Monitoring and progress evaluation

Objective: Plan the monitoring, evaluation and reporting of the implementation of the measure.



Indicative timeframe	Description of key activities	City departments/ offices involved
	<ul style="list-style-type: none"> <li>- <b>Project monitoring:</b> Cork City Council and SEAI are responsible for project monitoring.</li> <li>- <b>Project evaluation:</b> The project is evaluated in terms of cost savings in Euro and also in savings of CO2/KG and in electricity consumption.</li> <li>- <b>Internal and external reporting:</b> Reports are required to inform the funding bodies of the implementation of work. Internal reports to the director of environment and for SEAI are also required.</li> </ul>	

## 6.3 Replication plan of measure Integrated Infrastructures/ Smart Street Lighting

### 6.3.1 Summary of implementation activity

This solution will not be replicated in Cork. To date Cork City Council has focused on upgrading lights to LED and also exploring remote control of lights. Options for implementing smart lighting as wifi to grid connectors and electrical chargers are under consideration. The Commission for the Regulation of Utilities, CRU has issued a Directive which proposes the sale of the EV Charge Point network as against continued ESB ecars ownership.

Options for Smart meter information analysis and actuators use cases under consideration in the context of the National Programme of Energy Efficient street lighting upgrades on which Cork City Council is an active participant.

## 6.4 Replication plan of Sustainable Urban Mobility/ AV Fuel driven Vehicles

### 6.4.1 Summary of implementation activity

- Need to encourage electric cars in Cork, through initiatives such as Drive4Zero.



- City Centre Movement Strategy (CCMS) will make city more attractive to all users and improve the environment for public transport users and is an integral part of this growth
- Less congestion and cleaner vehicles benefit everyone in Cork

#### 6.4.2 Phase 1: Preparation of the implementation framework

Objective: Set the basis for a successful implementation of the measure.

Indicative timeframe	Description of key activities	City departments/offices involved
	<ul style="list-style-type: none"> <li>- <b>Policy and regulatory screening:</b> 10% RES Target for transport by 2020</li> <li>- <b>Stakeholder's roles definition</b> Cork City Council: Roads &amp; Transportation aim to promote use of EV's  Energy Cork: The industry cluster for the energy sector in Cork working to: be a focal point for the energy sector in Cork; to contribute to economic growth and job creation in Cork and nationwide; to build upon resources; to consolidate and raise awareness of the leading position of Cork in the energy sector. Member-led (90+ members), Strong industry focus, All energy sectors and organisation types The Commission for the Regulation of Utilities, CRU has issued a Directive which proposes the sale of the EV Charge Point network as against ESB ecars ownership. National Transport Authority</li> </ul>	Cork City Council, Roads & Transportation Directorate.

### 6.4.3 Phase 2: Project inception planning, performance and finance

Objective: Outline key structural aspects for the measure's implementation.

Indicative timeframe	Description of key activities	City departments/offices involved
	<p><b>Governance designation:</b> Government policy has set a target for 50,000 (~2.5% of all vehicles) on our roads to be powered by electricity by 2020. The target has been set out in the White Paper on energy <i>Ireland's Transition to a Low Carbon Energy Future 2015-2030</i>".</p> <p><b>Targets and goals setting (short- to long-term):</b> At present, there are 2,000 home charge points in Ireland. Additionally there are 1,500 public charge points which are located along main inter-urban routes, local streets and petrol forecourts. Cork City Council has been very proactive in this area and will continue to support the government's transport strategy around Electric Vehicles (EVs). To this end, the Traffic Division of Cork City Council was also successful in achieving funding for an EU project titled Green Emotion. A consortium of Irish public sector bodies, academia and private industry was successful in receiving €1.5 million from EU structural funds to develop electric transport infrastructure. The funding was shared among the Irish partners; City of Dublin Energy Management Agency (CODEMA), the ESB, Trinity College and Cork City Council - of which, the Council received €170k. The funding is part of a European Commission initiative, with the value of €41.8m, to develop knowledge and experience of e-mobility in selected regions within Europe. Electric Vehicles offer a cost effective, environmentally clean solution to the Council energy costs. Given the relative size of Cork City, the use of EVs is an extremely efficient way of traversing it.</p> <p>A green/low-carbon future for Cork City's Bus Fleet EVs/Hybrids/Natural Gas all options Market should decide based on life-cycle costs ~120 vehicles transitioned to Green Bus technology CNG buses are a well tried and tested technology (in Cork also) CNG technology allows for transition to renewable biogas in the medium term</p> <p><b>Technology and infrastructure planning:</b> Cork City Council facilitated the installation of on-street EV 'Standard' Charge Points by ESB cars. Installation of Charge Points in multi-storey car parks has been completed Distinctive on-street signage has been designed and deployed to cater for the enforcement of Parking Bye-laws to restrict the duration of stay at EV Charge Points and allow proper turnover and access. In March 2013, Cork City Council Plant &amp; Machinery dept tendered for two EVs. The vehicles (two Renault kangoo vans)</p>	



	<p>are used by City Council drivers for the purposes of daily council operations.</p> <p><b>Definition of key performance indicators (KPIs):</b> City Council's fleet to be reviewed with a view to possible deployments of EVs. Roads &amp; Transportation manage the procurement of the City Council fleet and a significant target of 15 EVs out of a total of 78 vehicles in the small van category has been proposed for inclusion in the next Tender Specification.</p> <p>Bus transport is a key component of the long-term solution for public transport in Cork. 11% growth in bus passenger numbers via St Patrick's Street. 771 extra bus trips per week over last 2 years Successful CNG bus trials in Cork 2012/2013 Cluster approach – acting locally Aligns with Cork's European Green Capital ambitions</p> <p><b>Cost-benefit analysis:</b> Electric cars incur very low maintenance costs, particularly in the case of current lithium-based designs. Typical maintenance issues would simply include rotating the tyres and topping up the windshield washer fluid. Electric cars also do not have cooling problems like other vehicles. Approximately €200 per annum would be typical of what is spent on maintenance. The standard annual serving for a diesel/petrol vehicle would be approx €500. This figure may increase as the petrol/diesel car gets older A typical electric vehicle with a battery range of 150 km at an annual usage of 10,000 km will produce the following: An electrical vehicle doing an annual usage of 15,000km per annum will cost you approximately -€200 for electric fuel costs.</p> <p>- <b>Business and financial model definition</b> With Electric cars, you have long-term forecasting for electricity prices and consequently one can budget accordingly. The State contributes €5,000 to the capital cost of the EV. Some Insurance companies are offering tailored electric car insurance. All new large scale planning applications, should be required to provide EV parking and EV charging points provide parking and EV charge points e.g. 10% of the car park space will have charge points</p>	
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#### 6.4.4 Phase 3: Political approval and stakeholder engagement

Objective: Obtain and maintain political and stakeholder commitment for the implementation.

Indicative timeframe	Description of key activities	City departments/offices involved
	<b>Political commitment:</b>	



	<p>Drive4Zero was devised as a National programme for 2015 but it launched in Cork, Cork should lead in the roll-out of EVs and electromobility - Drive4Zero .</p> <p>Drive4Zero is a very successful example of Coordination and Cooperation by Key Stakeholders – New initiative required. And CCC should promotion of benefits and TrueTCO principles for Private Fleets.</p> <p>Guidelines produced by CCC to cater for the installation of Charging Infrastructure in public spaces &amp; within private areas – apartment complexes included - Planning Conditions for all new developments and changes of use should include EV charging</p> <p>Motor Tax for EV Commercial Vans has been reviewed - EV van now €120 - Previously rated on Gross Weight including weight of battery - Motor Tax for Kangoo EV was €358 pa</p> <p>Mandatory Targets be set and monitored for the deployment of EVs on Public Authority vehicle fleets</p> <p>Strategic intermediaries: name who influences the development of the initiative at a city level and how to engage them.</p> <p>Public participation and citizen engagement: name activities to engage citizens in the use of the measure to be implemented.</p> <p>Capacity building of city staff: name training aspects for city staff related to the project. Name if participation of external advisors need to be considered.</p> <p><b>Public participation and citizen engagement:</b> Use web presence to engage citizens with alternative technologies</p> <p><b>Capacity building of city staff:</b> Training is a key component of any initiative. Leverage cooperation between enterprises, public, academia and citizens. Build-up of intelligence and skills to enable change and empower stakeholders</p>	
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#### 6.4.5 Phase 4: Project implementation

Objective: Plan the effective implementation of the defined measure.

Indicative timeframe	Description of key activities	City departments/ offices involved
	<ul style="list-style-type: none"> <li>- <b>Implementation plan:</b> <i>Cork - a low-carbon vehicle hub : Drive4Zero:</i> outlines a roadmap for growth of low carbon transport including electric vehicles (EV) and compressed natural gas vehicles (NGV) to encourage a step-change in low-carbon vehicle uptake making Cork, Irelands hub for EV and NGV/Biogas roll-out City Council's fleet to be reviewed with a view to possible deployments of EVs. <b>NTA will trial low-emission buses in Cork and Dublin</b> (14 vehicles over 14 weeks – electric, hybrid, CNG)</li> <li>- <b>Procurement model:</b></li> <li>- Roads &amp; Transportation Dept, Cork City Council manage the</li> </ul>	Roads & Transportation, Cork City Council



	<p>procurement of the City Council fleet and a significant target of 15 EVs out of a total of 78 vehicles in the small van category has been proposed for inclusion in the next Tender Specification. An experienced team in the Roads &amp; Transportation Dept with assistance from the finance department if required will be formulated. The team will follow the rules laid out as part of national procurement process legislation. The contract will include specific requirements for payments, schedule of work and penalties to try to negate the risk of the contract. National Transport Authority (NTA) will procure buses for Cork</p> <ul style="list-style-type: none"> <li>- <b>Contract negotiation and management:</b> Key stakeholders will be involved in all contract negotiation and management</li> </ul>	
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#### 6.4.6 Phase 5: Monitoring and progress evaluation

Objective: Plan the monitoring, evaluation and reporting of the implementation of the measure.

Indicative timeframe	Description of key activities	City departments/offices involved
	<ul style="list-style-type: none"> <li>- <b>Project monitoring:</b> Roads &amp; Transportation Directorate, Cork City Council is responsible for the EV project monitoring. The project will be monitored throughout the implementation of the activity.</li> <li>- <b>Internal and external reporting:</b> Reports are required to inform the funding bodies of the implementation of work. Internal reports to the director of Roads &amp; Transportation, on progress and also to the Chief Executive are required. In the future it is hoped that more citizen engagement and communication reporting will be possible.</li> </ul>	



## 6.5 Replication plan of measure Sustainable Urban Mobility/ Smart Mobility Solutions

### 6.5.1 Summary of Solution

This solution has been replicated in Cork in the rebranding of a pre-existing Sustainable Transport hub. The sustainable transport hub is based on the north side of the city and is centred around Cork City's train station – Kent Station. On this site the train station is collocated with many forms of multi modal transport options which are promoting sustainable methods of transport. A bus terminus, car sharing options, public bike scheme and EV charging stations are collocated at the train station. There is also parking for traditional vehicles. Recently the train station and the site received a €10million upgrade. The Kent station development now facilitates passenger access to the quay adjacent to the city centre for the first time

The development features a new underground pedestrian access route from Horgan's Quay, a new concourse, improved car parking facilities and a new internal access road to a public transport hub from where bus services will operate directly to the city centre via the quays since the station opened in 1893. This will dramatically cut the journey time that it takes for rail passengers to get to the city centre. The reorientation of the station also now means that it faces Cork City's main bus station, and it is also closer to the regional bus services which depart from the Quays. Busses leaving the train station terminus will also travel to the city and further to key commuter destinations including the local University and Institute of Technology and Cork Airport. These changes will facilitate a greater number of people to use more sustainable methods of transport to commute.

As part of Cork City Council's City Centre Movement Strategy, Cork city council is continuously developing transport solutions that prioritise better sustainable transport include road upgrades, exclusion zones for private vehicles and bike, bus and pedestrian prioritisation.



## 7 Conclusions

Cork city council is committed to delivering on a smart agenda to drive the future prosperity of Cork City and to also enhance our sustainability efforts and improve the quality of life for our citizens. Cork city council's Smart initiative – the Cork Smart Gateway is a relatively new initiative and was only launched in 2016. Our participation in the GrowSmarter project helped us to understand the elements of critical importance to include in this smart initiative. For example the focus on mobility, interconnected infrastructure and energy efficiency from our GrowSmarter activities are strong elements in our wider smart city activities.

The peer learning element of GrowSmarter also helped us to understand the activities and governance models that exist in other cities with respect to their smart city initiatives and we have been able to replicate some of these learnings in the development delivery of our smart agenda.

The GrowSmarter project and the replication of activities undertaken by staff in Cork city council were instrumental in engaging a number of different directorates in the delivery of our smart agenda. For example as part of the GrowSmarter replication plan we engaged with the Housing Department, Environment Department and the Roads Department which helped to break down silos and disseminate the learning from GrowSmarter across a number of departments and not just the ICT department who were managing the project.

At the start of the project Cork city council agreed to replicate a number of measures as part of the project. We have learned many lessons regarding the practicalities of implementing smart solutions and in particular we have learned that some solutions that can be implemented readily in the lighthouse cities can not be as easily replicated due to unique policy or operational challenges in Cork. In saying that, we had a number of very successful activities implemented as part of the GrowSmarter replication that have benefitted the city and our citizens. In particular, the work undertaken as part of the building shell refurbishment work across our city has been hugely successful and beneficial for the tenants in the homes targeted. The implementation of the smart electricity management system in Ballyvolane Fire Station has been a great achievement as part of the project and could be replicated elsewhere in the city. Finally, the replication of the smart mobility hub based on Cologne's work has facilitated in increasing the options of citizens in terms of the use of multi modal transport.



The GrowSmarter project has been a key resource in developing our own smart city agenda. The lessons learned from the implementation of activities, the peer to peer knowledge sharing and the hands on approach to site visits and sharing of practical implementation has helped to progress our Smart activities to date. We will continue to reap benefits from the project and we further replication activities that have now been embedded into the City Council as part of the replication work undertaken.

