

Item 1

6th February 2018



Glasgow City Council

Environment Sustainability & Carbon Reduction City Policy Committee

Report by Acting Executive Director of Land & Environmental Services

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EUROPEAN COMMISSION HORIZON 2020 PROJECT – UPDATE ON RUGGEDISED

Purpose of Report:

To provide committee with the background and an update the EU Horizon 2020 funded Smart Cities & Communities project RUGGEDISED.

Recommendations:

The committee is asked to -

- note the contents of this report;
- continue to support the work of Land and Environmental Services (LES) in delivering the RUGGEDISED project; and
- request a further update on the progress of the project in 12 months.

Ward No(s):

Citywide: ✓

Local member(s) advised: Yes No consulted: Yes No

1. Project Overview

- 1.1 In early July 2016, the European Commission notified the consortium responsible for RUGGEDISED (**R**otterdam, **U**mea, & **G**lasgow: **G**enerating **E**xemplar **D**emonstrations in **S**ustainable **E**nergy **D**istricts) that the bid had been successful and that the project should commence on 1st November 2016.
- 1.2 The RUGGEDISED project is led by Rotterdam and seeks to develop innovative sustainable energy districts in each of the Lighthouse cities (Rotterdam, Umea & Glasgow) and have elements of those districts replicated in the follower cities (Parma, Gdansk, & Brno). Through the RUGGEDISED project, Glasgow will focus on creating a 'Smart Corridor District' that is situated along a section of George Street and Duke Street in the city centre, which has a mix of residential, community, academic, retail and industrial facilities. The Smart Corridor District will address the challenges Glasgow faces from ageing infrastructure, fuel poverty and air pollution by integrating planned regeneration and development with Smart City capabilities. Image 1 (overleaf) shows the extent of the Glasgow district.
- 1.3 The overall objectives of the RUGGEDISED project are as follows:
 - Transforming three large districts of buildings (old, new and mixed) into low carbon and resource efficient districts;
 - Smart interaction and integration of energy systems (largely based on Renewable Energy Resources (RES) at a district level;
 - Intelligent use of the thermal mass of buildings by utilising the buildings for thermal energy storage and exchange;
 - Integration with and consolidation of low carbon and interoperable ICT systems at district level.
 - Integration of smart charging hubs to balance the peak variation in the electricity network;
 - Creation of physical and virtual environments for stakeholder and community interaction and involvement;
 - Acquiring the knowhow to adequately integrate specific technical solutions in energy and e-mobility ('the hardware') with enabling ICT solutions ('the software') and appropriate business models ('the orgware');
 - Monitoring of the performance and evaluation of the impact of the integrated smart solutions;
 - Dissemination of the outcomes of the project, i.e. the integrated smart solutions and the lessons learned.

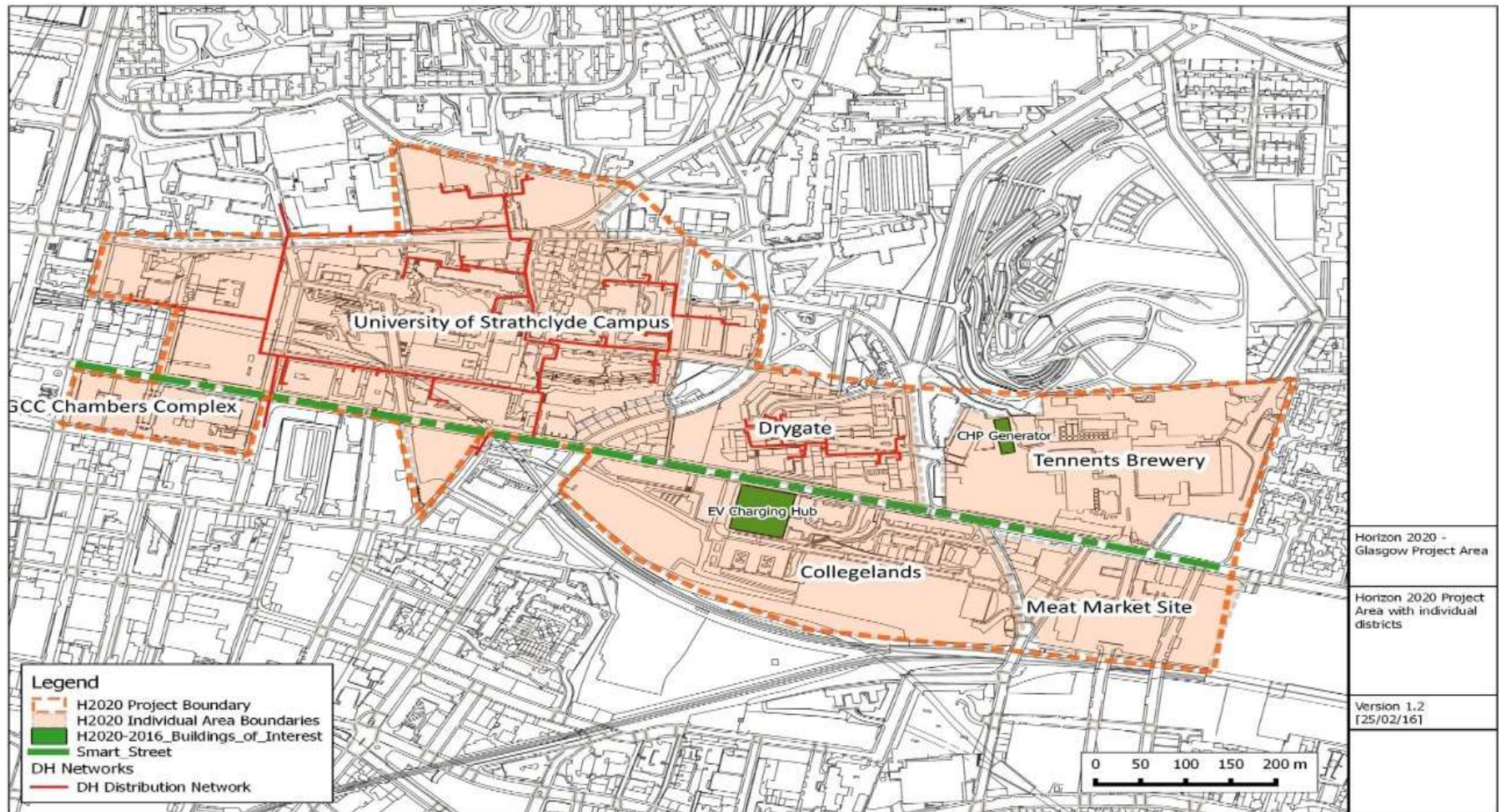


Image 1 - Overview of project district in Glasgow

1.4 The Glasgow element of the project has the following high level deliverables linked to achieving the above objectives

- Develop a replicable business model allowing buildings (public and private sector) to sell surplus heat (University of Strathclyde to Glasgow City Chambers & Tennents Brewery to Drygate housing);
- Implementation of a large scale energy storage system and associated business model for the use of battery storage as a grid balancing measure;
- Develop a business case allowing power transfer from CHP (Tennents Brewery) to the battery enabling storage and local access to power;
- Delivery of innovative renewable installation (innovative roof-mounted solar canopy and ducted vertical wind turbines on Duke Street Car Park) and integration with smart grid infrastructure and storage system;
- Creation of a decision support platform to enable Council officers to access and utilise open data for informing strategy and decision making;
- Deployment of rapid Electric Vehicle chargers in Duke Street Car Park increasing revenue opportunities and supporting the development of electric taxis in the city centre as well as the development of an Electric Vehicle Strategy for the city. A report on an Electric Vehicle Strategy for the city is intended to be brought to this committee for consideration in March 2018;
- Implementation of EV charging integrated into LED street lighting for increased on-street charging;
- Implementation of management system into domestic smart grid deliverable;
- Implementation of management system into non-domestic smart grid;
- Implementation of analysis tools on LED street lighting implemented to support intelligent control of electricity demand, otherwise known as Demand-Side Management.

1.5 The project is split into work packages to enable the delivery of the Lighthouse City smart solutions, replication of the solutions in the Fellow Cities, and to enable overall management of the entire consortium. The individual work packages are detailed in Table 1 below. Each Lighthouse City running Work Packages 2 – 4 are responsible for contributing to the delivery of the other work packages. The other seven work packages are managed by the organisations listed in table 1 overleaf.

Work Package	Description	Lead Partner
1	Cross-city Implementation and Innovation in the Lighthouses	UniResearch
2	Challenges and Solutions in Rotterdam	Rotterdam
3	Challenges and Solutions in Umea	Umea
4	Challenges and Solutions in Glasgow	Glasgow
5	Monitoring and evaluation	AIT
6	Enabling upscaled deployment and business model innovation	RI:SE
7	Replication to follower cities and knowledge transfer	ISINOVA
8	Interaction with Smart City Projects	Rotterdam
9	Communication and Dissemination	ICLEI
10	Project Management	Rotterdam

Table 1 – RUGGEDISED Work Packages

1.6 RUGGEDISED is a five year project. Years 1 – 3 are set for the installation of the smart solutions, and years 4 – 5 are for monitoring, verification, and dissemination.

1.7 In terms of Glasgow’s involvement, the main focus has been to build on working relationships that have been established through the Future City Glasgow Programme and a previous Horizon 2020 Smart Cities & Communities bid, with a view to achieving a good balance between multi-national industries, SME’s, public sector bodies and academic partners. The project partners are as follows:

- Scottish Power Energy Networks
- University of Strathclyde – Energy Services Research Unit
- Transport Scotland
- Tennents Caledonian Brewery
- Siemens
- Wheatley Group

1.8 The project has been designed to be complimentary to other projects being delivered through European Regional Development Funding, Green Investment Bank, and City Deal.

2. Value & Funding Package

2.1 The total grant allocated by the European Commission for the RUGGEDISED project is €17.6M; this equates to £15.6m.

2.2 The grant has been allocated across the various partners based on budgets submitted by each partner in the bid and covers resource costs, capital costs, and any sub-contracting costs. Each partner also receives an additional 25% to cover overheads.

- 2.3 The budget is allocated to each of the partners by Rotterdam at five intervals over the life of the project. Payments are made at the commencement of the project, then after 18 months (April 2018), 30 months (April 2019), 42 months (April 2020), and 60 months (October 2021). Financial reporting is carried out on a 6 monthly basis to inform the official report at the aforementioned payment intervals.
- 2.4 The breakdown of budget allocated to the Glasgow partners is illustrated in table 2 below.

Partner	EU Grant (€)	EU Grant (£)
Glasgow City Council	€2,469,323	£2,197,697
University of Strathclyde	€484,846	£431,513
Transport Scotland	€101,575	£90,402
Scottish Power Energy Networks	€255,981	£227,823
Tennents Caledonian Brewery	€110,480	£98,327
Siemens	€389,834	£346,952
Wheatley Group	€254,235	£226,269
Total	€4,066,274	£3,618,984

Table 2 – RUGGEDISED: Glasgow consortium budget breakdown

- 2.5 The grant allocated to Glasgow City Council is broken down in table 3 below.

Glasgow City Council Grant Allocation	Euro	Sterling
Resource	€791,765	£696,753
Sub-Contracting	€150,000	£132,000
Capital Assets	€1,063,693	£936,050
25% Uplift (indirect cost)	€463,865	£408,201

Table 3 – Council grant allocation

- 2.6 The budget for Glasgow City Council is being monitored and reported on a 6 monthly basis via the Council's appointed EU Financial Signatory, and reported into the EU-Fin online financial monitoring package as required by the European Commission under Horizon 2020.
- 2.7 The project budget is also being reported regularly into the DRS based European Funding Governance Group.
- 2.8 The project is currently resourced by two full time members of staff within LES who are 100% funded by the project, and one part time sub-contractor who is providing technical support.
- 2.9 Funding will also be used for part time support from the Data Team in DRS in support of some of the software elements of the project. The same monitoring conditions described in 2.6 will be applied.

3 Programme & Current Status

3.1 The table below sets out the deliverables and their deadline dates set out in Work Package 4. Glasgow City Council is the lead partner and, as such, is responsible for ensuring the delivery of all aspects of Work Package 4, including those owned by other partners.

Del. No.	Deliverable name	WP	Lead partner	Due date	RAG Rating
D4.1	Business Model allowing buildings selling heat (to each other and to local housing)	4	GCC	Jun-18	
D4.2	Business Model allowing use of battery storage as grid balancing mechanism	4	SIE	Oct-19	
D4.3	Business Case allowing power transfer from CHP to battery	4	GCC	Oct-19	
D4.4	Plan ready for innovative renewable installation (netting off energy generation against consumption)	4	GCC	Oct-19	
D4.5	Decision support Platform (ICT solution) for informing strategy and decision making	4	GCC	Oct-19	
D4.6	Implementation Report Glasgow (1/3)	4	GCC	Oct-19	
D4.7	Deployment of EV chargers in city centre car park	4	GCC	Feb-20	
D4.8	Street lights (300) replaced by intelligent LED columns	4	GCC	Feb-20	
D4.9	Implemented Management system to integrate domestic properties into a 'smart grid'	4	SIE	Apr-20	
D4.10	Implemented Management system to integrate non-domestic properties into a 'smart grid'	4	SIE	Apr-20	
D4.11	Analysis tools on LED street lighting implemented (to support demand-side management)	4	SIE	Oct-20	
D4.12	Implementation Report Glasgow (2/3)	4	GCC	Oct-20	
D4.13	Implementation Report Glasgow (3/3)	4	GCC	Oct-21	

Table 4 – RUGGEDISED: WP4 deliverables

3.2 An extensive project plan was produced at the start of the project, predicting how the project would progress. Year one was spent on the detailed design of the smart solutions upon successful award of the funding from the EU. Due to the progress made so far in year one, the project plan has been revised to reflect the detailed design and focus on the physical delivery in years two and three.

3.3 A detailed risk register and action log is maintained for the project. These follow the processes adopted during the delivery of the Future City Glasgow demonstrator projects.

3.4 Year one also involved virtual modelling of the smart street to allow testing of the proposed smart solutions in a virtual environment. Image 2 shows a fully rendered model of the Duke Street car park, part of the smart street, including the Drygate flats. This has been used to test the analysis of the electricity yield of the proposed solar PV array on the roof of the car park, as well as

ensuring that neighbouring buildings do not cause a shading issue. Further modelling is being carried out to measure the impacts of additional electric vehicle charging and battery storage upon the local electricity grid.

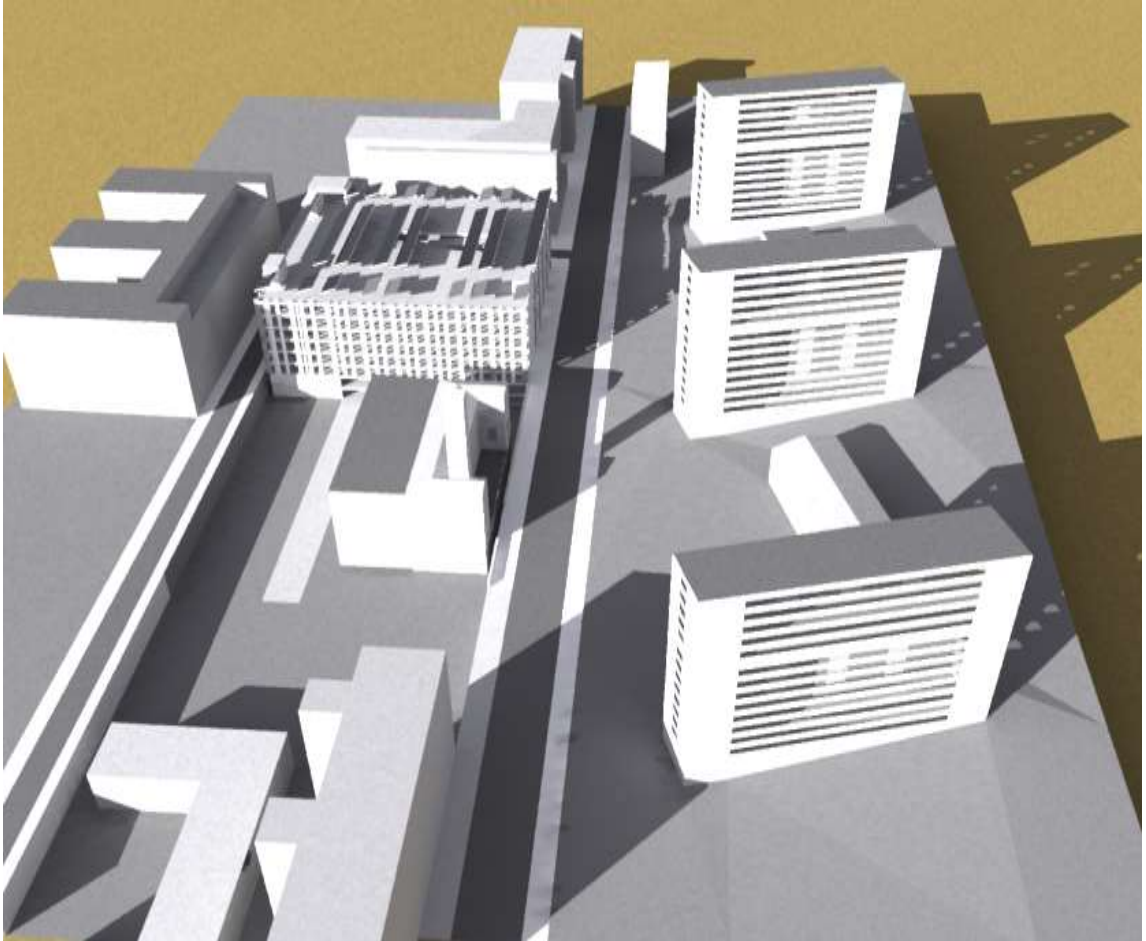


Image 2 – Simulated 3D model of Duke Street aspect of the Smart Street

4 SMART Innovation

- 4.1 The SMART innovations of the smart solutions being developed and deployed in the project, and the up-scaling opportunities are described in detail in Appendix 1 to this report.

5 Policy and Resource Implications

Resource Implications:

Financial: There are no new financial implications arising from the report.

Legal: The report raises no new legal issues.

Personnel: The staff managing the RUGGEDISED Project for Glasgow is the City Energy Team.

Procurement: No relevant procurement issues.

Council Strategic Plan:

The report supports the following strategic themes and outcomes:

A Thriving Economy

Outcomes are;

- a resilient, growing and diverse city economy where businesses thrive,
- Glasgow is rated highly for its business innovation and digital skills

A Vibrant City

Outcomes are;

- Glaswegians are active and healthier

A Sustainable and Low Carbon City

Outcomes are;

- the city is clean and public spaces are well maintained
- we have a low carbon footprint as a council and as a city
- we have more sustainable, integrated transport networks across the city and less congestion
- citizens use active travel including walking and cycling

Equality Impacts:

Does the proposal Yes

*support the
Council's
Equality
Outcomes
2017-22*

*What are the
potential
equality
impacts as a
result of this
report?*

An EQIA screening was undertaken (link below). The screening identified benefits through the delivery of technologies to increase the affordability of energy, sustainability of energy, management of energy assets, availability and management of electric vehicle infrastructure, thus providing positive benefits to the citizens of Glasgow regardless of gender, race, religion, or physical ability. Therefore, the result of the screening was that a full EQIA was not required.

<https://www.glasgow.gov.uk/CHttpHandler.ashx?id=40246&p=0>

**Sustainability
Impacts:**

*Environmental
:*

This report describes the RUGGEDISED project that aims to enhance the sustainability of a city district in a way that provides a template for city-wide replication.

Social:

This report describes the RUGGEDISED project that aims to enhance the community benefits of a city district in a way that provides a template for city-wide replication.

Economic:

This report describes the RUGGEDISED project that aims to enhance economic opportunities of a city district in a way that provides a template for city-wide replication.

6 Recommendations:

The committee is asked to –

- note the contents of this report;
- continue to support the work of Land and Environmental Services (LES) in delivering the RUGGEDISED project; and
- request a further update on the progress of the project in 12 months.

APPENDIX 1 – Glasgow Smart Solution Innovation and Upscaling Opportunities

Glasgow Smart Solutions	Innovation	Up-Scaling Opportunity
Thermal Smart Grid		
G1	<p>Heat and Cold exchange - Connection of buildings to district heating network</p> <p>Use of surplus heat from Tennent Caledonian Brewery (TCB) by a local housing association owned by the Wheatley Group (WG). Use of surplus heat from University of Strathclyde (UoS) DH network in Council headquarters. This project will develop the business models required to allow public sector buildings sell heat from one to the other and for private industry to sell heat to local housing, either directly or via an intermediary.</p>	<p>Using the Scottish Government heat map, there are identified a number of regions in the city where district heating could provide an increase in energy efficiency and affordable warmth. Delivery of the identified networks will require approximately £80m in investment and deliver benefits of 10,000 tCO2 saved. The funding from these networks will come from national grant funding, private investment, and recycled profit from other DH networks.</p>
Smart Electricity Grid and E-Mobility		
G2	<p>Business Model allowing use of battery storage as grid balancing mechanism</p> <p>Battery technology provides opportunity to store energy for use at a later time. When connected to a power network, they could offer services to the network, such as storing power when renewable generation is high and demand is low, or providing power when demand is high and generation assets are struggling.</p>	<p>Glasgow City Council owns 7 multi-storey car parks. In addition, a number of private car parks exist in the city. Successful delivery of the battery storage linked to EV charging will result in deployment of this technology in GCC owned car parks alongside EV charging deployment with an investment requirement of over £3M. Additional work will be done to engage private car park owners regarding deployment on their sites.</p>

G3	TCB CHP surplus power storage in EV Charging hub battery storage	The technological challenge to have energy distributed from TCB CHP to battery storage for later use in city systems, such as EV charging. Business model required, both technically and operationally. The former requires the technical evaluation of how the energy flows to battery storage influence the generation priorities of TCB and the load profile of storage. TCB will establish a business model that facilitates power transfer from CHP to battery, and includes the resale of the energy from the battery. The regulatory challenge in relation to the potential distribution cost of using the local grid.	Future deployment of this technology will depend on a number of factors, such as ownership and operation of assets, being aligned. The specific deployment opportunities will be developed in the project.
G4	Optimisation of the integration of near-site RES, potentially linked into battery storage	This is a technical and business case challenge, specifically in relation to the potential connection of urban wind turbines to the battery storage without a physical, wired connection, instead utilising an innovative system of netting off generation against consumption in assets owned by GCC, e.g. netting off the power generated by the turbines against the consumption of the car park, via the battery, thus freeing up potential placements for the turbines. It also concerns Roof Mounted Solar PV Canopies.	GCC owns 7 multi-storey car parks. Also a number of private car parks exist in the city. Successful delivery of the innovative RES installations, aligned with battery storage linked to EV charging will inform deployment of this technology in the remaining GCC owned car parks alongside EV charging deployment. The project will be used to encourage privately owned car parks to adopt the same technology. This will require roughly £ 5M (7 M€) and will be funded through public / private investment.
G5	EV Charging hub in city centre car park	The challenge is to develop the business case for concentrated deployment of EV chargers, alongside the connection of those chargers to renewable technologies and battery storage. The charging infrastructure will be funded by TSCO with the innovative connection to renewables and storage funded by H2020.	Glasgow City Council owns 7 multi-storey car parks. In addition, a number of private car parks exist in the city. Successful delivery of the battery storage linked to EV charging will result in deployment of this technology in GCC owned car parks alongside EV charging deployment with an investment requirement of £1.5M (€2M). Additional work will be done to engage private car park owners regarding deployment on their sites.

G6	Intelligent LED street lights with integrated EV charging functionality, wireless communications network, and air pollution monitors	This is both technical challenge and business case related. The integration of EV charging into the street lighting column will be funded by TSCO and the street lighting will be funded through European Regional Development funding. The H2020 funding will be used to develop the intelligence that allows communication of data generated to be used to examine the demand-side management potential of connected EV assets and street lights themselves. The business case challenge will be to understand how the owners of connected EV assets will be remunerated in the event of power being drawn from their battery upon the occurrence of a demand-side event.	Based upon the success of this project, Glasgow aspires to replace street lights within its estate using intelligent LED street lighting columns with integration into the Central Management System.
Energy Management & ICT			
G7	Smart open data Decision Platform/central management system	Creation of a query based geo-spatial 'Data Based Decision Platform' (DBDP) that will collect data related to city management (e.g. energy, air quality, traffic flow, etc) and provide analysis of multiple data sets to enhance energy planning in the city. GCC will utilise existing Open Data Platform and build DBDP around existing ICT infrastructure. This is a technical challenge.	The creation of a DBDP will be an open system for other developments in the city to access. The platform upon which the tool is built is already at city scale so little further investment will be required.
G8	Implementation of demand-side management technology in street lighting	The challenge with this solution is a technical one to examine how intelligent LED street lighting can be used in a demand-side management context to be part of a 'smart grid'. Examining how the central management system can control the lighting in a demand-side event. In addition it will explore the potential for also controlling connected assets, such as EV's.	It is the ambition of Glasgow City Council to ensure street lights are controllable and can be deployed in a demand side management application. The city centre already has planned investment of c.£3M (4 M€) from the European Regional Development Fund and the Council has profiled the spend required to upgrade all its lighting infrastructure in the coming decade, the programme for which has commenced with 10,000 lights due to be replaced in all major arterial routes.

G9	Implementation of demand-side management technology in domestic properties	The challenge is in developing the GCC central Management system to integrate domestic properties into a 'smart grid', thus allowing demand-side management events to be triggered that benefit both the grid and the residents. This will require the deployment of technology as well as intelligence to ensure that a full understanding of the potential of demand-side management is understood in a domestic scenario. This will include exploring the potential to activate cheaper tariffs for residents when renewable generation exceeds demand. The impact of local storage will also be analysed.	It is the ambition of the Wheatley Group to see deployment of the DSM technology in domestic properties across the city if the Smart Corridor demonstration proves successful Those with local generation, such as PV, will be the initial targets for deployment.
G10	Implementation of demand-side management technology in non-domestic properties	The challenge with this solution is a technical one to examine how non-domestic buildings can be used in a demand-side management context to be part of a 'smart grid'. Examining how the central management system can control the buildings in a demand-side event.	The Council has already explored demand side management at a lower TRL in a fraction of its non-domestic stock (10 properties). This project is an evolution of that initial work at a higher TRL. Therefore, successful integration with the central management system will lead to integration of more of GCC's stock in the future (GCC's estate exceeds 800 properties) with the ambition of having all buildings connected ultimately.