Proposal Part B
Section 1-3

Horizon 2020 – Work Programme 2014-2015

Challenge: Secure, clean and efficient energy
Call: Smart Cities and communities
Topic: SCC 1 – 2014/2015

GrowSmarter

2014-05-07, Stockholm

Project coordinator organisation name:

City of Stockholm, Environment and Health Administration

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List of participants

Participant No *	Participant name	Participant short name	Country	Type of participant	Main role in project
Stockholm					
1	City of Stockholm	MF	Sweden	Local authority, Lighthouse	Coordinator, WP 1 and WP4 Leader
Cologne					
2	City of Cologne	CGN	Germany	Local authority, Lighthouse	WP 3 Leader
Barcelona					
3	City of Barcelona	BCN	Spain	Local authority, Lighthouse	WP 2 Leader
Other WP-leaders					
4	ICLEI	ICLEI	Germany	Academic	WP 7-8 Leader
5	KTH	KTH	Sweden	Academic	WP 5 Leader
6	IESE	IESE	Spain	Academic	WP 6 Leader
Follower cities					
7	Graz	GRZ	Austria	Local authority	WP 1, WP 7-8
8	Suceava	SUC	Romania	Local authority	WP 1, WP 7-8
9	Valetta	VAL	Malta	Local authority	WP 1, WP 7-8
10	Porto	POR	Portugal	Local authority	WP 1, WP 7-8
11	Cork	COR	Ireland	Local authority	WP 1, WP 7-8
Industry partners					
12	REC	REC	Hungary	Academic	WP 6,7-8
13	Envac	ENV	Sweden	Industry partner	WP 2-3
14	Dalkia	DAL	Sweden	Industry partner	WP 2
15	Fortum	FPH	Finland	Industry partner	WP 2-3
16	Carrier	CAR	Sweden	Industry partner	WP 2, WP 4
17	Skanska	SKA	Sweden	Industry partner	WP 2
18	Info 24	INF	Sweden	Industry partner	WP 3-4
19	Stockholmshem	STH	Sweden	Industry partner	WP 2
20	IEM	IEM	Denmark	Industry partner	WP 4
21	Rhein Energie	RHEI	Germany	Utility Company	WP 2
22	Ampido	AMP	Germany	SME partner	WP 4
23	Cambio Cologne	CC	Germany	Service partner	WP 4
24	KVB	KVB	Germany	Public Transport	WP 4
25	AGT International	AGT	Germany	Industry partner	WP 3
26	DEWOG	DEW	Germany	Housing partner	WP 2
27	Endesa SA	END	Spain	Industry partner	WP 1-2-3-4-6-8
28	Retevision I SA	RIS	Spain	Industry partner	WP 1-3
29	Anteverti	ANT	Spain		Wp 1-2-3-4
30	Barcelona Supercomputing Center	BSC	Spain	Industry partner	WP3, WP5
31	CENIT - Center for Innovation in Transport	CENI	Spain	Academic	WP 1-4-8
32	Gas Natural Sdg	GN	Spain	Industry partner	WP 1-6 WP 8

33	Fundacio i2Cat	i2CAT	Spain	Academic	WP 4
34	IREC\ Energy research Center	IREC	Spain	Academic	WP 1-3, WP 5-8
35	Philips Lighting B.V.	PHL	Spain	Industry partner	WP 3
36	Schneider Electric	SCH	France	Industry partner	WP 2-3-8
37	Urbisup Consulting SL	UBI	Spain	Industry partner	WP 2-3-4
38	POLIS	POL	Belgium		WP 8
39	IBM	IBM	Sweden	Industry partner	WP 4

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1 Excellence

1.1 Objectives

The *GrowSmarter* project introduces 12 Smart Solutions to meet the three different aspects of sustainability: economic, social and environmental.

The first goal is to improve the quality of life for European citizens.

- The improvements in the options for personal mobility with better options for urban transport and better deliveries of goods with improved service towards citizens, the quality of life will be achieved.
- Cost efficient refurbishment of 100.000 square meters of representative types of existing residential and commercial buildings in cooperation with the tenants will improve the everyday life in the demonstration areas of the three lighthouses. Improvements in the street environment with smarter lighting and better communication facilities will also contribute to a better service to the citizens.
- Combined with a better economy by both lower energy costs and increased economic growth and job-creation the project truly meets the needs of the urban citizens. The project is expected, on the demonstration level and including all measures including other funding made available, to create as much as 1500 jobs.

The second goal is to reduce the environmental impact.

- The project aims to reduce the need of energy and also reduce the greenhouse gas emissions. The aim for reduction of energy is 60 % on the demonstration level compared to levels before the project was implemented. The reductions of Greenhouse-gases are slightly higher through the extensive use of waste heat and renewable energy sources.
- The project aims to reduce the emissions from transport by 60% in the chosen districts by smarter sustainable transport solutions.

The third goal is to create a sustainable economic development.

- By choosing cost efficient solutions the project aims at saving energy with quantitative reductions in capital costs as well as reduced costs for energy and maintenance.
- The project aims at saving 60 % of the energy needs for the demonstrated smart solutions thus significantly reducing the cost of energy.
- The project aims to contribute to European economic growth by the integrated Smart Solutions demonstrated.

The main aim of *GrowSmarter* is to help get the 12 Smart Solutions to the market.
The demonstrations at the Lighthouse cities are not the primary aim, but a necessary means to create validated business cases and to initiate a market roll out of the smart Solutions to follower cities, and especially to the rest of the European market, thus helping Europe Grow Smarter.

1.2 Relation to the work programme

GrowSmarter demonstrates 12 Smart Solutions combining several integrated close-to market technologies to form a common business model.

The solutions will be tested in 3 different city areas – representative for many European cites: Downtown city district, nearby suburb about to be densified and a Former industrial/business area which partly will be turned into residential area.

The Lighthouse cities together with industry partners implement and validate **12 Smart Solutions**, regarding their energy efficiency, Greenhouse gas saving capacity, economic viability and also economic impact and spinoff. These solutions are well chosen and are in line with the cities urban strategies and plans, as well as with consumer and other organizations such as the tenants associations.

Business models are developed and by the end of the project fine-tuned and implemented together with 5 follower cities, resulting in a set of well tested and validated business models with the capacity to be implemented on sheer economical merits and with a potential to increase European growth and technology export. Both Lighthouse cities and Follower cities are chosen to cover Europe geographically as well as by size, climate and economic growth.

Light House Cities and local industry will compile the experiences and obstacles met during implementation and together with Follower cities fine-tune the smart Solutions into true business models working on sheer economical merits. By combining several close-to-market technologies with private-public partnership, where public authorities e.g. can use their regulatory power to overcome market failures and business partners hence dare to invest, it will be possible to break up deadlocks and exploit several win-win-solutions. These solutions all build on open data and are solutions that are open for several different providers and industrial partners.

The Smart solutions will be evaluated on their local impact by a independent Technical University so that the solutions are validated according to the set up goals in a independent way. *GrowSmarter* will elaborate an Evaluation plan agreeing i.e. on methodology and Key Performance Indicators both among partners but also with the SCC2-project

To evaluate the creation of jobs and growth potential a special workpackage headed by a business school is involved. They will evaluate the economic impact of a possible European-wide up scaling of the Smart Solutions.

GrowSmarter will show economically viable ways to reduce energy demand with 70-90 % in refurbished buildings, reuse the energy in waste, optimize energy usage in houses and streets through smart technology and reduce energy in transport through electromobility.

GrowSmarter will both demonstrate photovoltaics in integrated grids and the use of waste to create heat and gas for vehicles. This will reduce the need for virgin resources, to close the nutrient circulation and to turn other fractions into biogas fuel or heat. Utilizing waste heat is also an important part of GrowSmarter, both in buildings, industry and small scale shops. Using the sun for photovoltaics in integrated grids is an obvious part of the project. By open district heating systems, a new business model, existing resources of surplus heat will be used.

In addition to the local renewable resources sun, waste, biogas, waste heat, renewable electricity will be used and renewable fuels will be used for the transport

GrowSmarter also optimizes existing resources by smart use of ICT, e.g. by demand side meausres such as optimizing heat demand through integrated smart systems better controlled by the tennants. Besides buildings the project also reduces the need for cars by smart mobility measures i:e sharing or replacing cars with bikes, and optimizing the use of the road infrastructure.

GrowSmarter will show ways to further reduce transport needs by just in time deliveries, by replacing cars in both delivery and private transport, offering door-to-door solutions and by optimizing the use of the existing road network. GrowSmarter will show how the remaining vehicles can be as sustainable as possible by using renewable electricity and alternative fuels.

By substantially reducing energy use in housing, substituting car trips, optimizing deliveries and substituting fossil fuels with renewable *GrowSmarter* will show that it is possible to reduce GHG with 60 %

*GrowSmarte*r will also ensure better life conditions for their citizens by lower energy bills, better handling of waste, better mobility reducing both car and heavy vehicle transport (i:e waste collection vehicles) significantly with improvement to local air quality, reduced noise and improved urban environment.

1.3 Concept and approach

GrowSmarter will show ways to set up Smart Solutions that can be developed into business cases making their way into Europe on their own merits, with no need of additional funding.

Technology is not enough
European cities face the same challenges as all cities in the world. They need to provide good dwellings, reliable energy supply for electricity, heat and cooling, efficient and clean mobility and handle the waste and sewage created from the inhabitants. On top of that European cities are essential to meet the goals of reducing energy consumption and climate gas emissions. For fast growing cities, like many of those in developing countries these issues become even more acute. In Europe some cities are growing quickly, others are declining, still the needs are in many ways similar and solutions are required. GrowSmarter has defined 3 different city areas – common in all European cites: Downtown city district, nearby suburb about to be densified and a Former industrial/business area which partly will be turned into residential area and integrated with already existing residential area.

In essence there is technology available to address these problems, but most solutions are still too expensive or not tested in larger scale to be installed without additional funding. Trying to implement these technologies by means of strict legislation often leads to sub optimization and adapting to regulations instead of finding the optimal balanced solutions.

Smart Solutions break dead-locks and start market development
GrowSmarter will show ways to set up Smart Solutions that can be developed into business cases which will make their way into Europe on their own merits, with no need of additional funding. The cities together with local industry partners will implement and validate 12 Smart Solutions, regarding their energy efficiency, Greenhouse gas saving capacity, economic viability and also economic impact and spinoff.

A Smart Solution exploits a potential win-win situation that hitherto has not reached the take-off phase in the market development, sometimes because the technology is too new, but often also because there hasn't been a fair way to charge for a service or the demand has not been recognized. A smart solution often includes several business partners cooperating and sometimes also a slight change of legislative preconditions – e.g. giving increased delivery access to bundled goods compared to non-bundled. By combining several close-to-market technologies with private-public partnership, where public authorities e.g. can use their regulatory power to overcome market failures and business partners hence dare to invest, it will be possible to break up deadlocks, exploit win-win-solutions and start a market development.

GrowSmarter has defined 3 different city districts as Light House areas in where to show the Smart Solutions. These areas represent common features in all European cites: A Downtown city district, A Nearby suburb about to be densified and A Former industrial/business area which partly will be turned into residential area and integrated with already existing residential area.

In these Light House areas, the industry partners implement 12 Smart Solutions which will serve as show cases for other cities that face similar problems. The Lighthouse cities are the early adopters helping create a market, finding the market obstacles and helping fine tune the business models.

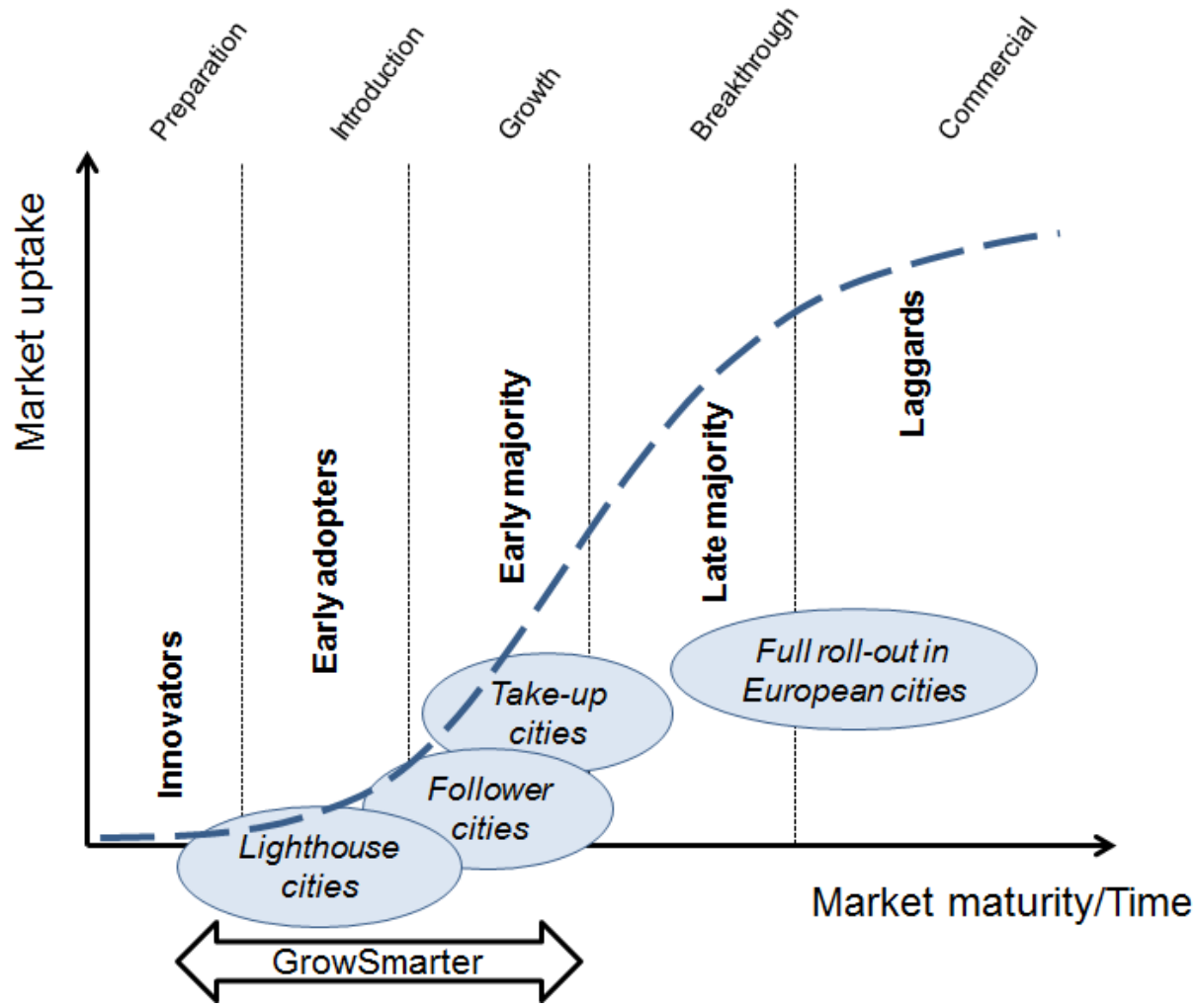
The Validation WP 5-6
The Smart Solutions are validated with reference to their energy efficiency, Greenhouse gas saving capacity and cost benefit in WP5 and with reference to their Business performance, economic impact, spinoff and potential for European growth in WP 6. This is essential to help, by independent research partners, prove their virtues so that others find interest in the solutions ans so that the industrial partners gets proof of the solutions cost-efficiency that they can use in marketing.

The Replication WP 7
The validated Smart Solutions are developed and fine-tuned into Business models together with the 5 Follower cities and then implemented, resulting in a set of well tested and validated Smart business models

with the capacity to be implemented on their own merits and with a potential to increase European growth and technology export.

The roll-out WP 8
Both Lighthouse cities and Follower cities are chosen to cover Europe geographically, by size, climatewise and economical growth, and there will hence be Smart Solutions suitable for all Europe. Preparing for the market uptake of the smart solutions to the majority of European cities is the ultimate goal of the GrowSmarter city.

GrowSmarter envisage a close cooperation between all Smart City projects to broaden the basis of knowledge and experience, further develop industry contacts and offer even more solutions to potential take-up cities. Take-up cities will be invited to take part in dialogues and study-visits to Light House cities and the most interested of these will form City Interest Group receiving even more detailed information and direct contacts to industry and Light House City officials. In addition a set of seminars and Light-House study tours will be arranged where Take-up cities will meet with all involved stakeholders



The solution GrowSmarter proposes is centered on a set of powerful city pilots and strong industrial partners. The success of this approach rests on providing a monitoring, modeling, analysis, and decision making methodology based on a deep understanding of the structure and interaction of environmental and human factors in urban contexts. This is key to improve the quality of life of the citizen, reduce the negative environmental impact, and create new and competitive business opportunities. To ensure that this solution can be easily imported by other cities it is fundamental to provide a unified, flexible, and extendible data

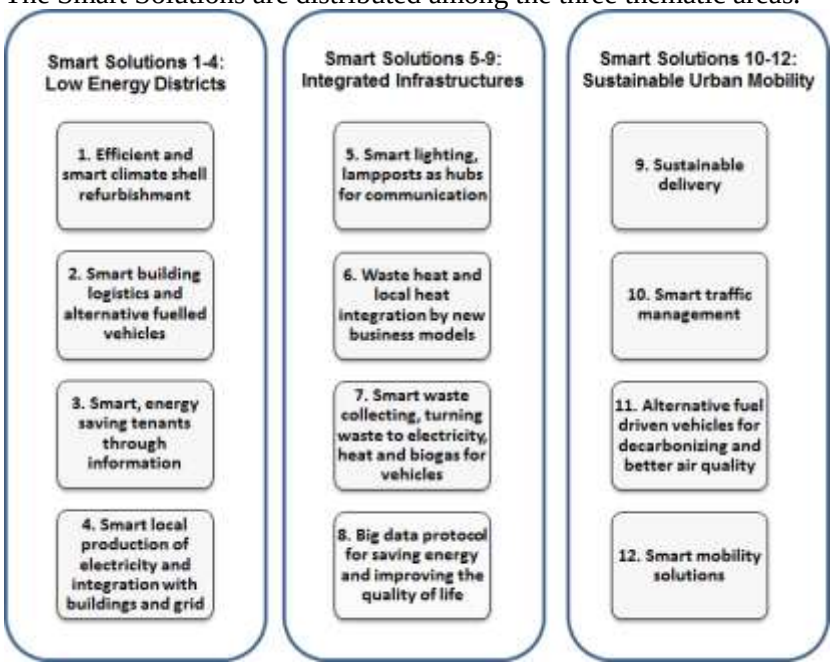
integration model that can aggregate information from many vertical domains and thus expose implicit transversal semantic relationships. This will help with the management of the variability of data in different cities and the evolution of the urban model and indicators (KPIs) over time, as well as with better planning tools for the whole urban ecosystem – environment, people, businesses, and society as a whole.

1.2. 2 Integration of solutions in several dimensions is the projects key to success

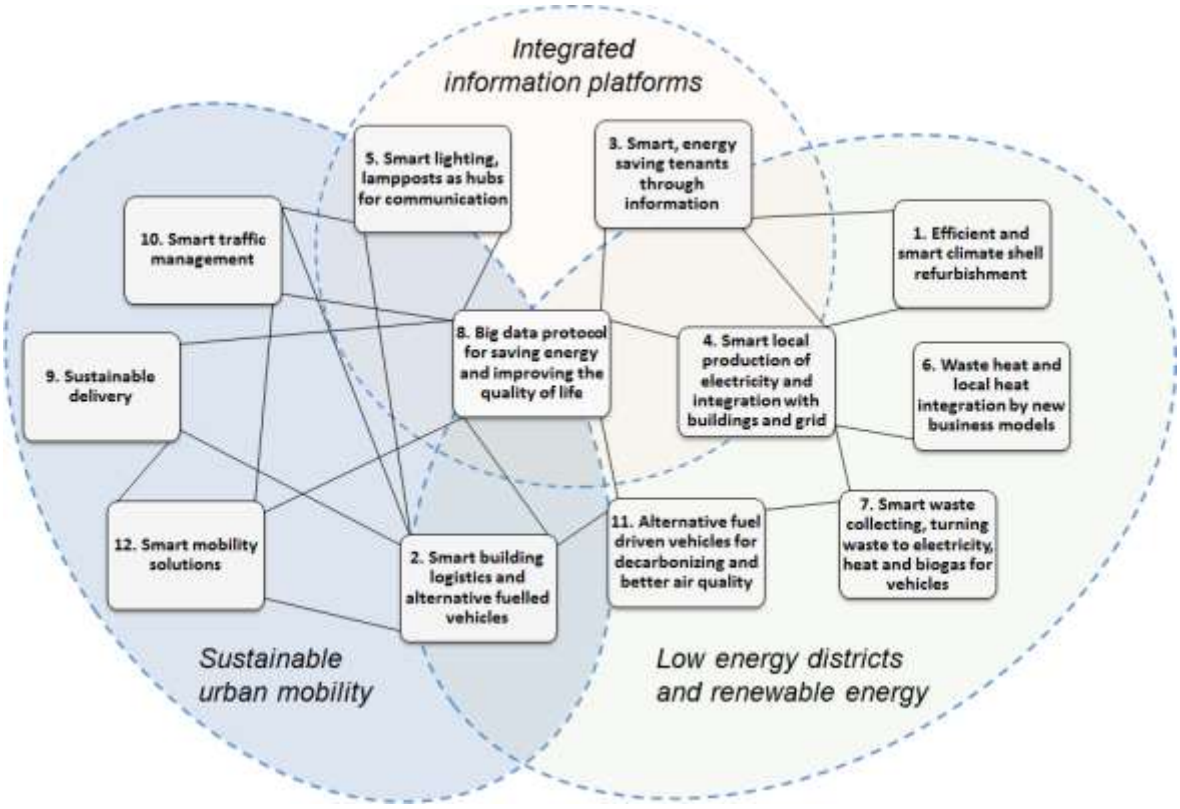
The smart solutions in *GrowSmarter* are all **integrated** in several dimensions:

- *Geographically* all the solutions are integrated in the same site thus making these good lighthouse sites where the different solutions easily can be demonstrated for followers thus facilitating a uptake within Europe. Visitors will easily be able to meet both the cities and industrial partners to see the solutions in place and speak to the persons responsible. This is facilitated by having the solutions integrated into one geographical area.
- The *partners* are integrated through a collaboration of cities and industrial partners and research. All three are needed. The cities know the needs of their citizens; the industrial partners can provide the Smart Solutions and the research partners are needed to help verify the virtues of the solutions by a independent partner thus giving the solutions credibility before being spread to others.
- The *information* used in the project solutions will be integrated in open platforms to facilitate the development of new solutions. Integrated platforms will be developed for the big data collected.
- The three light-house projects have been chosen to represent a wide selection of city sizes, geographical and climatological conditions and city economies. The work on the smart solutions will be integrated so that the same type of solutions will be tried in the three lighthouse- cities. This will help demonstrate slightly different approaches to these smart solutions thus giving a better choice for the follower cities and wider rollout.
- *Technical, practical and economical knowledge* will be integrated in a, for European projects, new way so that the technical solutions will be able to reach the market and not only end up in project reports.

The Smart Solutions are distributed among the three thematic areas.

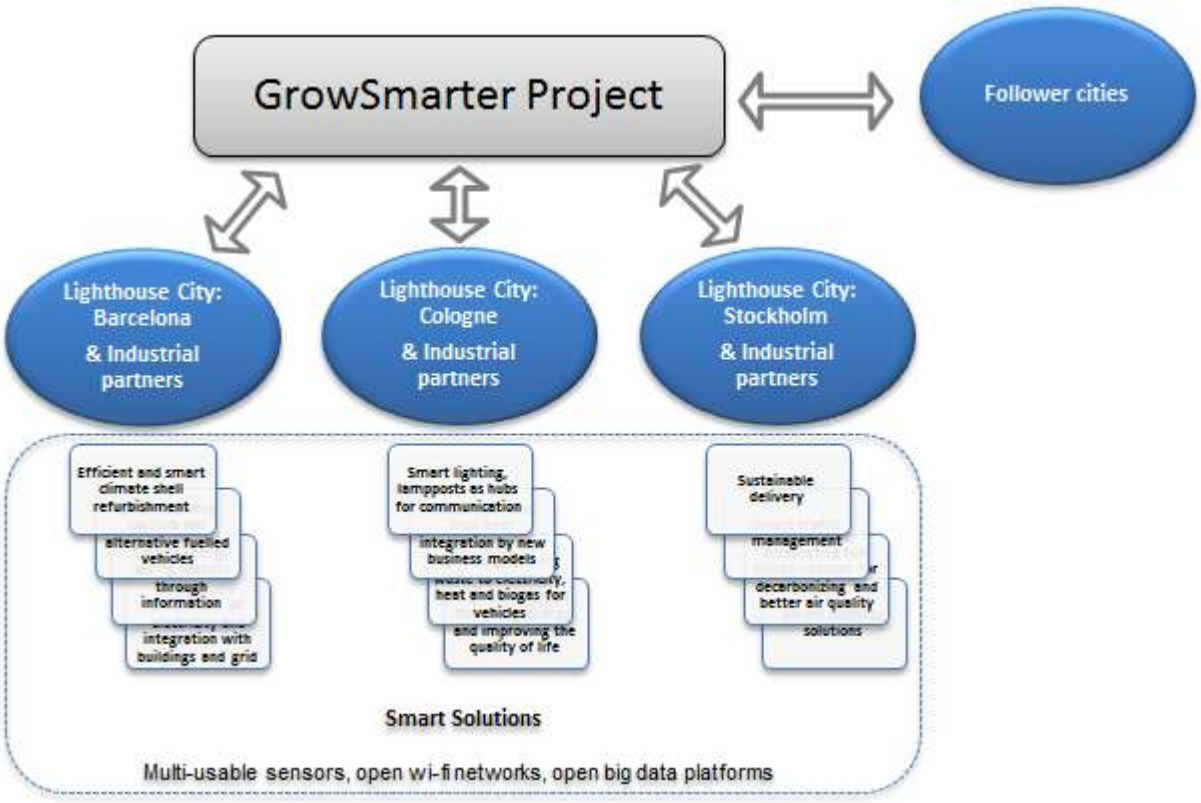


The Smart Solutions are integrated solutions with many cross-connections to each other as shown below.



1.3.1 12 Smart Solutions

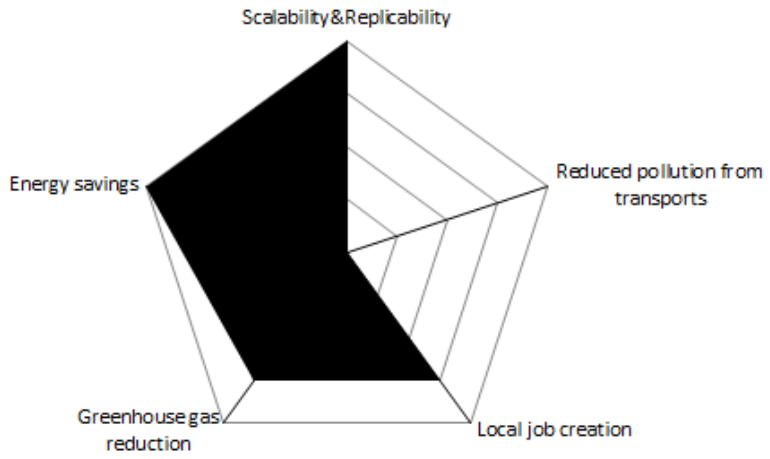
The overall goals of the Smart Solutions are to improve the quality of life and at the same time reduce negative environmental impacts. This will be measured using indicators such as reduced local pollutions, reduced greenhouse gas emissions, energy savings and local energy resource utilisation, as well as job creation. The Smart Solutions will also be valued for their potential to be scaled up locally and replicated in other cities. For the purpose of implementation the Smart Solutions have been clustered in three themes, each cluster led by a Lighthouse City which also is a WP leader. The GrowSmarter project will collect, synthesise and disseminate models, lessons and outcomes from the Smart Solutions to ensure that all project participants have access to the information, examples and lessons generated during the project. ICT is an enabler for all three clusters providing multiusable sensors, open wifi-networks and open big data platforms for city planning and decision making processes.



1. *Efficient and smart climate shell refurbishment*

The technology to build new near zero-energy houses has developed strongly but most of Europe's buildings are already built and are due for refurbishment. The buildings chosen by GrowSmarter represent common building types for Europe. A special focus has been given to the buildings from the 1950- 1970:ies, being the buildings that today count for more than one third of Europes' building stock and accommodate more than 200 million Europeans. Growsmarter covers different climate conditions and different starting points and needs, and will demonstrate economically sound solutions to reduce energy consumption, increase the use of renewable energy and improved living conditions in all areas, proving the replicability of the solutions all over Europe. Two types of business models will be compared: public-private partnership and Energy performance contracting, both to be further developed within the project as a way of overcoming the market obstacles these models face today.

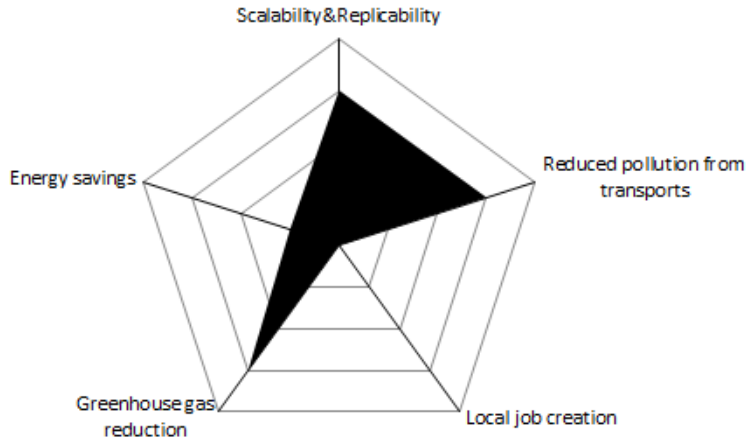
Residential and industrial buildings will be refurbished using both traditional and innovative solutions, like extremely energy efficient windows, ventilation and high performance sewage heat recovery, energy-certified water taps, air tightness and technical insulation. GrowSmarter will renovate 100 000 m^2 of residential living space and decrease the energy consumption in the selected buildings from 150-200 kWh/m^2 to in most cases less than 50 kWh/m^2. The standards after renovation will be affordable for current tenants thus enable them to move back to the renovated apartments. Depending on the kind of refurbishment, current tenants will be able to stay or will be offered a substitute apartment for a short time, all the time having access to their apartment. In addition, Home Energy Management Systems and basic refurbishment will be offered to all tenants in the Barcelona demo site at a special rate, increasing the number of buildings renovated and the energy saved.



2. *Smart building logistics and alternative fuelled vehicles*

Europe's cities are growing and the materials used in construction of buildings and infrastructure accounts for up to 30-40 % of the goods moved in a modern city. Reducing unnecessary freight by consolidation will lead to improved quality of life through reductions in noise, emissions and traffic hazard. This will also lead to a reduction of construction costs. Typically a consignment is moved four times before it is put in place at a construction site. An estimated 25 % of construction labour time is used for looking for the material or moving material being in the way.

Building on previous experience Carrier will establish a building logistics center will in Årsta, to handle goods arriving to the construction site. Construction material deliveries are directed to the center, where they are stored in a secure, weather-protected environment, awaiting delivery to the site just-in-time, using renewably fuelled trucks. Hybrid-electric and ethanol (ED95) trucks will be used. Fully loaded trucks will receive a fitting slot-time in advance and go directly to the constructions site. Suitable goods will be delivered to the center by rail – saving even more energy and climate emissions. When the Årsta area is developing with more construction sites, the center will be scaled-up to serve also these.



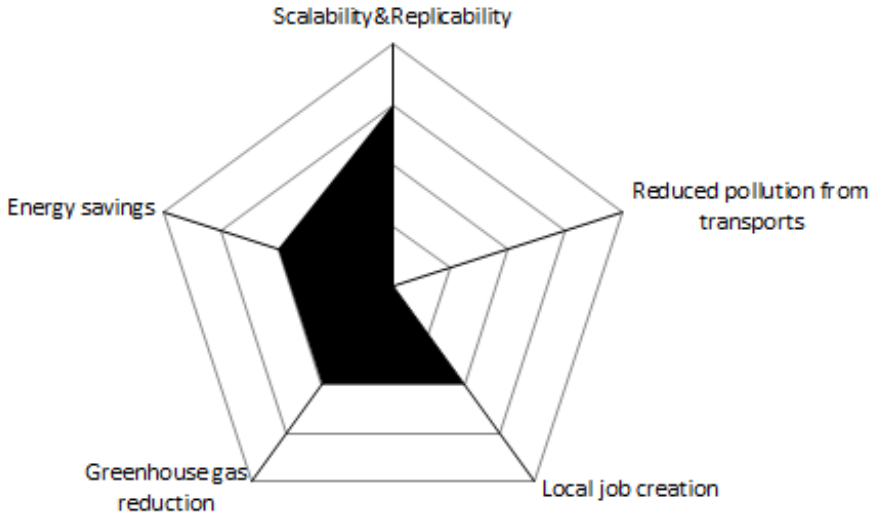
3. *Smart, energy saving tenants through information*

Tenants' behavior influences the energy consumption in buildings up to 10 % through e.g. their use of electricity gadgets, hot water or opening windows in cold conditions. Behavior can furthermore help to even

out peak loads. The way to influence tenants is relatively cheap and the business case is hence good. In many countries the energy cost is not included in the rent so there is a strong incentive for the tenants themselves to reduce their energy bill, thus making the business case to provide accurate energy information stronger. As residential buildings grow more energy efficient, the role of the tenants will be even greater regarding energy savings, as they may affect a bigger share of the total energy use.

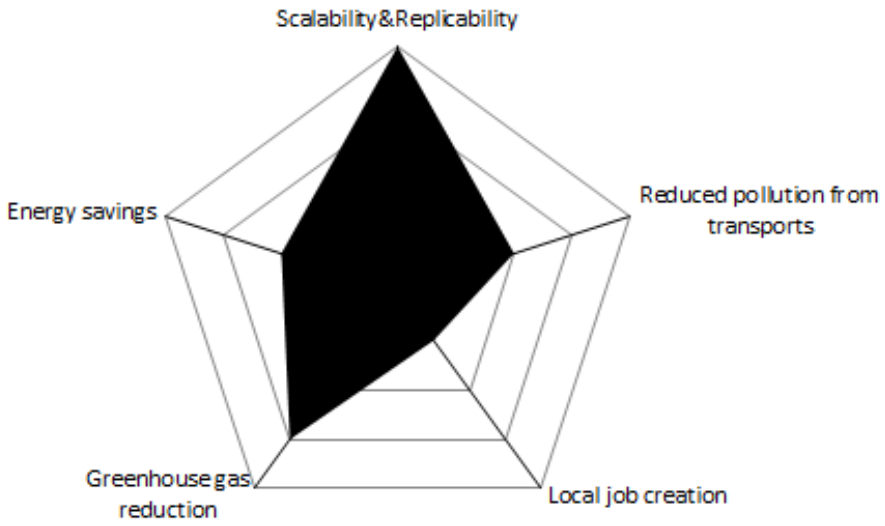
By deploying sensors in buildings it is possible to bring information on real-time energy use to the tenants who in turn can monitor the energy consumption and find ways to reduce it. Home Energy Management Systems will be installed in all three Light House cities, visualizing and manage energy consumption. New solutions will be used to automatically steer household appliances, minimizing energy consumption and avoid wasting energy. To further motivate the tenants, dynamic pricing will be tested, raising the price of electricity at peak times and lowering it when the demand is lower.

GrowSmarter will also introduce measurement of the amount of waste each household throws away. By billing according to the waste sorting rate, it is possible to encourage increased rate of recycling and hence save energy.



4. *Smart local electricity production and integration with buildings and grid*

Europe is increasing its use of renewable electricity but electricity production from sun and wind is intermittent and causes local deficits and surplus that sometimes cannot be balanced as some regional and national grids are not capable of fast distribution at long distances, or there is a lack of fast acting balancing power. Hence demand and supply may need to be balanced locally and combined with storage.
All three Light House cities will produce local electricity and through energy management and storage devices even out the mismatches.



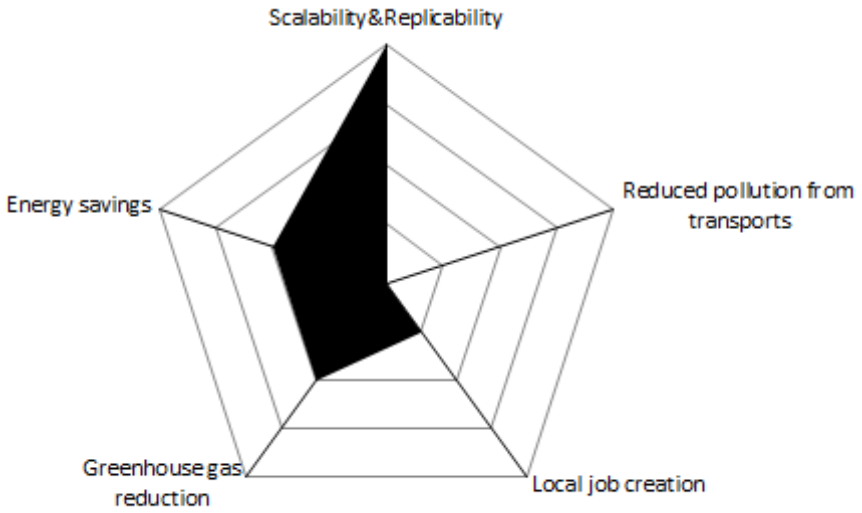
5. *Smart lighting, lampposts as hubs for communication*

Lampposts consume a lot of energy and today most street lighting are set to either on or off with no stand-by position in between. Combining LED lighting with movement sensors allow for varying the level of lighting to a minimum when there is no need, make it possible to save up to 50 % of the electricity. It can also be combined with status reporting, thus improving maintenance and reducing the time between breakage and repair.

GrowSmarter will test three different techniques of energy efficient lighting:

a) Sensor controlled LED lighting for pedestrian and bicycle paths, providing base lighting to satisfy security needs at all times, but increasing the light when someone approaches.
b) Self-controlled LED street lighting with pre-set lighting schemes based on levels of traffic.
c) Remote-controlled LED street lighting adapting to the time of the day and the level of traffic.

The lampposts will also be the base for sensors, wifi, mobile network and will also be used for charging electric vehicles.

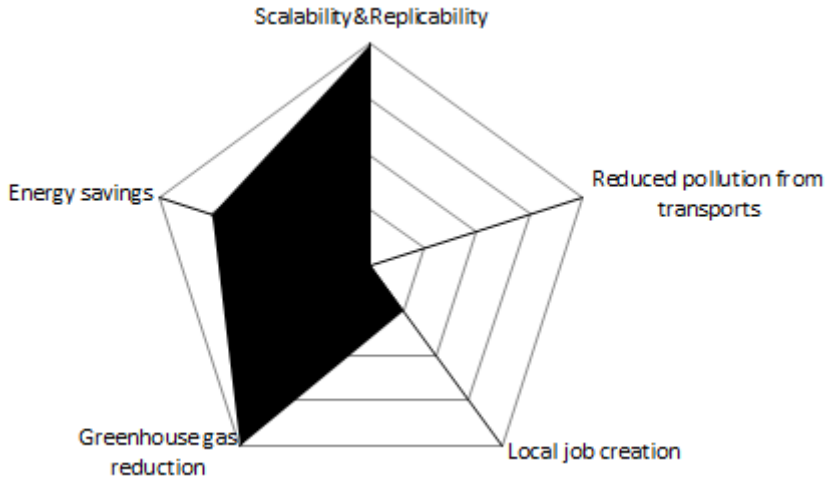


6. *Waste heat and local heat integration by new business models*

Open district Heating is a concept for energy re-use to a district heating network or a district cooling network. The Open District Heating concept makes it possible to recover waste heat (for example from Datacenters and Supermarkets) that otherwise would be lost via cooling towers to the atmosphere. Waste heat from existing DataCenters and Supermarkets for example in Stockholm could potentially warm up 110 000 apartments in Stockholm via the Open District Heating concept. The concept is being built with an aim to be as scalable and standardized as possible in order to spread the concept to other cities.

Waste heat is abundant in cities but rarely used, because the distribution grids are too small, the heatprovider has a monopoly and sometimes this is conflicting with the production of renewable electricity through CHP. However, e.g. data centers and shopping malls with many freezers and coolers often pay to get rid of the extra heat. This offers a smart business case that will be explored. The business model of letting the district heating operator buy excess heat through a plug- and play heat pump solution, and then sell it to the customers needing heat is a completely new business model that could open up the district heating systems to a open market of heat exchange.

Waste heat will be recovered from a range of different sources and be delivered to the district heatingsystem to provide heat to warm up buildings. Currently the mid-level heat can be fed into outbound water after being further heated by efficient heat pumps, or fed inwards at the end of some lines. The electricity needed will be the renewable mix, but could be provided by PV:s in other countries. The business case will improve further in the near future when freezers are renewed, using CO_2-technology, which delivers waste heat at 80° C. This heat can be fed directly into the outward stream.



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

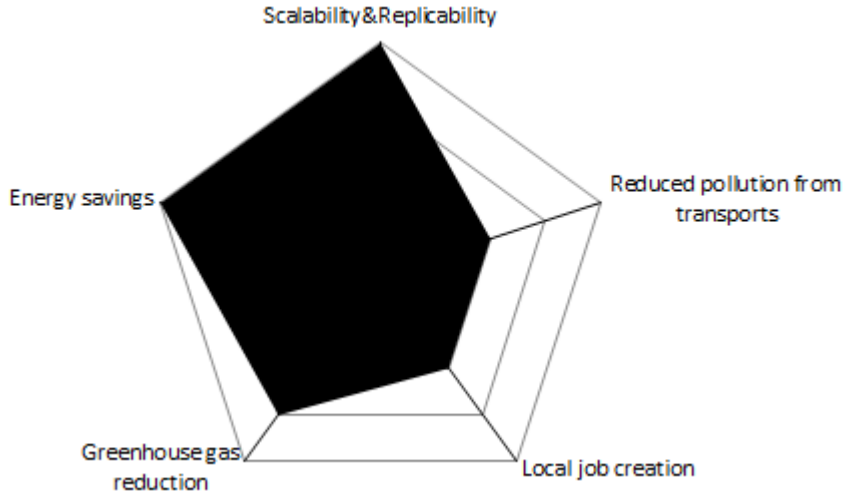
Waste handling in residential areas and dense inner cities is a growing challenge to all cities. Most cities still collect waste using trucks picking up bins or bags in close proximity to residential buildings, causing noise and emissions. Sorting and recycling are often difficult. Using different colored bags for different fractions, thrown in the same bin makes sorting easy and reduces need for storing waste at home. The bags are then sorted automatically.

This reduces the number of bins, the driving and also improves the sorting. The system can easily be developed to include all kinds of waste, thus reducing the need for special bins for paper, metal, plastic and improve the sorting as citizens do not need to go to different collecting bins. Experiences from Norway and Sweden show that the sorting is very accurate.

In Stockholm the system will be an important part of the system for collecting organic waste to produce biogas. The city will collect 50 % of all organic waste and turn this into biogas for transport. This also

improves the quality of the sludge as soil improver. Currently 300 buses, 100 waste collection trucks and some 15,000 taxis, small transport vehicles and cars use biogas.

To further reduce the driving in residential areas, an automated waste collection system (AWCS), using vacuum to transport the bags through underground pipes, will be implemented. This opens for collecting almost all different fractions of waste from only one inlet. Using smart keys, scales and smart technology makes it possible to charge household individually thus increase the incentive to sort waste and also to allow companies using the very same system.

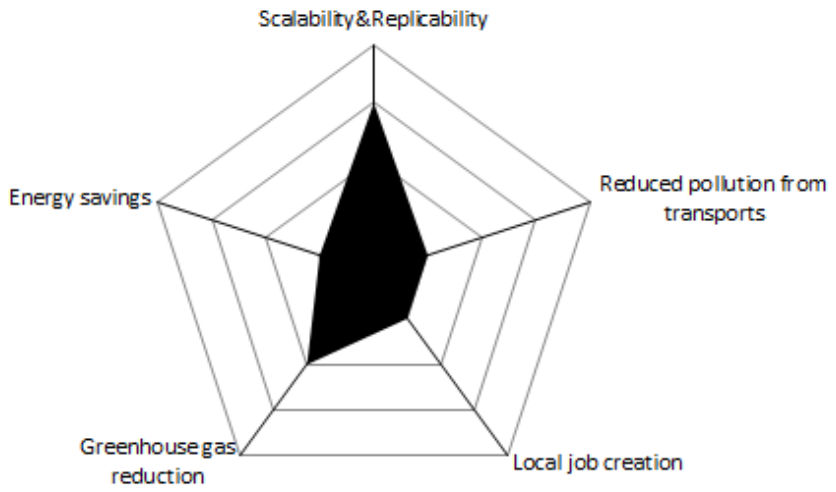


8. *Big data for saving energy and improving the quality of life*

Building an open data integration platform for all types of city related data (from sensors, mobile devices, and other city data) offers a unique opportunity to interrelate concepts and extract knowledge that is not always apparent without crossing vertical domain frontiers. Being able to openly access this raw or aggregated data is invaluable as it creates new business opportunities; it optimizes the operational cost and resource allocation for companies that make use of it, and fosters the appearance of better services for all city stakeholders.

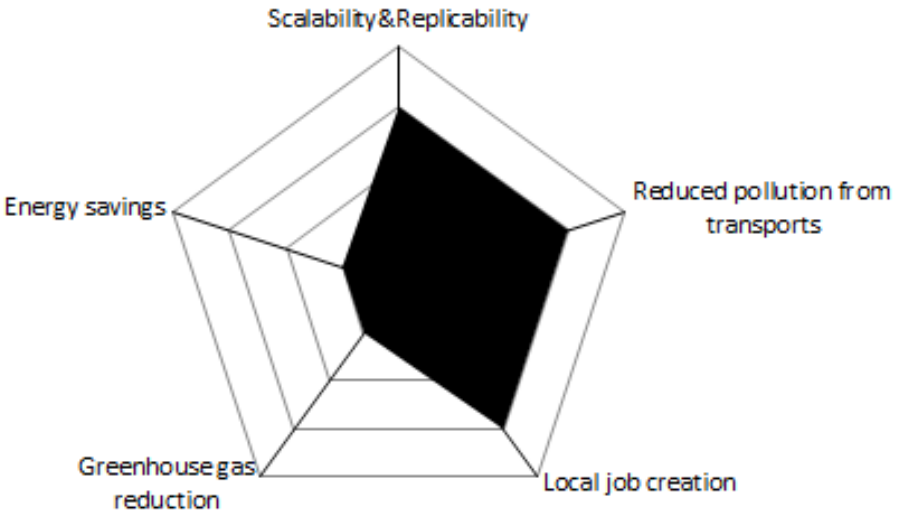
Traffic and communication of people, goods, and values is crucial for the city and its growth. Management, planning, and control of physical infrastructure and buildings are critical for citizens in particular and the economy in general, and are part of what will make a city smart and attractive for living, working, and investing. A better and more careful management of the effects of city activities on the environment and climate is one of the most important dimensions for the sustainability and resilience of our cities. These are just a few examples of complex processes that can be more deeply understood, analyzed, and optimized based on integrated and openly available information.

To make these solutions flexible and adaptable to other cities we use a model for urban concepts and infrastructure which allows to keep the data connected, consistent, accessible, and dynamically evolving. . The model integrates KPIs for environmental monitoring, such as CO2 footprint and air quality



9. *Sustainable delivery*

Online shopping is increasing rapidly which threatens to increase the total amount of freight movements, leading to increased emissions. Operating big delivery trucks in small city streets causes noise, local emissions, takes time for the driver and increases the risk for traffic hazards and delays. At the receiving end retailers can hence not trust the timing of the deliveries and for citizens there is often need to either be at home half a day to meet with an unpredictable delivery time – or travel to a certain delivery agent to collect purchases. Experience shows that citizens are willing to pay for extra fast delivery are reluctant to make this trip or prevented by business hours from gathering their package for several days. This smart solution will demonstrate how smart deliveries with better logistical solutions better serving the inhabitants integrated with clean vehicles running on renewable fuels will help improve the quality of life.

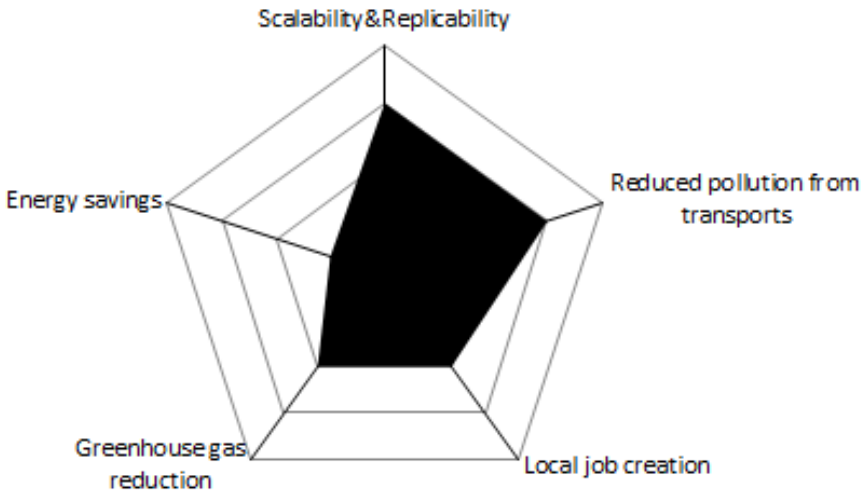


10. *Smart traffic management*

Congestion and traffic accidents causes significant loss of time and money in Europe's cities. Using smart technology to even out traffic flows and avoid unnecessary stops will reduce emissions and also traffic accidents. Giving real-time information on e.g. travel time may also redirect citizens from car to public transport or other modes, or to make their journeys at another time. Once the infrastructure is in place it opens up for many business applications.

With the help of a range of different sensors, traffic patterns will be analyzed in a new way in Cologne. This will create a good picture of current traffic flows in the city and form a basis for a multi-mode travel planner. A similar system will be implemented in Stockholm

Stockholm will together with i.a. BMW also test smart communication between the traffic lights system and vehicle GPS systems to guide the vehicles through green lights and where traffic is less dense, and synchronize traffic signals to prioritize the movement of goods distribution vehicles to minimize starts and stops, resulting in more effective goods movements with lower emissions, noise and improved junction safety.



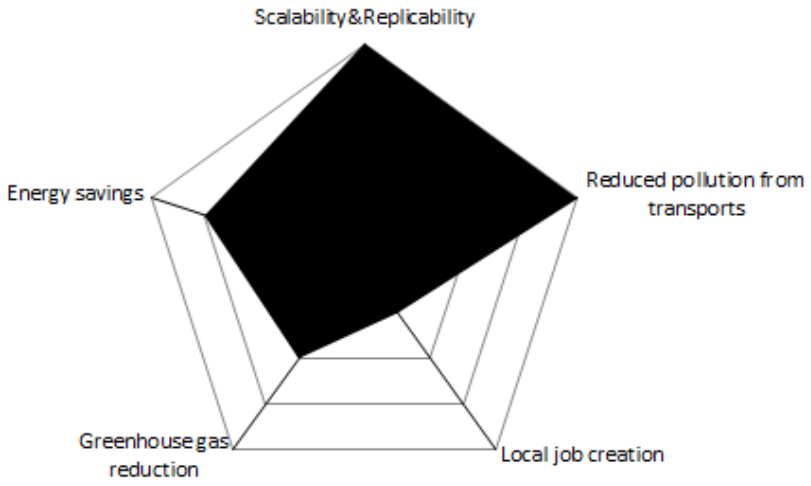
11. *Alternative fuel driven vehicles for decarbonizing and better air quality*

There is no single propulsion technology that alone can replace today's fossil fuelled vehicles, the solution must be a combination of smarter mobility running on both electricity and sustainable biofuels..

While the market development is a bit on its way for light duty vehicles and buses, distribution trucks which are so important for cities still have just started to develop.

For electrical vehicles the access to charging facilities may be a concern, and in some cities also the impact on the local grid, as they are expected to load at about the same time. Initially there will not be charging posts everywhere and there is a need for the drivers to know where they are located and if they are occupied. This is an essential part for the wider uptake of EVs.

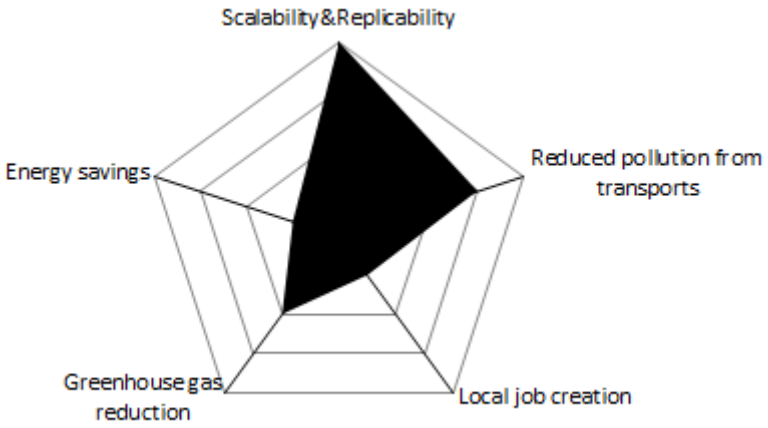
GrowSmarter will demonstrate how the uptake of these vehicles can be speeded up by an integrated approach combining better charging and fuelling facilities, information helping effect the choice of vehicle users and buyers and the use of these vehicles in the different mobility measures in the project.



12. *Smart mobility solutions*

Public transport is a good alternative to personal cars for regular trips to school and work, and the Light House cities in *GrowSmarter* already have a relatively good share of Public Transport for these trips

The big challenge is hence to substitute the car in other trips, that are less regular and more individual. *GrowSmarter* will launch a range of different solutions completing the existing public transport network. This includes bike pools, cargo bikes, e-bikes, EV-pools and improved shuttling to bus hubs, and improved taxi service thus providing the choice of the best option for each individual trip.



1.5.1 Site descriptions

Below is a table showing which of the smart solutions the Lighthouse Cities will demonstrate in the *GrowSmarter* project.

		Lighthouse Cities		
Area	***Smart Solutions***	*Stockholm*	*Barcelona*	*Cologne*
Housing measures	*1. Efficient and smart climate shell refurbishment*	*X*	*X*	*X*
	2. Smart building logistics and alternative fuelled vehicles	*X*		
	3. Smart, energy saving tenants through information	*X*	*X*	*X*
	4. Smart local electricity production and integration with buildings and grid	*X*	*X*	*X*
Integrated measures	*5. Smart lightning, lampposts as hubs for communication*	*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*		
	8. Big data protocol for saving energy and improving the quality of life	*X*	*X*	*X*
Mobility measures	*9. Sustainable delivery*	*X*		
	10. Smart traffic management	*X*		*X*
	11. Alternative fuel driven vehicles for decarbonizing and better air quality	*X*	*X*	
	12. Smart mobility solutions	*X*	*X*	*X*

1.3.2 Lighthouse of the north- Stockholm

Stockholm is well suited as a Lighthouse. The city was awarded by the European Commission as the first European Green Capital in 2010. Stockholm is internationally considered as a role model for sustainable urban development. Through development projects like Hammarby Sjöstad and the Royal Seaport attract thousands of international visitors annually. The ambition in the *GrowSmarter* project is to develop this function of showing good examples even further. By strengthening the cooperation between the industrial partners and the city, the smart solutions can be better described both from the cities view but also, from the industrial partners as business cases thus speeding up the rollout in Europe.

Stockholm has well developed systems for both district heating and cooling. About 80 % of the heat demand is covered by a single, city-wide grid, heated by 3 big CHP plants and a couple of smaller heat plants for peakloads, operating to 80 % on renewable fuel and also extracting heat from sewage water. Stockholm's grid is connected to adjacent grids, covering a total area of 60x60 km. In 2016 the world's biggest CHP plant

on biofuels will be put into operation, which will increase the renewable share to approx. 94 %. The cold side on heatpumps extracting heat from sewage water is together with cold water from the sea floor used to feed Stockholm's district cooling system, which is the most extensive in the world.
Sweden and Stockholm has a stable and well regulated electricity grid, the electricity is to 60 % renewable and 38 % nuclear. The grid is dimensioned for a much larger load than today and there is hence no need for smart grid technology, also if all fossil electricity should be replaced by renewable production. If differentiated pricing should be of interest in the future, the electricity consumption is already monitored on an hourly basis.

Stockholm has an extensive fiber optic network covering almost every building in the city with >50 Mbit/s and more than 75 % of the population have access to internet at a speed of 100 Mbit/s or more. This network enables high speed communication enabling technical solutions requiring large amounts of data transfer. Sewage sludge is fermented to biogas that drives the buses, taxis, garbage trucks and a large amount of other transport vehicles in Stockholm. Sorting of organic waste has recently started and by 2018, 50 % of all organic waste will collected and used for biogas. Recycling levels varies between 60 % (metal) and 90 % (glass and paper)

Stockholm's citizens travel to work and school mainly by public transport and to some extent by bike. In rush hours as much as 80 % of the trips are made by public transport and some 10 % by bike. The main need for mobility measures is hence for shopping and leisure trips where the use of cars still is high and public transport struggles to compete. The congestion charge decreased the car traffic on streets in and around the charging zone by up to 20 %. The zone will be extended in 2016 and charges raised by up to 75 %.

Stockholms Vision for 2030, an ambitious integrated approach for the city's strategic planning
The City of Stockholm has a vision for 2030. Through Vision 2030, the City of Stockholm has clarified its long-term ambitions and aspirations. The vision of a world-class Stockholm is challenging and inspires commitment from citizens, business sector and employees. The city is one of the fastest growing in Europe. The vision not only deals with how the city can create attractive and affordable housing but also how social services, such as schools and childcare, Infrastructure for public transport, cycle lands and roads can best meet the new needs. A decisive factor in Stockholm's competitiveness and power of attraction is the city's favourable living environment. Tomorrow's Stockholmers must be able to make their everyday lives work well. The implementation will take many years to realise. When taking decisions, a long-term approach is essential to ensure that Stockholm can stand up to the growing international competition. The *GrowSmarter* project helps support the cities strive to meet this vision.

The ambitions for further environmental improvements are also high. The Stockholm city council has decided on a roadmap pointing out the direction on how to be free from fossil fuels by 2050. To achieve that goal, international cooperation is essential. In the city's Sustainable Energy Action Plan it is clear the largest challenges are to achieve energy efficiency improvements in the existing buildings and reaching the climate goals in the transport sector. The *GrowSmarter* project will address these energy challenges.

As Stockholm is undergoing rapid growth, mobility is an important issue and several mobility plans have also recently been adopted or updated:

- Stockholm's Urban Mobility Strategy (adopted 2013)
- The public transport plan (adopted 2014)
- The cycle plan (adopted 2012)
- A city logistics plan (under consultation)
- A walking plan (subject to consultation in 2014)

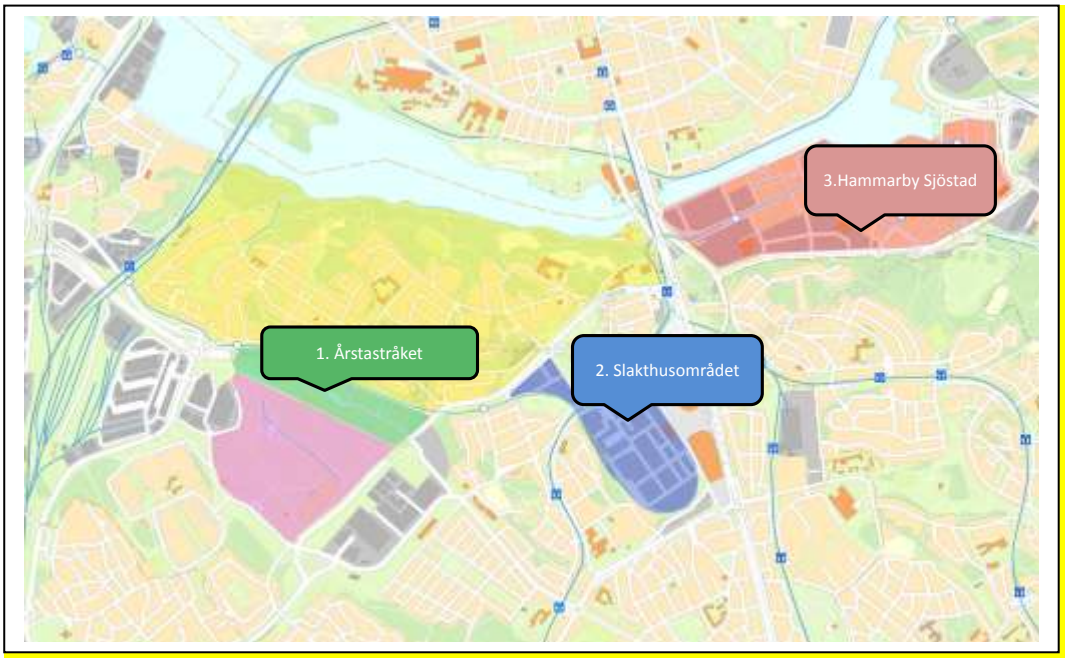
Integrated planning process together with the citizens and union of tenants
The planning of the changes in land-use and the renovation of the buildings in the *GrowSmarter* project are done in dialogue with the stakeholders including residents and other groups affected by the changes.

All changes of land-use must be prepared by detailed development plans. The planning process involves all stakeholders in different steps before the plan is approved by the city council. This process with reviewing and exhibits, information meetings and information material in newspapers etc. ensures that all get involved. For renovation the city owned housing company will set up a dialogue with the residents about how to improve the houses and the area surrounding the houses. The renovations will be done in a way that includes deep+ energy renovation but at the same time avoiding longer periods of time for residents to move out to temporary dwellings in the area. The improvements in energy efficiency will not increase the rents at all. The other improvements, if standard of kitchen and bathrooms i.e. are improved, may increase the rental levels after negotiations with the Swedish union of tenants.

The site Årsta

Årsta is elected as Stockholms site and is situated just south of the inner city of Stockholm. The area is facing a rapid growth both in terms of new dwellings, but also in terms of new business, office and shopping districts. The Årsta site is divided in three distinctively different areas:

1. **Årstastråket**, which is an area holding dwellings, three to four story buildings consisting of smaller apartments built in the 1940s and 1960s. Approximately 2000 new dwellings will be built in this area.
2. **Slakthusområdet,** which is currently a 300 000 m^2 large industrial area. The area has several protected buildings from the early 20th Century. There are around 250 companies employing 2500 persons in the area. Half of the activities in the area are related to food industry. The area will be developed into a mixed neighbourhood with 3 000 new apartments, 100 000 m^2 of office space and 100 000 m^2 of commercial buildings.
3. **Hammarby Sjöstad,** which is Stockholms first ecodistrict will in 2017 have approximately 13 000 dwellings with 28 000 inhabitants. There is a strong consumer activism in the area as well as a strong willingness to improve the energy effectiveness of the area.



Residential buildings in Årstastråket

The chosen six buildings are from the 1960ies. The buildings have together an area of 30 000 m^2 .The current energy consumption in these buildings are around 150 kWh/m^2. They represent the typical prefabricated, modular building of this era. More than 200 million Europeans live in similar houses from the 50ies to 70ies, which are in need for refurbishing in many countries. The replication potential is thus very large.

Integrated solutions in old and new residential buildings
New residential buildings will be constructed on the same lot as the existing ones during 2016-2020. This will open up possibilities to implement and demonstrate integrated infrastructures in the neighbourhood. Both old and new buildings could share the same technology, for instance waste collection system, heating system, solar energy production and storage system. There is also a possibility to expand the integrated infrastructure into the development area Årstafältet, situated directly South of the existing area. Here some 6000 new dwellings will be built between 2015-2030.

New mobility demands
Årstastråket represents an area in Stockholm where there are a lot of parking places available for cars. Cars are used here more frequently as in the central parts of Stockholm. As part of the development plans for the area different means to decrease car use are analysed. One possibility is to have a mobility center connected to the tramline station in the north-west of the area. Another possibility is to offer new inhabitants a mobility package, which provides services replacing the need for owning an own car.

Industrial buildings in Slakthusområdet
The industrial buildings chosen for the project are located in the eastern parts of Slakthusområdet. The buildings will form a new entrance to the area and connect the area with the sports- and event facilities located nearby. They will be situated in a commercial main path with smaller shops, cafés and restaurants.

The industrial area of Slakthusområdet represents in many ways the transformation of a city from divided functional city areas into mixed multi-purpose areas. Heavy industries are moving out from the city and industrial buildings needs to be refurbished and modified to meet the requirements of the new activities. Both of the buildings are currently empty and would have approximately 250 kWh/m^2 of energy use if they would be rented out as they are. There are a lot of similar industrial buildings in Stockholm, but industrial areas like Slakthusområdet is common throughout Europe.

Improving the existing infrastructure
Slakthusområdet has currently a weak infrastructure for pedestrians and bicyclists. Also the digital infrastructure is weak. The ambition is to create a multi-functional urban environment which links together surrounding urban districts, where sport-, culture and entertainment events works alongside commerce, offices and service. The area shall work as an attractive pedestrian city, where older buildings are found alongside new residential buildings. The development of the area will give possibilities to upgrade current infrastructure, have integrated solutions connecting existing old buildings with new buildings and increase the connectivity of the region with fiber and open wifi-networks.

New mobility demands
New businesses, offices and residential buildings will be built in the area. These will put a demand on producing sustainable mobility solutions for the region. Large events will require public transportation systems that can adapt to high peak demands. Pedestrians and bicyclists needs to move safely through the area. Mobility packages for offices and commercial buildings can reduce the car traffic in the region.

Low-energy district in Hammarby Sjöstad
The association of private condominians in Hammarby Sjöstad has an ambition to lower the current energy use in buildings and works closely with industrial partners to reach the goal of an average of 100 kWh/m^2. Several waste heat sources have been found in Hammarby Sjöstad and by connecting these to the district heating system a large quantity of the heat required in buildings can be produced locally. The demonstration site of Hammarby Sjöstad will show how also relatively new built areas can substantially lower their energy demand in co-operation with industrial partners.

1.3.3 Lighthouse of the South- Barcelona

Barcelona is the ideal lighthouse at the Mediterranean. It is the second most populated city in Spain, with 1.615.908 citizens in 100 km^2. Considering Metropolitan Area, with more than 5 million inhabitants on an area of 803 km^2, Barcelona is also the 5th largest industrial agglomeration and a city with much experience of

smart solutions. The city has come up as one of Europe's top leading ICT cities and has developed smart city cooperation together with citizens and local business partners. The city has good experiences of demonstrating new solutions and has participated in several European projects in the past.

Regarding Barcelona's final energy consumption on 2008 of 17.000 GWh/y, the specific energy consumption of the citizens is 10,5 MWh/inhabitant per year that corresponds to 30.784 GWh of primary energy and 4.053.765 t/y of carbon emissions[1]. Barcelona is promoting the transformation of the 22@ innovation district area, from the very entrance to the district: Glories Square. This will become the largest urban park along the Mediterranean and become a central residential center, along leisure and business activities. Barcelona's main focuses on how to use ICT to become a smart city are:

- Glories square: this area was demolished and will be integrated with adjacent districts which require urban transformation.
- Smart city campus: concentrate smart city companies in the area to bring back productivity to the city.
- 22nd district of innovation- best practice internationally recognized, e.g. smart grids.
- Energy efficiency residential refurbishment in residential area.

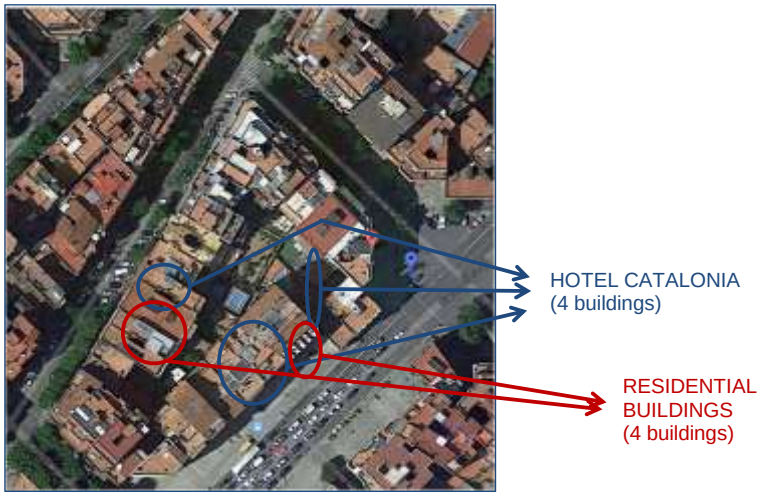
The Smart City Campus location in the 22nd district is a setting with cutting-edge technological infrastructures where highly innovative companies, research centres and universities coexist with housing, public facilities and green areas. It offers space for the establishment of companies, universities, entrepreneurs and research centres dedicated to ICT, ecology and urban planning, as well as auxiliary facilities. The ambition is to attract activities related to smart cities through the creation of a cluster that will boost business cooperation at local and international level and counts on the participation of the public sector.

The main proposed measures are:

- Zero energy blocks: Refurbishment of existing buildings, waste heat and renewable energies.
- Energy: District heating and cooling network.
- Mobility: electric public and private vehicles, deployment of charging points, applications.

[1] *Ajuntament de Barcelona. PECQ. Pla de l'Energia, el Canvi Climàtic i la Qualitat de l'aire de Barcelona 2011-2020.*

- To show the feasibility of these actions several buildings have been selected which are described in the next table and figure. In the following table, total primary energy savings and carbon emissions reduction are shown
- Moreover, a singular pilot case will be developed to demonstrate the feasibility of a Smart Energy and Self-Sufficient block, connecting buildings H3, H6 and Hotel Catalonia above mentioned. This will consist of a new small scale DHC network feed by CHP plant for heating and domestic hot water needs and electricity requirements. PV modules will be integrated also in this pilot case and integration between thermal and power networks will be validated. This experience will be an integration of RES with high efficient energy systems, low energy buildings and integrated management to reach nearly zero energy blocks, upgrading the concepts suitable for NZEB buildings to block scale, enlarging the potentiality of replication and the improvement of carbon emissions reduction and energy savings.
- Some of the refurbished buildings will be connected to the already existing DHC network in the city, that is operated by Districlima Company and that recovers heat from the urban waste to energy plant of TERSA Company.
- Integration of RES will be done by PV modules of solar thermal collectors and storage for domestic hot water requirements



The presented pilot action of Smart Energy and Self-Sufficient block has a high potential of replication. Residential building (built from medium XIX century to 1930), represents 13 % of total typologies of the building sector stock in Barcelona[2]. The proposed refurbishment in this case considered as the best cost-effective according the study referenced consists of improvement of isolation of façade and roof and substitution of windows by lower U-value ones (glazing and frame improved). This means that the savings reached with this pilot case has a potential of replication of 7.3 million m^2 built. On the other hand, considering together with H3 (whole cost-effective refurbishment), the integration of H6 (built from 1940 to 1979) typology on this block that is 64 % of the total (35.8 million m^2 built) with less passive measures and, a commercial building (hotel Catalonia) helps to create an economic feasible business model of distributed power and heat generation reaching an optimal cost and a relevant improvement of global energy savings.

Barcelona's ambitious urban vision

Barcelona's Municipality vision is to create productive districts at human speed inside a hyper-connected and zero emissions city. A smart city responds to a vision of city of the future where is necessary to:

- Increase value-added information for the managers and users decision.
- Generate knowledge on processes and system nodes.

[2] *Propostes per a la rehabilitació energètica d'habitatges de Barcelona. Estudi tècnic PECQ Pla d'Energia, qualitat de l'aire i canvi climàtic de Barcelona 2011-2020*

- Create relationships between actors, processes and nodes.
- Take advantage of the possibilities offered by Information and Communication Technologies.

This vision projects towards the strategic and political objectives with the aim of:

- Increase efficiency of public services.
- Improving quality of life.
- Increase citizen participation in municipal processes.
- Improve conditions for environmental sustainability.
- Increase the opportunities the city offers to the people and companies.

Key strategic lines have been designed, including the following regarding this project:

- Regenerating neighborhoods: improving public spaces and environmental quality.
- Improving cleaning, air quality and acoustic standards, with the collaboration of society as a whole.
- Conserving resources: improving energy efficiency, optimizing the energy efficiency and reducing residues.
- Full assimilation of the climate change phenomenon as regards the city's management.
- To spread the culture of sustainability: broadening the community network of companies, organizations, schools and bodies committed to this issue.

Aligned with the smart city evolution, Barcelona is developing some urban plans that help to support the lighthouse activities. The most relevant are:

- Energy Self-sufficiency in Buildings Plan:
- The energy, climate change and air quality plan of Barcelona (2011 – 2020)
- Barcelona's Lighting Plan.
- Barcelona Air Quality Improvement Plan.
- Urban Mobility Plan
- Strategy to promote electric vehicle in Catalonia
- Municipal Actions Plan
- Glories Urban Plan
- Orthogonal Bus Network:

1.3.4 Lighthouse in the central - Cologne

The long tradition of trade, industry and research made Cologne very open minded to new technologies and innovations. The city implemented a SmartCity Strategy in 2011 with the aim to promote new technologies all over the territory of the city. The planed lighthouse projects will demonstrate how innovative and climate friendly technologies can be introduced in a neighbourhood with a very diverse society and a limited budget. The city wants to integrate a technological and social infrastructure and foster the citizen's dialogue with the general aim to improve the quality of living in Cologne.

Cologne is located in West Germany along the middle part of the Rhine at the junction of historical and modern trade channels. Today, Cologne is the fourth largest city of Germany with a growing population of presently more than 1 Mio inhabitants. It provides jobs for about 500,000 residents and commuters and is an economic and cultural centre for its immediate conurbation which comprises some 2.5 million inhabitants. It is expected that the population will increase by more than 10% until the year 2030.

Blueprints for boosting innovations and sustainable city developments
The fast growth in population presents a big challenge for the city of Cologne in need to supply more and affordable housing, improved infrastructure and jobs in a very short time frame. Further, the growth needs to be based on a sustainable and resource efficient way and taking into account restricted public finances.
Within GrowSmarter, the City of Cologne intends to develop a role model for an integrated sustainable and innovative district development for Cologne`s numerous upcoming development projects but also serving as blue print for many cities in Europe with a diverse population and restricted budgets.

This blueprint shall provide a sustainable and integrated plan for the development of districts and neighbourhoods having in mind environmental, economic and human-well-being goals. A special focus shall also be on the social aspects. The city wants to avoid any form of gentrification.

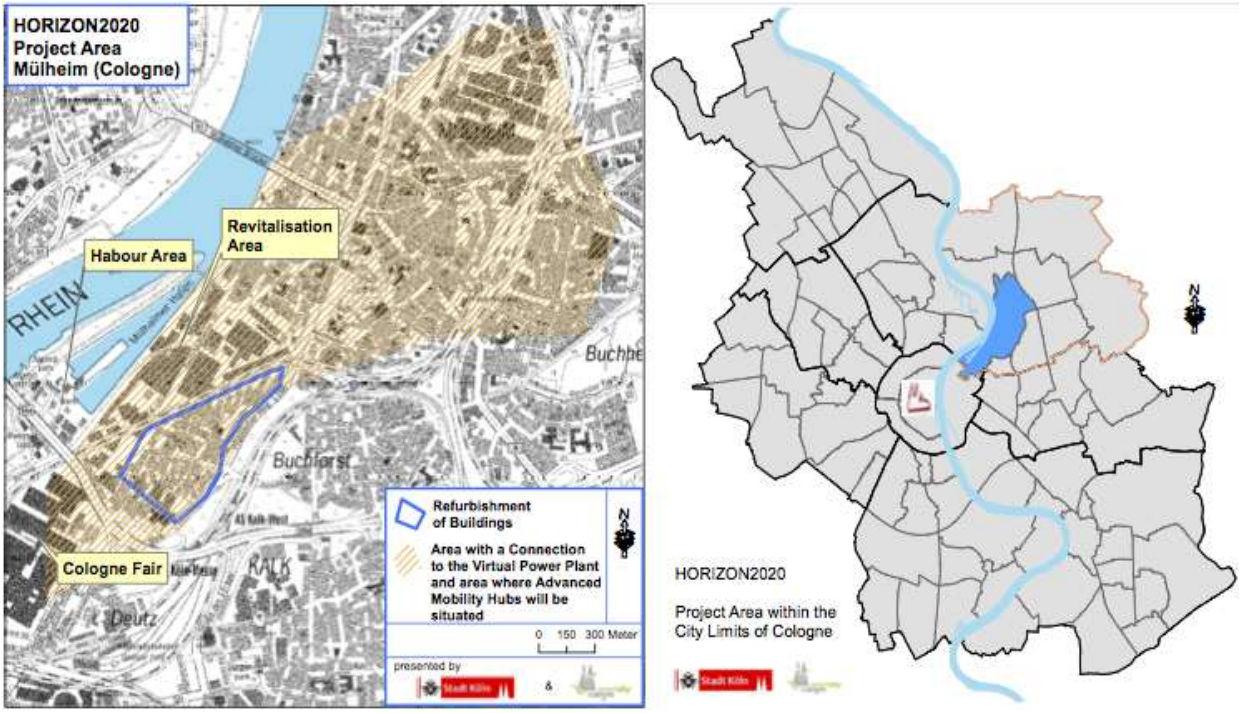
Mobility
The strategic position of Cologne in the Middle of Europe, connecting East and West and North and South, makes the city a turntable for roads, rails, shipping and air transport. The main station of Cologne is the most important rail junction in Europe. A central key to achieve the greenhouse gas reduction targets is a brand new mobility concept. The concept is including mobility hubs developed in GrowSmarter which will be alternatively fuelled with solar energy. Hence, a climate friendly substitute to fossil powered traffic will be offered to the public and the local economy. In addition, the city tries to link the different modes of transportation instead of continuing with the former stereotype thinking. The city believes that improved intermodality and multimodality have the potential to increase the efficiency of mobility drastically.

Energy
Cologne's energy supply is based on district heating and electricity/gas delivery from two very efficient combined heat and power gas plants. A third power plant of this type will be constructed this year. Cologne could already prove that this form of energy production has the potential to decrease greenhouse gas emissions significantly. Cologne is also looking into the use of alternative energies such as the use waste water heat, photovoltaic, solar-thermal and heat pumps. Within the GrowSmarter project, Cologne would like to combine several energy sources in a virtual power plant with intelligent energy management.

ICT and media
The Cologne region is the centre of the ICT and media industry of the federal state of North Rhine-Westphalia, with 45% of the state's media operations having their headquarters here. Today, 1,5 in ten jobs is provided by the media and communication sector. Beside the Deutsche Telekom, the regional telecom company NetCologne operates an advanced network of optical cables which is constantly being extended. Cologne has the vision to be an Internet-City and is offering open data to the citizens already.
Within the GrowSmarter project, the ICT application is serving as backbone of the smart and integrated energy and transport management in Cologne. The ICT is offering real time data on energy and mobility which will stimulate and promote new businesses. Based on the data, young urban professionals receive the basic data to develop applications on traffic and energy management. The applications have the potential to improve the quality of living of the urban society.

SmartCityCologne strategy and citizens participation
The City of Cologne, in close cooperation with the local Energy company RheinEnergie AG, has launched a SmartCity Strategy already in 2011. The mayor is heading the steering committee. The committee consists out of three board members of the city, three employees of the energy company and one out of the public transport company. The SmartCityCologne steering committee works in partnership with the advisory committee, comprising Colognes main economic players, such as Microsoft, LANXESS, REWE, University Cologne, University of Applied Science, German Space Agency (DLR), Chamber of Commerce and others.
SmartCityCologne is in a constant dialogue with the citizens and the city hall. The GrowSmarter measures, which Cologne proposes, have been development together with the citizens and the companies developed in 5 workshops and conferences. The SmartCity initiative of the city hall and the RheinEnergie has the overall objective to add to the climate goals of the city hall and to contribute to the turnaround of the German and European Energy Policy. Cologne hopes to become a flagship for new technologies and to give the local economy a platform for the promotion and implementation of innovations.

Project area
The city of Cologne decided to choose the district of Mülheim as target area. The area is part of the borough Mülheim. The following paragraph shall highlight some aspects of the borough and district and explain why the Cologne decided to focus on the area.



The borough of Mülheim is located in the north of Cologne on the right side of the Rhine. Today, the borough of Mülheim consists out of nine districts with an area of 5,223 hectare and 144,360 inhabitants. The borough of Mülheim has a very diverse population with a lot of immigrants and students. Cologne fair, one of the leading trade fair centres in Europe and overseas is situated in Mülheim.

Changing economic structure

During the late 80s and 90s of the last century, the area experienced significant de-industrialization. A lot of companies closed or relocated the production to other areas. During this phase, about 15,000 jobs were lost. An all-time record of the unemployment rate with severe social problems was the consequence. During the peak of the de-industrialization roughly 160 hectare of industrial wastelands needed a new designation.

The northern part of the borough experienced a renaissance when the media discovered the area. Today, a high variety of broadcasting and television productions are using the former factories as headquarters. It is in the intention of the city hall to foster this trend and to encourage additional companies to settle in the area.

Mülheim a district of opportunities

In contrast to the northern part of Mülheim, the southern areas (Mülheim South) are still offering the opportunity for new developments. The area is characterized by an exceptional ensemble of Wilhelmina style factory buildings which makes the area unique to Cologne. In addition, some areas are still untiled which gives the potential for new innovative buildings.

The closeness of the international station "Köln Messe/Deutz" with its high speed train terminal and the airport Köln/Bonn make the area attractive for new business and housing which need quick access to international transportation. Cologne fair is bordering Mülheim-Süd which offers a distinctive location advantage. The city centre of Cologne, which is just 2 km away, can be reached via public transportation in a very short period of time.

A residential area with energy deficits

Part of Mülheim South is also the residential area "Stegerwaldsiedlung". The neighbourhood was created in the 50s and 60s of the last century. When the de-industrialization took place, the area suffered from social problems. A new perspective for Mülheim South shall also improve the quality of living in this neighborhood with the fundamental aim to preserve the present residential structure. At the moment the area

has a poor integration into the greater spatial structure. The neighborhood presents a typical mix of partly refurbished and un-refurbished buildings. The area has presently access to gas supply. Thus, the replication potential of any energetic modernization, which has the aim to create a low energy district, is very high.

Mülheim South: Unique architecture but a poor developed infrastructure
In 2013, the council hall initiated a new planning concept for the development of the area. The intention of the integral concept is to preserve the unique architecture but also attract companies of all scales for new investments. The aim is to create a neighborhood for roughly 3,000 people and generate the potential for about 5,000 jobs. It is easy to assume that such a development needs an improved infrastructure and a better integration of the area into the surrounding neighborhoods. However, due to the nature of the former industrial area, the de-industrialization and rather low investments into the area for more than 20 years, the infrastructure has weak standards. In addition, the former industrialized area is partly disconnected from the surrounding neighborhoods. The ambitious plan of the city hall requires an opening of the area via different modes of urban sustainable mobility to the surrounding neighborhoods. This can only be achieved on the base of an integrated infrastructure concept. The projects which are planned in the area shall function as a blueprint for a sustainable city development of Cologne with the ambition to also serve other partner cities.

The area is also part of the investment project "Mülheim 2020" which is funded by the European Union (EFRE) via the local state. The program has the objective to improve the economic and social situation of Mülheim and surrounding areas. It is investing roughly 40 Million Euros into education, local economy and city development. A nearly completed project is the opening of the area towards the Rhine: A boulevard between the Rhine and Mülheim South towards Mülheim will increase the amenity of the area significantly. Other projects to achieve a better integration of Mülheim South with the surrounding neighborhood expect realization.

Ambitious urban plan Cologne
The city is committed to the goals of the climate alliance: Cologne plans to cut greenhouse gas emissions by 50% until the year 2030.

The target area „Mülheim" is in the focus of different city development plans, such as the „rechtsrheinische Entwicklungskonzept (REK)", the „Masterplan tor the City" and the results of the workshop procedure „Mülheimer Süden inklusive Hafen". In addition to the just mentioned concepts, the traffic is undergoing an intensive analysis and expertise with the aim to present varieties of options on the future sustainable and multimodal and intermodal development of the individual and public transportation.

It is in the attention of the city hall to present for different areas of Mülheim different types of sustainable land use concepts. The aim of those concepts is the safeguarding of the historical existing community and business centers. The new evolving cultural and creative utilization approaches of the area shall also be preserved; but additional investors shall be attracted to the area. Further, the concepts shall present a pathway on how the often disconnected fallow lands can be integrated into the greater spatial structure and which utilization might be best suiting the area. A special focus is on the preservation of the unique Wilhelmina style factory buildings which could be an additional soft location advantage.

A central aspect of any development project in Cologne is the dialogue with the urban society in any new development. The city hall will continue to reach out to the local community of Mülheim and to experts within the city hall and in other institutes. The city hall wants to avoid the impression as the development takes place with a top down approach disregarding the interests of the local communities. In contrast, the city hall wants to understand local needs and ideas of the local urban society. Their remarks will be part of the development.

The integrated climate protection proposal of the city hall presents the general goals of the city for a CO2 emission and energy consumption reduction. The proposal presents 80 different measures addressing the areas energy, mobility, urban housing and living, business and education.

The practical implementation of the different city development projects focusing on Mülheim is strongly influenced and inspired by the above mentioned integrated climate protection proposal of the city. Any CO2

reduction targets will be discussed with the involved actors may they be inhabitants of the district or business owners. This approach guarantees a social and economic balanced course of action. It could be observed, that such a close cooperation leads to a much higher acceptance of the public and to a higher level of efficiency on all levels.

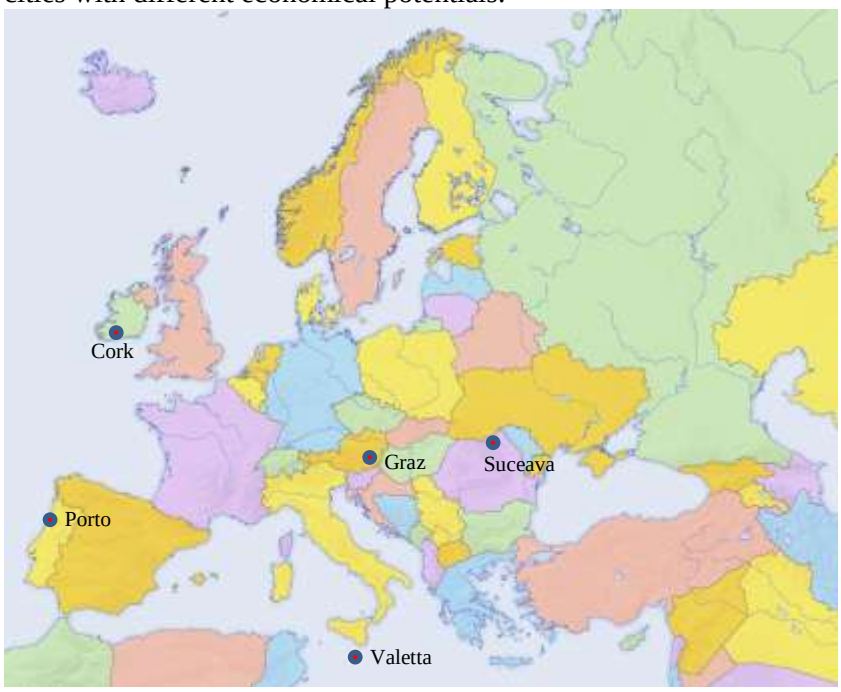
The GrowSmarter application and the planned lighthouse projects can benefit from the city development concepts, the mobility investigations and the proposed activities in the field of climate protection. For any planned project, the city tries to combine the areas of mobility, energy and the information and telecommunication technology to a holistic concept. The city believes that this is the way forward to achieve the ambitious city development and climate protection goals.

The different concepts, expertise and the proposed measurements of the integrated climate protection proposal constitute the „Ambitious Urban Plan Cologne". The focus is on small spatial and local discussed projects to achieve climate protection and a sustainable city development. The experience of Mülheim will function as a blueprint for future city developments and climate protection activities in other parts of Cologne.

It can be concluded that Mülheim is offering a combination of very unique soft and hard position advantages but also the freedom to develop new sustainable city development concepts from scratch. Presently, the area has a poorly developed infrastructure of all aspects but the potential to function as a role model of a post-industrial neighborhood which combines modern forms of working and living in an urban environment on a sustainable base.

1.5.2 Follower cities- future deployment

The project involves five follower cities ready to implement successful measures from the lighthouse cities. These five cities (Valetta, Suceava, Porto, Cork and Graz. Marked on the below map are wide spread geographically across Europe and have slightly different focuses regarding their area of focus (Low energy districts, integrated infrastructure and sustainable mobility). This enables replication of all the smart solutions tested in the project in different geographical conditions, different climatic conditions and also cities with different economical potentials.



The below table shows which solutions the follower cities plan to replicate to give an overview of their potential to expand into other markets as well.

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

Suceava

The north-east Romanian city of Suceava (population about 107,000), one of Romania's oldest settlements, has been the capital of Suceava County since 1388. Suceava lies 450 km from Romania's capital Bucharest, on a main European highway. The government is making efforts to improve the region's transport network as part of a broader urban regeneration using EU Cohesion Policy grants.

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

In 2013 Suceava Local Council approved a Sustainable Energy Action Plan (SEAP) regarding energy efficiency and implementation of project regarding increase of alternative usage at local level, implementation of the electro mobility concept. The main objective of SEAP is to reduce the greenhouse gas emissions by at least 20% by 2020 and to promote the investments carried out within Suceava Municipality

which can lead to an efficient use of energy by improving the existing energy performance or the development of constructions, installations, equipment and technologies enjoying high energy efficiency, including feasible renewable energy sources.

Smart Solutions Suceava plan to replicate

Smart Solution 1. Efficient and smart climate shell refurbishment

Suceava has constructed works for rehabilitation of 380 apartments in order to reduce the waste of energy and to improve energy and these projects is expected to be implemented in 2016. Suceava will learn about the introduction of the *GrowSmarter* solutions improving energy efficiency and to transfer best practice with e.g. Barcelona. Suceava will gain experiences from the produced knowledge from *GrowSmarter* about introducing measures improving energy efficiency, not only for the rehabilitation of the residential and municipal buildings but also in being able to develop facilities at local level for " technological parks " for companies which will invest in new green technologies in order to develop the local market and to create new jobs .

Smart Solution 3. Smart, energy saving tenants through information

Suceava Municipality plan to develop pilot Home Energy Management Systems for public buildings (cultural centres and apartments buildings) in order to promote among public servants and citizens "smart energy behaviour " that is expected to reduce energy consumption, friendly attitude to environment and also test the citizens availability to implement future measures concerning energy efficiency improvement. The city hopes that the Smart Solutions in the *GrowSmarter* project can be implemented also in Suceava and is looking forward to the validation of the energy efficiency of these solutions.

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

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

- Establish a photovoltaic panels grid for own municipal needs.
- photovoltaic panels will be installed in 2015 in order to provide the amount of energy necessarily for the charging station for the electric bikes.
- Rehabilitation of the Bazaar Commercial Centre – the main commercial building will be rehabilitated in order to increase the usage of daily lights , to reduce the waste of energy and also geothermal underground pumps will be introduced in order to provide the necessarily amount of heating by using alternative sources of energy.
- Rehabilitation of the main city markets (including introduction of energy saving systems, recycling facilities and mobility plans for freight.

These proposed above measures are closely connected to the *GrowSmarter* Lighthouse cities measures like Home Energy Management Systems that will be installed in a pilot residential and municipal building, visualizing and manage energy consumption.

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

Suceava will extend the recently rehabilitation of the public lightning system of 24 km to include the entire city, in order to reduce the energy consumption and increase the efficiency the a management system. All lamps will be replacement with LED light for the entire city to reduce the energy consumption.

This public lightning system with the production of energy from the a new power plant will benefit from the experience from the *GrowSmarter* validated solutions regarding reduction of energy consumption by using LED lighting for public lighting system and production increasing the green energy production at local level.

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

A new city power plant is functional from 2013 using only biomass, provided both heating for the entire city and energy is the starting point for the increase of production of green energy at local level. Suceava city is preparing a tender for waste management supplier at local level. In connection with the smart waste collecting, turning waste to electricity, heat and biogas for vehicles our expectation is to be able to transfer the experience from city of Stockholm mostly in connection with separate waste connection , recycling facilities and production of " green energy " by using biomass and reduce the dependency of the conventional sources.

Smart Solution 10. Smart traffic management

Suceava plan for an implementation of electric busses, intermodal points, park and ride and also system monitoring and controlling traffic signals. Real time information will be provided to users about traffic conditions in order to reduce the traffic emissions and impact against environment and public health and will reduce traffic congestion and energy consumption.

Smart mobility solutions are mobility plans, alternative ways of travelling, and promotion of electric vehicles and development of the cycling infrastructure in Suceava City. City of Stockholm and the measures to be implemented in this project is a very reliable example of a " state of the art " example for mobility management and actions to avoid traffic congestion and to reduce traffic emissions .Our goal in this project is to transfer the best practice from Stockholm mainly in connection with the cycling facilities and traffic management and before these in connection with alternative solution for public transport (biogas or electric busses) in order to increase the number of passengers, reduce the car dependency , avoid traffic congestion and change people's behaviour regarding mobility habits .

Smart Solution 11. Alternative fuel driven vehicles for decarbonizing and better air quality

For the action Implementation of a local public transport with electric buses and establishes measures to encourage the use of electric public transport means Suceava Municipality funding through the Swiss-Romanian Cooperation Programme. A feasibility study and technical documentation will allow the Municipality to apply for a funding scheme trough ERDF in order to implement the electro mobility concept for public transport (purchasing of 30- 40 electric buses and charging facilities for local public transport company). Suceava will start in 2015 as the first Romanian city with an electro mobility project implemented.

Suceava Municipality plan to set an infrastructure including; 28 charging points in public places, and implementing a bike charging and renting system (e-docking) for 10 electric bikes, implementing renewable energy sources to feed the electric bike charging system 28 parking spaces for electric vehicles, 56 bike-charging.

Local and national dissemination will be performed in order to increase the number of electric vehicles used by private owners and public institutions, to increase the number of charging points. Also, activities related to development of local and national markets for car dealers and companies responsible for charging points installation. Benefits from participation in *GrowSmarter* will be the transfer of best practice and know how between partners with the expectation to learn from the experience of the lighthouse cities in domains that are connected with the " green city " concept. In the next 3 years Suceava City will start the implementation of the electro mobility concept at local level we expect that the participation in GrowSarter will facilitate the transfer of best practice that Stockholm has in the field of electric vehicles , charging points and facilities for electric vehicles.

Smart Solution 12. Smart mobility solutions

The City Urban Plan is under a redesigning process and one of the new innovative parts of this study will be an Urban Mobility Plan. Based on the conclusion from this plan the city will start the implementation of other new innovative mobility projects at local level.The new municipal EV's will be used for promoting the car pooling concept among public servants, citizens and private companies in 2015.

Suceava encourage walking instead of driving and electric bikes will be available in Suceava from 2015 to promote an alternative way of traveling (among citizens and tourists) as a rental system at local level. The aim of Suceava city measures is to replicate the lighthouse city experience (Stockholm in order to substitute the car in other trips that are less regular and more individual. Our goal is to offer different and alternative solutions completing the existing public transport network like bike pools, e-bikes, EV-pools.

Porto

By participating in the project Porto's city council aims at fostering the strategy defined in the follow up of signing the "Aalborg Charter" in 2006 and the Covenant of Mayors for sustainable energy in 2009. This strategy is detailed in the Porto's Sustainable Energy Action Plan (SEAP-P), which defines policies for tax incentives, regulations and a transportation infrastructure planning. In this context, and based in the previously developed Energy Matrix, the city sets an ambitious goal of reduce 45% of CO2 from 2004 to 2020. The progress review monitoring tool already shows a solid progress in the GHG emissions reduction. Referred to 2009 the figures shows the 'greening' electricity is already contributing to reduce in 15% and the new underground mobility system (local) with 7%. As detailed bellow the municipality of Porto aims at fostering this strategy by replicate the results of the Lighthouse cities.

Smart Solutions Porto plan to replicate

Smart Solution 3. Smart, energy saving tenants

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

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

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

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

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

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

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

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

In the follow up of the ambitious target defined to reduce the CO2 emissions the city council is defining a new mobility plan in each it will promote low CO2 emission fuels, such as bio-gas. The city council will replicate the validated solutions developed in *GrowSmarter* in this context.

Graz

In 2011 the City of Graz launched the strategy driven project „I live Graz", which was funded by the national KLIEN-Funds. Within this project 8 indicators where developed which were seen as essential to accomplish a local state-of-the-art Smart City development. For economy, society, ecology, mobility, public services (supply and waste management) and building standards as the fields of interest indicators were developed and an integrated urban development strategy for a Graz as a "zero emission location" were established by the municipial planning offices which was officially decided in form of a city development plan by the city council mid-2013.

2012 Graz submitted the integrated implementation project "Smart City Project Graz Mitte" for a defined development area next to the central station in the western part of the city for funding within the national KLIEN-Funds scheme as a first implementation project in regard to this city-wide strategy. This specific project covers innovative technologies in the sectors of buildings, energy networks, other urban supply and disposal systems, mobility, communication and information and was chosen on the national level as the first (and currently still the only) Smart City flagship project of Austria. This national-funded part of the further reaching "Smart City Strategy Graz" was started in April 2012 and is expected to be finished in June 2016. Additional measures are currently planned with the time horizon until 2020.

This "Smart City Project Graz Mitte" is intended to be a première, demonstrating new urban energy technologies for a smart zero-emission quarter offering great quality of life. Innovative developments in terms of buildings, energy networks and mobility will be linked up to form an urban whole. The integrated holistic planning process involving all relevant players will make smart urban development tangible and come alive. The project's exchange with national and international partner cities as Darmstadt/D, Zagreb/HR, Malmö/S, Strasbourg/F, Ljubljana/SLO, Maribor/SLO and national partners like Salzburg/AT, Villach/AT or regional Partner as Leoben/AT, Weiz-Gleisdorf/AT or Hartberg/AT will support learning and reflective processes and further the disseminations of findings and results on different levels.

<u>Smart Solutions Graz plan to replicate</u>

Smart Solution *1. Efficient and smart climate refurbishment*

The issue of innovative energetic district redevelopment will become strategically relevant in Graz during the next years and will additionally play an important part within our Smart City-Strategy in near future. Thus the City of Graz would especially benefit from innovative energetic district redevelopment kowhow and as well from ICT-knowhow as expected outcomes of the prepared GrowSmarte project. The both Smart City Districts GRAZ WEST (Waagner Biro, Graz Reininghaus) and GRAZ SÜD defined within the official city development plan have a huge potential concerning refurbishment of mult-storey-buildings of the 1970ies (energy efficient renovation).

Graz intends to replicate smart solutions in integrating know how from the lighthouse cities in strategies especially developed for these local Smart City districts; besides innovative financing schemes (PPP) for implementation purposes will be developed in Graz within the Horizon 2020 Project (issue of high priority for Graz!)

Smart Solution 3. Smart, energy saving tenants

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

Smart Solution 5 Smart lightning, lampposts as hubs for communication

A communal smart lightning strategy is the rollout of this strategy should be implemented in the medium term after the Smart Solutions are tested in the *GrowSmarter* project. Graz aims to replicate suitable solutions in this field of action integrating them in the currently planned lightning strategy. Additional knowhow through the *GrowSmarter* could therefore ideally be taken in account.

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

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

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

The ICT-Sector is hitherto rather underrepresented in many municipal strategies of Graz. The Smart Solutions to be implemented in the *GrowSmarter* project ill be very important for Graz (issue of high priority for Graz). As replication measures within the *GrowSmarter* project the City of Graz will define a separate project structure for this issue and will set up a local action group gathering local stakeholders from the administration and other sectors as well. After this first step a discussion and a decision-making process will be started to define the main points for a local ICT- strategy. After that the first steps to implement ICT-pilot projects will be defined.

Smart Solution 12. Smart mobility solutions

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

Malta

The Government of Malta is committed to making transportation in Malta environmentally sustainable. To achieve this, the Maltese Government has placed the electrification of transport as one of its main pillars in its transport policy, while additional transport services that have not been considered so far will also be studied.

Transport Malta has always supported the development, introduction and deployment ofelectromobility in Malta to the extent that it was one of the main promoters for the setting up of the Malta National Electromobility Platform and a main contributor towards the drafting of Malta's National Electromobility Action Plan.Moreover, evidence of this is the Authority's full support and participation in pioneering demonstration projects, such as the Demo-EV and the PORT-PVEV, the aim of which is:

- to introduce electric cars in Malta;
- to showcase their use;
- to facilitate market penetration;
- to set up the national electric car charging infrastructure.

The Government of Malta plans to keep developing electromobility in Malta and it is for this reason that the Ministry for Transport and Infrastructure together with Transport Malta have launched the Malta National Electromobility Platform (MNEP) and Action Plan (MNEAP) in November 2013.

As part of this Action Plan, a number of concrete projects have been identified this will be implemented over the coming seven years. This Action Plan will not only assist the country to improve its air quality and noise pollution, but also will contribute towards the mitigation of climate change; thus meeting EU targets set by the Air Quality Directive and the Climate Change and Energy Package targets, particularly the Effort Sharing Directive, of which the transport sector forms part.

Smart Solutions Graz plan to replicate

Smart Solution 9.Sustainable delivery

Due to rising congestion levels and the resulting negative effects on air quality and climate change, the reduction of congestion levels within urban centres has been a long-standing priority in Malta. To this effect, the last mile delivery of goods using light-goods electric vehicles (N1) is one of several solutions that the Government intends to explore and see whether such a solution is feasible especially when one considers the short distances that come into play on such a small island.

There are still several issues that need to be addressed and considered before such a project can be implemented. These include; the identification of an ideal premises (warehouse/storage facility) and its location outside of the city where the reloading of goods from trucks to smaller, light goods electric vehicles can take place; the types of goods that should be targeted and the respective retail outlets that should be approached; identification of the right stakeholders that would allow such a project to come to fruition and which would be willing to share such a platform and logistics; costs involved for the various parties; and, most importantly, the actual feasibility of implementing such a project within the area and the context in which it is being proposed.

Valletta has been chosen as the city in which this project will be considered since apart from being the national capital, it is also the administrative and shopping capital; Valletta sees an estimated 50,000 commuters daily, almost double its residential population.

The topography of Valletta is characterised by hills and steep slopes, making the use of bicycles for the delivery of light goods ineffective. A great part of Valletta's core is also pedestrianised, thus drastically reducing accessibility to heavy goods vehicles. In fact, currently, pedestrianised areas are accessible only to battery-powered vehicles.

The concept being proposed and considered – the use of electric light goods vehicles for last mile deliveries – is very similar to that which will be implemented in Stockholm and Barcelona, particularly the testing of delivery of heavy goods using clean trucks.

Transport Malta is very interested in following the implementation of this Solution as it will be implemented in both Barcelona and Stockholm since the concept of reloading of goods from trucks to smaller, clean energy efficient vehicles and the removal of heavy goods vehicles from the city centre with the resultant reduction in emission and congestion would be very beneficial if implemented in Valletta (should such replication be found to be feasible). Such an initiative would also contribute towards the minimisation of the effects of pollution on historical buildings within the city. The results to be obtained from such a project are therefore considered to be highly beneficial, but further, detailed study must first be put into the matter.

In planning this project, Transport Malta needs further know-how on the logistical planning arrangements that need to be in place in order to make the project effective and, most importantly, find out whether such a project would in fact be feasible in the context in which it is being considered, i.e. the walled city of Valletta.

However, what works in Stockholm and Barcelona may not work in Malta, considering the differences in size, topography, distances and context. To this effect, in compiling the Replication Plan, while following

closely the implementation of this Solution, TM will also be considering the feasibility of this solution, and how it can be adapted to fit the Maltese context, particularly befitting Valletta.

As part of the Replication Plan, Transport Malta aims to, among other things, achieve the following:

- Feasibility analysis of the implementation of such a system in the Valletta context;
- Identification of an ideal premises (warehouse/storage facility) and its location outside of the city where the reloading of goods from trucks to smaller, light goods electric vehicles can take place;
- Identification of the types of goods that should be targeted and the respective retail outlets that should be approached;
- Identification of the right stakeholders that would allow such a project to come to fruition and which would be willing to share such a platform and logistics;
- Costs involved for the various parties;
- Logistical Plan of how the system would operate;
- Identification of a suitable management system;
- Funding and financing options for the implementation and operation of the system.

Smart Solution 11. Alternative fuel driven vehicles for decarbonizing and better air quality

As part of the ongoing DEMOEV project, forty-five charging pillars have been installed nationwide in Malta. The pillars are dual-point; hence by the beginning of 2014, ninety points will already be available for public use. Furthermore, as part of the PORT-PVEV project, additional charging points and solar charging stations are being installed around port areas together with batteries to demonstrate carbon neutral transportation as part of the pilot within the same project. A monitoring platform for the existing charging points is already in place which specifically covers the forty-five pillars that have been installed as part of the DEMOEV project. The setup of a national e-platform is planned and which will connect current and future charging points and enable their remote management and monitoring while ensuring interoperability and the competitivity of the charging infrastructure on the national transport network.

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

Within Valletta, several electromobility projects will merge over the coming seven years. These will include, but not be limited to;

- E-car sharing initiatives between officials of several government entities which are based in Valletta;
- The drive towards the electrification of Public Transport – to focus on the Valletta Bus Terminus and the Floriana Park and Ride (outside Valletta city walls);
- The introduction of pedelecs and charging infrastructure at bus termini and P&R locations.

To this effect, Transport Malta is very interested to learn from the experience of other cities on how charging infrastructure for electric vehicles can be effectively managed to provide the best service to its users, maintain an open, competitive market, while leaving the least possible negative impact on the electricity grid.

Transport Malta is also very interested to learn how the locations for the additional charging points can best be determined. Variables that would need to be considered would include the demand for the service based on the number of electric vehicles in the area; the population of said area; parking space availability; accessibility of the location; impact of the proposed charging location on other factors such as traffic congestion, businesses in the vicinity etc; existing connections and the need for additional infrastructure to enable to connection of the charging points and much more.

All this will be closely followed by Transport Malta as part of the project to be implemented in Barcelona. It is important to keep in mind that what is found to be successful in Barcelona may not be feasible if replicated identically in Valletta, considering the different sizes and contexts of the two cities. Therefore, as part of the Replication Plan, the data and know-how gathered from the implementation of this Solution in Barcelona will then be analysed, by Transport Malta and adapted to the context of Valletta and its surroundings.

As part of the Replication Plan, Transport Malta aims to achieve the following:

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

While Transport Malta is following the implementation of these smart solutions and compiling the respective replication plans, local citizens will be engaged through media and publicity, and more directly, through stakeholder forums organised to get feedback from and inform the targeted audience on what TM is planning as part of this project. The feedback gathered from the targeted audience will feature within, and assist the compilation of, the Replication Plans.

Cork

Activity participating in the Lighthouse Project will help the local authority to meets 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 meets 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.

<u>Actions in relation to the Grow Smarter smart solutions:</u>

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. Therefor 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.

1.3.5 Industrial partners- the providers of smart solutions

The *GrowSmarter* project puts high emphasis on the industrial partners. It is these companies that are to deliver the smart solution to help reach the project goals. The project therefor has included several major industrial partners representing 11 countries, with varying size from thousands of employees to 10 employees. The number of Industrial partners is deliberately high All of these industrial partners are prepared to participate in the lighthouse-projects, in the scaling up with the followers and eventually rolling out these solutions for the rest of Europe.

The *GrowSmarter* project puts heavy emphasis on the industrial partners. It is they that provide the smart solutions to the cities and it is these companies that have a major role on rolling out these solutions to a wider market. The *GrowSmarter* project has chosen some of the most prominent European industrial partners to provide the project with the right knowledge and capacity to achieve these project goals.

The *GrowSmarter* project involves some of the major European corporations and together they represent some of the best solutions available on the European market. These companies will together prove smart, integrated solutions on the district level at the three sites and are briefly described below.

Envac invented the vacuum waste collection system in 1961. Since then they have designed and installed over a thousand stationary, mobile and kitchen vacuum waste systems worldwide. http://www.envac.se/ **Envac role in GrowSmarter is:** Smart Solution 7 Smart waste collection, turning waste into energy with automated waste collecting systems.	envac

Dalkia provides innovative solutions to support the sustainable growth of cities and businesses. They are a global leader in energy services and will provide help in the energy efficiency information systems in the GrowSmarter project. http://www.dalkianordic.com **Dalkia role in GrowSmarter is:** Smart Solution 1 Efficient and smart climate shell refurbishment with Energy Optimization of Apartment and Industrial buildings, handle all buildings in a virtual energy network.	
Fortum generate, distribute and sell electricity and heat, and offer related expert services. In the GrowSmarter project they will provide both new business models for open district heating and provide smart grid solutions. http://www.fortum.com **Fortum role in GrowSmarter is:** Smart Solution 2: Smart building logistics and alternative fuelled vehicles with Individual energy metering. Smart Solution 3: Smart, energy saving tenants. Demonstrating several smart ways to inform tenants how to optimize their behavior to achieve maximum energy efficiency and reduce their energy bill. Smart Solution 4 Local Renewable energy production and integration with buildings and grid with smart meters – to manage the grid and to incentivize the demand and supply. Smart Solution 6 New business models for district heating and cooling to recover heat from sources that generate waste heat which can be directly recovered into the district heating system. Smart Solution 11 Alternative fuel driven vehicles for decarbonizing and better air quality with install another 100 normal charging stations and 10 fast chargers.	
Carrier is the operator of the Årsta cargo terminal, and provides services within transportation, warehousing and logistics both locally with the Stockholm region and internationally. http://www.carrier.se/ **Carrier role in GrowSmarter is**: Smart Solution 2: Smart building logistics and alternative fuelled vehicles with operating the logistic centre and the delivery with alternatively fuelled trucks	

Skanska is one of the world's leading project development and construction groups, concentrated on selected home markets in the Nordic region, other European countries and in the Americas. With a focus on green construction, ethics, occupational health and safety, Skanska offers competitive solutions – not least for the most complex assignments such as the deep renovations in the GrowSmarter project. http://www.skanska.se/ **Skanska role in GrowSmarter is:** Smart Solution 1 Efficient and smart climate shell refurbishment as the main building contractor responsible of overall energy reduction in construction.	
Info24 provides products and services within business systems, digital information brokerage and web hosting. Provides both own application as well as support to integrate third party applications. http://info24.eu/ **Info24 role in GrowSmarter is:** Smart Solution 2: Smart building logistics and alternative fuelled vehicles as the provider of a technical platform for permission and access to building site. Smart Solution.3 Smart, energy saving tenants with technical platforms for handling sensor based data flows and interfaces for end-users. Measure 7.3 Waste collection statistics for individual households/businesses (Stockholm) as the technical provider of a platform to handle sensor based data flows. Smart Solution 9 Sustainable deliveries Demonstration of last mile deliveries to retailers and home-delivery. Provider of technical platform and interfaces between internal service providers and external providers and the end-users. Smart Solution 10 Smart traffic management by develop smart phone applications to follow up changes in travel behavior. Smart Solution 12 Integrating innovative parking policies with Smart bike pools/citybikes as provider of technical platform and interfaces between internal and external service providers and the end-users.	
Stockholmshem is Sweden's second largest housing company with 49,000 tenants. It is owned by the City of Stockholm and provides both apartments and	

commercial space. The company invites other cities to take part of their experiences in the *GrowSmarter* project. http://www.stockholmshem.se/ **Stockholmshem role in GrowSmarter is:** Smart Solution 1: Efficient and smart climate shell refurbishment in the role of a housing company with overall responsibility of the energy effectiveness of all smart solutions implemented in the buildings**.** Smart Solution.3 Smart, energy saving tenants: Planning, implementing and operating a common infrastructure/interface in apartments which offer shared sensors and actuators as well as an open business model for smart services at home. Smart Solution 9 Sustainable delivery by owning the service boxes where tenants can pick up home goods delivered by light trucks after business hours. Smart Solution 12 Integrating innovative parking policies with Smart bike pools/citybikes. Providing tenants with alternatives to own their own car it is possible to reduce the number of trips that is done with car.	
Insero E-Mobility aims to create activities and breeding ground for profitable businesses within e-mobility in Denmark and enerate growth and jobs to create a broader roll-out of e-mobility in internationally. Insero E-mobility role in GrowSmarter is: Participation in WP 4 and evaluation.	INSERO E-MOBILITY
RheinEnergie is an infrastructure service provider for the Rhine region. It delivers energy (electricity, gas, heat, etc.) and drinking water to approx. 2.5 million people, industry, trade and commerce. The operating model is based on cooperating with other companies in the region. The company has a municipal base and its majority shareholder is the City of Cologne. http://www.rheinenergie.com **RheinEnergie role in GrowSmarter is:** Smart Solution 1: Efficient and smart climate shell refurbishment, Reducing hotwater losses with new solutions, hot water converter losses, New adaptive control and regulation techniques for heating systems, Energy quality assurance, Efficient Air / Water heat pumps and Efficient lightning. Smart Solution 3: Smart, energy saving tenants, Smart home system, Energy Visualization, Smart plugs,	RheinEnergie

Connected lightning and thermostats, Dynamic price models Smart Solution 4 : Local Renewable energy production and integration with buildings and grid with, Virtual Power Plant (VPP)	
Ampido is the first German parking lot finder that enables owners of driveways, garages, or parking lots to rent out their spaces on a flexible short-term (instant booking) or long-term basis. Using our app users can find the next free parking space in a few seconds and pay easily online. www.ampido.com **Ampido role in GrowSmarter is**: Smart Solution 12 Integrating innovative parking policies with Smart bike pools/citybikes, Mobility hub.	
Cambio Cologne is part of one of the biggest independent CarSharing providers. 59,000 customers including 1,550 organisations are using more than 1,600 cambio cars in 15 German and 29 Belgian cities. http://www.cambio-carsharing.com **Cambio role in GrowSmarter is**: Smart Solution 12 Integrating innovative parking policies with Smart bike pools/citybikes, Mobility hub	
Kölner Verkehrs-Betriebe forms the backbone of public transport in Cologne with its more than one million inhabitants. Eleven light rail lines and 50 bus lines as well as supplementary offers interconnect nearly all destinations within Cologne and its immediate neighbours. http://www.kvb-koeln.de **KVB role in GrowSmarter is:** Smart Solution 12 Integrating innovative parking policies with Smart bike pools/citybikes, Mobility hub	
AGT Group (R&D) GmbH is one of the fastest-growing security and public safety solutions organizations in the world and provides end-to-end integrated safety and security solutions for clients in the public and private sector. AGT R&D's solutions bring revolutionary urban management and disaster-preparedness capabilities to urban decision makers. http://www.agtinternational.com/ **AGT role in GrowSmarter is:** Smart Solution 8 Big open data platform for saving energy and improving the quality of life, Consolidated open data platform.	

The Deutche Wohnungesellschaft mbH (DEWOG) manages a portfolio of 4,256 residential units located primarily in the Cologne area and its affiliated companies handle a total housing stock of around 25,000 dwellings, the majority social housing, as well as 2,800 commercial units. http://www.dewog.de/ **DEWOG role in GrowSmarter is:** Smart Solution 1: Efficient and smart climate shell refurbishment, Reducing hotwater losses with new solutions, hot water converter losses, New adaptive control and regulation techniques for heating systems, Energy quality assurance, Efficient Air / Water heat pumps and Efficient lightning.	
Endesa is the leading electricity company in Spain, with a strong market position in the Mediterranean, and it is the first private electricity company in Latin America. It also has a growing presence in various segments of the natural gas market in Spain and Portugal. http://www.endesa.es **Endesa role in GrowSmarter is:** Participate in Smart Solution 4 Local Renewable energy production and integration with buildings and grid, integrating local RES and Demand in the smart grid, evaluating the impact on the electric grid of the overall measures on Barcelona demo as well as provide information from ENDESA smart meters. Participate in Smart Solution 5 Combined electrical energy and telecommunication services, optimizing the energy consumption of municipality assets through a new integrated infrastructure design that combine energy and telecommunication services. Participate in Smart Solution 8 Big open data platform for saving energy and improving the quality of life, creating the service platform to improve the energy efficiency of the public infrastructure integrating information from City OS or other Service Provider System that manages data from assets Participate in Smart Solution 11 Alternative fuels vehicles, deploying and operating a grid-friendly multi-standard EV infrastructure increasing competitiveness in the market through the participation of different energy aggregators	
Retevision is a telecommunication company providing network infrastructure and telecommunication, belonging to Spanish leader group in managing telecommunication infrastructures and services. In the GrowSmarter project the company sees great possibilities of managing ICT infrastructures and developing smart solutions.	

http://www.abertistelecom.com **Retevision role in GrowSmarter is**: Participate in Smart Solution 8 Big open data platform for saving energy and improving the quality of life, by managing different heterogeneous data, providing tools for unified management of integrated data, and managing smart ICT network.	
Anteverti is an independent consulting firm that advises executives and organizations in adapting to new business and environments, innovating and using new technologies. http://www.anteverti.com **Anteverti role in GrowSmarter is**: WP1 providing local coordination of measures to be tested in BCN and the link with WPs 5,6 and 7.	anteverti leading you to an innovative future
The Barcelona Supercomputing Center serves as the National Supercomputing Facility in Spain. Its mission is to research, develop and manage information technologies in order to facilitate scientific progress and foster multidisciplinary collaboration and innovation. https://www.bsc.es **BSC role in GrowSmarter is**: Smart Solution 8: Big open data platform for saving energy and improving the quality of life, developing (i) a semantic urban model that reflects the structure, processes, and events specific to urban environments, and (ii) Semi-automatic ontology aligning. Monitoring of urban air quality parameters through numerical simulation	BSC
Gas Natural SDG S.A. is a multinational energy services group whose activities include generation, supplying, distributing and commercialization of natural gas and electricity. GNF is the largest integrated gas and power company in Spain and Latin America.www.gasnaturalfenosa.com **Gas Natural SDG role in GrowSmarter is:** Liderate in Barcelona the Smart Solutions: 1 Efficient and smart climate shell refurbishment in Barcelona with Energy Optimization of Apartments and Tertiary Buildings; 3 Smart, energy saving tenants through information, monitoring and control residential homes and tertiary buildings; 4.Smart local electricity production and integration with buildings and grid developing a self-sufficient block with RES, energy storage (thermal and electric) and district heating and cooling; 6. Waste heat and local heat integration by new business model utilizing waste heat from an incineration plant. Moreover GNF participates in 11. Alternative fuel driven vehicles for decarbonizing and better air quality with a innovative gas fuel station.	gasNatural fenosa

All energy smart solutions will be monitored in a virtual energy platform.	
IREC is a private foundation committed to carry out, promote, spread, transfer and improve research activities in the energy and environment sectors such as micro-grids, electric vehicles, energy storage, efficiency in buildings, bioenergy and biofuels and offshore wind energy. www.irec.cat **IREC role in GrowSmarter is:** coordination, technical evaluation and monitoring of energy activities for Barcelona demo case. Involvement mainly in WP2 and WP3, in Smart Solution 1-Efficient and smart climate shell refurbishment, Smart Solution.3-Smart, energy saving tenants, Smart Solution 4-Local Renewable energy production and integration with buildings and grid, Smart Solution 6-New business models for district heating and cooling, Smart Solution 8-Big open data platform for saving energy and improving the quality of life, Smart Solution 11-Alternative fuels vehicles.	Institut de Recerca en Energia de Catalunya Catalonia Institute for Energy Research
Philips is focus on improving people's lives through meaningful innovation in the areas of Healthcare, Consumer Lifestyle and Lighting. The company is a leader energy efficient lighting solutions and new lighting applications. www.philips.com **Philips role in GrowSmarter is:** Participate in Smart Solution 8 Big Data Platform with Sustainable Connected lighting platform to enhance safety and mobility.	PHILIPS
As a global specialist in energy management with operations in more than 100 countries, Schneider Electric offers integrated solutions across multiple market segments, including leadership positions in energy and infrastructure, industrial processes, building automation, and data centers/networks, as well as a broad presence in residential applications, "Make the most of their energy." www.schneider-electric.com **Schneider Electric role in GrowSmarter is:** Smart Solution 8 Big open data platform for saving energy and improving the quality of life. Will together with associated partners create a platform to monitor the overall performance of lighting, traffic, bus shelters, environmental, and small EVSE from the energy point of view, assign priorities and command based on decision making algorithms via a "multi-functionality towers".	Schneider Electric

Participate in Smart Solution 3 Smart Energy Saving tenants with energy management systems	
Urbis Up is focused on supporting local governments in smart and resilient urban development projects with a strong innovative character. Urbis Up has experience in managing complex urban projects involving multi-stakeholders and multi-disciplines. www.urbisup.com **Urbis Up role in GrowSmarter is**: WPs 2, 3 and 4, providing support to the urban works definition and also to coordination and management of the Barcelona implementations.	
IBM is a global leader in providing services and solutions for information management, analysis and strategy, and was instrumental in implementing the toll road system in Stockholm. http://www.ibm.com IBM role in GrowSmarter is: participation in smart solution 8 Big data for saving energy and improving the quality of life by consolidating, aggregating and using existing and new sensor data from infrastructure and traffic.	

1.4 Ambition

GrowSmarter is based on many examples of innovative technology-based solutions that address the problems of increasing the overall energy efficiency of cities, exploiting the local resources, and ensuring a better quality of life for the citizens. ICT sharply increases the potential and the quality of these solutions thanks to its capacity of exposing dependencies and synergies between technologies, within or between the different vertical domains. Creating open, big data platforms that aggregates the information from all types of heterogeneous sources across vertical domains offers the opportunity of uncovering implicit relationships between concepts such as Balancing demand and supply of energy, learning systems to predict energy need and be able to store in advance, smart meters and lighting, active house systems or smart guiding to alternative fuel stations. This approach enables better decision making and optimized resource provisioning, encourages citizen participation in the solutions that are proposed, and offers new business opportunities. Our solution is based on semantic technologies. This is an open, unified approach, and is a big step forward towards a flexible solution that is easily replicable in other cities.

GrowSmarter provides many technical and managerial innovations that are on the verge to market development and will strongly benefit from being showcases in the Light House cities, thus being able to be verified in large scale application and disseminated to a large set of potential customers.

The table shows the Technology Readiness level for the measures included in proposal.

TRL 7 – system prototype demonstration in operational environment
TRL 8 – system complete and qualified
TRL 9 – actual system proven in operational environment (competitive manufacturing in the case of key enabling technologies)

Smart solution	TRL
Low energy districts:	
1. Efficient and smart climate shell refurbishment	
Windows with extra low U-values	7
Reducing hotwater losses with new solutions, hot water converter losses	7
Recovering waste water heat from the drain	7
Energy classified hot water fixtures	9
New efficient exhaust air heat pumps	8
New adaptive control and regulation techniques for heating systems	9
Energy quality assurance	8
Air tightness	7
Efficient lightning	8
2. Smart building logistics and alternative fuelled vehicles	
Integrated multi-modal transport for construction materials/logistics center	8
3. Smart, energy saving tenants through information	
Active house/Home Energy Management Systems/Smart home system	7
An open home net	7
Energy Visualization	9
Smart plugs, Connected lightning and thermostats	8
Dynamic price models	8
Individual energy metering	8
CO_2 signal	7
Energy Saving Center	8
4. Local renewable energy production and integration with buildings and grid	
Virtual Power Plant	7
Dynamic pricing for individual households and industry, reducing electricity usage during scarcity periods	8
Batteries for storage of RES,	7
Charging of Electric Vehicles	7
Heat pumps for heat storage in heating system and hot tap water system	8
Smart meters	7
Weather metering predicting RES storage demand	7
Integrated Infrastructures	
5. Smart lighting, lampposts as hubs for communication	**7**
lampposts as base for sensors, wifi, mobile network	7
lampposts as base EV-charging	7
6. New business models for district heating and cooling	
Open district heating with feed in of waste heat	7
Waste heat from data centers and vacuum waste systems	7
Waste heat from fridges and freezers in supermarkets	7
District heating and cooling rings	8
Smart local thermal districts	7
7. Smart waste collecting, turning waste to electricity, heat and biogas for vehicles.	
Optical sorting of waste	8

Introduction of AWCS (Automated waste collecting system) in an existing neighborhood	7
Waste collection statistics for individual households/businesses	7
8. Big data for saving energy and improving the quality of life	
Big open data platform	7
Semantic urban model	7
Semi-automatic ontology aligning	7
Semi-automatic instance mapping	7
Integration of sensor data in a uniform, standard-driven data format	7
Portal for visualizing the sensor infrastructure of the city	7
Smart Municipality Integrated Efficiency Infrastructure Platform	7
Sustainable Connected lighting to enhance safety and mobility	7
Sustainable urban mobility	
9. Sustainable delivery	
Integrated multi-mode transport for light goods	8
Micro distribution of freight	8
10. Smart traffic management	
Traffic management through MFD	7
Traffic management analysis	8
Travel Demand management	7
Traffic control system for passenger vehicles.	7
Traffic signals synchronized to prioritize certain vehicles movement of goods	9
11. Alternative fuel driven vehicles for decarbonizing and better air quality	
Developing charging infrastructure	7
E-taxi combining Fast charging and E-parking	7
Charging infrastructure for electric tricycles for micro distribution	7
Setting up refueling facilities for alternative heavy duty fuels fuel	7
Smart guiding to alternative fuel stations and fast charging	8
Small distributed CNG grid	7
LNG powered tugboats will further be introduced as a step in towards an Ecological port.	7
12. Smart mobility solutions	
Green parking index in combination with car sharing pool with EV	7
Electrical and cargo bike pool	8
Mobility hub	7
Electrical and conventional car sharing	8
Conventional/PHEV/CNG vehicle-sharing fleets	8
Smart taxi stand system	7

2 Impact

2.1 Expected impacts

GrowSmarter will demonstrate wide-scale, innovative, replicable and integrated solutions in the energy, transport, and ICT. The demonstrations aims to meet the three different aspects of sustainability; economic, social and environmental. On the demonstration level *GrowSmarter* will implement 12 replicable Smart Solutions in the field of energy transport and ICT. Together they will:

1. Accommodate the cities' needs of good housing, reliable infrastructure for energy, waste and mobility.
2. Reduce the need of energy by 60 %, greenhouse gas emissions with approximately 60 % and local emissions from transport esp NOx by 60% of the chosen districts.
3. Create 1 500 new jobs on the demonstration level

This will increase the energy efficiency of districts and of cities and foster the use of renewables and their integration energy system and enable active participation of consumers and by this achieving the overall goals. This will naturally also reduce costs for energy both for the city and especially for the citizens and also improve growth in the involved cities by creating investments on the local level.

But the project primarily aims at much larger impact. The Smart solutions correspond to common needs in European cities and the Light House cities are chosen to represent all Europe from Mediterranean climate, over Central Continental climate to the Northern temperate-boreal zone. Also the buildings and city districts are chosen to be representative for a large part of Europe's inhabitants.

By carefully benchmarking the energy savings made, using the same methodology for monitoring - *GrowSmarter* partners will be able to go beyond the normally regional/national mindset and framework and get a fully comparable view of the potential for economical energy saving in refurbishing Europe's residential buildings.

The Lighthouse cities: Stockholm, Barcelona and Cologne have been chosen since they all have the:

- will and capacity to host the smart solutions,
- capability to show them to followers and other cities
- the extensive networks to help disseminate the results through different channels.

The industrial partners have been chosen because they:

- Have high knowledge and available near market smart solutions
- Have a clear capability and will to demonstrate the smart solutions to follower cities
- Have ambitions to roll out the smart solutions to the rest of Europe and globally.

Thus the impacts of *GrowSmarter* don't stop in the project cities but are targeted to the European and Global market. The smart solutions impacts on the European level can have energy saving potential on the same levels as in the Lighthouse cities and the number of jobs created could, up scaled to the European level come up to approximately 1,5 million.

Trigger large scale economic investments with the repayment of implementation costs in acceptable time lines (to facilitate the bankability of the projects);

The Smart Solutions are chosen for their business and payback potential. They fulfill the energy and city plans already adopted by the Light House Cities. When validated and proven efficient, feasible and economical, these Smart Solutions will be up-scaled in the Light House cities themselves as a fulfilment of the plans, and by joint dissemination byLH-cities and industrial partners replicated, firstly in the regional and national scale by cities facing the same challenges and working under the same legislation, and then through the example of the Follower cities also in other take-up cities.

Increase mobility efficiency with lower emissions of pollutants and CO2

GrowSmarter Light House cities are well developed in the use Public Transport, the use of alternative fuels, EVs and mobility, as are several of the Follower cities. The Smart Solutions adds brings this even a bit further with the further deployment of EVs, Delivery vehicles operating on clean renewable fuels, the reduction of traffic through use of logistic centres, last mile delivery, smooth door-to-door options, traffic management and real time travel planners

Decarbonise the energy system while making it more secure and stable;

GrowSmarter will substitute more than XX GWh yearly by renewable and waste energy. To match intermittent RES production and uneven demand, Virtual Power Plants will manage and balance the need and supply, using several smart technologies, including visualization and dynamic pricing, but also using storage in form of batteries and heat, supported by learning systems which will learn when to store in advance.

Increase quality of life by creating local jobs (that cannot be delocalised) in cities;

The *GrowSmarter* project will create new jobs in the lighthouse cities but especially for the involved industrial partners. The investments in integrated infrastructure, sustainable mobility and energy efficiency improvements will all involve significant input of labour. Some of the jobs, such as construction work, may possibly be local but will be procures according to European legislation during the inception phase of the project. Other jobs will be created at the industrial partners sites within Europe.

Create stronger links between cities in Member States with various geographical and economical positions through active cooperation.

The 3 light House cities Stockholm, Barcelona, cologne and 5 follower cities Cork, Porto, Graz, Valetta and Suceava shows a good representation of Europe in both geographical and economical position and also in size. There will be meeting in all cities with many occasions to study different solutions to similar problems and to tie personal bonds, which by experience is the best way of knowledge transfer.

A large barrier for the wider spread of technology and methods is lack of knowledge of the true energy saving potential and the true costs by the decision maker in housing companies.. The current lack of knowledge - or disbelief in true energy savings - form a chicken-and-egg situation where technology suppliers are unable to establish business in new markets as there is no demand. This creates the current paradoxical situation where cost-effective energy saving measures are standard in some countries but almost not at all available in others (e.g. high performance windows and heat pumps are standard in Sweden, also in refurbishing, but only used in very special applications in other European countries). By using independent validators from reputable universities and open data the true potential and cost benefit of each smart solution will be public and available.

Some business models are dependent on policy decisions to break deadlocks. A typical example is building logistic centres where there is a win-win situation by not having to move construction material several times and not risking it being destroyed or stolen. It has however shown necessary to set a requirement to use such centres to get the market going and a city needs to have clear evidence of the potential before it takes such a presumably unpopular policy decision.

2.2 Measures to maximise impact

2.2.1 Dissemination and exploitation of results

The Replication (exploitation of results) and Dissemination follow a logical chain with 5, partly overlapping, phases

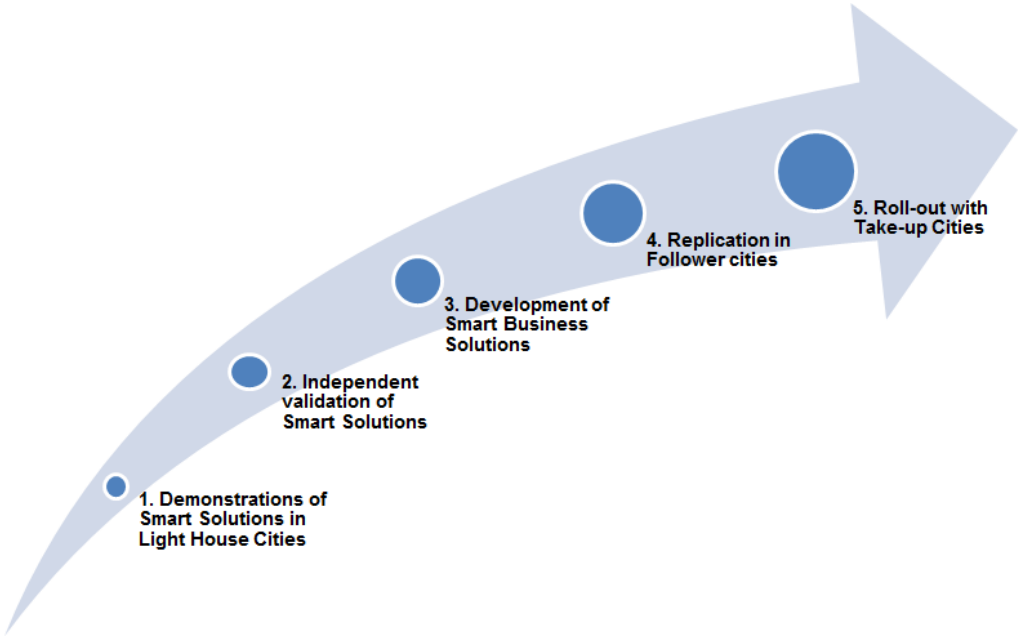
1. **Demonstrations of Smart Solutions in Light House Cities**
   The demonstrations will show the feasibility of the chosen Smart Solutions and also reveal inherent weaknesses and administrative obstacles that need to be amended. More details can be found in the WP 2-4 descriptions

2. **Independent validation of Smart Solutions**
   Two well reputated Universities: the Royal Technical Institute in Stockholm and IESE Business School in Barcelona, will carefully validate the Smart solutions and guarantee their performance regarding environment, energy, social and economic impact. More details can be found in the WP 5-6 descriptions

3. **Development of Smart Business Solutions**
   When the Smart Solutions are tested and validated for both environmental and social performance and also analysed regarding their over-all economic potential, Industry partners will together with IESE and follower cites develop the Smart Solutions into Smart Business Solutions that are able to be replicated on their own merits, without additional supporting funding. More details can be found in the WP 6 description

4. **Replication in Follower cities**
   The Smart Business Solutions will then pass their final test by being implemented in the Follower Cities which all the time have been closely following the development and results in the Light House Cities. Hence followers are able to avoid the mistakes and pitfalls inevitably made by the first movers in Light House cities and simultaneously been able to prepare for replication in their own cities, taking the necessary decisions and raise funding for the necessary investments and find the correct stakeholders. More details can be found in the WP 7 description

5. **Roll-out with Take-up Cities**
   After this meticulously testing and development the Smart Business Solutions are ready to face reality in form of Take-up cities – being interested early majority cities. Using the extensive networks of ICLEI, REC, POLIS and also other important networks, like Eurocities, Covenant of Mayors, C40, Green Building Council and key networks, and a set of study visits and workshops, *GrowSmarter* are already during the project time building up a pool of potential and interested Take-up cities, which will be ready to adopt the Smart Business Solutions that are apt for their specific city. More details can be found in the WP 8 description



2.2.2 Dissemination Plan

During the first twelve months a detailed Dissemination plan will be developed. Target cities, groups and stakeholders for the dissemination will be identified all over Europe. The plan will contain a number of dissemination activities that will be targeting each identified stakeholder or target group.

The plan will regularily be updated to include new findings in the project, new target groups, new ways to approach target groups changed circumstances etc. ICLEI is responsible for developing and updating the plan.

Target Groups

The obvious target groups are policy makers and energy officers in potential Take-up Cities.

Regional/National: Cities in the same country as Light House cities will be likely to replicate as they the regulations are the same and industry partners can hence apply their Smart Business Solutions in yet a city without further ado. There are also well developed networks among several stakeholders at many levels within a country.

European: Cities outside the Light House and Follower cities will receive regular information on the progress in Light House Cities through web pages, newsletters, project Diary, presentations and meetings in other fora, e.g CONCERTO, Civitas Forum, Eurocities' meetings, Covenant of Mayors, Smart Cities Stakeholder Platform, Major Cities of Europe etc.

They will also be invited to workshops in the Light House cities and to a series of European workshops, which *GrowSmarter* aims at co-arranging together with other Light House City-projects

The most interested of the potential Take-up cities will be offered to participate in **a City interest group** of about 20 cities, receiving access to more detailed information and study visits to Light House Cities to get personal contacts with both industry, validators and city officers, thus receiving fair and balanced information on all aspects of the Smart Solutions. To further support the exchange of information, there will be an open and interactive **helpdesk** for this city group in order to develop on detailed issues regarding the Smart Solutions.

Communication Tools
The Dissemination plan will analyse which other tools that serve the purpose best to reach each target group. Example on communication tools that will be closely examined are:

- **Project website**: Focus on providing concise updates on Lighthouse Cities' projects (and Follower Cities, once underway), and the presentation of other project materials
- **Promotional brochure** to be produced to promote the project and its activities to a wide audience via relevant events and mailings
- Project mailing list/interest group
- Electronic **Project Diary** to be published three times per year providing short updates on Lighthouse City implementation measures, as well as an relevant updates from Follower Cities
- LinkedIn: A Linkedin group will be created targeting the Consortium partners and engaged members. It will be closed to members and comments will be moderated.
- Slideshare: All the relevant presentations will be shared in platforms such as slideshare.com respecting the levels of privacy (presentations are going to be public or private according to the topic and information provided).
- Youtube/Vimeo may be used to publish promotional and tutorial videos.
- Wikipedia: Elaboration of Wikipedia articles of key concepts and innovation artefacts, such us Energy Efficiency embedded in Urban Planning, City Protocol, and so on.
- Fact sheets to be produced that focus on particular aspects of the smart cities approach.
- In the final year of the project a **Results Brochure** will be developed presenting summarised results from the three Lighthouse Cities, with a focus on presenting "good reasons for going smart" and "success stories".

Study visits and City-to-City exchange
The SEE demonstration sites will set up local study visit programmes that will be adapted and marketed to selected target groups, covering all phases. After careful analysis and initial contacts with likely Take-up cities, a more in-depth City-to-City exchange will be developed and offered to these cities together with the local housing and possibly energy companies.

Local dialogue
A local dialogue with the citizens and especially the tenants is important for the successful implementation of several Smart Solutions. Building on the existing channels for Citizen dialogue and tenants dialogues together with established cooperations with Tenants organisations and local Citizens groups, each Light House City will develop this further and set up locally adapted strategies for the remake of the pilot areas, using different interactive tools as:

- Interactive Website, daily updated on the development of the refurbishment and other news referring to the project and other local conditions, e.g. necessary re-routing of bus lines, temporary movement of bus stops etc
- Facebook: A specific project page will be created targeting a broad audience.
- Blog: A blog embedded in the website as a platform for project members to blog about their activities around the project. This will be an active place addressed to Stakeholders to incentive their participation and used to achieve feedback in the process..
- Twitter: Twitter will be used to inform the interest group on the project progress and milestones achieved, to inform the users on the new services provided by the project, to get feedback from the users and interests groups and to publish project news and events. Hashtags of related topics will be used.
- Local Newsletter: The newsletter is going to link to all social media channels and inform about the recent news related with the project.
- Manned showrooms, showing the different innovations and how to make best use of them
- Youtube/Vimeo will be used to publish promotional and tutorial videos.

2.2.3 Management of Knowledge and Intellectual Property

GrowSmarter is expected to generate and refine knowledge of commercial interest in some fields, especially ITC. Partners investing in evolving such products should have an advantage over those who do not. On the other hand, they will gain from having the products tested under real conditions.
This leads to the principle that generated knowledge is made available to the extent needed for other partners to improve the common work and the success of *GrowSmarter*.

This approach to Knowledge management and Intellectual Property will be regulated in the Consortium Agreement.

Some of the major aspects covered are shortly indicated below.

- Confidentiality: Each partner will treat information from other partners as confidential and not disclose it to third parties unless it is obvious that the information is already publicly available.
- Ownership of Knowledge: Knowledge is owned by the partners who carried out the work generating the knowledge, or on whose behalf such work was carried out.
- If a partner wishes to assign any knowledge to a third party he should inform the other partners and request their consent, which should not unreasonably be withheld.
- Patents: Partners who own knowledge suitable for patent may (and are encouraged to) at their own expense make applications for patent or similar form of protection and shall supply details of each such application to the other partners.
- Access Rights: Partners grant to each of the other partners royalty-free access right to knowledge generated in the project to the extent needed to successfully perform the project.

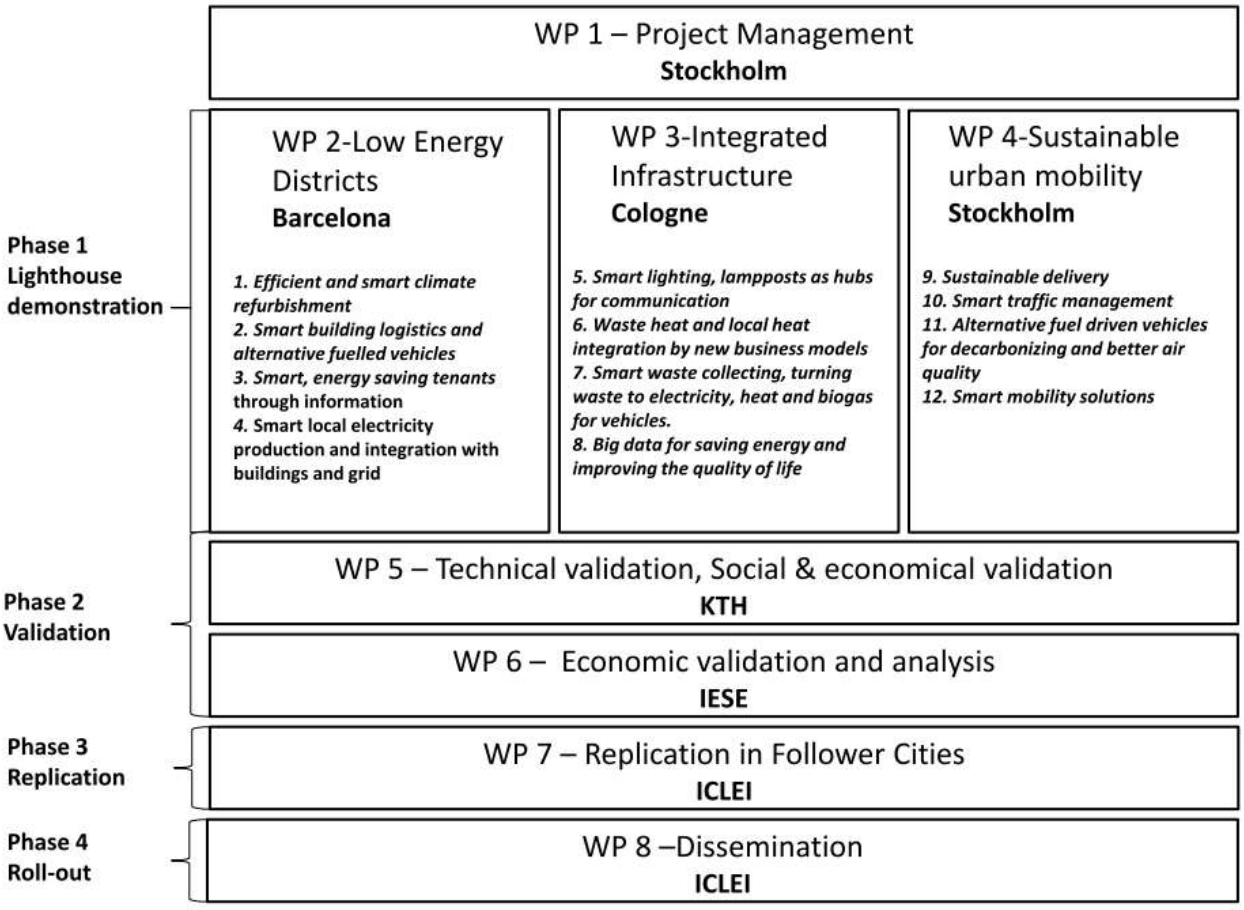
3 Implementation

3.1 Work plan — Work packages, deliverables and milestones

The Grow Smarter project has organized the work in 8 work packages and 4 phases. Each WP has an appointed WP leader responsible for the work.

The basic concept in the *GrowSmarter* project is to provide real-life energy savings with integrated solutions within low energy, integrated infrastructure and sustainable mobility. The innovative smart solutions will be demonstrated in each of the three Lighthouse cities which also will lead one of the demonstrating work packages (WP2-4). The cities will carefully monitor and validate the solutions to provide first the follower cities and then rest of Europe with replicable solutions with sustainable business models for everyday use of our citizens. WP5 will validate technical, economic and social aspects of the demonstrated solutions to prove the potential for replication. WP6 will support market introduction when innovative solutions are offered to a broader market and develop green business plans. Follower cities participate in WP7 managing how to adjust the demonstrated solutions to be successful in these cities, and adopt to the solutions after WP5 has validated them and WP 6 has developed market up take plans and potential, the basis for European market wide replication in close cooperation with WP8 which focuses on dissemination. Finally, the entire project work will be coordinated by WP1 Project management.

The two phases procurement and implementation runs as thematic areas across WP2-4 as each Lighthouse city perform this work and benefit from synergies from interaction when e.g. identifying and procuring suppliers that can deliver the innovative solutions to the market.



3.1.1 Project phases

Phase 1- Lighthouse demonstration , month 1-18

The phase, and the *GrowSmarter* project, begins with sub-phase inception in month 1-3. Procurement of all industrial suppliers that are able to provide the smart solutions as specified in this proposal will be carried out by define requirements prior procurement. Due to the Law of Public Procurement this is not possible prior the project has been approved. The Implementation sub-phase follows in month 4-18, manage the issues related to the actual implementation of the smart solutions in the Lighthouse cities and achieve a coordinated approach on how to solve implementation issues and transfer knowledge from all the Lighthouse cities. This phase will be active until all measures are implemented, maximum of 2 years from project start. All demonstration partners will deliver data from demonstrated solutions which will be monitored in the monitoring sub-phase which last more than 2 years.

The Lighthouse demonstration phase covers WP 2-4 to exchange knowledge from all the sub- phases including prepare procurement process, get necessary permissions and establish cooperation's, carry out procurement and construction according to the European procurement directive from the other Lighthouse cities. Each Lighthouse city is foreseen to have about 7-10 industrial partners prepared to deliver the smart solutions.

Phase 2- Validation, month 19-48

The collected data from the demonstrated smart solutions will be the basis for WP5 who coordinates the monitoring methods, data gathering formats and evaluation criteria of the data to be collected. The phase begins in month 19 and ends no later than month 48. Validation also include evaluation includes market obstacles encountered during the implementation – as a basis for work in WP 6, 7 and 8.

Phase 3 –Replication, month 42-60

The *GrowSmarter* project is now ready to start the replication phase which begin by building the business cases in month 42-48 followed by the replication of business cases in month 49-60. This is the main phase for follower cities but also the involvement of other European cites as well.

Phase 4- Roll-out, month 52-60

Now the *GrowSmarter* project has successfully demonstrated and validated the measures of the smart solutions and created business plans, involved the necessary business partners who consider the measures as viable business cases for smart energy savings measures to be roll out in first the follower cities and secondly in other European cities.

3.1.2 Work Packages

Work package number	1										
Starting date or starting event	M1										
Work package title	Project Management										
Participant number	1	2	3	4	5	6	7	8	9	10	11
Short name of participant	MF	COL	BCN	ICLEI	KTH	IESE	GRZ	SUC	VAL	POR	COR
Person/months per participant:	62,27	5,07	0,32	4,11	4,11	4,11	1,49	14,40	1,49	1,49	1,49
Participant number	27	28	29	31	32	34	35				
Short name of participant	END	RIS	ANT	CENI	GN	IREC	PHL				
Person/months per participant:	1,87	2,00	40,80	1,07	6,86	1,14	0,85				

Objectives

- Offer clear and concise co-ordination and integration of the project, ensuring that all relevant information and experience reach the relevant stakeholders, avoid double-working and ensure a clear decision structure.
- Ensure effective communication between the partners and facilitate knowledge exchange and a culture of mutual learning.
- Monitor and supervise the project development, in order to fulfil the work-programme activities, objectives and schedules.
- Ensure the interaction with the European Commission.
- Ensure the interaction on the European level with relevant networks and organisations.

Description of work (where appropriate, broken down into tasks), lead partner and role of participants

The day-to-day management of the whole project is undertaken by the Coordinator in close consultation with the site coordinators and WP-leaders. In particular, it will ensure a sound management of all technical and administrative issues of the project by means of face-to-face meetings, audio conferences, document collaboration tools and regular exchange by phone and email. Site coordinators are specifically responsible for the local coordination task 1.6. For details on the different roles and responsibilities.

Task 1.1 – Technical and Administrative co-ordination

The coordinator will be responsible for the following

- Supervise the progress and fulfilling of each partners‟ tasks in order to achieve the project's objectives on time and to cost.
- Prepare a Consortium Agreement which will complement the contract which specifies rights, rules and obligations for all partners.
- Co-ordinate between all project partners and the EU Commission
- Support the local management at the Lighthouse cities
- Support coordination with local industry partners
- Ensure the integration between the different Lighthouse cities and Work Packages
- Coordinate work planning and managing possible adaption of the work plan after changes

- Report to the EU Commission about project status and progress, including design and maintain templates for collecting input, compiling and reviewing partners input and verify consistency with the project tasks before transmission and the follow-up of EC-reviews and comments.
- Prepare and report to and from the Steering Group Meetings. Support the Steering Group in its work. Follow-up on the Steering Group decisions.
- Support risk identification and monitoring, see chapter xx

Task 1.2 – Financial coordination

The coordinator is responsible for the following

- Supervise and support the local management with the partners‟ financial tasks overseeing compliance with funding rules and providing advice in financial aspects
- Compile and transmit financial report to the Commission, distribute funds received, keep the records and financial accounts

Task 1.3 – Quality assessment

The coordinator will together with the WP-leaders, monitor and assess the quality of the work and reports performed in the WPs. WP1 leader will coordinate the work including setting up an internal quality control system that will ensure that internal external quality control mechanisms will result in excellent quality deliverables.

Task 1.4 – Internal project communication

The project requires a cross-site approach and the internal project communication is crucial for all tasks to be performed. The coordinator is responsible for

- Establish routines that ensure the communication, between and among the project partners, associated partners and stakeholders and with the European Commission and External Key Networks.
- Arrange a telecommunication service to manage the virtual meetings.
- To support WP-leaders in the task to initiate exchanges between partners
- Set up a document repository for sharing knowledge, experience and best practices

Task 1.5 Smart City Lighthouse Project Peer Group

Considering the challenges that are faced by the lighthouse project cities it is considered helpful to broaden the basis of knowledge and experience by establishing a Lighthouse Project Peer Group with representatives from each of the envisaged lighthouse projects (3-4 in 2014, and 4-5 in 2015). The role of the Group includes the following:

- All lighthouse project cities will have an annual peer exchange meeting in one of the lighthouse project cities. This will be linked to the extent possible with the European workshop series in 8.4
- Each lighthouse city will receive an annual peer review by a least two cities from different lighthouse projects
- Through the Project Peer Group a common project evaluation scheme will be developed, reflecting the results of the smart cities KPI project under SCC2 as well as the results of international standardisation processes like ISO TC 268 and CEN working group on smart and sustainable cities.
- The Project Peer Group will form the core group for the Smart City Roadmap

Task 1.6 – Represent the project

The coordinator represents the project externally and is the main contact point for the project vis-à-vis the European commission and also other external contacts.

Task 1.7 – Local co-ordination

Task 6 is performed by each site manager. Local coordination performs similar task at local level as the overall coordination does at project level. Local coordination contains the following main tasks

- Technical and Administrative co-ordination
- Financial co-ordination
- Quality assessment
- Internal project communication

Task 1.8 - Local dialogue

In each Light House city the industry together with the city will develop several communication channels to ensure an open and multi-directional dialogue. This will build on existing structures for district democracy and e-communication, but further develop the new technology options like interactive websites, discussion for a etc.

Deliverables (brief description and month of delivery)

- D1.1 Inception report M3
- D1.2 Data management plan M6
- D1.3 Annual technical and management reports M12, 24, 26, 48
- D1.4 Final Technical Report M60

Work package #	2													
Starting date or starting event	M4													
Work package title	Low Energy Districts													
Participant #	1	2	3	5	7	8	9	10	11	14	15	16	17	18
Short name of participant	MF	CGN	BCN	KTH	GRZ	SUC	VAL	POR	COR	DAL	FPH	CAR	SKA	INF
Person/months per participant	36,29	1,07	2,88	5,33	0,21	4,27	0,21	0,21	0,21	14,93	16,00	16,00	14,93	7,47
Participant #	19	21	29	32	34	37								
Short name of participant	STH	RE	ANT	GNS	IREC	UBI								
Person/months per participant	51,73	20,05	1,07	137,07	50,31	3,57								

Objectives

- Identify and procure industrial partner at local site
- Implement and demonstrate energy savings measures in Low Energy districts.
- Gather data from implemented measures for evaluation
- Analyse legislative and structural barriers
- Analyse replicability of Low Energy measures

Description of work (where appropriate, broken down into tasks), lead partner and role of participants

The work package structure for WP 2-4 is generic since all the Lighthouse cities will perform the same tasks but in different main areas (Low Energy, Integrated Infrastructure and Mobility). This task structure is generic, transparent and proves synergy among the main partners in the project since it require close cooperation between the WP 2-4 leaders in each task.

Task 2.1 - Prepare the realization
This task aims to collect necessary permissions and carry out the procurements required by European legislation. As the Lighthouse cities have prepared for this phase it should be able to keep it short at approximately six months. The experiences from this process will be compiled in a deliverable when the phase has ended. The WP 2 leader is responsible for this task and will coordinate work in cooperation with the WP 3-4 leaders that have performed procurement processes for measures in Low energy district.

Task 2.2 - Implementation
This is the core essence of the project and focus on implementation of the concrete measures in each Lighthouse city within Low Energy District. When each measure has been implemented the main results and experiences will be compiled into a deliverable. For detailed information for each smart solution and all measures included, view section "Smart solutions to implement". The WP 2 leader is responsible for this task and will coordinate work in cooperation with the WP 3-4 leaders that have completed implementation for measures in Low energy district in their cities.

<u>Smart Solution 1 : Efficient and smart climate shell refurbishment.</u>

Demonstration of combining shell thermal envelope/refurbishment measures such as wall/floor, attics and roofs with energy efficient measure such as windows with low U-values, heat recuperation from both ventilation and sewage, air tightness and technical insulation. This will drastically reduce the net energy demand for all buildings.

The below table summarises the sites included in *GrowSmarter* under this component.

No & City	Site	Total area (m^2)	Old demand (kWh/m^2 yr)	Suggested new demand (kWh/m^2 yr)	Own generation (kWh/m^2 yr)	Net savings in demand (%)
1. Stockholm	Fastighetskontoret	1,600	255	104	57	82
2. Stockholm	Årstahöjden	4,950	122	92	2.6	27
3. Stockholm	Valla Torg	29,757	155	41	2.1	72
4. Cologne	Stegerwaldsiedlung	20,528	153	18	6.8	84
5. Cologne	Stegerwaldsiedlung	12,762	186	18	6.9	87
6. Barcelona	Residential Buildings	3,840	59	30	?	49
7. Barcelona	Hotel Catalonia	6,417	201	62		69

The full Building Energy Specification Tables (BEST) for the above 7 sites are found in Annex 1.

GrowSmarter will act as a showcase for the following technical and practice innovations that saves energy and improve living conditions for the tenants

Measure 1.1 Energy efficient refurbishment of the building

- Windows with extra low U-values
  Skanska will use a new window with a U-value of 0.7 developed for easier mounting will be used when refurbishing existing buildings in Stockholm. This will save time when mounting the windows and energy when they are put in place. One thing that has turned out to be a problem with this kind of highly insulating windows is cellphone coverage. Therefore a study on how to solve this will be conducted within the project.

- Reducing hotwater losses with new solutions, hot water converter losses
  Poorly piping isolation when connecting buildings has long been overseen and recent studies have shown losses of 6-20 kWh/m^2. Now these losses will be cut with. 50 %.

- Recovering waste water heat from the drain (Stockholm, Barcelona)
  Recovering heat from the sewage system to preheat tap hot water is a new area for heat recovery with great potential. About 25 % of the energy for heating water will be saved.

- Energy classified hot water fixtures (Stockholm)
  By using energy classified hot water fixtures it is possible to save ca. 5 kWh/m2 annually. There is a work ongoing to turn the Swedish classification standard into a CEN standard.

- New efficient exhaust air heat pumps (Stockholm)
  Heat recovery connected to the ventilation system is unusual in old buildings. A new type of heat pump cools the exhaust air to -10 to -15 degrees, saving up to 50 kWh/m^2 annually.

- New adaptive control and regulation techniques for heating systems (Stockholm, Barcelona)
  Indoor temperature sensors will be used to give feedback to the heating/cooling and ventilation control system. It is a learning system that adapts to the individual building's dynamics and response to weather, and hence provides heating/cooling in a more efficient way than traditional systems which only use outdoor temperature sensors. The savings potential is around 10 %.

- Energy quality assurance (Stockholm)
  Using an energy supervisor for all parts influencing energy performance during the whole building process is a new way of optimizing the building practice. Buildings will finally be thermographed to ensure that there is no heat leakage.

- Air tightness (Stockholm)
  Part of the buildings will be tested in order to secure the quality of measures according to the climate shield. This is not common practice to apply on large scale or in a renovation context but can be of great importance in a climate with a fairly long heating season.

- Efficient lightning (Stockholm, Barcelona, Cologne)
  By implementing different energy saving measures a lot of electricity can be saved. The lighting in elevators will be controlled efficiently These lights will, if they are on at all times consumes as much electricity as the elevator engine. Also the elevator engine will be steered efficiently. LED lighting will be used in public spaces and energy efficient appliances in common laundry rooms.

- Pool measures (Barcelona)
  Swimming pools have special characteristics and are seldom built to be energy efficient. In Barcelona several specific pool measures will be implemented: heat pumps for dehumidification, heat recovery from shower waste water, pool insolation, night covers of the pool, heat pumps in ventilation system, condensing natural gas boilers, variable speed fans and pumps

  Involved industry partners: Skanska, Stockholmshem, Gas Natural, Schneider, IREC, Dalkia, DEWOG
  Associated partners: Aiguasol

Smart Solution 2: Smart building logistics and alternative fuelled vehicles

This smart solution will demonstrate what type of goods can be consolidated, how the city and local transport market are affected and the energy savings achieved e.g. less heavy goods transport in urban areas.

- Measure 2.1 Integrated multi-modal transport for construction materials/logistics center in Årsta (Stockholm)
  A center will be established in Årsta to handle the incoming construction materials. All deliveries under a set amount will deliver to the logistics center where it will be consolidated with other goods and then delivered to the site where it is needed, when it is needed. This will save time for delivery firms and at the building site as it avoids the need to handle all the smaller deliveries and manage on-site logistics and security. It will also save both time and money as the materials get delivered at the right time. This saves about two or three times of reshuffling the materials at the building sites which saves both time and reduces the damage caused on the goods. This very logistic centre will be located at a train station, which will provide opportunity to deliver some construction material by train, which is very unusual in the construction business.

  Involved industry partners: Carrier, Info24

Smart Solution.3 Smart, energy saving tenants

Demonstrating several smart ways to inform tenants how to optimize their behavior to achieve maximum energy efficiency and reduce their energy bill. The basis is collecting of individual energy data, compiling it to the tenants. The Energy information will be integrated with mobility and infrastructure information in the different data platforms.

On an aggregated level this data will complement other demand data and is hence an important part of the smart grid system.

- Measure 3.1 Active house (Stockholm) /Home Energy Management Systems (Barcelona)/Smart home system (Cologne)
  Presenting the tenants with customized energy data and real-time prices together with real-time feedback on individual behavioral influence on price and energy will lower the demand for energy. It will also even out peak loads of heat and electricity and keep track of e.g. personal electricity production via PVs and is hence closely connected to Smart Solution 4 and 5:

  The system includes several components that interact with each other.

  An open home net The open home net is a common infrastructure/interface in apartments which offer shared sensors and actuators as well as an open business model for smart services at home. This opens up for a range of new business opportunities and service providers. By sharing the sensors needed to provide different services in apartments it is possible to add many services to low costs.

  Energy Visualization (Stockholm. Barcelona, Cologne)
  Each household will get access to a smart home energy visualization application. This application will typically run on a tablet or smartphone and will give the user instant feedback on energy consumption. The current consumption of electricity, heat, hot water and gas is visualized in real-time.

  Smart plugs, Connected lightning and thermostats (Stockholm, Cologne)
  In order to allow even more detailed metering and add the dimension of remote control, smart plugs that allow the user to control the electricity outlets remotely, thus allowing tenants to benefit from lower energy prices to run e.g. washing machines. The smart plugs also measure the electricity consumption in the outlet in realtime. A similar remote system is installed for lightning and radiator thermostats

  Dynamic price models (Stockholm, Cologne Barcelona)
  An essential part of the smart grid is to provide a mechanism to reduce demand when electricity consumption is low. Hourly prices, also visualised serve as a clear such signal, incentivizing the reduction of electricity when local production doesn't meet demand.

  Individual energy metering (Stockholm)
  In Stockholm, as usual in many houses heated by district heating, heat and hot tap water has hitherto been included in the rent and there is hence no individual metering. Fortum will install meter readers to leverage the existing sub-metering in the buildings.

  CO_2 signal (Stockholm)
  Hourly carbon dioxide intensities is connected to the actual need for ventialtion. Fortum will provide such a signal to consumers in Årsta, to be visualized together with other energy data.

  Energy Saving Center (Stockholm)
  ESC uses a thermodynamic model adapted to each building to influence, not replace, existing heat/hot water control systems. DESC uses a thermodynamic model adapted to each building to influence, not replace, existing heat/hot water control systems. Each building is unique. The system improves the buildings energy performance through modeling how the building behaves with consideration to tenants, heating, cooling and hot water usage. Through energy forecasts it is possible to decrease heating power, cooling required and to avoid power peaks. DESC can be connected to the open home net (Measure 3.1) and the Active house (Measure 3.2) to find and visualize the energy savings potential in the house. It is estimated that it is possible to save 15-25 % of the energy used with the help of DESC.

  Involved industry partners: Fortum, Dalkia, Schneider Electric, Gas Natural, IREC, Retevision I,

Rhein Energie, Info24
Associated partners: Aiguasol, STOKAB

Smart Solution 4 Local Renewable energy production and integration with buildings and grid

Demonstrating smart management of local renewable energy production with local demands, integrating producers and consumers and combining with heating/cooling and storage capacity for surplus production.

- Measure 4.1 Virtual Power Plant (VPP) – balancing demand with supply (Cologne, Stockholm)
  Energy virtual power plant means the interconnection of many small energy systems by a central control system into a virtual power plant. Virtual power plants balance the fluctuate input of distributed systems of renewable energy, constantly balancing electricity use with production, reducing demand when necessary and storing surplus energy when needed. To optimize storage, weather forecasts and good modelling of the expected need is essential.
  The Virtual Power Plant interacts in real time with the following production and storage facilities:

  Local production
  - Photovoltaics, mainly on rooftops and façades in the whole LH-district
  - CHP (Stockholm, Barcelona, Cologne)
  - Fuel cells as an add-on to air heat pumps (Cologne)

  Demand/Storage
  - Dynamic pricing for individual households and industry, reducing electricity usage during scarcity periods
  - Decision to store/not store the cars be managed by the VPP-manager (Cologne)
  - VPP managed Batteries,
  - Charging of Electric Vehicles – a price model will allow for temporarily reduction of the electricity to charging stations. A driver in no hurry can utilize this cheaper price model
  - Heat pumps for heat storage in heating system and hot tap water system (Barcelona, Cologne)

  Metering and sensors
  - Smart meters – to manage the grid and to incentivize the demand and supply, it is essential to install smart metering that can monitor the net electricity flow at each users inlet.
  - Weather metering (Barcelona). In sunny climates the electricity usage is closely connected to the weather conditions. Good forecasting is essential to plan for storage before demand rises

  Involved industry partners: Rhein Energie, Fortum
  Assoisiated partners: Aiguasol

- Measure 4.2 Smart Energy and Self-Sufficient Block (Barcelona)
  Aiguasol in Barcelona will integrate also the excess heat production from restaurants, offices, swimming pools and from thermal solar collectors and micro CHP boiler in the Light House District, which calls for even more integration and accurate measuring of production and need.

  Involved industry partners: IREC, Gas Natural, ENDESA
  Assoisiated partners: Aiguasol

Task 2.3 - Monitoring and Evaluation

Each implemented measure will be monitored for a minimum of 2 years. Gathered data will be used to evaluate innovation potential, theoretical vs practical energy savings, user acceptance and real investment costs, etc. The results will be main input to WP5 where the data will be analyzed on a global project level

and further validate the measures from technical, economic and social perspectives. The WP5 leader will provide instructions prior implementation on data gathering format and monitoring methods to be used at each site to achieve comparable data from the measures. In addition, all demonstration partners will set up special quality systems to make sure the implementation is made with all care and precision possible

The results from the monitoring and evaluation will be compiled into a deliverable from each measure. The WP 2 leader will coordinate this task in cooperation with the other Lighthouse cities that have implemented measures within the same smart solution.

Task2.4 Conclusions

At the end of phase 1-3 the WP2-4 leaders will jointly, coordinated by WP7 leader, develop conclusions with the focus on up-scaling and replicability and to disseminate results external to the project.

Deliverables (brief description and month of delivery)

D2.1 Procurement ready (repare the realization and perform procurement), M8

D2.2 Implementation reports, M32

- measure 1.1, Energy efficient refurbishment of the building, M32
- measure 2.1, Integrated multi-modal transport for construction materials/logistics center in Årsta, M32
- measure 3.1, Active house (Stockholm) /Home Energy Management Systems (Barcelona)/Smart home system (Cologne), M32
- measure 4.1, Virtual Power Plant (VPP) – balancing demand with supply (Cologne, Stockholm), M32
- measure 4.2, Smart Energy and Self-Sufficient Block (Barcelona), M32

D2.3 Monitoring and Evaluation report, M48

D2.4 Concluding report on overall WP 2 conclusions, M58

Work package #	3													
Starting date or starting event	M4													
Work package title	Integrated infrastructure													
Participant number	1	2	3	5	7	8	9	10	11	13	15	18	25	27
Short name of participant	MF	COL	BCN	KTH	GRZ	SUC	VAL	POR	COR	ENV	FPH	INF	AGT	END
Person/months per participant	31,71	41,33	21,87	5,07	0,21	4,27	0,21	0,21	0,21	23,47	23,47	7,47	51,95	104,58
Participant number	28	29	30	32	34	35	36	37	38					
Short name of participant	RIS	ANT	BSC	GNS	IREC	PHL	SCH	UBI	IBM					
Person/months per participant	107,00	1,07	59,15	15,16	15,84	31,95	14,38	13,97	27,73					

Objectives

- Identify and procure industrial partner at local site

- Implement and demonstrate energy savings measures in integrated infrastructures districts.
- Gather data from implemented measures for evaluation
- Analyse legislative and structural barriers
- Analyse replicability of Integrated infrastructures measures

Description of work (where appropriate, broken down into tasks), lead partner and role of participants

The work package structure for WP 2-4 is generic since all the Lighthouse cities will perform the same tasks but in different main areas (Low Energy, Integrated Infrastructure and Mobility). This task structure is generic, transparent and proves synergy among the main partners in the project since it require close cooperation between the WP 2-4 leaders in each task.

Task 3.1 - Prepare the realization and perform procurement
This task aims to collect necessary permissions and carry out the procurements required by European legislation. As the Lighthouse cities have prepared for this phase it should be able to keep it short at approximately six months. The experiences from this process will be compiled in a deliverable when the phase has ended. The WP 3 leader is responsible for this task and will coordinate work with the WP 2 and WP 4 leaders that have performed procurement processes for measures in Integrated Infrastructure.

Task 3.2 - Implementation
This is the core essence of the project and focus on implementation of the concrete measures in each Lighthouse city within Low Energy District. When each measure has been implemented the main results and experiences will be compiled into a deliverable. For detailed information for each smart solution and all measures included, view section "Smart solutions to implement". The WP 3 leader is responsible for this task and will coordinate work in cooperation with the WP 2 and WP 4 leaders that have completed implementation for measures in Integrated Infrastructure district in their cities.

Smart Solution 5 Smart lightning, lampposts as hubs for communication

Demonstrate remote, self-controlled and sensor-controlled LED lighting for pedestrians and cyclists and how these solutions increase traffic safety and perceived security. Demonstrate how smart light posts can be used to provide wifi, charging of electric vehicles with additional built in functionality.

- Measure 5.1 Smart street lightning (Stockholm)

  Three different technologies will be tested and evaluated. The successful technology (-ies) will be taken up in city´s lightning programme if successful

  - Sensor controlled LED lighting for pedestrian and bicycle paths to enable the lights to provide base lighting to satisfy the feeling of security at all times and increase the level of lighting when someone approaches. This technique has a potential to save 40-50 % energy.

  - Self-controlled LED street lighting with pre-set lighting schemes based on levels of traffic has the potential to save about 20 % energy compared to regular LED lights.

  - Remote controlled LED street lighting which can be controlled from a distance to provide sufficient lighting depending on the time of the day and the level of traffic that comes with it. 30-50 % energy can be saved compared to regular LED lighting. 7-12 GWh can be saved yearly in the entire city using local grid energy supply. TALQ Consortium is supplier of advanced control system and standardized open protocol.

Involved industry partners: Philips, ENDESA
Associated partners:

- Measure 5.2 Combined electrical charging and street lighting poles + Wifi-to-grid connection (Stockholm, Barcelona)
  As lightposts are evenly distributed across cities they posts a great opportunity to provide extra data coverage throughout the city, both wifi and mobile data (4G). This will be tested in Stockholm areas with lots of people gathering at peak times and hence the load on the regular cell phone network extra high and extra capacity is needed.

  Involved industry partners: Philips, ENDESA
  Associated partners: STOKAB

- Measure 5.3 Smart Meter information analysis and actuators (Barcelona, Cologne)
  Many of residents houses or flats will be equipped with Smart Meters or even with SmartPlugs measuring the power and heat / cooling consumption. In addition some of the residents will be prosumers as they also produce energy through e.g. their photovoltaic installation. A power cloud-based analytic engine will sift through the data generated from the sensors and provide energy-saving information to the residents. An intuitive app will provide monitoring functionalities for the users and additionally a powerful tool to control to his privacy settings and his/her data sharing policies. In addition, the system can provide intelligence for automatically controlling devices (e.g. heating, washing machine, and coffee machine) making the use more efficient and increasing energy potentials. For the operator a dashboard will be developed that allows a situational awareness picture of the smart grid. The tool will additionally provide a forecast of the expected power demand for the next 15 to 30 minutes based on the individual power demand pattern learnt over the past measurements. The operator application will also provide an anomaly detection that indicates potential failures in the grid.

  Involved industry partners: AGT, ENDESA
  Associated partners:

Smart Solution 6 New business models for district heating and cooling

Demonstrate new business models with plug and play heatpumps and contracts where the district heating provider buys waste heat from local energy sources such as data centers and shopping malls with many freezers and coolers. This task will focus on how to recover this waste heat into district heating or other energy systems for local energy demands and how to develop this innovative business model for this yet unexplored potential as integrated energy solution.

- Measure 6.1 Open district heating with feed in of waste heat (Stockholm)
  Surplus heat from data centers, supermarkets and vacuum waste systems will be inserted in the district heating system. This energy will admittedly replace biomass produced heat and also some renewable electricity produced by biomass-CHP, but it still makes sense to utilize this waste heat, as there is a win-win situation where the surplus providers today pay to get rid of the heat. Currently mid-level heat can be fed into outbound water after being further heated by efficient heat pumps, using renewable electricity, or fed inwards at the end of some lines.

  Waste heat from data centers and vacuum waste systems
  A new type of heat pump technology suitable to handle mid-level energy streams will be implemented. This system is expected to be able to save 0.5 TWh annually in Stockholm and although there are no regulations in place forcing data centers to recover their waste heat the EU are working on such directives. The same heat pump technology will be used to take care of waste heat from vacuum waste systems (see solution 7). This system is expected to save 55 kWh/apartment

served by the system annually.

Waste heat from fridges and freezers in supermarkets
Fridges and freezers using CO_2 as cold media generate waste heat at 80 degrees Celsius which can be directly recovered into the district heating system- These are getting increasingly usual there is also a new EU-directive under work which will demand replacing cold media with CO_2. This solution has the potential of saving 0.5 TWh annually in Stockholm alone.

A plug and play solution providing a standardized heat pump to raise the temperature of the waste heat to the required level for the district heating system together with a new business model where the district heating operator buys excess heat will be developed.

Involved industry partners: Fortum
Associated partners:

- Measure 6.2 District heating and cooling rings (Barcelona)
  The District heating and cooling network will be optimized and make use of local thermal generation from solar panels, heat pumps and micro CHPs and connect to the existing heating and cooling net. This will be integrated with the electricity production and managed by the same Virtual Power Plant making a truly integration of all energy systems at block level.

  Involved industry partners: Gas Natural
  Associated partners: Rital, Coromatic, Enaco, Aiguasol

- Measure 6.3 Smart local thermal districts (Barcelona)
  Smart local thermal district, offices and shopping mall, will demonstrate low temperature district heating, geothermal and high efficient heat pumps with thermal storage for cooling and photovoltaic. The results will be demonstrate the technical, socio and economic viability of this type solutions at higher scale and the total consumption from the grid will be nearly zero.

  GNF will coordinate the work included in this measure and together with Aiguasol define the smart energy and self-sufficient blocks.

  Involved industry partners: Gas Natural
  Associated partners: Rital, Coromatic, Enaco, Aiguasol

Smart Solution 7 Smart waste collection, turning waste into energy

This Solution demonstrates a smart waste solution for residential areas using differently colored bags for different sorts of waste, transporting the bags long distance underground and sorting them automatically in the collection station, in the area. The food waste will be recovered to produce biogas, which fuels 400 buses and trucks and 15,000 cars. Other waste streams will be recovered as material and/or energy.

The challenge to the use of conventional Automated Waste Collection Systems (AWCS) has been the installation costs, as well as finding space underground to fit the pipe work.

- Measure 7.1 Optical sorting of waste
  Different fractions of waste are put in bags with different colors in the same collection bin. It is then transported to a sorting facility where the different fractions are separated. This method is new and not widely spread in Europe. It will be the main way of collecting organic waste in Stockholm.

  Involved industry partners: Envac

- Measure 7.2 Introduction of AWCS (Automated waste collecting system) in an existing

neighborhood (Stockholm)
Automated waste collecting systems are normally only installed in new built residential areas as the costs can be included in overall infrastructure costs. AWCS are initially more expensive than traditional waste handling systems but offer significant advantages when in place. The traffic for collecting waste can be reduced with 90 % and space can be cleared in neighborhoods as there is no longer a need for storing garbage in many different places in the area. All waste is transported underground in pipelines to a collecting station located in the residential area with easy access to collection vehicles. To reduce the cost for piping and energy use, compaction of the waste will performed already in the inlet.

Involved industry partners: Envac

- Measure 7.3 Waste collection statistics for individual households/businesses (Stockholm)
  Using smart keys together with colour sensors and scales, it is possible to register down to individual households the amount and type of waste thrown at any given moment. This offers the opportunity to present statistics for individual households, buildings or clusters of buildings, visualized in the Active house /Home Energy Management Systems/Smart home system in Smart Solution 2. It can also be used as a basis for payment

  Involved industry partners: Envac, Info 24

Smart Solution 8 Big open data platform for saving energy and improving the quality of life

Due to the lack of standards in the area of smart cities, we propose a data integration platform (aligned with CityOS) which will aggregate information in a City Datawarehouse that support third party applications exploiting the raw and rich data. New services can connect to energy consumption in residential buildings where residents can be informed about their current and historical energy consumption and with the help of that information decrease it. Another application is the collection and processing of traffic data to make it possible to create a multi-modal travel planner or develop an API able to communicate the lighting management system with other applications (e.g. traffic management, weather systems.

- Measure 8.1 Big consolidated open data platform (Stockholm, Barcelona,Cologne)
  By consolidating, aggregating and using existing and new sensor data from infrastructure, traffic and users will generate a new base for innovation to support a new generation of management, control and policies. We will also be able to monitor the status and the impact of various measures in real time to a low cost. It will also be possible to simulate short and long term trips and transports in more detail in a dynamic way to improve the quality of decisions. By this we will manage environment and other impacts more efficiently but also open for new generations of policies as well as accelerate innovation of new services based on the open and available data. Finally this platform also will form a base for dialogue with citizens and the business community by a more transparent management.

  In order to improve the energy efficiency on the public infrastructure, we will integrate information from City OS or other Service Provider System that manages data from assets. The platform will monitor the overall performance of lighting, traffic, bus shelters, environmental, and small EVSE from the energy point of view, assign priorities and command based on decision making algorithms via a "multi-functionality towers".

  Involved industry partners: Schneider Electric, Barcelona Supercomputing center, AGT, IREC
  Associated partners: Cisco, STOKAB, Sigma, IBM

- Measure 8.2 Urban models (Barcelona, Cologne)
  Semantic urban model
  Building a concept that reflects the structure, processes, and events specific to urban environments. It may contain other more general concepts such as geopositioning, time, and KPIs, which are required by the modules computing e.g. carbon footprint and pollution. This data integration

platform will provide an API that any service may use to access domain-transversal data - geo-positioned when available - either in raw form or in form of aggregated indicators.

Semi-automatic urban model
We propose an approach that provides the participants and follower cities – and later on, any other city – to extend it to serve their specific needs. The techniques behind the integration are based on extending the urban model to adapt it to the specificity of the target cities. This involves the use of techniques in a semi-automatic fashion.

Involved industry partners: Barcelona Supercomputing center, AGT, IREC
Associated partners:

- Measure 8.3. Semi-automatic instance mapping (Barcelona, Cologne)
  The semantic urban model needs to be populated with actual data to take full advantage of the power of the approach. This step consists in the semantic mapping of the data to the concepts and is usually time consuming. Semi-automating this process is possible. We will use new technologies to semi-automatically map urban data to specific city. This problem is highly relevant when other want to populate the city model with their data. This requires finding correspondences between concepts and relationships embedded in the data, on one hand, and explicit in the ontology, on the other.

  Involved industry partners: Barcelona Supercomputing center, AGT, IREC
  Associated partners:

- Measure 8.4Integration of sensor data in standard data format (Barcelona)
  We will provide a platform for integration of sensor data coming from different producers (e.g. deployed sensors, data from proprietary platforms, open data repositories, etc) and using different formats based on a uniform, standard-driven format. This platform will provide a set of APIs to access the sensor data from the open linked city model, and will publish the integrated data --- raw or aggregated. We will also be building a Web portal that can access and visualize raw and aggregated data from sensor infrastructures managed by the city of Barcelona and other trusted third parties, partners in this project.

  Involved industry partners: Barcelona Supercomputing center, AGT, IREC
  Associated partners:

- Measure 8.5 Sustainable Connected lighting to enhance safety and mobility (Barcelona).
  To develop an API (Application Programming Interface) able to communicate the lighting management system with other applications (e.g. traffic management, weather systems) and software platforms in order to exchange data between systems. The solution will be a lighting technology agnostic system which means all kinds of luminaires (also third party products and new future innovative light sources) can be connected to the system. The lighting infrastructure will be managed by a system that will seamlessly connect to the Barcelona CityOS (Smart City Software Platform) or other SW platforms available in other cities using an API based on open standards. This means that lighting will be influenced not just by the decisions of the lighting system, but also by other systems managing other asset. The proposal seeks to motivate also a change of mind, realizing what the intelligent public lighting can do for cities when they become more interactive and create the base for novel services within the city.

  Involved industry partners: Barcelona Supercomputing center, AGT, IREC
  Associated partners:

Task 3.3 - Monitoring and Evaluation

Each implemented measure will be monitored for a minimum of 2 years. Gathered data will be used to evaluate innovation potential, theoretical vs practical energy savings, user acceptance and real investment costs, etc. The results will be main input to WP 5 where the data will be analyzed on a global project level

and further validate the measures from technical, economic and social perspectives. The WP 5 leader will provide instructions prior implementation on data gathering format and monitoring methods to be used at each site to achieve comparable data from the measures. In addition, all demonstration partners will set up special quality systems to make sure the implementation is made with all care and precision possible

The results from the monitoring and evaluation will be compiled into a deliverable from each measure. The WP 3 leader will coordinate this task in cooperation with the other Lighthouse cities that have implemented measures within the same smart solution.

Task 3.4 - Conclusions

At the end of phase 1-3 the WP 2-4 leaders will jointly, coordinated by WP 7 leader, develop conclusions with the focus on up-scaling and replicability and to disseminate results external to the project.

Deliverables (brief description and month of delivery)

D3.1 Procurement ready (Prepare the realization and perform procurement), M8

D3.2 Implementation report, M32

- Implementation report of Measure 5.1 Smart street lightning, M32
- Implementation report of measure 5.2 Combined electrical charging and street lighting poles + Wifi-to-grid connection, M32
- Implementation report of measure 5.3 Smart Meter information analysis and actuators, M32
- Implementation report of measure 6.1, Open district heating with feed in of waste heat, M32
- Implementation report of measure 6.2 District heating and cooling rings, M32
- Implementation report of measure 6.3 Smart local thermal districts,M32
- Implementation report of measure 7.1 Optical sorting of waste, M32
- Implementation report of measure 7.2 Introduction of AWCS in an existing neighborhood, M32
- Implementation report of measure 7.3 Waste collection statistics for individual households/businesses, M32
- Implementation report of measure 8.1 Big consolidated open data platform, M32
- Implementation report of measure 8.2 Urban models, M32
- Implementation report of measure 8.3. Semi-automatic instance mapping,M32
- Implementation report of measure 8.4Integration of sensor data in standard data format
- Implementation report of measure 8.5 Sustainable Connected lighting to enhance safety and mobility,M32

D3.3 Monitoring and Evaluation report, end phase 3, M48

D3.4 Concluding report on overall WP 3 conclusions, M58

Work package #	4															
Starting date or starting event	M4															
Work package title	Sustainable urban mobility															
Participant number	1	2	3	5	7	8	9	10	11	15	16	18	19	20	22	23
Short name of participant	MF	COL	BCN	KTH	GRZ	SUC	VAL	POR	COR	FPH	CAR	INF	STH	IEM	AMP	CC
Person/months per participant	62,61	1,23	4,53	14,13	0,21	4,27	0,21	0,21	0,21	19,73	18,67	17,87	9,33	13,33	15,56	27,97
Participant number	24	29	31	32	33	34	37									
Short name of participant	KVB	ANT	CENI	GN	i2CAT	IREC	UBI									
Person/months per participant	6,67	1,07	49,60	27,43	23,73	1,23	5,81									

Objectives

- Identify and procure industrial partner at local site
- Implement and demonstrate energy savings measures in sustainable urban mobility districts.
- Gather data from implemented measures for evaluation
- Analyse legislative and structural barriers
- Analyse replicability of sustainable urban mobility measures

Description of work (where appropriate, broken down into tasks), lead partner and role of participants

The work package structure for WP 2-4 is generic since all the Lighthouse cities will perform the same tasks but in different main areas (Low Energy, Integrated Infrastructure and Mobility). This task structure is generic, transparent and proves synergy among the main partners in the project since it require close cooperation between the WP 2-4 leaders in each task.

Task 4.1 - Prepare the realization and perform procurement
This task aims to collect necessary permissions and carry out the procurements required by European legislation. As the Lighthouse cities have prepared for this phase it should be able to keep it short at approximately six months. The experiences from this process will be compiled in a deliverable when the phase has ended. The WP 4 leader is responsible for this task and will coordinate work with the WP 2-3 leaders that have performed procurement processes for measures in Sustainable urban mobility.

Task 4.2 - Implementation
This is the core essence of the project and focus on implementation of the concrete measures in each Lighthouse city within Low Energy District. When each measure has been implemented the main results and experiences will be compiled into a deliverable. For detailed information for each smart solution and all measures included, view section “Smart solutions to implement”. The WP 4 leader is responsible for this

task and will coordinate work in cooperation with the WP 2-3 leaders that have completed implementation for measures in Sustainable urban mobility in their cities.

Smart Solution 9 Sustainable delivery
Demonstration of last mile deliveries to retailers and home-delivery.

- Measure 9.1 Integrated multi-mode transport for light goods (Stockholm)
  Service boxes will be placed in a central location among the refurbished residential properties, where tenants can receive a 24 h PIN code for home deliveries, which reduces the need to go far away to pick up packages and the need to stay home waiting for the delivery to come. Some boxes will be refridgerated to handle the very popular grocery delivery. To reduce traffic in the area, only bike deliveries will have access to the boxes.

  Involved industry partners: Stockholmshem, Carrier
  Associated partners: MoveByBike

- Measure 9.2 Micro distribution of freight (Barcelona)
  Demonstrate the use of micro platforms or micro Urban Consolidation Centres (mUCC) where transport operators can store their goods and transfer them to electric tricycles for the last mile distribution, covering a designated area. Provision of the mUCC and its related facilities, as well as the installation of the charging infrastructure for the electric tricycles an installed operation zone, which could also be available for citizens. Tricycles will be equipped with sensors to monitor relevant parameters of the service, as well as relevant city environmental parameters, and a dynamic routing algorithm will be implemented. Results will show the technical, socio and economic viability of the measure, reducing emissions and calming traffic in inner city streets. The work will be carried out by CENIT, I2CAT, and Barcelona city council together with a subcontracted micro carrier.

  Involved industry partners: i2CAT, CENIT
  Associated partners:

Smart Solution 10 Smart traffic management
Demonstration of how traffic signals can be controlled to even out traffic flows and avoiding unnecessary stops. This task will demonstrate a smart system monitoring and controlling traffic signals and at the same time providing real time information to users on traffic conditions with the help of different sensors.

- Measure 10.1 Traffic management through MFD (Barcelona)
  This measure will be carried out by CENIT and the Barcelona city council. Test the new theory on the existence of MFD (see Daganzo 2008) for the urban area (already proven by simulation in Barcelona) as a traffic management tool to assist traffic managers in making decisions on actions to avoid or alleviate congestion in dense urban areas by controlling the entry and evacuation flow rates. It allows the control of the street network performance and traffic state in a reasonable density domain, and the prevention of energy consumption and emissions. This measure includes a traffic management specification, the implementation of the MFD, the traffic information specification, the traffic and air quality visualization and the information delivery. Concurrently it also includes the normalization of signals and technologies in the urban space. This measure will be carried out by CENIT and the Barcelona city council.

  Involved industry partners: CENIT
  Associated partners:

- Measure 10.3 Travel Demand management (Stockholm)
  Info24 will together with KTH develop smart phone applications to follow up up changes in travel behaviour in a way that is more effective and has a greater response rate that traditional travel surveys. This will improve the travel demand management measures.

Involved industry partners: KTH, Info24
Associated partners:

- Measure 10.4 Traffic control system for passenger vehicles.
  This measure will use open traffic information data to find a the traffic rhythm and route to allow for a smooth ride with as few stops and queuing as possible, thus reducing emissions and risk for accidents. The equipment will be used on renewably fuelled cars/EVs to add an extra incentive for these cars.

  Involved industry partners: Info24
  Associated partners:

- Measure 10.5 Traffic signals synchronized to prioritize certain vehicles movement of goods (Stockholm)
  Traffic signals in and around Årsta will be re-programmed and synchronized to prioritize the movement of goods distribution vehicles to minimize starts and stops, resulting in more effective goods movements with lower emissions, noise and improved junction safety. Researchers from the Royal Institute of Technology will assist in the monitoring of results. Methods for real time priority for certain types of heavy vehicles will be tested.

  Involved industry partners: KTH,
  Associated partners:

Smart Solution 11 Alternative fuel driven vehicles for decarbonizing and better air quality

There is no single propulsion technology that alone can replace the fossil fuelled vehicles of today, we will have to use both electrics and sustainable biofuels, in combination. To develop the market for these technologies we might even have to promote the use of some fossil fuels like natural gas (to promote biogas vehicles) and Plug-in Hybrid-Electric Vehicles operating on petrol or diesel (to develop the biofuel PHEVs).

While the market development is a bit on its way for light duty vehicles and buses, distribution trucks which are so important for cities still have just started to develop.

- Measure 11.1 Developing charging infrastructure (Stockholm, Barcelona and Cologne)
  Barcelona, Stockholm and Cologne are setting up a network of charging terminals for electric vehicles at strategic locations in the city, designed to fit in the surroundings. Both fast charging and normal charging will be installed

  In order to reduce the energy consumption and to promote low carbon mobility modes, Barcelona will implement charging stations for electric vehicles to give service to different transport systems. In this way, Barcelona will implement a fast charging infrastructure for taxi vehicles, as well as V2X charging infrastructure and e-parking services for vans. These charging facilities will be deployed and installed at strategic points of the study zone (macroblocks near Glòries) and eventually embedded in a commercial mall or a municipal parking. Furthermore, a charging infrastructure for electric tricycles giving last mile distribution services will be implemented. Charging infrastructure developed for the Barcelona case is detailed in Measures 11.2 and 11.3.

  In Cologne, the charging infrastructure provides the relevant data for the integration of the vehicles in the energy management concept and integrates the vehicles in such a way that also a controlled energy back supply from the vehicles is possible. The car sharing system of measure 13 needs information about the available energy in the vehicle battery around with the vehicle reservation information to the desired distance to be able to consider.
  The vehicles in the E Mobility will also be able to be charged in peak time without additionally network load. They should also to be used as energy storage serving demands in the grid

The ca 1600 electric vehicles in Stockholm are in good balance using private charging. Complementary there is 8 fast charging stations and about 80 public normal charging stations. The development of PHEVs is believed to increase the demand for public charging. Fortum will together with City of Stockholm install another 100 normal charging stations and 10 fast chargers and closely monitor the use of these to form a strategy for the further roll-out of chargers. The grid in Stockholm is very stable and redundant and also a large amount of EVs will not affect the grid.

Involved industry partners: Info 24, Fortum, ENDESA, Schneider Electric
Associated partners: Avantcar

- Measure 11.2 E-mobility management system (Barcelona)
  Installation, management and impact on the grid of charging infrastructure related to:
  - E-V2X parking microdistribution lot: 3 charging/discharging station will be installed in a parking area inside the macroblock. This infrastructure will be operated by an EMS of ENDESA. This e-parking will provide private and public e-mobility services to the EV user and also to the e-parking owner, including V2X functionalities acting as a storage system for the parking facility optimizing the use of energy for e-mobility services and/or other consumptions. E-parking facility inside the macroblock will be evaluated from the point of view of mobility and energy.
  - E-Taxi demo: deploy and operation of the fast charging public infrastructure (5) to accelerate the e-taxi private part of the project in a multistandard approach. The main task will be based on the manufacturing, commisiong and operation of fast charge infrastructure for public recharging services. All EVSE will be managed by EMS of ENDESA acting as EVSE operator and integrated on the City Os for an overall management of the city councilacting as EVSP.

  ENDESA and Barcelona city council will all work together to install fast charging stations in strategic places.

  Involved industry partners: ENDESA
  Associated partners: Avantcar

- Measure 11.3 Charging infrastructure for electric tricycles for micro distribution (Barcelona)
  Installation of charging points (initially planned to be 3-5) for the electric tricycles of the micro distribution measure (9.2), making them adaptable to electric bicycles and motorbikes to also be available for citizens. These charging points will provide energy to those tricycles that would substitute diesel vans in the last mile distribution in the macroblock through a micro Urban Consolidation Center (mUCC). These charging points will also be managed to assess their impact on the grid. Barcelona city council will work probably together with a subcontractor to make this measure successful.

  Involved industry partners: ENDESA
  Associated partners:

- Measure 11.4 Setting up refueling facilities for alternative heavy duty fuels fuel (Stockholm)
  While there are many fuel stations available for cars and light duty distribution vehicles, there are only very few stations for heavy duty distribution vehicles. Following the work started in the Life+ project CleanTruck, Stockholm will together with the distribution companies set up at least 10 new stations for ED95, LBG, or HVO, operate the logistic centre on these vehicles, require increased rates of renewable fuels in the city's procurements of transport, and encourage business to put the same requirement on their deliveries. This strategy has been very successful to introduce renewably fuelled cars. Industrial companies IDS and AGA will be involved in the realization of this measure as associated partners to the project.

  Involved industry partners:
  Associated partners: IDS, AGA

- Measure 11.5 Smart guiding to alternative fuel stations and fast charging (Stockholm)

To improve for the 36,000 cars and light duty transport vehicles operating on renewable fuels in Stockholm, a mobile application will be developed, containing e.g. updated information on where each alternative fuel can be filled up, together with most recent price. There is currently 45 E85-stations, 12 Biogas stations, 8 fast charging stations and about 80 public normal charging stations in Stockholm and especially the latter are growing fast. Industrial companies IDS and AGA will be involved in the realization of this measure as associated partners to the project.

Involved industry partners: Info 24
Associated partners: IDS, AGA

- Measure 11.6 Small distributed CNG grid (Barcelona)
  Setting of 1 small CNG filling station giving service to CNG vehicles, with the following equipment: a small compressor, 60 m3/h, storage tanks, filling hose and control and payment devices. This kind of small CNG charging infrastructure technology has not yet been proven for public use. All the equipment would be integrated into a technological module. A HMI provides the user with at least the following information: location of alternative fuels, advantages, costs. CNG filling stations are a charging infrastructure technology that has not been proven for urban public use. Finally, these CNG stations may be integrated with information system on EV charging.

  Involved industry partners: Gas Natural Servicios,

Smart Solution 12 Smart mobility solutions In this task, *GrowSmarter* will launch a range of different solutions completing the existing public transport network. By providing residents/citizens with alternatives to own their own car it is possible to reduce the number of trips that is done with car.

- Measure 12.1 Green parking index in combination with car sharing pool with EV (Stockholm)
  By offering membership in a car pool, property owners are able to reduce the number of parking spaces attached to the buildings (green parking index) drastically. By reducing the available number of parking spaces it gets less attractive to own a car which will act in favor of other modes of transportation such as public transport or bike and by offering a car pool it is easier for people to drop the car completely because they have the option to borrow a car when they really need to.

  Involved industry partners: Stockholmshem, Info24, Insero E-Mobility, Fortum, KTH, CENIT
  Associated partners: Bilpoolen.nu

- Measure 12.2 Electrical and cargo bike pool (Stockholm)
  To reduce the car use the project will establish pools with electrical and cargo bikes. This will enable residents to perform a higher share of their daily chores without the need of a car. By providing electrical and cargo bikes it gets possible for people to travel longer distances with bikes and also take the bike when buying food for the week etc. The electrical and cargo bike pools will be offered in two variations, one “closed” where a limited number of members have access and one “open” system available to the whole city.

  Involved industry partners: Info24, Insero E-Mobility, Stockholmshem
  Associated partners: Bilpoolen.nu

- Measure 12.3 Mobility hub (Cologne)
  Cologne will establish three mobility hubs for up to 20 EV and 50 pedelecs including a larger number of electrical pedelecs, which will be available both as standard bikes or cargo bikes. There will be installed several charging stations for EV as well as EP.

  The hubs are distributed evenly in the quarter and are the residents’ contact points due to their mobility offers. They are clearly visible in the public space and easily identified. At least one electric car and/or a bike rental outlet will be offered at each hub. The mobility hubs are the real and virtual

spaces for mobility offers as well as the interface to the user and the spaces where neighbours meet. They are linked to the local energy provider and have interfaces to the OpenData platform of the city of Cologne. A mobility hub includes integration of electric car sharing, conventional car sharing, parking space management with dynamic pricing of public spaces, rented bikes, parking spaces for private bikes, timesharing of private parking spaces as well as park & ride systems for private cars. The people can chose which mode of transport that fits them the most at the moment and with the help of a mobility card they can pay for whatever mode of transport they pick.

To even further increase the incentives to join a mobility hub, extra parking spaces will be made available to car pool cars in the streets of Cologne.

The intermodal chain from the project area Mülheim will connected to the E-Bus Line (articulated buses with regular service), to be introduced in Cologne in the project time frame at the Main station. In order to exploit the full potential of e-mobility and stimulate broader rollout in Cologne and Europe, the consortium will look into the call MG 8.3- 2015, as future perspective and in order to maximise European impact by use of innovation procurement(e.g. PPI)

Involved industry partners: Cambio, Ampido, KVB
Associated partners:

- Measure 12.4 Electrical and conventional car sharing (Cologne)
  A car sharing service will be set up with a range of different cars to be able to cater to everybody's need in different situations. To completely be able to not owning your own car it is necessary that car pools can offer different car for your different needs. An electrical vehicle might be suitable for shorter trips in the city but when travelling longer distances with a big family an electric vehicle might not fit the needs and it is therefore important to offer alternatives. This offer will be put together by Cambio. Rentable e-bikes will be provided.

  Involved industry partners: Cambio
  Associated partners:

- Measure 12.5 Conventional/PHEV/CNG vehicle-sharing fleets (Barcelona)
  Provision of vehicle sharing systems in the project area to enhance a more cooperative, flexible and sustainable transport service. This vehicle-sharing system is initially planned to be focused on cars (car-sharing, service provided by Avancar), but Barcelona also contemplates the possibility to incorporate motorbikes service (MotIt, e-Cooltra). The service will be mainly provided with EV/PHEV, but the possibility of including conventional and CNG vehicles is also considered (optional). These systems would benefit from the filling and charging infrastructures defined in other tasks of this project.

  Involved industry partners: CENIT
  Associated partners: Avancar

- Measure 12.6 Smart taxi stand system (Barcelona)
  Taxis represent an important mobility agent in cities, providing fast and door-to-door services to users In this measure, users request for a taxi (accomplishing specific user's requirements) via mobile app or through a smart stand (included in the multipurpose information pole) in a designated location, and a taxi is assigned to satisfy this service. The main interest of the measure is that vacant taxis will be parked in a bigger feeder stand located outside crowded areas (i.e., in a municipal or mall parking area) reducing their cruising for clients, thus reducing the unproductive mileage in vacant and the consequent congestion, fuel costs, energy consumption and pollutant emissions.

  The purpose of the measure is the efficient assignment of taxi services and the reduction of costs and externalities (energy consumption and pollution) related to vacant mileage of the taxi vehicles. Users will request for a taxi (accomplishing specific requirements) via mobile app or through a smart stand

(included in the multipurpose information pole), and a taxi parked in a bigger feeder stand located outside crowded areas (e.g., in a municipal or a mall parking) will be assigned.

Involved industry partners: CENIT
Associated partners:

Task 4.3 - Monitoring and Evaluation

Each implemented measure will be monitored for a minimum of 2 years. Gathered data will be used to evaluate innovation potential, theoretical vs practical energy savings, user acceptance and real investment costs, etc. The results will be main input to WP 5 where the data will be analyzed on a global project level and further validate the measures from technical, economic and social perspectives. The WP 5 leader will provide instructions prior implementation on data gathering format and monitoring methods to be used at each site to achieve comparable data from the measures. In addition, all demonstration partners will set up special quality systems to make sure the implementation is made with all care and precision possible

The results from the monitoring and evaluation will be compiled into a deliverable from each measure. The WP 4 leader will coordinate this task in cooperation with the other Lighthouse cities that have implemented measures within the same smart solution.

Task 4.4 - Conclusions

At the end of phase 1-3 the WP 2-4 leaders will jointly, coordinated by WP 7 leader, develop conclusions with the focus on up-scaling and replicability and to disseminate results external to the project.

Deliverables (brief description and month of delivery)

D4.1 Procurement ready (Prepare the realization and perform procurement), end phase 1, M8

D4.2 Implementation reports, M32:

- Implementation report of measure 9.1 Integrated multi-mode transport for light goods, M32
- Implementation report of measure 9.2 Micro distribution of freight, M32
- Implementation report of measure 10.1 Traffic management through MFD, M32
- Implementation report of measure 10.3 Travel Demand management, M32
- Implementation report of measure 10.4 Traffic control system for passenger vehicles, M32
- Implementation report of measure 10.5 Traffic signals synchronized to prioritize certain vehicles movement of goods, M32
- Implementation report of measure 11.1 Developing charging infrastructure, M32
- Implementation report of measure 11.2 E-mobility management system, M32
- Implementation report of measure 11.3 Charging infrastructure for electric tricycles for micro distribution, M32
- Implementation report of measure 11.4 Setting up refueling facilities for alternative heavy duty fuels fuel, M32
- Implementation report of measure 11.5 Smart guiding to alternative fuel stations and fast charging, M32
- Implementation report of measure 11.6 Small distributed CNG grid, M32
- Implementation report of measure 12.1 Green parking index in combination with car sharing pool with EV, M32
- Implementation report of measure 12.2 Electrical and cargo bike pool, M32
- Implementation report of measure 12.3 Mobility hub, M32
- Implementation report of measure 12.4 Electrical and conventional car sharing, M32
- Implementation report of measure 12.5 Conventional/PHEV/CNG vehicle-sharing fleets, M32
- Implementation report of measure 12.6 Smart taxi stand system, M32

D4.3 Monitoring and Evaluation report, end phase 3, M48
D4.4 Concluding report on overall WP 4 conclusions, M58

Work package #	5											
Starting date or starting event	M4											
Work package title	Technical validation, Social & economical validation											
Participant number	1	2	5	6	7	8	9	10	11	30	32	34
Short name of participant	MF	COL	KTH	IESE	GRZ	SUC	VAL	POR	COR	BSC	GN	IREC
Person/months per participant	1,35	1,81	28,36	6,67	0,21	4,27	0,21	0,21	0,21	15,57	2,29	0,75

Objectives

- Provide a transparent framework and methodology for comparable performance evaluation of energy, environment, economic and social metrics to enable validation and comparison of deployed smart solutions at all project sites and support decision making on their replication
- Guide data collection and analysis to assess the implemented measure's impact on reduction of greenhouse gas, other emissions, energy efficiency and share of renewable energy sources as well as evaluation of the potential value for money and consumer engagement.
- Assess the vulnerability/robustness of the deployed smart city solutions, with specific focus on their cumulative effects on other resources, economics, and security of energy and transport service supply
- Assess replicability of the implemented measures, including key success factors, impact of local specifics on success, key stakeholders to be involved, standardisation and interoperability issues
- Provide input for assessment of potential for wider market uptake of the implemented measures and pathways to upscaling
- Visualisation and presentation of assessment results
- Develop and disseminate recommendations for European and national policy makers and practitioners

Description of work (where appropriate, broken down into tasks), lead partner and role of participants

The validation WP is designed based on experiences from the CONCERTO, CIVITAS, the Green Digital Charter, CIVIS, Smart City SRS, Urban Smart Grid, Energy Awareness, and Active House projects.

The KPIs on energy and transportation performance, as well as the ICT's performance itself, and aggregated indicators on system performance and potential rebound effects, will be developed based on contributions from European and international initiatives such as the Reference Framework for sustainable Cities, the CityProtocol and the International Telecommunication Union initiatives.

The WP's team will ensure communication and synergies with the respective teams of the other selected SCC1 Lighthouse projects as well as the SCC2 ones.

Task 5.1 - Elaborate an Evaluation Plan

The Evaluation Plan will be prepared to establish guidelines for monitoring and evaluation activities within the WPs 2, 3 and 4. It describes the proposed framework, methodology and the workplan for data collection and analysis for monitoring and evaluating the implemented measures, as well as a visualisation and

presentation protocol. The framework for validation includes following steps which may be adapted for each solution:

- Setting up the baseline period for the demonstration sites prior to implementing solutions at the different levels (e.g. apartment, building, district)
- Establishing common KPIs, their possible underlying metrics/sensors, and required spatial and temporal resolution, to ensure comparability between the implemented measures at all project's sites
- Defining the set of system boundaries for the proposed solutions, the demonstration sites, and city sectors
- Existing data: Data request to each project site, to make available existing data streams (e.g. electric grid mix)
- New data: Deploying interoperable sensor networks in the demonstration sites
- New data: Data request of qualitative data (e.g. questionnaires before and after deployment)
- Data integration into information management system
- Real-time KPI analytics and feedback using the established Smart Urban Metabolism framework
- Transportation analytics and scenario development using the CERO model
- Energy balance assessments of energy technology performance
- Environmental cost-benefit analysis of the deployed solutions
- Baseline comparison of outcomes
- Analysis of economic and societal effects based on KPIs and system-wide effects
- System analysis to gauge externalities and potential rebound effects
- Visualisation and presentation of the monitoring and evaluation results

Task 5.2 – Coordination of monitoring and evaluation activities

Following the Evaluation Plan, the WP5's team provides training sessions for the Local Evaluation Managers on monitoring and evaluation framework and methodology for measures on Low energy districts (WP2), Integrated infrastructures (WP3) and Sustainable urban mobility (WP4).

During implementation stage, the WP's team will provide necessary guidance, quality control, eventual trouble shooting and other support to the local evaluation teams.

Task 5.3 – Validation, assessment of robustness, replicability and potentials of market uptake and upscaling

Based on the information and evaluation results delivered by the WPs 2, 3 and 4 the WP5's team will prepare a report on results of technical, economic and social validation of the implemented measures on Low energy districts (WP2), Integrated infrastructures (WP3) and Sustainable urban mobility (WP4).

The robustness/vulnerability assessment of the smart solutions will be carried out through adding climate scenarios to the analysis of the deployed smart city solutions, investigating system redundancy in energy and mobility service provision, and assessing potential conflicts over resources or management on a city level between the different smart solutions.

The replicability of the implemented measures will be assessed, including key success factors, impact of local specifics on success, key stakeholders to be involved, standardisation and interoperability issues.

Comparative analysis between baseline scenario and the trajectories envisioned based on the large scale implementation of the project's deployed smart city solutions on energy efficiency and transport will be performed and the conclusions will be provided as an input to the WP6.

Task 5.4 – Recommendations for policy makers and practitioners

Based on the monitoring and evaluation results as well as information gained in communication with the

other SCC1 Lighthouse projects and SCC2 projects, the key recommendations to European and national policy makers and practitioners will be developed in relation to deployment of the demonstrated smart solutions and in relation to their performance measurement framework and methodology to ensure comparability between different sites and projects and to facilitate identification of best practices and replicable solutions.

Deliverables (brief description and month of delivery)

D 5.1. Evaluation Plan, M9

D 5.2. Guidelines for monitoring and evaluation, M18

D 5.3. Report on results of technical, economic and social validation, M48

D 5.4. Recommendations for policy makers and practitioners, M58

Work package #	6												
Starting date or starting event	M4												
Work package title	Economic validation and analysis												
Participant number	1	2	3	4	5	6	7	8	9	10	11	12	13
Short name of participant	MF	CNG	BCN	ICLEI	KTH	IESE	GRZ	SUC	VAL	POR	COR	REC	ENV
Person/months per participant	0,96	1,23		2,00		48,80	1,50	1,50	1,50	1,50	0,53	1,00	1,50
Participant number	15	17	23	26	32	34	35	36					
Short name of participant	FPH	SKA	CC	DEW	GN	IREC	PHL	SCH					
Person/months per participant	1,50	1,50	1,50	1,50	1,50	0,43	1,50	1,50					

Objectives

This WP will analyse the economical impact of each Smart Solution on a European scale when implemented in its full potential. The WP will also develop the Smart Solutions into Smart Business Cases and hence be a stepping stone for Industrial partners to develop their business models and reach out to a larger market.

Impact analysis on local, regional and European scale

For each of the smart solutions the potential upscaling potential at local, regional and European is analyzed together with an analysis of the potential impact if the Smart Solutions are implemented at this scale.

This includes a upscaling of information collected in WP 5, extrapolating this knowledge but also taking into account market obstacles encountered in WP 2-4.

WP 6 will analyze the potential of upscaling the smart business solutions for creating jobsa and economic growth in Europe.

Business case analysis and development

The Smart Solutions implemented in the Light House cities need to be adjusted, fine-tuned and made flexible to make feasible business cases for all the different conditions in European cities.

- WP 6 will gather the practical experiences from WP 2-4 and together with the industry partners and follower cities develop the Smart Solutions into true Business models with potential to be replicated and rolled out all over Europe, also highlighting what specific city conditions that will help each Business model

Description of work (where appropriate, broken down into tasks), lead partner and role of participants

Task 6.1 Economic analysis and validation of the smart solutions

The main activities to carry out in this task are:

- Validate if the over-all economic goals of the project have been achieved locally. This activity will

consist in two different stages: First of all, provide a mid-term assessment of the project, analysing the indicators provided in the initial assessment. The achievement will be measured both globally (the over-all project) and locally (each of the participating cities). Secondly, a final and more wide-ranging assessment will be carried out and published with information of the economic evolution of projects.

- Calculate possible spin-off effects and other positive externalities. The assessment will include indicators and the analysis of spin-off effects arising from the project and other positive externalities, not only economic externalities, but social and environmental externalities.

Activity 6.2 Development of Smart Business Solutions together with the industrial partners

Smart Business Solutions will be developed from each Smart Solution, designed to provide industry and society withconvincing and detailed information on how smart solutions can be developed into smart business models.

These Implementation Packages will be split into three sections:

a) Development of **Smart Business solutions** for each Smart Solution tested in Lighthouse project – main aim: Analize the potential for each of the smart solutions to be upscaled to the Euopean market. This will give a view of where are the potiential markets for this solution, what are the market obstacles and how can they be addressed by standardization, changes in legislation or just by marketing. This will also involve, key marketgoals/success indicators, and cost/benefit analysis with quantitative/qualitative data on costs, environmental impacts, user/citizen satisfaction.

b) **Stakeholder Process Descriptions** – main aim: to detail the involvement of all relevant stakeholder groups, including citizens/end users, and the engagement processes used to do so to enable replication

c) Identification of **Deployment Strategies**. We will analyse different scenarios for conjunct deployment of projects in order to achieve economies of scale.

Activity 6.3: Fine-tuning the business models with the follower cities

The validated Smart Business Solutions will be fine-tuned by testing them on the follower cities. How can the different stakeholders be approached in these business models:

  - How and when should political parties/regulating authorities be involved to allow for fast decision making?
  - How to bring private sector and research actors into implementation activities?
  - How should citizens be involved and which citizens are key, which stakeholders in the city are key for a successful implementation and for taking their fellow citizens on the same track?

- Success factors and pitfalls:
  - What factors are key in allowing for the effective realisation of plans, and what are the potential market pitfalls/barriers?
  - What indicators typical for early failure should closely be monitored?

The market introduction will be developed by IESE by month 30, in close collaboration with the Industry partners and other project partners, and will include input from the workshop series in Activity 6.4. It will be circulated for consultation to the other lighthouse projects (of the 2014 and 2015 call).

Activity 6.4: Smart City market introduction workshop series

To contribute to the development of, and validate the work three workshops will be organised, where industrial partners will meet potential take-up cities:

- Workshop 1 is an intermediate workshop, after 2 years. The aim is to provide an overview of the implemented measures in each of the Lighthouse cities in all Lighthouse projects, and understand what worked well/didn't work and why. This will be used to provide direct input into the

development of market plans and business models.

- Workshop 2 is designed to directly discuss the first draft work and will take place before the end of the 3rd year and will be circulated to all participants in advance.
- The final workshop will take place before the end of the 4th year, and will have two purposes: a) To update the results based on latest experiences from each of the projects, with a focus on different measures taken, success/impact assessed and reasons for success or failure discussed;
- b) To examine the Replication Plans developed by each of the Follower Cities (see Activity 7.5)

In depth analysis of final results by expert and summary report. This is a public document that holds a relevant overview for industry, cities and regulatory bodies.

Partner responsibilities:

IESE:

- Work package co-ordination
- Coordinate with Lighthouse Cities the assessments proposed (Activity 6.1)
- Develop Smart Business solutions in partnership with Industrial partners (Activity 6.2)
- Organise Smart City market introduction workshop series (Activity 6.3)

Industrial partners

- Develop Smart Business solutions in partnership (Activity 6.2)
- Meet take-up cities at workshop series

Follower Cities:

- Support Industry in fine-tuning Smart Business solutions (Activity 6.2)

Lighthouse Cities:

- Prepare and update information for both economic assessments (Activity 6.1 – based on WP 2-4)
- Attend Smart City market introduction workshop series (Activity 6.3)

ICLEI and REC:

- Support IESE in the development of the Smart City market introduction (Activity 6.2)
- Attend Smart City market introduction workshop series (Activity 6.3)

Deliverables (brief description and month of delivery)

Deliverable 6.1 Lighthouse Cities market introduction [M:31]

Market plans and business models for each smart solution will be established, based on the experiences of the Lighthouse cities as well as cities in other Smart City projects. The deliverable will provide:

- Evidences that the project is a good investment for the community
- Executive briefing of all cases performed
- Summary of results obtained
- Recommendations and decisions to be taken into account
- Business drivers and the scope

On the financial side:

- Metrics, assumptions, costs and benefits and risks to be undertaken
- Strategic options
- Opportunity costs
- Conclusions and final recommendation

Derivable 6.2 Economic validation and assessments [M48]
Each deliverable (2 in total) will consist of three parts:

- Stakeholder Process Descriptions: detailed information of all relevant stakeholder groups, including citizens/end users, and the engagement processes used to do so to enable replication.
- Reports from each demonstration project in order to provide detail on the practical implementation of measures taken, targeted at technical staff in replicator cities.
- Validation of the over-all economic goals of the project and local achievement assessment.
- Business models analysis and recommendations based on collected information.
- Jobs created and social benefits achieved.

Deliverable 6.3 Smart City market introduction [M56]

In depth analysis of final results by experts and summary report. This will be a public document that will hold a relevant overview for industry, cities and regulatory bodies. It will be based on main conclusions arising from activity 6.4.

Work package #	7									
Starting date or starting event	M7									
Work package title	Replication in Follower Cities									
Participant number	1	2	4	7	8	9	10	11	12	34
Short name of participant	MF	COL	ICLEI	GRZ	SUC	VAL	POR	COR	REC	IREC
Person/months per participant	2,73	0,80	13,60	2,72	30,29	2,72	2,99	3,52	8,00	0,80

Objectives

The Follower Cities are committed to preparing for the replication of the Smart Solutions demonstrated within the Follower Cities, with expressed ambitions to substantially improve energy efficiency and increase the uptake of renewable energy within their territories.

In order to ensure appropriate and effective transfer of knowledge and experiences, the Follower Cities will be closely involved with the lighthouse project cities - observe, learn, and reflect on developments there. Moreover, they will be supported with their setting-up of a local smart-city stakeholder engagement and capacity development process through appropriate means and coaching activities based on a dedicated peer-to-peer approach.

To this end, objectives of this WP include the following:

- Establish, facilitate and maintain privileged contacts between Follower cities, Lighthouse cities and industrial partners
- Provide a framework for Follower Cities to develop their smart city projects through in-depth understanding of concept, approaches, applications, opportunities, challenges, needs, success factors of smart city applications in lighthouse cities
- Engage Follower Cities as 'sounding boards' in observing, supporting and evaluating the lighthouse projects

Cork, Graz and Porto will be supported through all activities by ICLEI. Suceava and Valetta will be supported by REC.

Task 7.1: Smart City Liaison Group – Establishing stakeholder engagement & monitoring of Lighthouse City implementation

In each Follower City a multi-stakeholder 'Smart City Liaison Group' will be established, coordinated by the Follower City administration. The Liaison Group will meet regularly over the course of the project. It will consist of staff from all relevant city departments and relevant stakeholder as mapped out at the outset of the project. The Liaison group will:

- Follow activities in the Lighthouse Cities, i.e. through study visits and also taking part in selected WP-meetings, as a basis for replication
- Provide input and feedback to Lighthouse Cities as 'critical friends' applying a P2P-approach as appropriate and requested
- Manage/plan the replication of measures in the respective Follower City
- Communicate to locally relevant stakeholders (applying a vertical (e.g. regional) and horizontal perspective)

The Liaison Group will identify and engage with key stakeholders including at least local SMEs, business organisations and research institutions. This will likely involve a series of bilateral meetings, together with broader workshops where relevant. This engagement should seek to raise interest in the Smart City concept

and identify relevant opportunities and challenges to implementation.

Activity 7.2: Baseline Assessments in Follower Cities

Early in the project, each Follower City Liaison Group will prepare an initial Smart City Baseline Assessment. This will present:

- An initial assessment of the potential for replication of some or all of the Smart City solutions being demonstrated in the Lighthouse Cities, including potential sites/districts for deployment
- The local state of play regarding district level energy efficiency, use of renewables, mobility efficiency, quality of infrastructure
- Existing targets/goals, urban development and renovation programmes and plans, financing opportunities, as well as key policy and legislation frameworks affecting smart city project developments
- Existing stakeholder participation processes including user/consumer groups

The Baseline Assessments should help to inform the selection of relevant KPIs in WP5.

Once sufficient data has been collected to make a preliminary assessment of the results of the measures piloted in the Lighthouse Cities (likely after 2 years) the Baseline Assessments will be updated.

Both the initial and updated Baseline Assessments will be peer reviewed by the Lighthouse Cities.

Task 7.3: Updating Replication Plans

Based on the updated Baseline Assessment, each Follower City will prepare a detailed update on their initial Replication Plan, submitted in the proposal. This plan should outline:

- Key goals/targets to be achieved
- Key measures to be implemented
- Mapping of relevant stakeholders to be involved in the implementation, from within and outside the city administration
- Planned approach to citizen engagement and involvement
- Required adaptations of local/regional policy and regulatory frameworks
- Integration with existing infrastructure
- Detailed funding concept for the planned measures
- Presentation of the implementation process, including a work plan detailing tasks, responsibilities and timeframes
- Smart City Impact and Improvement Assessment with specific focus on societal benefits such as impact on energy costs for all users and consumers, but in particular for citizens and public authorities, local jobs markets, environmental and life qualities (including e.g. air quality) as well as broader sustainability. The assessment will compare expected results of planned activities with the Smart City Baseline Assessment.

The Replication Plans will be developed in close collaboration with the Lighthouse Cities and the relevant industrial partners. They will be prepared in English to allow for this collaboration as well as for the wider project group. However, for local use they will be translated into the respective local language.

Each plan will be examined in detail at dedicated local workshops, gathering local stakeholders, Lighthouse Cities and relevant industrial partners.

Task 7.4: Capacity development programme for Follower Cities

To help strengthen understanding and local capacities within the Follower Cities, which will underpin successful replication activities, a structured capacity building programme will be developed for the Follower Cities, including all relevant stakeholders.

Capacity building activities will be based on a peer-to-peer approach, with the opportunity to develop personal relationships which has been found to be the most effective and efficient approach for supporting

learning. The capacity building programmes will be supervised and supported by ICLEI and REC.

The precise capacity development programmes will be tailor-made for each Follower City but will include:

- Study-visits to all three Lighthouse Cities both initially and when results are visible
- Organised business dialogues with companies involved in implementation of measures in Lighthouse Cities with opportunity to meet relevant city administration representatives
- Seminars/Workshops on-site in the Follower Cities to develop a greater understanding for smart city approaches
- Direct guidance and collaboration, mainly through phone and electronic communication in the elaboration of tasks 7.1 – 7.3.
- Provision of Lighthouse City Implementation Reports, developed in WP 2-4, providing detailed information on measures implemented, processes and stakeholder engagement activities follower, and results achieved

Co-operation between the Follower City and the Lighthouse Cities will be further supported by a series of peer-to-peer meetings. Regular phone meetings will be held between the project coordinators in Follower City and Lighthouse Cities to develop personal relationships and discuss issues relevant to implementation.

Partner responsibilities:

ICLEI:

- Work package co-ordination
- Elaborate templates for Baseline Assessments, Replication Plans and three-monthly progress updates
- Assist Cork, Graz and Porto in preparation of Baseline Assessments (Activity 7.2)
- Assist Cork, Graz and Porto in preparation of Replication Plans (Activity 7.3)
- Establish tailored capacity development programmes for Cork, Graz and Porto (Activity 7.4)
- Assist Cork, Graz and Porto in the organisation of on-site seminars/workshops and business dialogues (Activity 7.4)
- Provide ongoing helpdesk support to Cork, Graz and Porto in their Smart City activities (Activity 7.5)

REC:

- Assist Suceava and Valetta in preparation of Baseline Assessments (Activity 7.2)
- Assist Suceava and Valetta in preparation of Replication Plans (Activity 7.3)
- Establish tailored capacity development programmes for Suceava and Valetta (Activity 7.4)
- Assist Suceava and Valetta in the organisation of on-site seminars/workshops and business dialogues (Activity 7.4)
- Provide ongoing helpdesk support to Suceava and Valetta in their Smart City activities (Activity 7.5)

Follower Cities:

- Establishment of Smart City Liaison Groups (Activity 7.1)
- Preparation of Baseline Assessments (Activity 7.2)
- Preparation of Replication Plans (Activity 7.3)
- Logistical organisation of local capacity development programme activities (Activity 7.4)

Lighthouse Cities:

- Peer reviews of Baseline Assessments (both initial and updated versions) (Activity 7.2)
- Peer reviews of Replication Plans (Activity 7.3)
- Peer to peer meetings with representatives of the Follower Cities within the context of the local capacity development programme activities (Activity 7.4)

Industry partners:

- Participation in business dialogues with Follower City administrations (Activity 7.4)

Deliverables (brief description and month of delivery)

- D7.1 – Follower City Baseline Assessments (M6)
- D7.2 – Updated Baseline Assessments (M30)
- D7.3 – Follower City Replication Plans (M 48)

Work package #	8											
Starting date or starting event	M4											
Work package title	Dissemination											
Participant number	1	2	3	4	5	6	7	8	9	10	11	12
Short name of participant	MF	COL	BCN	ICLEI	KTH	IESE	GRZ	SUC	VAL	POR	COR	REC
Person/months per participant	4,00	2,13	0,32	25,87	0,53	0,53	0,64	12,80	0,64	1,12	0,85	14,03
Participant number	27	31	32	33	34	35	36	38				
Short name of participant	END	CENI	GN	i2CAT	IREC	PHL	SCH	POL				
Person/months per participant	0,48	0,53	0,38	0,27	0,69	0,27	0,53	4,00				

Objectives

The main aim of the dissemination part of the work package is to complement the in-depth individual city replication and deployment activities of the deployment part with wider European communication and dissemination activities, and encourage further deployment.

The work package will also carry out a series of European Smart City exchange activities which aim to promote direct exchange and learning between stakeholders across Europe.

- Engage Follower Cities in up-scaling and replication activities
  Engage Follower Cities in the project's dissemination

Description of work (where appropriate, broken down into tasks), lead partner and role of participants

Task 8.1 Smart City Roadmap

Although it is the buzz-word of the time, the concept of the "smart city" is largely driven by concerned industries and higher level policy processes. It resonates well with cities but at the same time many cities lack a clear and comprehensive idea what the options, opportunities and challenges are connected to the idea. They also lack a clear understanding which components they would have to integrate in actual solutions in order to create future options for fully unfolding the smart city potential. In parallel we note on the side of industry still a focus on products from various branches rather than a clear definition of solutions by integrating the available and upcoming products into systems solutions.

The Smart City Roadmap will be a dialogue process developed around the Smart City Lighthouse Project Peer Group. By reflecting the experiences and results from the lighthouse projects together with other key stakeholders in the light of relevant policy processes it will help to better inform other smart city projects through improved material and the helpdesk (see above), and at the same time feed back into relevant policy processes on the European and even international level (Smart Cities Stakeholder Platform, Covenant of Mayors, Public Procurement of Innovation, ISO and CEN processes, ELTIS and CIVITAS Platforms, and all involved DGs of the EC). Activities envisaged:

- One annual meeting and workshop with all relevant stakeholders in Brussels
- Separate communication section on project web platform (see below)
- Facilitated exchange and communication by the coordinator of the helpdesk and web platform
- Putting together a set of recommendations for a joint development of solutions on a systems level between cities and technology providers

Task 8.2: City Interest Group

To expand the deployment of measures implemented in the Lighthouse Cities beyond the group of Follower Cities, a further City Interest Group will be established with the aim of recruiting up to 20 additional cities to closely follow activities within the Lighthouse and Follower Cities, with the aim of achieving further potential replication.

Additional cities will be recruited throughout the project, with cities to be approached based on knowledge within the project consortium of likely interest, together with an assessment of any relevant prerequisites for implementation of the lighthouse city measures (e.g. climate, population density, transport/infrastructure networks, housing types, economic profile). Each interested city will be asked to submit an expression of interest form.

The City Interest Group will have the following opportunities to get involved in the project:

- Participation in the capacity building/study visit series within the Lighthouse Cities
- Receive all detailed information from Lighthouse City implementation, including the results from WP2-4
- Access to a helpdesk, co-ordinated by ICLEI, which will aim to match specific requests/needs from the City Interest Group participants with relevant experiences in the Lighthouse and Follower Cities, including, where relevant, from other Smart City projects
- The first five City Interest Group participants that produce an Implementation Potential Study (as in Activity 7.3) will have the opportunity to receive one on-site capacity building workshop to support the development of a full Replication Plan (as in Activity 7.4), organised by ICLEI with the involvement of Lighthouse and/or Follower Cities as appropriate.

Task 8.3 European workshop series

- **Annual European workshops** will be held over the course of the project (5 in total) – hosted by Lighthouse and Follower Cities – targeting up to 50 city representatives and other relevant stakeholders at national, regional and local levels. These will be aimed at further exploring and defining the concept of the "Smart City", with a focus on key issues surrounding implementation. They will include showcases on the experience of the host city, as well as presentations from other European cities. These events will focus strongly on interaction and peer-to-peer exchange between city counterparts. Participants from other Horizon 2020 smart city demonstration projects will be invited to participate.
- The aim will be to combine at least two of these workshops with events from other projects to expand them into full European Smart City conferences building on the existing Smart Cities Stakeholder Platform annual conference series (http://eu-smartcities.eu/conference).

Task 8.4 Capacity building/study visit series

- Each Lighthouse City will organise an **annual capacity building/study visit**, with the support of ICLEI – focus on provision of training and information by all stakeholder groups involved in implementation. Up to 30 participants will be invited to participate in each study visit, with priority given to Follower Cities, and the City Interest Group (see activity 8.2). Study visits to include both site visits and learning workshops. Where possible, these will be held back-to-back with other project events such as project meetings or European workshops.
- At least one of the study visits in each Lighthouse City will be expanded to act as a national/regional **showcase event**.

Task 8.5: Website and mass electronic dissemination activities

- **Project website**: Focus on providing concise updates on Lighthouse Cities' projects (and Follower Cities, once underway), and the presentation of other project materials. If considered appropriate in discussion with the other Lighthouse projects the website should have the potential to develop into a shared Smart City Lighthouse Platform (see www.innovation-procurement.org) between different

lighthouse projects in order to facilitate the envisaged peer to peer cooperation and to support the work around the Smart Cities Roadmap (see above)

- Corporate design to be developed including: logo, document templates, html project diary design, promotional brochure
- **Promotional brochure** to be produced to promote the project and its activities to a wide audience via relevant events and mailings
- Project mailing list/interest group
- Electronic **Project Diary** to be published three times per year providing short updates on Lighthouse City implementation measures, as well as an relevant updates from Follower Cities
- Series of press releases to a media list compiled of contacts collected from all partners
- Identification of, and presentation of results to, relevant national and European electronic dissemination channels (websites, mailing lists, newsletters, online forums)
- Four fact sheets to be produced that focus on particular aspects of the smart cities approach.
- In the final year of the project a **Results Brochure** will be developed presenting summarised results from the three Lighthouse Cities, with a focus on presenting "good reasons for going smart" and "success stories".
- LinkedIn: A Linkedin group will be created targeting the Consortium partners and engaged members. It will be closed to members and comments will be moderated.
- Slideshare: All the relevant presentations will be shared in platforms such as slideshare.com respecting the levels of privacy (presentations are going to be public or private according to the topic and information provided).
- Youtube/Vimeo may be used to publish promotional and tutorial videos.
- Wikipedia: Elaboration of Wikipedia articles of key concepts and innovation artefacts, such us Energy Efficiency embedded in Urban Planning, City Protocol, and so on.

Task 8.6 Ensure links to other European activities

The project will ensure both staff resources and travel budget are available to allow effective links and contributions to be made to the activities of the SCC EIP, including the Smart Cities Stakeholder Platform.

Partner responsibilities:

ICLEI:

- Work package co-ordination
- Elaborate templates for Implementation Packages, Replication Plans and three-monthly progress updates
- Develop website, corporate design, production of promotional material and implementation of mass electronic dissemination activities (Activity 8.5)
- Organise European workshop series (Activity 8.3)
- Assist in the development of study visits and regional showcase events (Activity 8.4)
- Co-ordinate City Interest Group activities for 2 cities (Activity 8.4)

Follower Cities:

- Provide input into the development of promotional material where required (Activity 8.5)

- Participate in European workshops (Activity 8.3)
- Contribute to the identification of potential cities for the City Interest Group (Activity 8.4)
- Participate in multiple meetings with at least one city in the City Interest Group (Activity 8.4)
- Engage with SCC EIP activities (Activity 8.6)

Lighthouse Cities:

- Provide direct assistance to one or two Follower Cities in preparation and implementation of Replication Plans (Activity 8.2)
- Provide input into the development of promotional material where required (Activity 8.5)
- Participate in European workshops (Activity 8.3)
- Organise annual study visits, including one regional/national showcase event (Activity 8.4)
- Engage with SCC EIP activities (Activity 8.6)

REC:

- Co-ordinate translation of reports into relevant languages and regional dissemination (Activity 8.5)
- Promotion of European Exchange events throughout CEE region (Activities 8.3 & 8.4)
- Participate in European workshops (Activity 8.3)
- Organise one European workshop (Activity 8.3)
- Assist To co-ordinate City Interest Group activities for 2 CEE cities (Activity 8.4)

POLIS:

- Promotion of European Exchange events (Activities 8.3 & 8.4)
- Participate in European workshops (Activity 8.3)

Deliverables (brief description and month of delivery)

D8.1 – Project website (M3)

D8.2 – Corporate design (logo, document templates, html project diary design, promotional brochure) (M3)

D8.3 – Promotional brochure (M3)

D8.4 – Project mailing list/interest group (M3)

D8.5 – Electronic Project Diary (M3 – then every 4 months)

D8.6 – Smart City Roadmap (M9)

D8.7 – 5 European workshops (M10 – then every 12 months)

D8.8 - Three study visits in each Lighthouse City, including one national/regional showcase event per Lighthouse City (Spread throughout the project, M16, M30 and M44)

D8.9 – 6 press releases (M24 and M48)

D8.10 – Project Results Brochure (M58)

D8.11 – 4 Smart Cities Fact Sheets (M58)

Table 3.1.b: List of work packages

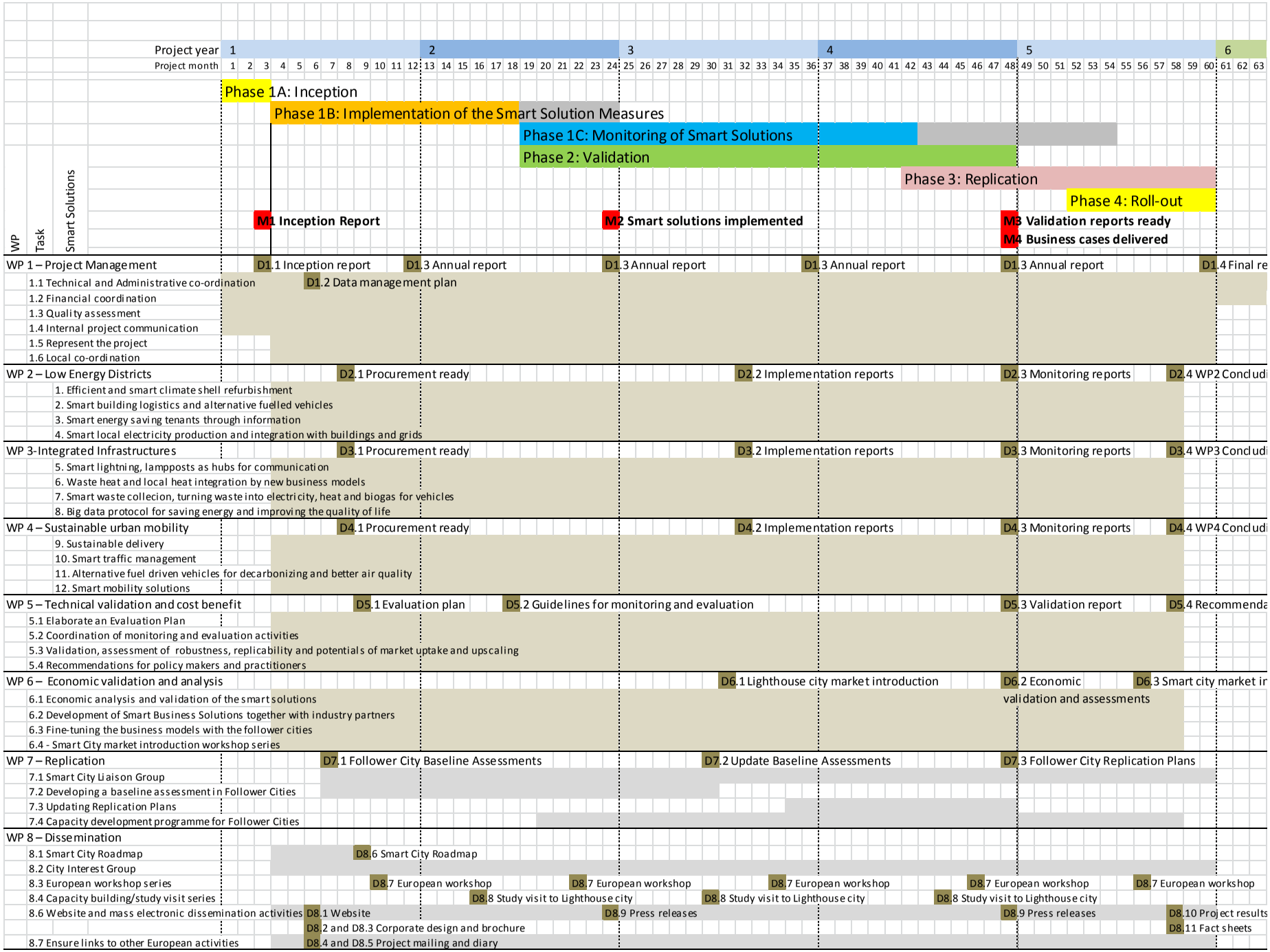
Work package No	Work Package Title	Lead Participant No	Lead Participant Short Name	Person-Months	Start Month	End month
1	Project Management	1	MF	155	1	60
2	Low energy districts	2	BCN	384	4	58
3	Integrated measures	3	CGM	601	4	58
4	Sustainable urban mobility	1	MF	326	4	58
5	Technical, Social and Economical Validation	5	KTH	62	4	58
6	Economic validation and analysis	6	IESE	73	4	58
7	Replication in Follower Cities	4	ICLEI	68	7	60
8	Replication and Dissemination	4	ICLEI	71	4	60
				1739 Total months		

Table 3.1c: List of Deliverables[3]

Deliverable (number)	Deliverable name	Work package number	Short name of lead participant	Type	Dissemination level	Delivery date
D1.1	Inception report	1	MF	R		M3
D1.2	Data management plan	1	MF	R		M6
D1.3	Annual technical and management reports	1	MF	R		M12, 24, 26, 48
D1.4	Final Technical Report	1	MF	R		M60
D2.1	Procurement ready	2	BCN		CO	M8
D2.2	Implementation reports	2	BCN	DEM	CO	M32
D2.3	Monitoring and Evaluation report	2	BCN	R	CO	M48
D2.4	Concluding report	3	BCN	R	CO	M58
D3.1	Procurement ready	3	CGN		CO	M8
D3.2	Implementation reports	3	CGN	DEM	CO	M32
D3.3	Monitoring and Evaluation report	3	CGN	R	CO	M48
D3.4	Concluding report	3	CGN	R	CO	M58
D4.1	Procurement ready	4	MF	R	CO	M8
D4.2	Implementation reports	4	MF	DEM	CO	M32
D4.3	Monitoring and Evaluation report	4	MF	R	CO	M48
D4.4	Concluding report	4	MF	R	CO	M58
D 5.1	Evaluation Plan	5	KTH	R	CO	M9
D 5.2	Guidelines for monitoring and evaluation	5	KTH	R	CO	M18
D 5.3	Report on results of technical, economic and social validation	5	KTH	R	CO	M48
D 5.4	Recommendations for policy makers and practitioners	5	KTH	R	CO	M58
D6.1	Lighthouse Cities market introduction	6	IESE	R	CO	M31
D6.2	Economic validation	6	IESE	R	CO	M48

[3] If your action taking part in the Pilot on Open Research Data, you must include a data management plan as a distinct deliverable within the first 6 months of the project. This deliverable will evolve during the lifetime of the project in order to present the status of the project's reflections on data management. A template for such a plan is available on the Participant Portal (Guide on Data Management).

	and assessments					
D6.3	Smart City market introduction	6	IESE	R	CO	M56
D7.1	Follower City Baseline Assessments	7	ICLEI	R	CO	M6
D7.2	Updated Baseline Assessments	7	ICLEI	R	CO	M30
D7.3	Follower City Replication Plans	7	ICLEI	R	CO	M48
D8.1	Project website	8	ICLEI	DEC	PU	M3
D8.2	Corporate design	8	ICLEI	DEC	PU	M3
D8.3	Promotional brochure	8	ICLEI	DEC	PU	M3
D8.4	Project mailing list/interest group	8	ICLEI	R	PU	M3
D8.5	Electronic Project Diary	8	ICLEI	DEC	PU	M3 (every 4 months)
D8.6	Smart City Roadmap	8	ICLEI	DEC	PU	M9
D8.7	5 European workshops	8	ICLEI	DEC	PU	M10, then every 12 months
D8.8	Three study visits in each Lighthouse City	8	ICLEI	DEM	PU	M16,M30 , M44
D8.9	6 press releases	8	ICLEI	DEC	PU	M48
D8.10	Project Results Brochure	8	ICLEI	DEC	PU	M58
D8.11	4 Smart Cities Fact Sheets	8	ICLEI	DEC	PU	M58


Project year
1
2
3
4
5
6
Project month
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63
Phase 1A: Inception
Phase 1B: Implementation of the Smart Solution Measures
Phase 1C: Monitoring of Smart Solutions
Phase 2: Validation
Phase 3: Replication
Phase 4: Roll-out
M1 Inception Report
M2 Smart solutions implemented
M3 Validation reports ready
M4 Business cases delivered
WP
Task
Smart Solutions
WP 1 – Project Management
D1.1 Inception report
D1.3 Annual report
D1.3 Annual report
D1.3 Annual report
D1.3 Annual report
D1.4 Final re
1.1 Technical and Administrative co-ordination
D1.2 Data management plan
1.2 Financial coordination
1.3 Quality assessment
1.4 Internal project communication
1.5 Represent the project
1.6 Local co-ordination
WP 2 – Low Energy Districts
D2.1 Procurement ready
D2.2 Implementation reports
D2.3 Monitoring reports
D2.4 WP2 Conclud
1. Efficient and smart climate shell refurbishment
2. Smart building logistics and alternative fuelled vehicles
3. Smart energy saving tenants through information
4. Smart local electricity production and integration with buildings and grids
WP 3-Integrated Infrastructures
D3.1 Procurement ready
D3.2 Implementation reports
D3.3 Monitoring reports
D3.4 WP3 Conclud
5. Smart lightning, lampposts as hubs for communication
6. Waste heat and local heat integration by new business models
7. Smart waste collecion, turning waste into electricity, heat and biogas for vehicles
8. Big data protocol for saving energy and improving the quality of life
WP 4 – Sustainable urban mobility
D4.1 Procurement ready
D4.2 Implementation reports
D4.3 Monitoring reports
D4.4 WP4 Conclud
9. Sustainable delivery
10. Smart traffic management
11. Alternative fuel driven vehicles for decarbonizing and better air quality
12. Smart mobility solutions
WP 5 – Technical validation and cost benefit
D5.1 Evaluation plan
D5.2 Guidelines for monitoring and evaluation
D5.3 Validation report
D5.4 Recommenda
5.1 Elaborate an Evaluation Plan
5.2 Coordination of monitoring and evaluation activities
5.3 Validation, assessment of robustness, replicability and potentials of market uptake and upscaling
5.4 Recommendations for policy makers and practitioners
WP 6 – Economic validation and analysis
D6.1 Lighthouse city market introduction
D6.2 Economic validation and assessments
D6.3 Smart city market ir
6.1 Economic analysis and validation of the smart solutions
6.2 Development of Smart Business Solutions together with industry partners
6.3 Fine-tuning the business models with the follower cities
6.4 - Smart City market introduction workshop series
WP 7 – Replication
D7.1 Follower City Baseline Assessments
D7.2 Update Baseline Assessments
D7.3 Follower City Replication Plans
7.1 Smart City Liaison Group
7.2 Developing a baseline assessment in Follower Cities
7.3 Updating Replication Plans
7.4 Capacity development programme for Follower Cities
WP 8 – Dissemination
8.1 Smart City Roadmap
D8.6 Smart City Roadmap
8.2 City Interest Group
8.3 European workshop series
D8.7 European workshop
D8.7 European workshop
D8.7 European workshop
D8.7 European workshop
D8.7 European workshop
8.4 Capacity building/study visit series
D8.8 Study visit to Lighthouse city
D8.8 Study visit to Lighthouse city
D8.8 Study visit to Lighthouse city
8.6 Website and mass electronic dissemination activities
D8.1 Website
D8.9 Press releases
D8.9 Press releases
D8.10 Project results
D8.2 and D8.3 Corporate design and brochure
D8.11 Fact sheets
8.7 Ensure links to other European activities
D8.4 and D8.5 Project mailing and diary

3.2 Management structure and procedures

The project management contains the following bodies:

- Steering Group
- Project Management Team
- Site Groups/Lighthouse cities
- WP-Leaders
- Industrial partners

Steering Group
The Steering Group is the superior deciding body and consists of the Project Management team, the Site coordinators and the Work Package leaders. The Steering Group is chaired by the coordinator.

The responsibilities of the Steering Group are:

- Over-all responsibility for the project
- Discuss and decide on strategic issues
- Approval of public reports and deliverables
- If necessary, adjust the project content
- Handle contractual and financial matters

The chair of the steering group will be Gustaf Landahl, City of Stockholm,

Project Management Team
The Project Management Team coordinates the day-to-day-activities on European level and monitors the project. The team consists of the Coordinator and Assistant coordinator. The team will work in close and daily contact with site coordinators and WP 4-6 leaders. The group is responsible for information, evaluation and integration of demonstration activities and research–related tasks.

Co-ordinator
The Co-ordinator's responsibilities are:

- Guarantee the day-to-day management, coordination between all project partners, establish agreement on common working routines and procedures
- Organisation of the project conferences, meetings, seminars and workshops.
- Integrate, supervise and monitor the project in order to fulfil the objectives on time and to cost
- Co-ordinate the administrative and financial reporting
- Represent the project externally and be a contact point towards the Commission
- Prepare, lead and report to and from the project Steering Group

Gustaf Landahl, City of Stockholm will be the Coordinator.

Assistant co-ordinator
The assistant co-ordinator will assist the Coordinator in his tasks. Most of the daily work will be performed by the assistant coordinator. Experts on different administrative aspects will also be assisting on a sub-contracting basis. Tasks that will be subcontracted do not lie in the core responsibilities of the coordination.

Jonas Ericson, City of Stockholm will be the assistant coordinator.

Site Groups
Each lighthouse city site will set up a local group to co-ordinate and monitor the work performed by the local partners. This team includes representatives from all the local contractors and stakeholders.

Site coordinator

The Site coordinator responsibilities are:

- Perform the day-to-day management, co-ordination between the local partners, the exchange of results, the participation of relevant local partners and stakeholders in project conferences, meetings, seminars and workshops.
- Integrate, supervise and monitor the local project in order to fulfil the objectives on time and to cost
- Provide WP-leaders with data as a basis for cross site evaluation
- Set up the local communication lines
- Coordinate the local administrative and financial reporting as well as other administrative and financial issues
- Represent the local project externally
- Represent the site in the Steering group

Workpackage leaders

WP-leaders responsibilities are:

- Ensure comparison and integration between lighthouse cities
- Harmonizing the data gathering and evaluation methods within and between the WPs
- Ensure coordination of the work to monitor and evaluate the chosen techniques and methods which addresses their WP related issues
- Internal Transfer of knowledge on the WP theme, through WS, Seminars, informal contacts
- Producing WP-reports on the results and recommendations from the WP
- Analyse the replicability of the actions implemented and identify target groups for replication and dissemination on European level.

3.2.1 Management elements

The primary elements that will be used to manage the project are:

Project Meetings

The entire project will meet on three occasions during the project time, the Kick-off, Midterm event and the Final conference. This will give all partners the possibility to know each other by face and name, which will enhance the informal communication by phone and e-mail.

Steering Group meetings

The Steering Group will meet three times year 1 and 5 to start up and finalize the project and twice a year during year 2-4. Each Steering Group meeting will be hosted by a Lighthouse in order, "Lighthouse Tours", will be conducted where also follower cities can participate after the first year of the project. Virtual meetings will be set up in between when relevant to monitor progress and integration within and between the Lighthouse cities.

Lighthouse city meetings

The Lighthouse cities will meet in order to monitor progress and decide on common issues, about 6 meetings each year.

Work Package meetings

Workshop and Work Package meetings will be conducted in conjunction with Steering Group meetings.

Internal information channels

The main internal information channel at project level will be

- Meetings and minutes from these meetings, both physical and video link meetings.
- Monthly letter to the Steering Group, summarising all importing fact and dates
- Web based project site, providing common documents, version handling, internal timetables, screen sharing, virtual meeting rooms etc

- Informal contacts by telephone and e-mail

Evaluation Plans
WP 5 has the overall responsibility for the technical and economical evaluations.

Replication and Dissemination Plans
Replication is the ultimate aim of the project. Plans will be elaborated both on site-level and on European level in close cooperation with follower cities and industry partners during the first 12 months of the Project. WP4 and WP6 have the overall responsibility for the Replication and Dissemination.

Quality review.
Each technical deliverable produced by the project will go through a quality review. Some key deliverables, decided by the Steering Group, will also go through an external review by sub-contracted independent experts.

Administrative reports will only be released through the project co-ordinator, which will undertake a final document check, according to the definition set out in the quality plan. Key public reports will be approved by the Steering Group before publishing.

Decision making and conflict solving
Possible conflicts will be solved by the Steering Group. The decision and problem resolving process will be defined in a Consortium Agreement. A consortium agreement will be elaborated before signing the contract with the European Commission.

Table 3.2a: List of milestones

Milestone number	Milestone name	Related work package(s)	Estimated date	Means of verification
1	Inception report	WP1	M3	Report delivered
2	Smart solutions implemented	WP2,3,4	M24	Measures are up and running
3	Validation report	WP5,6	M48	Reports delivered
4	Business cases	WP 2,3,4,7	M48	Reports delivered

The *GrowSmarter* partners have long experience of cooperation in similar successful projects. In the event of risks occurring, the consortium is prepared to adjust the work plan to avoid failure of activities. The clear division of responsibilities between the *GrowSmarter* partners will ensure decisions are taken appropriately and decisively and possible conflicts will be solved. The decision and problem resolving process will be defined in detail in a Consortium Agreement.

To minimize risks partners have already identified possible risks presented below. Risks related to specific WP tasks are presented in a risk assessment table. The table will be updated once a year, more often if needed ensuring that risks are identified and contingencies developed as early as possible. Risk reporting will feed into the overall project reporting and will be linked to evaluation and related training activities

- Personnel and administrative risks

If qualified project managers are not found in time there are risks for delays in these tasks. There can also be a risk that someone with an important role in the project coordination gets another job, goes on parental leave or by some other reason leaves the project. Administrative risks could occur if documents and information are not available to relevant parts of the project team.

- Contingency actions

The personnel and administrative risks will be reduced by a system with open files accessible to local managers in all lighthouse cities (internal web site), an extensive cooperation between the cities and close cooperation between the work package leaders. It's important to not have only one person with all the knowledge of GrowSmarter at the lighthouse cities. For successful project implementation, knowledge must always be spread and shared.

- Political risks

There is broad political consensus in the Lighthouse cities on the importance of the proposed measures, and the specific objectives are decided in city plans, in many cases in charge since several years. Increased energy efficiency and renewable energy, are together with reduced emissions of greenhouse gases, over-arching goals for both the GrowSmarter cities and the EU as a whole. The risk that decision makers withdraw the investments in the cities are regarded as a merely theoretical risk.

➢ Contingency actions

A range of dissemination and awareness-raising measures, as well as feedback and evaluation mechanisms, are built into the project structure and these will be adjusted if necessary. Stakeholders will be integrated throughout the project and will be not only beneficiaries of the measures carried out, but also as active participants. The consensus in the cities on the importance of the proposed measures and by the cities implementing and disseminating these measures jointly in the project increases the political and public support.

- Technical risks

GrowSmarter will demonstrate a number of methods and technologies related to the thermal envelope, smart communication, energy efficient appliances and renewable energy systems. Though market ready, not all users are readily accepting new technology and it may hence not deliver the expected effects. Failure in properly information to stakeholders could generate some resistance amongst residents

➢ Contingency actions

Companies delivering innovative technologies are either partners in the project or local partners, guaranteeing fast response in the event of any problem impacting upon service delivery. Effective and innovative information to the users of the new technology and strategic information of the new technical solutions will increase the level of user acceptance and also mitigate any negative reactions from the public. Effective dissemination of information, opportunities for training and availability of feedback mechanisms, together with research and evaluation of both the techniques and their socio-economic impacts, will help users get accustomed to innovative methods and technologies, and enable the project coordinators to adjust or modify aspects of new installations to better suit user needs.

- Financial risks

Other resources of funding can be a risk.

➢ Contingency actions

All funding sources, other than EU contribution, are secured and all financial contributors have guaranteed their financial contribution will be available at the appropriate time in letters of intent or letter of support and enclosed in appendixes to this proposal. For more information please see section 2.4 resources to be committed.

- Risks related to specific WP´s and tasks

To minimize risks in the WP tasks the partners have already identified possible risks tasks and contingency planning within these tasks. (see table 3.2b below)

Table 3.2b: Critical risks for implementation

Description of risk	Work package(s) involved	Proposed risk-mitigation measures
Technical and Administrative co-ordination **Change of personnel**	WP1	A system with open files accessible to all project partners make it possible for new personnel to continue
Financial co-ordination Delays by one partner causes delayed payments	WP1	Coordinator will not wait longer than accepted by Steering group. All partners have high liquidity.
Quality assessment Lack of skills	WP1	Contract external experts
Internal project communication Lack of available relevant information Telecommunication show difficult	WP1	A system with open files accessible to all project partners Substitute with (fewer) meetings IRL + telephone conferences
Local co-ordination Change of personnel	WP1	Local team consist of several persons, knowledgeable of the project
Smart Solutions measures Measures prove not to achieve the energy savings goals and replication potential as set up by the project and call text	WP1-8	Carefully selected measures which are 7-9 on TRL, industry partners with capability to serve Europe with measures and cities willing to demonstrate and further replicate the measures.
Conclusions and recommendations Unable to get credible data from demonstrated measures	WP2-4	See relevant monitoring tasks in WP 1-4
Demonstration of smart solutions measures Demonstration fail or are considerable delayed due to local conditions, lack of partners, investment or legal regulation.	WP2-4	Good and stable *GrowSmarter* consortium with close cooperation between public, commercial and academic sector
Procurement of industrial partners Unable to procure supplier due predefined requirements	WP2-4	Close cooperation with the market sector
Monitoring Different methods used to collect data Not comparable data from year to year	WP2-4	IPMVP protocol principles will be applied to ensure comparability of energy data

and from Lighthouse cities to Lighthouse cities		
Monitoring methods Different cities use different monitoring methodologies and metrics. Incomparable datasets produced Difficulty in generating relevant monitoring data for projects and underestimation of time required to acquire data	WP5	A common monitoring protocol will be agreed upon. This will ensure that common and recognised principles will be applied across the demonstration projects to ensure comparability of performance data
Evaluation of financial models Contexts might be so different that it is difficult to develop common approaches.	WP6	Literature search to extract information from more or less similar projects and to put the investigated projects into perspective
National and EU policy and regulatory frameworks Incomparable data due to different terminology between countries/cities	WP6	Development of common analytical framework for all countries/cities
Replication analysis Unable to get credible data	WP5,6,7	See relevant monitoring tasks in WP 2-4
Follower Cities replication Follower cities do not replicate desired smart solutions	WP1,7,8	Involve Follower cities from the start of the deployment of measures and communicate advantages and disadvantages in a transparent manner.
Evaluation coordination Unable to get credible data, data not comparable	WP 5,6,8	See relevant monitoring tasks in WP 2-4
Local and national Replication and Dissemination Selection of wrong target group, wrong message Non effective message, contrary result Lack of interest from the sites	WP7,8	Preparatory study on target group and messages Keeping right contacts with media The wrong target group has been identified, find another
European Replication and Dissemination Selection of wrong target group, wrong message Non effective message, contrary result Lack of interest from the Lighthouse cities and follower cities	WP7,8	Preparatory study on target group and messages Keeping right contacts with media The wrong target group has been identified, find another

3.3 Consortium as a whole

The GrowSmarter partners are a well acquainted group of organisations with proven success track record of cooperation with each other. All partners have set up high ambitions in the field of energy saving and climate change mitigation and also includes the expertise needed. The partners complement each other on the various areas of expertise related to the three main issues expressed for SCC-1.

The consortium consists of 39 partners from 13 different European countries. The three Lighthouse cities in the project are spread across Europe from north to south with one Lighthouse in the north (Stockholm), one in the south (Barcelona) and one in the center of Europe (Cologne). The Light House Cities represent the whole European span of different climatic conditions. Together with the Follower cities, the GrowSmarter Consortium cities represent both large and small cities, from North, South, East and West, rich cities and poor cities, growing economies and cities going through harder conditions.

Excellence

The Light House Cities

Barcelona is long recognized as one of the smartest cities in Europe, Stockholm being among the most environmentally friendly and Cologne experienced on ICT and smart solutions and have a long history of environment.

The Lighthouse cities have been chosen since they all have the:

- will and capacity to host the smart solutions,
- capability to show them to followers and other cities
- the extensive networks to help disseminate the results through different channels.

These facts enable the project to test the different smart solutions in different conditions with the help of the involved European industry.

Industrial partners

As the main aim of the GrowSmarter project is to help get the smart solutions to the market, thus not only the lighthouse demonstrations in themselves, the industry partners are a very important part of the project. A majority of the partners involved in the GrowSmarter project are industry partners that will both demonstrate their solutions in the lighthouse cities and actively spread the solutions to the rest of the world after the project is finished.

To help in getting the replication of the smart solutions going in countries and cities outside the lighthouses, the project also involves five follower cities spread across Europe (Porto, Valetta, Graz, Suceava and Cork) and together they provide an European geographical coverage, representing different parts of Europe in the following main areas, Low Energy Districts, Integrated infrastructure and Sustainable urban mobility.

The GrowSmarter project gathers top energy experts and the leading industry partners to further improve the choice and implementation of energy solutions and methods, to monitor and evaluate the real-world results and to jointly analyse the replicability of the measures undertaken.

The industrial partners have been chosen because they:

- Have high knowledge and available near market smart solutions
- Have a clear capability and will to demonstrate the smart solutions to follower cities
- Have ambitions to roll out the smart solutions to the rest of Europe and globally.

For detailed information about each participant, view section 4-5, the second part of this proposal.

Potential impact

GrowSmarter project has involved the top industrial partners that offer innovative and energy saving solutions and are considered best in the world for their product and services, e.g. Skanska, Schneider Electric, Gas Natural SDG S.A, Rhein energie, IBM and Philips are just a few examples.

Climate and Energy ambitions
All Lighthouse cities in the consortium have a long experience in working with energy efficiency and reducing Climate gas emissions. All cities are members of the Covenant of Mayors, all cities take active part in the Clinton Climate Initiative and all cities have adopted very ambitious goals and plans for reducing energy use and emission of climate gasses, including the Sustainable Energy Action Plans in Covenant of Mayors.

Similarity and complementarity
The GrowSmarter demonstrations and smart solutions have many similarities but also very specific differences that will be exploited through benchmarking and comparisons. Example of such differences is the influence residentials can have on energy bills and investment decisions. These similarities and differencies will be explored in benchmarking workshops and later exploited in developing realistic replication analysises

Replication & Dissemination
The Industrial partners and the Lighthouse cities administrations have existing networks to initiate local and national replication of the successful methods. GrowSmarter has involved ICLEI as WP leader for WP7 and 8 which is one of the world's leading association of cities and local governments dedicated to sustainable development. GrowSmarter has also involved REC and POLIS who will use their expertise and extensive networks to reach out and maximize the replication potential.

Through subsequent EU-projects and participation in networks, the 3 city administrations have a wide network to other European cities that will be used to find cities suitable for replication of measures. In addition, the GrowSmarter project has involved the European key networks to reach out to cities and other key actors which are presented in the Annex 3- LoI.

Management
All cities are well experienced in working in both national and international projects, both as participants and as coordinators, and the city partners have worked together in earlier projects. The coordinator Stockholm has coordinated several projects of similar size and scope, e.g Zeus, Civitas Trendsetter, the BEST project.

3.4 Resources to be committed

This chapter describes the overall financial plan for the project, including how budget is distributed between activities, summary of staff effort and description of other direct cost items.

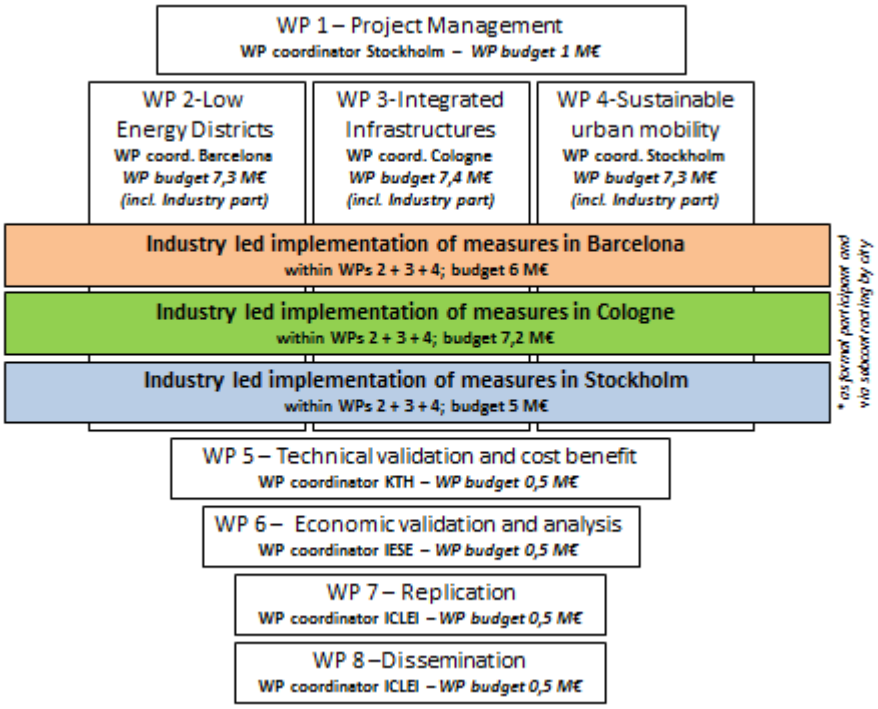


Table 3.4a: Summary of staff effort

	WP1	WP2	WP3	WP4	WP5	WP6	WP7	WP8	Total Person/Months per Participant
1. City of Stockholm	62,27	36,29	31,71	62,61	1,35	0,96	2,73	4,00	201,92
2. City of Cologne	5,07	1,07	41,33	1,23	1,81	1,23	0,80	2,13	54,67
3. City of Barcelona	0,32	2,88	21,87	4,53	0,00	0,00	0,00	0,32	29,92
4. ICLEI	4,11	0,00	0,00	0,00	0,00	2,00	13,60	25,87	45,57
5. KTH	4,11	5,33	5,07	14,13	28,36	0,00	0,00	0,53	57,53
6. IESE	4,11	0,00	0,00	0,00	6,67	48,80	0,00	0,53	60,11
7. City of Graz	1,49	0,21	0,21	0,21	0,21	1,50	2,72	0,64	7,21
8. Suceava	14,40	4,27	4,27	4,27	4,27	1,50	30,29	12,80	76,06
9. Valetta	1,49	0,21	0,21	0,21	0,21	1,50	2,72	0,64	7,21
10. Porto Municipality	1,49	0,21	0,21	0,21	0,21	1,50	2,99	1,12	7,95
11. Cork	1,49	0,21	0,21	0,21	0,21	0,53	3,52	0,85	7,25
12. REC	0,00	0,00	0,00	0,00	0,00	1,00	8,00	14,03	23,03
13. Envac	0,00	0,00	23,47	0,00	0,00	1,50	0,00	0,00	24,97
14. Dalkia	0,00	14,93	0,00	0,00	0,00	0,00	0,00	0,00	14,93
15. Fortum	0,00	16,00	23,47	19,73	0,00	1,50	0,00	0,00	60,70
16. Carrier Transport AB	0,00	16,00	0,00	18,67	0,00	0,00	0,00	0,00	34,67
17. Skanska	0,00	14,93	0,00	0,00	0,00	1,50	0,00	0,00	16,43
18. Info 24	0,00	7,47	7,47	17,87	0,00	0,00	0,00	0,00	32,80
19. Stockholmshem	0,00	51,73	0,00	9,33	0,00	0,00	0,00	0,00	61,07
20. IEM	0,00	0,00	0,00	13,33	0,00	0,00	0,00	0,00	13,33

21. Rhein Energie	0,00	20,05	0,00	0,00	0,00	0,00	0,00	0,00	20,05
22. Ampido	0,00	0,00	0,00	15,56	0,00	0,00	0,00	0,00	15,56
23. Cambio Cologne	0,00	0,00	0,00	27,97	0,00	1,50	0,00	0,00	29,47
24. KVB	0,00	0,00	0,00	6,67	0,00	0,00	0,00	0,00	6,67
25. AGT International	0,00	0,00	51,95	0,00	0,00	0,00	0,00	0,00	51,95
26. DEWOG	0,00	0,00	0,00	0,00	0,00	1,50	0,00	0,00	1,50
27. Endesa SA	1,87	0,00	104,58	0,00	0,00	0,00	0,00	0,48	106,93
28. Retevision I SA	2,00	0,00	107,00	0,00	0,00	0,00	0,00	0,00	109,00
29. Anteverti	40,80	1,07	1,07	1,07	0,00	0,00	0,00	0,00	44,00
30. Barcelona Supercomputing Center	0,00	0,00	59,15	0,00	15,57	0,00	0,00	0,00	74,72
31. CENIT	1,07	0,00	0,00	49,60	0,00	0,00	0,00	0,53	51,20
32. Gas Natural Sdg	6,86	137,07	15,16	27,43	2,29	1,50	0,00	0,38	190,69
33. Fundacio i2Cat	0,00	0,00	0,00	23,73	0,00	0,00	0,00	0,27	24,00
34. IREC\ Energy research Center	1,14	50,31	15,84	1,23	0,75	0,43	0,80	0,69	71,18
35. Philips Lighting B.V.	0,85	0,00	31,95	0,00	0,00	1,50	0,00	0,27	34,57
36. Schneider Electric	0,00	0,00	12,80	0,00	0,00	1,50	0,00	0,53	14,83
37. Urbisup Consulting SL	0,00	3,57	13,97	5,81	0,00	0,00	0,00	0,00	23,36
38. POLIS	0,00	0,00	0,00	0,00	0,00	0,00	0,00	4,00	4,00
39. IBM	0,00	0,00	27,73	0,00	0,00	0,00	0,00	0,00	27,73
Total Person/Months	154,93	383,83	600,70	325,62	61,92	72,94	68,17	70,62	1 738,74

Table 3.4b: 'Other direct cost' items (travel, equipment, other goods and services, large research infrastructure)

For the following participants the sum of the costs for' travel', 'equipment', and 'goods and services' exceeds 15% of the personnel costs for that participant. If not specified in the long table below, the justification for the costs is that the 'Other direct cost' items are related to the implementation of the Smart Solution measures in the 3 Lighthouse cities.

Participant 1 Stockholm city	**Cost (€)**	**Justification**
Travel	55.750	Travel for project meetings as WP Coordinator and Lighthouse City
Equipment	160.000	
Other goods and services	40.000	Hosting of site visits
Total	255.750	
Participant 3 Barcelona city	Cost (€)	Justification
Travel	2.250	Travel for project meetings as WP Coordinator and Lighthouse City
Equipment	75.000	
Other goods and services		
Total	77.250	
Participant 4 ICLEI	Cost (€)	Justification
Travel	29.250	Travel for project meetings as WP Coordinator
Equipment		
Other goods and	19.000	

services		
Total	48.250	
Participant 5 KTH	Cost (€)	Justification
Travel	52.400	Travel for project meetings as WP Coordinator
Equipment	30.000	
Other goods and services		
Total	82.400	
Participant 6 IESE	Cost (€)	Justification
Travel	15.000	Travel for project meetings as WP Coordinator
Equipment		
Other goods and services	57.400	
Total	72.400	
Participant 7 Graz	Cost (€)	Justification
Travel	17.250	Travel for project meetings as Follower city
Equipment		
Other goods and services	5.000	Hosting of site visits
Total	22.250	
Participant 8 Suceava	Cost (€)	Justification
Travel	11.700	Travel for project meetings as Follower city
Equipment		
Other goods and services	3.000	Hosting of site visits
Total	14.700	
Participant 9 Valetta	Cost (€)	Justification
Travel	9.750	Travel for project meetings as Follower city
Equipment		
Other goods and services	51.500	Technical support for WP7 Hosting of site visits
Total		
Participant 10 Porto	Cost (€)	Justification
Travel	22.500	Travel for project meetings as Follower city
Equipment		
Other goods and services	15.000	Hosting of site visits
Total	37.500	
Participant 11 Cork	Cost (€)	Justification
Travel	14.250	Travel for project meetings as Follower city
Equipment		
Other goods and services	4.000	Hosting of site visits
Total	18.250	
Participant 12 REC	Cost (€)	Justification
Travel	10.500	Travel for project meetings

Equipment		
Other goods and services	14.000	Dissemination products
Total	24.500	
Participant 13 Envac	Cost (€)	Justification
Travel		
Equipment	480.000	
Other goods and services		
Total	480.000	
Participant 15 Fortum	Cost (€)	Justification
Travel	6.000	Travel for project meetings
Equipment	246.000	
Other goods and services		
Total	252.000	
Participant 16 Carrier	Cost (€)	Justification
Travel	3.000	Travel for project meetings
Equipment	62.000	
Other goods and services	10.000	
Total	75.000	
Participant 18 Info24	Cost (€)	Justification
Travel	6.000	Travel for project meetings
Equipment	64.000	
Other goods and services		
Total	70.000	
Participant 19 Stockholmshem	Cost (€)	Justification
Travel	2.000	Travel for project meetings
Equipment	193.022	
Other goods and services		
Total	195.022	
Participant 21 Rhein Energie	Cost (€)	Justification
Travel		
Equipment	1.200.000	
Other goods and services		
Total	1.200.000	
Participant 23 Cambio	Cost (€)	Justification
Travel		
Equipment	432.000	
Other goods and services	126.000	
Total	558.000	
Participant 24	Cost (€)	Justification

KVB		
Travel		
Equipment	160.000	
Other goods and services		
Total	160.000	
Participant 27 Endesa	Cost (€)	Justification
Travel	8.000	Travel for project meetings
Equipment	221.875	
Other goods and services	164.000	
Total	393.875	
Participant 32 Gas Natural Fenosa	Cost (€)	Justification
Travel	3.000	Travel for project meetings
Equipment	641.330	
Other goods and services		
Total	644.330	
Participant 36 Schneider	Cost (€)	Justification
Travel	3.000	Travel for project meetings
Equipment		
Other goods and services	100.000	
Total	103.000	
Participant 38 IBM	Cost (€)	Justification
Travel		
Equipment	500.000	
Other goods and services		
Total	500.000	

Annex 1 – BEST Table for Lighthouse Cities

Table 1-3 – Stockholm

Table 4-5 – Cologne

Table 6-15 - Barcelona

Building Energy Specification Table (BEST)

Community / site: Stockholm

BEST no. 1

1,1 **Building Category**

[1] Food court/shops

total area / category / BEST sheet [2]: 1600 m^2

1,2 **Local Climate**

Climatic Zone: Sweden

(national definition): Climate zon 3

January average outside temperature	°C	-2,8
August average outside temperature	°C	16,2
Average global horizontal radiation	kWh/m^2 yr	980
Annual heating degree days [3]	°Cd/yr	3497

1,3 **Maximum requirements of building fabric**

			Existing building [5]	National regulation for new built [6]*	**suggested** specification [7]	Energy savings [%] [8]
Façade/wall	U	W / m2K	1,2		0,45	63
Roof	U	W / m2K	0,5		0,09	82
Ground floor	U	W / m2K	0,5		0,5	0
Glazing	U_g	W / m2K	2		0,9	55
Average U-value	U_{av}	W / m2K	0,8		0,4	50
Glazing	g	total solar energy transmittance of glazing [%	70		40	43
Shading	Fs	Shading correction factor				
Ventilation rate [4]		air changes/hr	1,2	0,5	1	17

*National regulations stipulates max 80 kWh/m2 + additional according to ventilationflow and the developer decides where to put the losses

2 Building Energy Performance

2,1 Energy demand per m2 of total used conditioned floor area (kWh / m2yr) incl. system losses

energy carrier existing	**suggested energy carrier**		specify energy efficiency measures [13]	Existing building [5]	National regulation / normal practice	**suggested** specification [7]	% Energy savings [8]
Heating + ventilation							
Electricity	Heatpump	kWh/m^2yr	Insulation roof+walls, new windows, 90% he	200		75	63
Cooling + ventilation							
Electricity	Free cooling	kWh/m^2yr	Free cooling from bore hole	15		2	87
Ventilation (if separate from heating/cooling)							
Electricity	Electricity	kWh/m^2yr	CO2 controlled ventilation,low pressure duct	10		8	20
Lighting							
	Electricity	kWh/m^2yr	Demand controlled LED lightning	20		10	50
Domestic Hot Water (DHW)							
District heating	Heat pump	kWh/m^2yr	Efficient water taps	5		4	20
Other energy demand							
		kWh/m^2yr		5		5	
		kWh/m^2yr	Subtotal sum of energy demand	255	200	104	59
Appliances (please indicate, but costs are not eligible)							
	electricity	kWh/m^2yr	Efficient appliances (fridges etc)	30		25	17

2,2 RES contribution per m2 of total used conditioned area (kWh / m2 yr)

total production kWh/yr	m^2 installed	kW installed	specify RES measures	Existing building [5]	National regulation / normal practice	**suggested** specification [7]	RES contribution [%][8]
10700	90		PV cells	0		5	
93600	7x200m		Geothermal heatpump	0		52	
		kWh/m^2yr	Subtotal sum of RES contribution	0	0	57	59

3 Building Energy Use

per m^2 of total used/heated floor area (kWh/m2 yr)

kWh/m^2yr	Subtotal sum of energy demand	255	200	104	59
kWh/m^2yr	Subtotal sum of RES contribution	0	0	57	
kWh/m^2yr	Total Building Energy Use	255	200	47	82

Building Energy Specification Table (BEST)

Community / site: Stockholm | Årstahöjden | **BEST** no. 2

1,1 **Building Category**: tertiary retrofitted [1] Appartment/stories (Housing association), Built 2007

total area / category / BEST sheet [2]: 4950 m²

1,2 **Local Climate**

Climatic Zone: Sweden
(national definition): Climate zone 3

January average outside temperature	°C	-2,8
August average outside temperature	°C	16,2
Average global horizontal radiation	kWh/m² yr	980
Annual heating degree days [3]	°Cd/yr	3497

1,3 **Maximum requirements of building fabric**

			Existing building [5]	National regulation for new built [6]*	**suggested** specification [7]	Energy savings [%] [8]
Façade/wall	U	W / m2K	0,21		0,21	
Roof	U	W / m2K	0,14		0,14	
Ground floor	U	W / m2K	0,16		0,16	
Glazing	U_g	W / m2K	1,3		1,3	
Average U-value	U_{av}	W / m2K	0,39		0,39	
Glazing	g	total solar energy transmittance of glazing [%	70		70	
Shading	Fs	Shading correction factor				
Ventilation rate [4]		air changes/hr	0,5	0,5	0,5	

*National regulations stipulates max 90 kWh/m2 and the developer decides where to put the losses

2 Building Energy Performance

2,1 Energy demand per m2 of total used conditioned floor area (kWh / m2yr) incl. system losses

energy carrier existing	**suggested energy carrier**		specify energy efficiency measures [13]	Existing building [5]	National regulation / normal practice	**suggested** specification [7]	% Energy savings [8]
Heating + ventilation							
District heating	District heating	kWh/m²yr	Adaptive controll system. Air quality sensors	87		57	35
Cooling + ventilation							
		kWh/m²yr					
Ventilation (if separate from heating/cooling)							
		kWh/m²yr					
Lighting							
	electricity	kWh/m²yr		5		5	
Domestic Hot Water (DHW)							
District heating	District heating	kWh/m²yr		30		30	
Other energy demand							
		kWh/m²yr					
		kWh/m²yr	Subtotal sum of energy demand	122	122	92	25
Appliances (please indicate, but costs are not eligible)							
	electricity	kWh/m²yr		35		35	

2,2 RES contribution per m2 of total used conditioned area (kWh / m2 yr)

total production kWh/yr	m² installed	kW installed	specify RES measures	Existing building [5]	National regulation / normal practice	**suggested** specification [7]	RES contribution [%][8]
13000	100	15	PV Cells			2,6	
		kWh/m²yr	Subtotal sum of RES contribution	0	0	2,6	

3 Building Energy Use

per m² of total used/heated floor area (kWh/m2 yr)

kWh/m²yr	Subtotal sum of energy demand	122	122	92	25
kWh/m²yr	Subtotal sum of RES contribution	0	0	2,6	
kWh/m²yr	Total Building Energy Use	122	122	89,4	27

Building Energy Specification Table (BEST)

Community / site: Stockholm | Valla Torg | **BEST** no. 3

1,1 **Building Category**: residential retrofitted [1] Appartments/stores | total area / category / BEST sheet [2]: 29757 m²

1,2 **Local Climate**

Climatic Zone	Sweden	January average outside temperature	°C -2,8
(national definition)	Climate zone 3	August average outside temperature	°C 16,2
		Average global horizontal radiation	kWh/m² yr 980
		Annual heating degree days [3]	°Cd/yr 3497

1,3 **Maximum requirements of building fabric**

			Existing building [5]	National regulation for new built [6]*	**suggested** specification [7]	Energy savings [%] [8]
Façade/wall	U	W / m2K	0,49		0,22	55
Roof	U	W / m2K	0,18		0,08	55
Ground floor	U	W / m2K	0,40		0,40	0
Glazing	U_g	W / m2K	2,20		0,70	68
Average U-value	U_{av}	W / m2K	0,76		0,42	45
Glazing	g	total solar energy transmittance of glazing [%	79		60	24
Shading	Fs	Shading correction factor	40		40	
Ventilation rate [4]		air changes/hr	0,5	0,5	0,5	

*National regulations stipulates max 90 kWh/m2 and the developer decides where to put the losses

2 Building Energy Performance

2,1 Energy demand per m2 of total used conditioned floor area (kWh / m2yr) incl. system losses

energy carrier existing	**suggested energy carrier**		specify energy efficiency measures [13]	Existing building [5]	National regulation / normal practice	**suggested** specification [7]	% Energy savings [8]
Heating + ventilation							
District heating	District heating + H	kWh/m²yr	Insulation roof/walls. New windows. Heat rec	100		26	74
Cooling + ventilation							
		kWh/m²yr					
Ventilation (if separate from heating/cooling)							
		kWh/m²yr	Heat recovery				
Lighting							
	electricity	kWh/m²yr	LED- light, movement and sound activated.	9		5	44
Domestic Hot Water (DHW)							
District heating	District heating+ H	kWh/m²yr	Insulat waterpipes. Heat recovery waste wat	31		10	68
Other energy demand							
		kWh/m²yr					
		kWh/m²yr	Subtotal sum of energy demand	155	125	41	71
Appliances (please indicate, but costs are not eligible)							
	electricity	kWh/m²yr	Efficient appliances (fridges, hobs) Informati	50		45	10

2,2 RES contribution per m2 of total used conditioned area (kWh / m2 yr)

total production kWh/yr	m² installed	kW installed	specify RES measures	Existing building [5]	National regulation / normal practice	**suggested** specification [7]	RES contribution [%][8]
65000	500		PV cells	0	0	2,1	
		kWh/m²yr	Subtotal sum of RES contribution	0	0	2,1	

3 Building Energy Use

per m² of total used/heated floor area (kWh/m2 yr)

kWh/m²yr	Subtotal sum of energy demand	155	125	41	71
kWh/m²yr	Subtotal sum of RES contribution	0	0	2,1	
kWh/m²yr	Total Building Energy Use	155	125	38,9	72

Building Energy Specification Table (BEST)

Community / site: Köln | Stegerwaldsiedlun | **BEST** no. 4

1,1 **Building Category**: residential retrofitted [1] | total area / category / BEST sheet [2]: 20528 m²

1,2 **Local Climate**

		January average outside temperature	°C: -1,3
		August average outside temperature	°C: 18,3
Climatic Zone	Deutschland	Average global horizontal radiation	kWh/m² yr: 1000
(national definition)		Annual heating degree days [3]	°Cd/yr: 3328

1,3 **Maximum requirements of building fabric**

			Existing building [5]	National regulation for new built [6]	**suggested** specification [7]	Energy savings [%] [8]
Façade/wall	U	W / m2K	0,416	0,28	0,143	65,6
Roof	U	W / m2K	1,462	0,2	0,133	90,9
Ground floor	U	W / m2K	1,038	0,35	0,201	80,6
Glazing	U_g	W / m2K	2,9	1,3	0,95	67,2
Average U-value	U_{av}	W / m2K	1,454	0,53	0,369	74,62
Glazing	g	total solar energy transmittance of glazing [%	0,75		0,5	
Shading	Fs	Shading correction factor	0,9		0,9	
Ventilation rate [4]		air changes/hr	0,7	0,7	0,4	80

2 Building Energy Performance

2,1 Energy demand per m2 of total used conditioned floor area (kWh / m2yr) incl. system losses

energy carrier existing	**suggested energy carrier**		specify energy efficiency measures [13]	Existing building [5]	National regulation / normal practice	**suggested** specification [7]	% Energy savings [8]
Heating + ventilation							
Erdgas	Strom	kWh/m²yr	Installation Wärmepumpe Luft/Wasser	117,37	34,24	6,98	94
Cooling + ventilation							
		kWh/m²yr					
Ventilation (if separate from heating/cooling)							
	Strom	kWh/m²yr	Installation Lüftung WRG			2	
Lighting							
	electricity	kWh/m²yr	Modernisierung Beleuchtung	8,75		1,46	83,3
Domestic Hot Water (DHW)							
		kWh/m²yr	Installation Wärmepumpe Luft/Wasser	26,76	10,72	7,23	72,98
Other energy demand							
		kWh/m²yr					
		kWh/m²yr	Subtotal sum of energy demand	152,88	44,96	17,67	88,44
Appliances (please indicate, but costs are not eligible)							
	electricity	kWh/m²yr	Nutzung RES	33,97		23,78	30

2,2 RES contribution per m2 of total used conditioned area (kWh / m2 yr)

total production kWh/yr	m² installed	kW installed	specify RES measures	Existing building [5]	National regulation / normal practice	**suggested** specification [7]	RES contribution [%][8]
621840,1	7100	852	Photovoltaik			6,8	38,48
		kWh/m²yr	Subtotal sum of RES contribution	0	0	6,8	

3 Building Energy Use

per m² of total used/heated floor area (kWh/m2 yr)

		Existing building [5]	National regulation / normal practice	**suggested** specification [7]	% Energy savings [8]
kWh/m²yr	Subtotal sum of energy demand	152,88	44,96	17,67	11,55
kWh/m²yr	Subtotal sum of RES contribution	0	6,74	6,8	38,48
kWh/m²yr	Total Building Energy Use	152,88	38,22	10,87	7,11

4 Other national overall energy performance targets or criteria (additional information, mandatory if existing)

	Units [9]	explain content and scale [10]	Existing building	National regulation for new built (2006)*	**suggested** specification

Building Energy Specification Table (BEST)

Community / site: Köln | Stegerwaldsiedlun | **BEST** no. 5

1,1 **Building Category**: residential retrofitted [1]

total area / category / BEST sheet [2]: 12762 m²

1,2 **Local Climate**

Climatic Zone (national definition): Deutschland

January average outside temperature	°C	-1,3
August average outside temperature	°C	18,3
Average global horizontal radiation	kWh/m² yr	1000
Annual heating degree days [3]	°Cd/yr	3328

1,3 **Maximum requirements of building fabric**

			Existing building [5]	National regulation for new built [6]	**suggested** specification [7]	Energy savings [%] [8]
Façade/wall	U	W / m2K	1,485	0,28	0,191	87,14
Roof	U	W / m2K	1,462	0,2	0,133	90,9
Ground floor	U	W / m2K	1,038	0,35	0,201	80,6
Glazing	U_g	W / m2K	2,9	1,3	0,95	67,2
Average U-value	U_{av}	W / m2K	2,9	1,3	0,95	67,2
Glazing	g	total solar energy transmittance of glazing [%	0,75		0,5	
Shading	Fs	Shading correction factor	0,9		0,9	
Ventilation rate [4]		air changes/hr	0,7	0,7	0,4	80

2 Building Energy Performance

2,1 Energy demand per m2 of total used conditioned floor area (kWh / m2yr) incl. system losses

energy carrier existing	**suggested energy carrier**		specify energy efficiency measures [13]	Existing building [5]	National regulation / normal practice	**suggested** specification [7]	% Energy savings [8]
Heating + ventilation							
Erdgas	Strom	kWh/m²yr	Installation Wärmepumpe Luft/Wasser	151,75	30,96	6,08	96
Cooling + ventilation							
		kWh/m²yr					
Ventilation (if separate from heating/cooling)							
	Strom	kWh/m²yr	Installation Lüftung WRG			2	
Lighting							
	electricity	kWh/m²yr	Modernisierung Beleuchtung	7,85		1,31	83,3
Domestic Hot Water (DHW)							
		kWh/m²yr	Installation Wärmepumpe Luft/Wasser	26,27	10,69	8,16	68,94
Other energy demand							
		kWh/m²yr					
		kWh/m²yr	Subtotal sum of energy demand	185,87	41,65	17,55	90,56
Appliances (please indicate, but costs are not eligible)							
	electricity	kWh/m²yr	Nutzung RES	30,49		21,34	30

2,2 RES contribution per m2 of total used conditioned area (kWh / m2 yr)

total production kWh/yr	m² installed	kW installed	specify RES measures	Existing building [5]	National regulation / normal practice	**suggested** specification [7]	RES contribution [%][8]
459811,3	5250	630	Photovoltaik			6,9	39
		kWh/m²yr	Subtotal sum of RES contribution	0	0	6,9	

3 Building Energy Use

per m² of total used/heated floor area (kWh/m2 yr)

		Existing building [5]	National regulation / normal practice	**suggested** specification [7]	RES contribution [%][8]
kWh/m²yr	Subtotal sum of energy demand	185,87	41,65	17,55	9,44
kWh/m²yr	Subtotal sum of RES contribution	0	6,74	6,9	39
kWh/m²yr	Total Building Energy Use	185,87	34,91	10,65	5,73

4 Other national overall energy performance targets or criteria (additional information, mandatory if existing)

	Units [9]	explain content and scale [10]	Existing building	National regulation for new built (2006)*	**suggested** specification

Building Energy Specification Table (BEST)

Community / site: Barcelona | **BEST** no. 6

1,1 **Building Category**: Residential retrofitted

[1] Traditional from Eixample neighbourhood (30's)

total area / category / BEST sheet [2]: 5 549 m^2

1,2 **Local Climate**

Climatic Zone: Mediterranean climate

(national definition): C2

January average outside temperature	^oC	11,3
August average outside temperature	^oC	26,3
Average global horizontal radiation	kWh/m^2 yr	1371,0
Annual heating degree days [3]	$^oCd/yr$	855,0

1,3 **Maximum requirements of building fabric**

			Existing building [5]	National regulation for new built [6]	**suggested** specification [7]	Energy savings [%] [8]
Façade/wall	U	W / m2K	1,8	0,75	0,54	28%
Roof	U	W / m2K	1,28	0,5	0,36	28%
Ground floor	U	W / m2K	2,46	0,75	2,46	-228%
Glazing	U_g	W / m2K	5,17	3,1	2	35%
Average U-value	U_{av}	W / m2K	3,02	0,97	0,53	45%
Glazing	g	total solar energy transmittance of glazing [%]	(*)	(*)	(*)	(*)
Shading	Fs	Shading correction factor	0,4	0,4	0,4	0
Ventilation rate		air changes/hr	3	0,81	0,27	67%

2 Building Energy Performance

2,1 Energy consumption per m2 of total used conditioned floor area (kWh / m2yr) incl. system losses

energy carrier existing	**suggested energy carrier**		specify energy efficiency measures	Existing building [5]	regulation / normal practice for new built	**suggested** specification [7]	% Energy savings [8]
Heating + ventilation							
electricity & gas	district heating	kWh/m^2yr	insulation (façade and roof), new windows, heat recovery micro-CHP	40,02	24,26	3,73	85%
Comment: As the surface where passive measures are implemented is higher than the 25% of the total surface of the building, it exists a requirement in the regulation.							
Cooling + ventilation							
electricity	electricity	kWh/m^2yr	insulation (façade and roof), new windows	2,99	2,99	1,36	55%
Comment: It exists no energy consumption requirements in Spanish regulation for cooling in residential buildings.							
Ventilation (if separate from heating/cooling) This ratio includes electricity consumption in AHU's and independent heat pumps directly connected to this system							
		kWh/m^2yr					
Lighting							
electricity	electricity	kWh/m^2yr	No improvements	5,80	5,80	5,80	0%
Domestic Hot Water (DHW) (no consumption in this building)							
electricity & gas	district heating	kWh/m^2yr	heat recovery (micro-CHP), efficient water taps	17,28	17,28	3,63	79%
Other energy demand							
electricity	electricity	kWh/m^2yr	No improvements	10,90	10,90	10,90	0%
		kWh/m^2yr	Subtotal sum of energy consumption	76,99	61,23	25,42	58%
Appliances (please indicate, but costs are not eligible)							
electricity		kWh/m^2yr					

2,2 RES contribution per m2 of total used conditioned area (kWh / m2 yr)

total production kWh/yr	m^2 installed	kW installed	specify RES measures	Existing building [5]	National regulation / normal practice for new built (2006) [6]*	**suggested** specification [7]	RES contribution [%][8]
						0,0	
		kWh/m^2yr	Subtotal sum of RES contribution	0	0	0,0	

3 Building Energy Use

per m^2 of total used/heated floor area (kWh/m2 yr)

kWh/m^2yr	Subtotal sum of energy demand	77,0	61,2	25,4	58%
kWh/m^2yr	Subtotal sum of RES contribution	0	0	0,0	
kWh/m^2yr	Total Building Energy Use	77,0	61,2	25,4	58%

4 Other national overall energy performance targets or criteria (additional information, mandatory if existing)

	Units [9]	explain content and scale [10]	Existing building	National regulation for new built (2006)*	**suggested** specification
		energy performance certification	D	C	A

(*) Comment: Building Technical Code in Spain do not define different values for "g" and for "Fs". The value proposed corresponds to"modified Fs", since it integrates both concepts.

Building Energy Specification Table (BEST)

Community / site: Barcelona | **BEST** no. 7

1,1 **Building Category**: Residential retrofitted
[1] Building constructed in the 60s
total area / category / BEST sheet [2]: 1 134 m^2

1,2 **Local Climate**

Climatic Zone: Mediterranean climate
(national definition): C2

January average outside temperature	^oC	11,3
August average outside temperature	^oC	26,3
Average global horizontal radiation	kWh/m^2 yr	1371,0
Annual heating degree days [3]	^oCd/yr	855,0

1,3 **Maximum requirements of building fabric (no passive measures in façade/ windo**

			Existing building [5]	National regulation for new built [6]	**suggested** specification [7]	Energy savings [%] [8]
Façade/wall	U	W / m2K	1,566			
Roof	U	W / m2K	1,82			
Ground floor	U	W / m2K	2,46			
Glazing	U_g	W / m2K	4,96			
Average U-value	U_{av}	W / m2K	2,12			
Glazing	g	total solar energy transmittance of glazing [%]	(*)			
Shading	Fs	Shading correction factor	0,2			
Ventilation rate		air changes/hr	3			

2 Building Energy Performance

2,1 Energy consumption per m2 of total used conditioned floor area (kWh / m2yr) incl. system losses

energy carrier existing	**suggested energy carrier**		specify energy efficiency measures	Existing building [5]	National regulation / normal practice for	**suggested** specification [7]	% Energy savings [8]
Heating + ventilation							
electricity & gas	district heating	kWh/m^2yr	Improvement of shutters (night protection), heat recovery (micro-CHP)	46,33	46,33	10,42	78%
Comment: It exists no energy consumption requirements in Spanish regulation, if the surface where passive measures are implemented is lower than 25% of total building surface							
Cooling + ventilation							
electricity	electricity	kWh/m^2yr	Improvement of shading elements and shutters	5,18	5,18	3,11	40%
Comment: It exists no energy consumption requirements in Spanish regulation for cooling in residential buildings.							
Ventilation (if separate from heating/cooling)							
		kWh/m^2yr					
Lighting							
electricity	electricity	kWh/m^2yr	No improvements in lighting	5,08	5,08	5,08	0%
Domestic Hot Water (DHW)							
electricity & gas	district heating	kWh/m^2yr	heat recovery (micro-CHP), efficient water taps	23,89	23,89	5,02	79%
Other energy demand							
	electricity	kWh/m^2yr		10,90	10,90	10,90	0%
		kWh/m^2yr	Subtotal sum of energy consumption	91,38	91,38	34,53	62%
Appliances (please indicate, but costs are not eligible) **Equipment in kitchens**							
	electricity	kWh/m^2yr					

2,2 RES contribution per m2 of total used conditioned area (kWh / m2 yr)

total production kWh/yr	m^2 installed	kW installed	specify RES measures	Existing building [5]	National regulation / normal practice for new built (2006) [6]*	**suggested** specification [7]	RES contribution [%][8]
		kWh/m^2yr	Subtotal sum of RES contribution	0	0	0,0	

3 Building Energy Use

per m^2 of total used/heated floor area (kWh/m2 yr)

kWh/m^2yr	Subtotal sum of energy demand	91,4	91,4	34,5	62%
kWh/m^2yr	Subtotal sum of RES contribution	0	0	0,0	
kWh/m^2yr	Total Building Energy Use	91,4	91,4	34,5	62%

4 Other national overall energy performance targets or criteria (additional information, mandatory if existing)

	Units [9]	explain content and scale [10]	Existing building	National regulation for new built (2006)*	**suggested** specification
		energy performance certification	D	C	B

(*) Comment: Building Technical Code in Spain do not define different values for "g" and for "Fs". The value proposed corresponds to"modified Fs", since it integrates both concepts.

Building Energy Specification Table (BEST)

Community / site: Barcelona

BEST no. 8

1,1 **Building Category**

Residential retrofitted

[1] Building constructed in the 00s

total area / category / BEST sheet [2]: 3 840 m^2

1,2 **Local Climate**

Climatic Zone (national definition): Mediterranean climate / C2

January average outside temperature	°C	11,3
August average outside temperature	°C	26,3
Average global horizontal radiation	kWh/m^2 yr	1371
Annual heating degree days [3]	°Cd/yr	855

1,3 **Maximum requirements of building fabric (no passive measures in façade/ windows**

			Existing building [5]	National regulation for new built [6]	**suggested** specification [7]	Energy savings [%] [8]
Façade/wall	U	W / m2K	0,81			
Roof	U	W / m2K	0,46			
Ground floor	U	W / m2K	2,46			
Glazing	U_g	W / m2K	4			
Average U-value	U_{av}	W / m2K	1,38			
Glazing	g	total solar energy transmittance of glazing [%]	(*)			
Shading	Fs	Shading correction factor	0,2			
Ventilation rate		air changes/hr	3			

2 Building Energy Performance

2,1 Energy consumption per m2 of total used conditioned floor area (kWh / m2yr) incl. system losses

energy carrier existing	**suggested energy carrier**		specify energy efficiency measures	Existing building [5]	regulation / normal practice for new built	**suggested** specification [7]	% Energy savings [8]
Heating + ventilation							
gas	district heating	kWh/m^2yr	Improvement of shutters (night protection), heat recovery from DH&C (Districlima)	13,01	13,01	3,90	70%
Comment: It exists no energy consumption requirements in Spanish regulation, if the surface where passive measures are implemented is lower than 25% of total building surface							
Cooling + ventilation							
electricity	electricity	kWh/m^2yr	Improvement of shading elements and shutters	5,66	5,66	3,40	40%
Comment: It exists no energy consumption requirements in Spanish regulation for cooling in residential buildings.							
Ventilation (if separate from heating/cooling)							
		kWh/m^2yr					
Lighting							
electricity	electricity	kWh/m^2yr		5,08	5,08	5,08	0%
Domestic Hot Water (DHW)							
electricity & gas	district heating	kWh/m^2yr	efficient water taps, heat recovery from DH&C (Districlima)	23,89	23,89	6,69	72%
Other energy demand							
electricity	electricity	kWh/m^2yr		10,90	10,90	10,90	0%
		kWh/m^2yr	Subtotal sum of energy consumption	58,54	58,54	29,97	49%
Appliances (please indicate, but costs are not eligible)							
electricity		kWh/m^2yr					

2,2 RES contribution per m2 of total used conditioned area (kWh / m2 yr)

total production kWh/yr	m^2 installed	kW installed	specify RES measures	Existing building [5]	National regulation / normal practice for new built (2006) [6]*	**suggested** specification [7]	RES contribution [%][8]
		kWh/m^2yr	Subtotal sum of RES contribution	0	0	0,0	

3 Building Energy Use

per m^2 of total used/heated floor area (kWh/m2 yr)

kWh/m^2yr	Subtotal sum of energy demand	58,5	58,5	30,0	49%
kWh/m^2yr	Subtotal sum of RES contribution	0	0	0,0	
kWh/m^2yr	Total Building Energy Use	58,5	58,5	30,0	49%

4 Other national overall energy performance targets or criteria (additional information, mandatory if existing)

	Units [9]	explain content and scale [10]	Existing building	National regulation for new built (2006)*	**suggested** specification
		energy performance certification	D	C	A

(*) Comment: Building Technical Code in Spain do not define different values for "g" and for "Fs". The value proposed corresponds to"modified Fs", since it integrates both concepts.

Building Energy Specification Table (BEST)

Community / site: Barcelona

BEST no. 9

1,1 **Building Category**

[1] Escocesa - Residential apartments

total area / category / BEST sheet [2]: 1200 m^2

1,2 **Local Climate**

Climatic Zone	Mediterranean	January average outside temperature	11,3 °C
(national definition)	C2	August average outside temperature	26,3 °C
		Average global horizontal radiation	1371 kWh/m^2 yr
		Annual heating degree days [3]	855 °Cd/yr

1,3 **Maximum requirements of building fabric**

			Existing building [5]	National regulation for new built [6]	**suggested** specification [7]	Energy savings [%] [8]
Façade/wall	U	W / m2K	2,09	0,7	0,63	10,00%
Roof	U	W / m2K	6,67	0,41	0,37	10,00%
Ground floor	U	W / m2K	0,68	0,5	0,45	10,00%
Glazing	U_g	W / m2K	5,7	4,4	3,96	10,00%
Average U-value	U_{av}	W / m2K	3,129	1,391	1,2519	10,00%
Glazing	g	total solar energy transmittance of glazing [%]	85	35	31,50	10,00%
Shading	Fs	Shading correction factor				
Ventilation rate [4]		air changes/hr	1	1	0,90	10,00%

2 Building Energy Performance

2,1 Energy demand per m2 of total used conditioned floor area (kWh / m2yr) incl. system losses

energy carrier existing building	**suggested energy carrier**		specify energy efficiency measures [13]	Existing building [5]	National regulation / normal practice for new built (2006) [6]*	**suggested** specification [7]	% Energy savings [8]
Heating + ventilation							
electricity	district heating	kWh/m^2yr	DHC - Residual thermal source from Waste to Energy Plant	50,4	28,3	20	29%
Cooling + ventilation							
electricity	district cooling	kWh/m^2yr	DHC - Residual thermal source from Waste to Energy Plant	9,8	8	6	25%
Ventilation (if separate from heating/cooling)							
		kWh/m^2yr					
Lighting							
	electricity	kWh/m^2yr	Energy monitoring	5,8	5,5	5	9%
Domestic Hot Water (DHW)							
electricity	district heating	kWh/m^2yr	DHC - Residual thermal source from Waste to Energy Plant	20,4	12,8	10	22%
Other energy demand							
		kWh/m^2yr					
		kWh/m^2yr	Subtotal sum of energy demand	86,4	54,6	41	25%
Appliances (please indicate, but costs are not eligible)							
electricity		kWh/m^2yr	Energy monitoring + Appliances Energy Label A	45,1	42	38	10%

2,2 RES contribution per m2 of total used conditioned area (kWh / m2 yr)

total production kWh/yr	m^2 installed	kW installed	specify RES measures	Existing building [5]	National regulation / normal practice	**suggested** specification [7]	RES contribution [%][8]
1704	31,3	5	PV in roof: 5 kWp for common uses (PV is not compulsory in residential buildings)	0	0	1,42	1,42
		kWh/m^2yr	Subtotal sum of RES contribution	0	0	1,42	

3 Building Energy Use

per m^2 of total used/heated floor area (kWh/m2 yr)

kWh/m^2yr	Subtotal sum of energy demand	86,4	54,6	41
kWh/m^2yr	Subtotal sum of RES contribution	0	0	1,42
kWh/m^2yr	Total Building Energy Use	86,4	54,6	39,58 (27,51%)

4 Other national overall energy performance targets or criteria (additional information, mandatory if existing)

	Units [9]	explain content and scale [10]	Existing building	National regulation for new built (2006)*	**suggested** specification

(*) Comment: Building Technical Code in Spain do not define different values for "g" and for "Fs". The value proposed corresponds to"modified Fs", since it integrates both concepts.

Building Energy Specification Table (BEST)

Community / site: Barcelona | **BEST** no. 10

1,1 **Building Category**: tertiary retrofitted — total area / category / BEST sheet [2]: 6 417 m^2

[1] Hotel Catalonia (4 buildings in the same block)

1,2 **Local Climate**

		January average outside temperature	°C 11,3
		August average outside temperature	°C 26,3
Climatic Zone	Mediterranean climate	Average global horizontal radiation	kWh/m^2 yr 1371,0
(national definition)	C2	Annual heating degree days [3]	°Cd/yr 855,0

1,3 **Maximum requirements of building fabric (only building B, which is the oldest and w**

			Existing building [5]	National regulation for new built [6]	**suggested** specification [7]	Energy savings [%] [8]
Façade/wall	U	W / m2K	1,51	0,73	0,47	36%
Roof	U	W / m2K	1,65	0,41	0,36	12%
Ground floor	U	W / m2K	2,46	0,75	2,46	-228%
Glazing	U_g	W / m2K	5,7	2,85	1,95	32%
Average U-value	U_{av}	W / m2K	2,78	1,33	0,99	26%
Glazing (*)	g	total solar energy transmittance of glazing [%]	0,85	0,35	0,35	0%
Shading (*)	Fs	Shading correction factor	1			
Ventilation rate		air changes/hr	1	2,3	1	57%

2 Building Energy Performance

2,1 Energy consumption per m2 of total used conditioned floor area (kWh / m2yr) incl. system losses

energy carrier existing	**suggested energy carrier**		specify energy efficiency measures	Existing building [5]	regulation / normal practice for new built	**suggested** specification [7]	% Energy savings [8]
Heating + ventilation							
gas & electricity	district heating	kWh/m^2yr	insulation and new windows in the oldest building (surface affected < 25%), heat recovery (micro-CHP)	84,97	84,97	25,52	70%
Comment: It exists no energy consumption requirements in Spanish regulation, if the surface where passive measures are implemented is lower than the 25% of the total surface of the b							
Cooling + ventilation							
electricity	electricity	kWh/m^2yr	External solar shading facility in oldest building, free-cooling in common areas ventilation	31,58	31,58	18,54	41%
Comment: It exists no energy consumption requirements in Spanish regulation, if the surface where passive measures are implemented is lower than the 25% of the total surface of the b							
Ventilation (if separate from heating/cooling)							
electricity	electricity	kWh/m^2yr	CO2 controlled ventilation, high efficient fans	4,49	4,49	2,69	40%
Lighting							
electricity	electricity	kWh/m^2yr	No improvements in lighting	8,27	8,27	8,27	0%
Domestic Hot Water (DHW)							
gas	district heating	kWh/m^2yr	heat recovery (micro-CHP), efficient water taps	68,40	68,40	4,90	93%
Other energy demand							
electricity	electricity	kWh/m^2yr	Variable speed pumps, improvements in fan-coils fans	2,91	2,91	2,62	10%
		kWh/m^2yr	Subtotal sum of energy consumption	200,62	200,62	62,55	69%
Appliances (please indicate, but costs are not eligible) **Equipment in kitchens**							
	electricity	kWh/m^2yr					

2,2 RES contribution per m2 of total used conditioned area (kWh / m2 yr)

total production kWh/yr	m^2 installed	kW installed	specify RES measures	Existing building [5]	National regulation / normal practice for new built (2006) [6]*	**suggested** specification [7]	RES contribution [%][8]
59106			Aerothermal heat pumps (cooling)	0	0	9,2	
		kWh/m^2yr	Subtotal sum of RES contribution	0	0	9,2	

Comment: RES in heat pumps are determined according European Decision 2014/11/UE

3 Building Energy Use

per m^2 of total used/heated floor area (kWh/m2 yr)

kWh/m^2yr	Subtotal sum of energy demand	200,6	200,6	62,5	69%
kWh/m^2yr	Subtotal sum of RES contribution	0	0	9,2	
kWh/m^2yr	Total Building Energy Use	200,6	200,6	53,3	73%

4 Other national overall energy performance targets or criteria (additional information, mandatory if existing)

	Units [9]	explain content and scale [10]	Existing building	National regulation for new built (2006)*	**suggested** specification
		energy performance certification	C	C	A

(*) Comment: Building Technical Code in Spain do not define different values for "g" and for "Fs". The value proposed corresponds to"modified Fs", since it integrates both concepts.

Building Energy Specification Table (BEST)

Community / site: Barcelona | **BEST** no. 11

1,1 **Building Category**: tertiary retrofitted | total area / category / BEST sheet [2]: 3 000 m^2

[1] Sports Centre Can Felipa

1,2 **Local Climate**

Climatic Zone (national definition): Mediterranean climate / C2

January average outside temperature	°C	11,3
August average outside temperature	°C	26,3
Average global horizontal radiation	kWh/m^2 yr	1371
Annual heating degree days [3]	°Cd/yr	855

1,3 **Maximum requirements of building fabric**

			Existing building [5]	National regulation for new built [6]	**suggested** specification [7]	Energy savings [%] [8]
Façade/wall	U	W / m2K	0,81	0,73	0,81	-11%
Roof	U	W / m2K	0,46	0,41	0,23	44%
Ground floor	U	W / m2K	0,75	0,75	0,75	0%
Glazing	U_g	W / m2K	2,4	3	2,40	20%
Average U-value	U_{av}	W / m2K	0,85	0,87	0,78	10%
Glazing (*)	g	total solar energy transmittance of glazing [%]	0,73	0,35	0,73	-106%
Shading (*)	Fs	Shading correction factor	0,84		0,84	
Ventilation rate		air changes/hr	1	3,2	1	69%

2 Building Energy Performance

2,1 Energy consumption per m2 of total used conditioned floor area (kWh / m2yr) incl. system losses

0,41 ## 0,41

energy carrier existing	**suggested energy carrier**		specify energy efficiency measures	Existing building [5]	regulation / normal practice for new built	**suggested** specification [7]	% Energy savings [8]
Heating + ventilation							
electricity&ga	electricity&gas	kWh/m^2yr	Heat recovery from dehum syst (swimming pool heat pump) and heat recovery from shower waste water, roof insulation, pool insulation, ventilation system	273,00	273,00	150,15	45%
Comment: It exists no energy consumption requirements in Spanish regulation, if the surface where passive measures are implemented is lower than the 25% of the total surface of the b							
Cooling + ventilation							
electricity	electricity	kWh/m^2yr	Free cooling Systems integrated in Air Handling Units, night period pool covers	40,00	40,00	18,00	55%
Comment: It exists no energy consumption requirements in Spanish regulation, if the surface where passive measures are implemented is lower than the 25% of the total surface of the b							
Ventilation (if separate from heating/cooling)							
		kWh/m^2yr					
Lighting							
electricity	electricity	kWh/m^2yr	low energy lamps, LEDs	30,00	25,00	6,00	76%
Domestic Hot Water (DHW)							
gas	gas	kWh/m^2yr	low flow water fittings, condensing natural gas boiler	17,00	15,00	11,90	21%
Other energy consumption							
electricity	electricity	kWh/m^2yr	Variable Speed Pumps, Smart meter, feedback mechanism, awareness raising measures	164,00	164,00	98,40	40%
		kWh/m^2yr	Subtotal sum of energy consumption	524,0	517,0	284,5	45%
Appliances (please indicate, but costs are not eligible)							
electricity		kWh/m^2yr					

2,2 RES contribution per m2 of total used conditioned area (kWh / m2 yr)

total production kWh/yr	m^2 installed	kW installed	specify RES measures	Existing building [5]	National regulation / normal practice for new built (2006) [6]*	**suggested** specification [7]	RES contribution [%][8]
247450	340		Solar thermal + thermal storage			82,5	
		kWh/m^2yr	Subtotal sum of RES contribution	0	0	82,5	

3 Building Energy Use

per m^2 of total used/heated floor area (kWh/m2 yr)

kWh/m^2yr	Subtotal sum of energy demand	524,0	517,0	284,5	45%
kWh/m^2yr	Subtotal sum of RES contribution	0	0	82,5	
kWh/m^2yr	Total Building Energy Use	524,0	517,0	202,0	61%

4 Other national overall energy performance targets or criteria (additional information, mandatory if existing)

	Units [9]	explain content and scale [10]	Existing building	National regulation for new built (2006)*	**suggested** specification
		energy performance certification	D	C	A

(*) Comment: Building Technical Code in Spain do not define different values for "g" and for "Fs". The value proposed corresponds to"modified Fs", since it integrates both concepts.

Building Energy Specification Table (BEST)

Community / site: Barcelona | **BEST** no. 12

1,1 **Building Category**: others [1] Ca l'Alier (offices public building) | total area / category / BEST sheet [2]: 2 400 m²

1,2 **Local Climate**

		January average outside temperature	°C 11,3
		August average outside temperature	°C 26,3
Climatic Zone	Mediterranean climate	Average global horizontal radiation	kWh/m² yr 1371
(national definition)	C2	Annual heating degree days [3]	°Cd/yr 855

1,3 **Maximum requirements of building fabric**

			Existing building [5]	National regulation for new built [6]	**suggested** specification [7]	Energy savings [%] [8]
Façade/wall	U	W / m2K	2,21	0,73	0,63	14%
Roof	U	W / m2K	6,67	0,41	0,37	10%
Ground floor	U	W / m2K	0,56	0,5	0,45	10%
Glazing	U_g	W / m2K	5,7	2,81	1,2	57%
Average U-value	U_{av}	W / m2K	3,68	1,27	0,73	42%
Glazing (*)	g	total solar energy transmittance of glazing [%]	0,85	0,35	0,315	10%
Shading (*)	Fs	Shading correction factor				
Ventilation rate		air changes/hr	1	1	0,9	10%

2 Building Energy Performance

2,1 Energy consumption per m2 of total used conditioned floor area (kWh / m2yr) incl. system losses

energy carrier existing	**suggested energy carrier**		specify energy efficiency measures	Existing building [5]	regulation / normal practice for new built	**suggested** specification [7]	% Energy savings [8]
Heating + ventilation							
electricity	district heating	kWh/m²yr	DHC - connection to Districlima network	50,00	50,00	30,00	40%
Cooling + ventilation							
electricity	district cooling	kWh/m²yr	DHC-connection to Districlima network	82,00	82,00	55,00	33%
Ventilation (if separate from heating/cooling)							
		kWh/m²yr					
Lighting							
electricity	electricity	kWh/m²yr	LED + natural lighting exploitation + energy management&control	90,00	90,00	60,00	33%
Domestic Hot Water (DHW)							
		kWh/m²yr	No sanitary hot water will be needed				
Other energy consumption							
		kWh/m²yr					0%
		kWh/m²yr	Subtotal sum of energy consumption	222,0	222,0	145,0	35%
Appliances (please indicate, but costs are not eligible)							
	electricity	kWh/m²yr	Energy management and control stand-by of computers, of TV, of radio	40	40	30	25%

2,2 RES contribution per m2 of total used conditioned area (kWh / m2 yr)

total production kWh/yr	m² installed	kW installed	specify RES measures	Existing building [5]	National regulation / normal practice for new built (2006) [6]*	**suggested** specification [7]	RES contribution [%][8]
123696	619	99,0	PV with energy storage system: 98,96 kWp (only 16,80 kWp are compulsory)	0	8,05	51,5	540%
		kWh/m²yr	Subtotal sum of RES contribution	0	8,05	51,5	540%

3 Building Energy Use

per m² of total used/heated floor area (kWh/m2 yr)

kWh/m²yr	Subtotal sum of energy demand	222,0	222,0	145,0	35%
kWh/m²yr	Subtotal sum of RES contribution	0	8,05	51,5	540%
kWh/m²yr	Total Building Energy Use	222,0	214,0	93,5	56%

4 Other national overall energy performance targets or criteria (additional information, mandatory if existing)

	Units [9]	explain content and scale [10]	Existing building	National regulation for new built (2006)*	**suggested** specification
		energy performance certification	D	C	B

(*) Comment: Building Technical Code in Spain do not define different values for "g" and for "Fs". The value proposed corresponds to"modified Fs", since it integrates both concepts.

Building Energy Specification Table (BEST)

Community / site: Barcelona | **BEST** no. 13

1,1 **Building Category**: others [1] La Escocesa (offices public building) | total area / category / BEST sheet [2]: 4 050 m^2

1,2 **Local Climate**

Climatic Zone (national definition): Mediterranean climate / C2

January average outside temperature	°C	11,3
August average outside temperature	°C	26,3
Average global horizontal radiation	kWh/m^2 yr	1371
Annual heating degree days [3]	°Cd/yr	855

1,3 **Maximum requirements of building fabric**

			Existing building [5]	National regulation for new built [6]	**suggested** specification [7]	Energy savings [%] [8]
Façade/wall	U	W / m2K	2,09	0,73	0,63	14%
Roof	U	W / m2K	6,67	0,41	0,37	10%
Ground floor	U	W / m2K	0,41	0,5	0,41	18%
Glazing	U_g	W / m2K	5,7	2,81	1,2	57%
Average U-value	U_{av}	W / m2K	3,61	1,27	0,73	43%
Glazing (*)	g	total solar energy transmittance of glazing [%]	0,85	0,35	0,315	10%
Shading (*)	Fs	Shading correction factor				
Ventilation rate		air changes/hr	1	1	0,9	10%

2 Building Energy Performance

2,1 Energy consumption per m2 of total used conditioned floor area (kWh / m2yr) incl. system losses

energy carrier existing	**suggested energy carrier**		specify energy efficiency measures	Existing building [5]	regulation / normal practice for new built	**suggested** specification [7]	% Energy savings [8]
Heating + ventilation							
electricity	district heating	kWh/m^2yr	DHC - connection to Districlima network	50,00	50,00	30,00	40%
Cooling + ventilation							
electricity	district cooling	kWh/m^2yr	DHC-connection to Districlima network	82,00	82,00	55,00	33%
Ventilation (if separate from heating/cooling)							
		kWh/m^2yr					
Lighting							
electricity	electricity	kWh/m^2yr	LED + natural lighting exploitation + energy management&control	90,00	90,00	60,00	33%
Domestic Hot Water (DHW)							
		kWh/m^2yr	No sanitary hot water will be needed				
Other energy consumption							
		kWh/m^2yr					
		kWh/m^2yr	Subtotal sum of energy consumption	222,0	222,0	145,0	35%
Appliances (please indicate, but costs are not eligible)							
electricity		kWh/m^2yr	Energy management and control stand-by of computers, of TV, of radio	40	40	30	25%

2,2 RES contribution per m2 of total used conditioned area (kWh / m2 yr)

total production kWh/yr	m^2 installed	kW installed	specify RES measures	Existing building [5]	National regulation / normal practice for new built (2006) [6]*	**suggested** specification [7]	RES contribution [%][8]
213962	1163	186,1	PV system: 186,07 kWp (only 28,35 kWp are compulsory)	0	8,05	52,8	556%
		kWh/m^2yr	Subtotal sum of RES contribution	0	8,05	52,8	556%

3 Building Energy Use

per m^2 of total used/heated floor area (kWh/m2 yr)

kWh/m^2yr	Subtotal sum of energy demand	222,0	222,0	145,0	35%
kWh/m^2yr	Subtotal sum of RES contribution	0	8,05	52,8	556%
kWh/m^2yr	Total Building Energy Use	222,0	214,0	92,2	57%

4 Other national overall energy performance targets or criteria (additional information, mandatory if existing)

	Units [9]	explain content and scale [10]	Existing building	National regulation for new built (2006)*	**suggested** specification
		energy performance certification	D	C	B

(*) Comment: Building Technical Code in Spain do not define different values for "g" and for "Fs". The value proposed corresponds to"modified Fs", since it integrates both concepts.

Building Energy Specification Table (BEST)

Community / site: Barcelona | **BEST** no. 14

1,1 **Building Category**: others — [1] La Escocesa (cultural center public building) | total area / category / BEST sheet [2]: 2 400 m²

1,2 **Local Climate**

		January average outside temperature	°C 11,3
		August average outside temperature	°C 26,3
Climatic Zone	Mediterranean climate	Average global horizontal radiation	kWh/m² yr 1371
(national definition)	C2	Annual heating degree days [3]	°Cd/yr 855

1,3 **Maximum requirements of building fabric**

			Existing building [5]	National regulation for new built [6]	**suggested** specification [7]	Energy savings [%] [8]
Façade/wall	U	W / m2K	2,09	0,73	0,63	14%
Roof	U	W / m2K	1,45	0,41	0,37	10%
Ground floor	U	W / m2K	0,41	0,5	0,41	18%
Glazing	U_g	W / m2K	5,7	2,81	1,2	57%
Average U-value	U_{av}	W / m2K	2,83	1,27	0,73	43%
Glazing (*)	g	total solar energy transmittance of glazing [%]	0,85	0,35	0,315	10%
Shading (*)	Fs	Shading correction factor				
Ventilation rate		air changes/hr	1	1	0,9	10%

2 Building Energy Performance

2,1 Energy consumption per m2 of total used conditioned floor area (kWh / m2yr) incl. system losses

energy carrier existing	**suggested energy carrier**		specify energy efficiency measures	Existing building [5]	regulation / normal practice for new built	**suggested** specification [7]	% Energy savings [8]
Heating + ventilation							
electricity	district heating	kWh/m²yr	DHC - connection to Districlima network	40,00	40,00	30,00	25%
Cooling + ventilation							
electricity	district cooling	kWh/m²yr	DHC-connection to Districlima network	75,00	75,00	55,00	27%
Ventilation (if separate from heating/cooling)							
		kWh/m²yr					
Lighting							
electricity	electricity	kWh/m²yr	LED + natural lighting exploitation + energy management&control	90,00	90,00	60,00	33%
Domestic Hot Water (DHW)							
		kWh/m²yr	No sanitary hot water will be needed				
Other energy consumption							
		kWh/m²yr					
		kWh/m²yr	Subtotal sum of energy consumption	205,0	205,0	145,0	29%
Appliances (please indicate, but costs are not eligible)							
electricity		kWh/m²yr	Energy management and control stand-by of computers, of TV, of radio	40	40	30	25%

2,2 RES contribution per m2 of total used conditioned area (kWh / m2 yr)

0,05

total production kWh/yr	m² installed	kW installed	specify RES measures	Existing building [5]	National regulation / normal practice for new built (2006) [6]*	**suggested** specification [7]	RES contribution [%][8]
117240	637,1	101,9	PV system: 101,94 kWp (only 16,8 kWp are compulsory)	0	8,05	48,9	507%
		kWh/m²yr	Subtotal sum of RES contribution	0	8,05	48,9	507%

3 Building Energy Use

per m² of total used/heated floor area (kWh/m2 yr)

kWh/m²yr	Subtotal sum of energy demand	205,0	205,0	145,0	29%
kWh/m²yr	Subtotal sum of RES contribution	0	8,05	48,9	507%
kWh/m²yr	Total Building Energy Use	205,0	197,0	96,2	51%

4 Other national overall energy performance targets or criteria (additional information, mandatory if existing)

	Units [9]	explain content and scale [10]	Existing building	National regulation for new built (2006)*	**suggested** specification
		energy performance certification	D	C	B

(*) Comment: Building Technical Code in Spain do not define different values for "g" and for "Fs". The value proposed corresponds to"modified Fs", since it integrates both concepts.

Building Energy Specification Table (BEST)

Community / site: Barcelona | **BEST** no. 15

1,1 **Building Category**: others [1] School Pere IV (school public building) | total area / category / BEST sheet [2]: 3 120 m^2

1,2 **Local Climate**

Climatic Zone: Mediterranean climate
(national definition): C2

January average outside temperature	°C	11,3
August average outside temperature	°C	26,3
Average global horizontal radiation	kWh/m^2 yr	1371
Annual heating degree days [3]	°Cd/yr	855

1,3 **Maximum requirements of building fabric**

			Existing building [5]	National regulation for new built [6] CTE25%ER	**suggested** specification [7]	Energy savings [%] [8]
Façade/wall	U	W / m2K	0,73			
Roof	U	W / m2K	0,41			
Ground floor	U	W / m2K	0,75			
Glazing	U_g	W / m2K	3			
Average U-value	U_{av}	W / m2K	1,32			
Glazing (*)	g	total solar energy transmittance of glazing [%]	0,35			
Shading (*)	Fs	Shading correction factor				
Ventilation rate		air changes/hr	7,5			

2 Building Energy Performance

2,1 Energy consumption per m2 of total used conditioned floor area (kWh / m2yr) incl. system losses

energy carrier existing	**suggested energy carrier**		specify energy efficiency measures	Existing building [5]	regulation / normal practice for new built	**suggested** specification [7]	% Energy savings [8]
Heating + ventilation							
gas	gas	kWh/m^2yr		34,39	34,39	34,39	0%
Comment: It exists no energy consumption requirements in Spanish regulation, if the surface where passive measures are implemented is lower than the 25% of the total surface of the buil							
Cooling + ventilation							
		kWh/m^2yr					
Comment: It exists no energy consumption requirements in Spanish regulation, if the surface where passive measures are implemented is lower than the 25% of the total surface of the buil							
Ventilation (if separate from heating/cooling)							
	electricity	kWh/m^2yr					
Lighting							
electricity	electricity	kWh/m^2yr	low energy lamps, LEDs	13,30	13,30	7,32	45%
Domestic Hot Water (DHW)							
gas	gas	kWh/m^2yr	No improvements (it exists a solar thermal)	11,48	11,48	11,48	0%
Other energy consumption							
		kWh/m^2yr					
		kWh/m^2yr	Subtotal sum of energy consumption	59,2	59,2	53,2	10%
Appliances (please indicate, but costs are not eligible)							
	electricity	kWh/m^2yr					

2,2 RES contribution per m2 of total used conditioned area (kWh / m2 yr)

total production kWh/yr	m^2 installed	kW installed	specify RES measures	Existing building [5]	National regulation / normal practice for new built (2006) [6]*	**suggested** specification [7]	RES contribution [%][8]
30365	120	20,3	PV system			9,7	
		kWh/m^2yr	Subtotal sum of RES contribution	0	0	9,7	

3 Building Energy Use

per m^2 of total used/heated floor area (kWh/m2 yr)

		Existing building [5]	National regulation / normal practice for new built (2006) [6]*	**suggested** specification [7]	
kWh/m^2yr	Subtotal sum of energy demand	59,2	59,2	53,2	10%
kWh/m^2yr	Subtotal sum of RES contribution	0	0	9,7	
kWh/m^2yr	Total Building Energy Use	59,2	59,2	43,5	27%

4 Other national overall energy performance targets or criteria (additional information, mandatory if existing)

	Units [9]	explain content and scale [10]	Existing building	National regulation for new built (2006)*	**suggested** specification
		energy performance certification	C	C	B

(*) Comment: Building Technical Code in Spain do not define different values for "g" and for "Fs". The value proposed corresponds to"modified Fs", since it integrates both concepts.

Annex 2 – Urban plans of the Lighthouse Cities

1. Stockholm
2. Cologne
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Stockholms stad

Roadmap for a fossil fuel-free Stockholm 2050

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www.stockholm.se/cykla

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Stockholms miljöprogram
2012–2015

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Stockholms stad

Strategi för miljöfordon och förnybara drivmedel

- för ett fossilfritt Stockholm

stockholm.se

Innehållsförteckning

Förslag till

En strategisk inriktning för bättre leveranstrafik

2014-2017

Tillsammans för effektivare, säkrare och grönare leveranser

Remissversion mars 2014

Stockholms stad

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www.stockholm.se/avfallsplan

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Stockholm
The Capital of Scandinavia

SÖDERORT 2030

A FUTURE VISION BECOMES REALITY

Söderort 2030 – a future vision for everyone

Agnes and David are two of the future 375,000 residents of Söderort – southern Stockholm – in 2030. Both they and everyone else who will live and work in Söderort in the future must have access to good, varied housing, workplaces and services. They must also be close to the very strength of Söderort, i.e. nature, cultural experiences and a deversified urban environment. Söderort's great diversity is something that must be both developed and managed with care.

To achieve this, everyone must work in the same direction. This is partly why the City Council has adopted the vision for Söderort 2030, which highlights more workplaces and better public transport cross links as two of the most important focus areas that need to be improved to increase the attractiveness of the whole area.

In this brochure you can read more about the vision, and about the tangible proposals for improvement which the City, along with other stakeholders, now needs to implement. I hope you will also play your part in implementing Söderort 2030 – a future vision for everyone.

JOAKIM LARSSON (MODERATE PARTY)
VICE MAYOR FOR URBAN DEVELOPMENT

Stockholm
The Capital of Scandinavia

Stockholm action plan for climate and energy 2012–2015

WITH AN OUTLOOK TO 2030

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Stockholms stad

Biogasstrategi för Stockholms stad

April 2013

stockholm.se

INNEHÅLL

Stockholm
The Capital of Scandinavia

VISION2030
A GUIDE TO THE FUTURE

The vision that moves us forward!

Through Vision 2030, the City of Stockholm has clarified its long-term ambitions and aspirations. Our vision is a world-class Stockholm. It's a challenging vision that inspires commitment. I hope that it will also inspire the City's employees and the business community and other public players, both in the city and regionally, to participate in the development of the future of the capital city and the Stockholm-Mälar region.

When the City Council adopted Vision 2030 in June 2007, it was not the conclusion of a project that had continued for a few years and involved most of the City's administrations and companies and many of its partners. On the contrary, it was the beginning of an exciting journey, and today we do not really know exactly where it will end. The journey is Stockholm's development, what Stockholm will be and wants to be in the future, and how it will be and wants to be understood and experienced by residents, businesspeople and visitors.

Stockholm is growing. In 2008, we exceeded our former population record from 1960 by 808,600 residents. The forecast is that we will reach one million residents by about 2030. That's 200,000 more residents than we have today. With the vision as our foundation, we must begin planning already now to ensure that Stockholm has enough housing, workplaces, pre-schools, schools and public services for a million Stockholmers.

At the same time, we must plan how the infrastructure will work. Public transport must be expanded in parallel with the new housing areas. In 2030, clean vehicles and public transport will use Förbifart Stockholm. As the new road links together southern and northern Stockholm, business activity in the entire region will be facilitated and the pressure on the Essingeleden motorway will be relieved.

We must begin today to work on ensuring, step by step, that we have a world-leading education system from pre-school and compulsory school to universities and research, that the fast-growing companies of the future establish themselves here and that Stockholm is a magnet for researchers, innovators and entrepreneurs.

A decisive factor in Stockholm's competitiveness and power of attraction is our well-known favourable living environment. Few of the world's cities can unite the pulse of a big city with proximity to nature experiences and a clean city environment in the way Stockholm does. Stockholm is a city of opportunities! I want that to continue. For me, an important part of the vision for the future is that we will continue to be a model city. We are the European Green Capital 2010. In 2030, we will be the green capital of the world.

My driving force is contributing to ensuring that Stockholm continues to be a favourable, exciting and safe city in which to live and work. Tomorrow's Stockholmers must be able to make their everyday lives work well. What we plan and decide now will benefit future generations. The implementation – building new housing areas, creating workplaces, constructing new public transport – will take many years to realise. When taking decisions, a long-term approach is essential to ensure that Stockholm can stand up to the growing international competition. Nothing is a given forever. We cannot rest on our laurels. Standing still is not an option. We must work in a goal-oriented manner by accepting the challenges and opportunities of a growing major city to secure our future. We can only do it together!

STEN NORDIN

Starting in spring of 2006 and finishing in spring 2007, in a project entitled "Vision Stockholm 2030," the City of Stockholm outlined an overall, long-term vision for a sustainable growth and development of Stockholm. The project was managed by the Executive Office, and the vision has come forth through dialogue with spokesmen for the City itself, with representatives of trade and industry, with schools and universities, as well as other public authorities. The final vision, named "A World-Class Stockholm," presents three coherent themes for Stockholm's future development, and describes some of the characteristics of Stockholm as a city in which to live, work or visit in 2030. The vision is illustrated by examples of the initiatives and projects that will lead the City on the right path towards making the vision real. Many of these are shown in the map at the end of this presentation. The vision also outlines several overall strategies that will be central to the implementation of the vision. "Vision Stockholm 2030" was formally adopted by the Stockholm City Council on 11 June, 2007.

ANLAGE 1

Aktionsplan
für nachhaltige Energie

Inhalt

Internetstadt Köln

Ziele - Strukturen – Zusammenarbeit - Unterstützung

Der Oberbürgermeister

Stadt Köln

Leitziele → Köln 2020

- Wirtschaftswachstum fördern und Arbeitsplätze sichern
- Umwelt- und Klimaschutz forcieren sowie Energieeffizienz fördern
- Soziale Balance anstreben und Chancengleichheit gewährleisten
- Bürgerengagement, Partizipation und Kommunikation mit der Stadtgesellschaft stärken sowie politische Prozesse gut organisieren
- Kulturelle Vielfalt sichern und ausbauen
- Zukunftschancen eröffnen – Bildungssystem modernisieren
- Integration und Inklusion meistern
- Stadtentwicklung integrativ gestalten
- Mobilität in der Großstadt sichern
- Nachhaltige Haushaltswirtschaft
- Transparente Stadtverwaltung für eine aktive Bürgerschaft

(Stand: SV 14.01.2012)

↳ und Zukunftsfähige

Herausforderungen für die Stadtentwicklung

- Steigende Nachfrage nach Wohnraum
- Sicherung des Flächenbedarfs in Abwägung mit anderen Nutzungsansprüchen
- Nutzung der Wohnungsbestände
- Anpassung und Ausbau der sozial-kulturellen sowie der technischen Infrastruktur
- Sicherung einer wohnortnahen Versorgung
- Verbesserung der Rahmenbedingungen für neue Arbeitsplätze
- Bewältigung der veränderten Mobilitätsbedürfnisse
- Beachtung von Klimaschutz und Klimaanpassung
- Erhalt der Lebensqualität

Chancen einer Strategischen Stadtentwicklung

- Transparente Grundlage für zukunftsgerichtete und nachhaltige Stadtentwicklung – auch für Externe
- Verbindlicher Orientierungsrahmen
- Klare Vorgaben für abgeleitete Planungen und Konzepte
- Steigerung der Effizienz und Effektivität städtischen Handelns
- Wesentliche Grundlage zur Abwägung von Flächen- und Ressourcenansprüchen
- Grundlage zur Gestaltung regionaler Strategien
- Voraussetzung zur Nutzung von Förderprogrammen
- Grundlage für den wirkungsorientierten Haushalt

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Integriertes Klimaschutzkonzept Köln 2013

Stand: 09. Januar 2014

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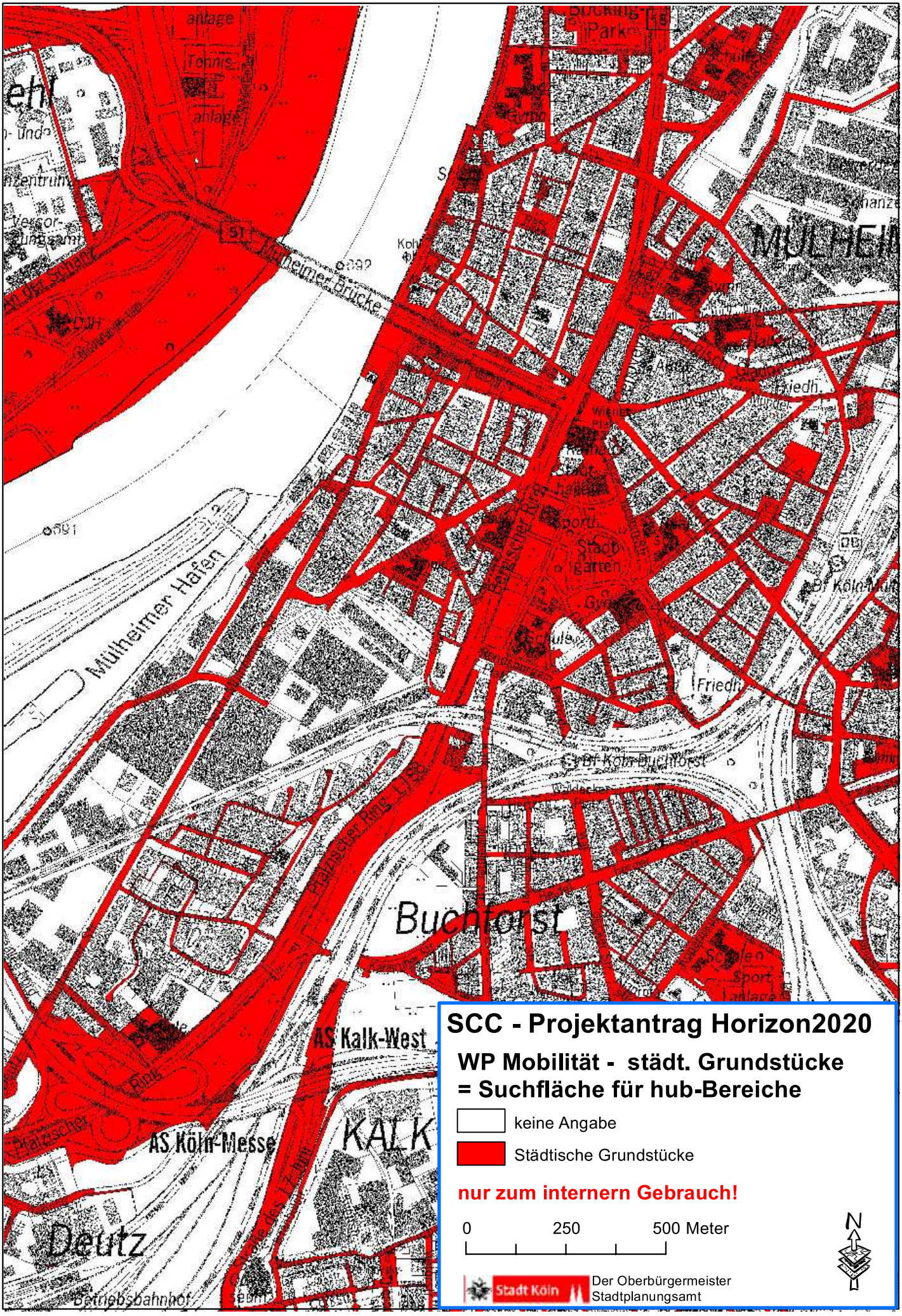

SCC - Projektantrag Horizon2020

WP Mobilität - städt. Grundstücke = Suchfläche für hub-Bereiche

keine Angabe

Städtische Grundstücke

nur zum internern Gebrauch!

0 250 500 Meter

N

Dezernat für Stadtentwicklung, Planen, Bauen und Verkehr
Stadtplanungsamt

Stadt Köln

Werkstattverfahren Mülheim Süd inkl. Hafen

Konzeptbausteine und Vorgaben

Auszug aus dem Entwurf der Aufgabenstellung (Bearbeitungsstand 18.06.2013)
als Anlage zur Vorlage Nr. 2171/2013

HINWEISE ZUM VERSTÄNDNIS DES DOKUMENTES:

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- Die blaue Schrift innerhalb des Textes markiert „Regieanweisungen" an die Bearbeitenden, ausstehenden Überarbeitungs- und Ergänzungsbedarf bzw. Nachfragen.

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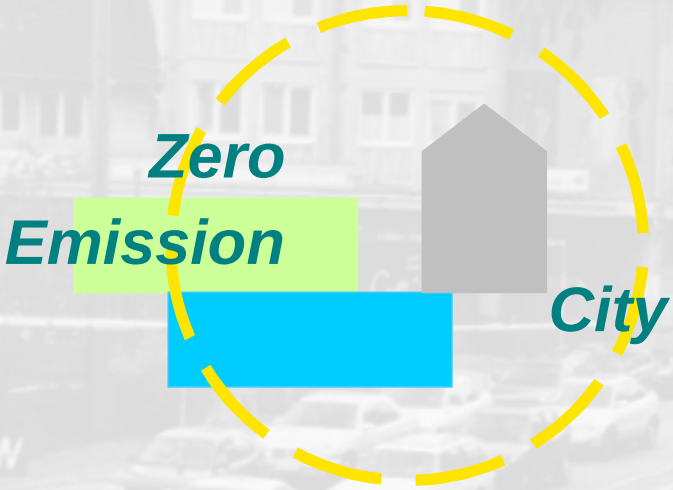

Sondierungsstudie im Auftrag des Bundesministeriums für Bildung und Forschung

vorgelegt vom

IWU – Institut Wohnen und Umwelt GmbH, Darmstadt

in Zusammenarbeit mit dem

ZIV – Zentrum für integrierte Verkehrssysteme, Darmstadt

Darmstadt, Oktober 2002

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Introducció, Diagnosi i Escenaris

Octubre 2012

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Contingut

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Contingut

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4. Cork Institute of Technology
5. EUROCITIES
6. Fastighetsägarna
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8. Fortum Power and Heat
9. NoAE
10. BRF Årstakrönet
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INSERO
E-MOBILITY

Letter of Intent concerning market up-take of innovative and energy saving smart solutions in Europe

Concerning: GrowSmarter proposal to Horizon2020 call SCC 1 – 2014/2015: Smart Cities and Communities solutions integrating energy, transport, ICT sectors through lighthouse (large scale demonstration - first of the kind) projects

20 Industrial partners, comprising i.a Skanska, Rheinenergie, Philips, Schneider, IBM etc, will together with the Lighthouse cities Barcelona, Cologne and Stockholm show ways to set up Smart Solutions that can be developed into business cases which will make their way into Europe on their own merits, with no need of additional funding.

A Smart Solution exploits a potential win-win situation that hitherto has not reached the take-off phase in the market development, sometimes because the technology is too new, but often also because there hasn't been a fair way to charge for a service or the demand has not been recognized. A smart solution often includes several business partners cooperating and sometimes also a slight change of legislative preconditions - e.g. giving increased delivery access to bundled goods compared to non-bundled. By combining several close-to-market technologies with private-public partnership, where public authorities e.g. can use their regulatory power to overcome market failures and business partners hence dare to invest, it will be possible to break up deadlocks and exploit win-win-solutions

The Lighthouses GrowSmarter has defined 3 different city districts as Light House areas in whereto show the Smart Solutions. These areas represent common features in all European cites: A Downtown city district. A Nearby suburb about to be densified and A Former industrial/business area which partly will be turned into residential area.

In these Light House areas, the industry partners implement 15 Smart Solutions which will serve as show cases for other cities that face similar problems.

The Validation The Smart Solutions are validated with reference to their energy efficiency, Greenhouse gas saving capacity and cost benefit in WP5 and with reference to their Business performance, economic impact, spinoff and potential for European growth in WP 6.

The Replication The validated Smart Solutions are developed and fine-tuned into Business models together with the 5 Follower cities Cork, Graz, Porto, Suceava and Valetta and then implemented, resulting in a set of well tested and validated Smart business models with the capacity to be implemented on their own merits and increase European growth and technology export

The roll-out Both Lighthouse cities and Follower cities are chosen to cover Europe geographically, by size climatewise and economical growth, and there will be Smart Solutions suitable for all Europe

GrowSmarter will further develop industry contacts and offer even more solutions to potential take-up cities. Take-up cities will be invited to take part in dialogues and study-visits to Light House cities and the most interested of these will form City Interest Group receiving even more detailed information and direct contacts to industry and Light House City officials. In addition a set of seminars and Light-House study tours will be arranged where Take-up cities will meet with all involved stakeholders

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Finally the results of the project will be disseminated to a wider group of cities, as cities are key stake-holders in breaking up these deadlocks but often do not take on that role.

INSERO
E-MOBILITY

The project is planned to start in the beginning of year 2015 and continue until 2020 and partly be funded by the European commission.

I, the undersigned, hereby declare that **Insero E-Mobility A/S,** is committed to co-operate with the GrowSmarter proposal in spreading and replication of the successful methods demonstrated. This promise will be realised in case the proposal would be accepted for funding by the European Commission.

Yours faithfully,
Mai Louise Agerskov
CEO
Insero E-Mobility A/S
Horsens, 5th of May 2014

Letter of Intent concerning market up-take of innovative and energy saving smart solutions in Europe

Concerning: GrowSmarter proposal to Horizon2020 call SCC 1 – 2014/2015: Smart Cities and Communities solutions integrating energy, transport, ICT sectors through lighthouse (large scale demonstration - first of the kind) projects

The Lighthouse cities of Barcelona, Cologne and Stockholm will identify, develop and deploy replicable, balanced and integrated solutions in the energy, transport, and ICT actions through partnerships between municipalities and industries. Cork, Graz, Porto, Suceava and Valetta are Follower cities planning to replicate the innovation as demonstrated in the Lighthouse cities in close collaboration with over 30 industrial partners. The cities serve the project, the project serve Europe with the ambition to improve the everyday life of the citizens in the near future.

The project will implement and validate 15 Smart Solutions, regarding their energy efficiency, Greenhouse gas saving capacity, economic viability and also economic impact and spinoff. Business models are developed and by the end of the project fine-tuned and implemented together with 5 follower cities, resulting in a set of well tested and validated business models with the capacity to be implemented on sheer economical merits and with a potential to increase European growth and technology export. Both Lighthouse cities and Follower cities are chosen to cover Europe geographically, by size, climate wise and economic growth.

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The project is planned to start in the beginning of year 2015 and continue until 2020 with an estimated budget of 25 million euro financed by the European commission.

Project proposal title: GrowSmarter

I, the undersigned, hereby declare that Sweden Green Building Council, is committed to co-operate with the GrowSmarter proposal in spreading and replication of the successful methods demonstrated. This promise will be realised in case the proposal would be accepted for funding by the European Commission.

Yours faithfully,

Bengt Wånggren
CEO
Sweden Green Buiding Council

Sundbyberg 5 May 2014

Sjöstadsföreningen
Hammarby Sjöstad

Letter of Intent concerning market up-take of innovative and energy saving smart solutions in Europe

Concerning: GrowSmarter proposal to Horizon2020 call SCC 1 – 2014/2015: Smart Cities and Communities solutions integrating energy, transport, ICT sectors through lighthouse (large scale demonstration - first of the kind) projects

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Project proposal title: GrowSmarter

I, the undersigned, hereby declare that Sjöstadsföreningen supports the GrowSmarter proposal and is willing to spread and replicate applicable successful methods demonstrated as well as to contribute to GrowSmarter with successful methods from projects in Hammarby Sjöstad, regaring eloctromobility, energy efficiency, smart and renewable energy and new local communication systems. This promise will be realised in case the proposal would be accepted for funding by the European Commission.

Yours faithfully,

Allan Larsson, Permanent Secretary of the Board of Sjöstadsföreningen
Stockholm May 5, 2014

Letter of Intent concerning market up-take of innovative and energy saving smart solutions in Europe

Concerning: GrowSmarter proposal to Horizon2020 call SCC 1 – 2014/2015: Smart Cities and Communities solutions integrating energy, transport, ICT sectors through lighthouse (large scale demonstration - first of the kind) projects

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Finally the results of the project will be disseminated to a wider group of cities, as cities are key stake-holders in breaking up these deadlocks but often do not take on that role.

The project is planned to start in the beginning of year 2015 and continue until 2020 and partly be funded by the European commission.

I, the undersigned, hereby declare that ***Cork Institute of Technology***, is committed to co-operate with the GrowSmarter proposal in spreading and replication of the successful methods demonstrated. This promise will be realised in case the proposal would be accepted for funding by the European Commission.

Yours faithfully,

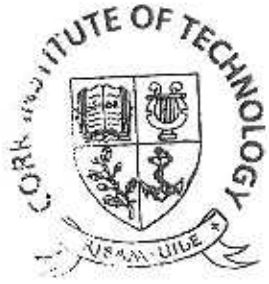
Carole O'Leary

Industry Liaison Manager

Cork Institute of Technology

Cork, Ireland

2nd May 2014



EUROCITIES

THE NETWORK OF MAJOR EUROPEAN CITIES

Brussels, 5 May 2014

Re:Letter of Support for the GrowSmarter proposal to Horizon2020 call SCC 1 - 2014/2015: Smart Cities and Communities solutions integrating energy, transport, ICT sectors through lighthouse (large scale demonstration - first of the kind) projects

The Lighthouse cities of Barcelona, Cologne and Stockholm will identify, develop and deploy replicable, balanced and integrated solutions in the energy, transport, and ICT actions through partnerships between municipalities and industries. Cork, Graz, Porto, Suceava and Valetta are Follower cities planning to replicate the innovation as demonstrated in the Lighthouse cities in close collaboration with over 30 industrial partners. The cities serve the project, the project serve Europe with the ambition to improve the everyday life of the citizens in the near future.

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The project is planned to start in the beginning of year 2015 and continue until 2020 with an estimated budget of 25 million euro financed by the European commission.

1, Square de Meeûs
B-1000 Brussels
tel +32-2-552.0888
fax +32-2-552.0889
vat be 0 447 820 987
www.eurocities.eu
info@eurocities.eu

EUROCITIES

THE NETWORK
OF MAJOR
EUROPEAN
CITIES

I, the undersigned, hereby declare that EUROCITIES is committed to co-operate with the GrowSmarter proposal in spreading the successful methods demonstrated in the project through EUROCITIES events. This promise will be realised in case the proposal would be accepted for funding by the European Commission.

As EUROCITIES is also directly involved in other SCC proposals, in case of success, the various Smart Cities projects may find a synergetic platform for direct exchange and cooperation.

Yours sincerely,

N. Vatthauer

Nicola Vatthauer

EUROCITIES Deputy Interim Secretary General

1, Square de Meeûs
B-1000 Brussels
tel +32-2-552.0888
fax +32-2-552.0889
vat be 0 447 820 987
www.eurocities.eu

FASTIGHETSÄGARNA

Letter of Intent concerning market up-take of innovative and energy saving smart solutions in Europe

Concerning: GrowSmarter proposal to Horizon2020 call SCC 1 – 2014/2015: Smart Cities and Communities solutions integrating energy, transport, ICT sectors through lighthouse (large scale demonstration - first of the kind) projects

The Lighthouse cities of Barcelona, Cologne and Stockholm will identify, develop and deploy replicable, balanced and integrated solutions in the energy, transport, and ICT actions through partnerships between municipalities and industries. Cork, Graz, Porto, Suceava and Valetta are Follower cities planning to replicate the innovation as demonstrated in the Lighthouse cities in close collaboration with over 30 industrial partners. The cities serve the project, the project serve Europe with the ambition to improve the everyday life of the citizens in the near future.

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Project proposal title: GrowSmarter

I, the undersigned, hereby declare that Fastighetsägarna Service Stockholm AB, is committed to support with the GrowSmarter proposal in spreading and replication of the successful methods demonstrated. This promise will be realised in case the proposal would be accepted for funding by the European Commission.

Yours faithfully,

Per-Erik Stålhandske

Per-Erik Stålhandske
Section head
Fastighetsägarna Service Stockholm AB
Stockholm 2014-05-06

SVERIGES ÅKERIFÖRETAG
ABC

Stockholm 6 may 2014

Letter of Intent concerning market up-take of innovative and energy saving smart solutions in Europe

Concerning: Grow Smarter proposal to Horizon2020 call SCC 1 – 2014/2015: Smart Cities and Communities solutions integrating energy, transport, ICT sectors through lighthouse (large scale demonstration - first of the kind) projects

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An important aspect is the introduction of more fuelling stations for renewable fuels like ED95, Biogas and HVO.

The project is planned to start in the beginning of year 2015 and continue until 2020 with an estimated budget of 25 million euro financed by the European commission.

I, the undersigned, hereby declare that Sveriges Åkeriföretag Region ABC, is committed to co-operate with the GrowSmarter proposal in spreading and replication of the successful methods demonstrated. This promise will be realised in case the proposal would be accepted for funding by the European Commission.

Yours faithfully,

Sveriges Åkeriföretag Region ABC

Torbjörn Heierson

Head of Region ABC

SVERIGES ÅKERIFÖRETAG ABC • Fagerstagatan 6 • 163 53 SPÅNGA • Telefon: 08-687 44 50 • Fax: 08-687 44 90
SVERIGES ÅKERIFÖRETAG ABC • Edvard Berlingsg.3 • 754 50 UPPSALA • Telefon: 018-13 91 95 • Fax: 018-69 61 73
epost: abc@akeri.se • www.abc-akarna.se

Fortum

Letter of Intent concerning the preparation of a Smart City Light House project proposal

On behalf of Fortum Power and Heat AB we, the undersigned, hereby express the interest in participating actively as a partner in the preparation of the proposal for the Collaborative Project under the coordination of the City of Stockholm. This proposal will be submitted in response to the call, SCC 1 – 2014/2015: Smart Cities and Communities solutions integrating energy, transport, ICT sectors through lighthouse (large scale demonstration - first of the kind) projects under the Horizon 2020 Work Programme 2014-2015, in the area of "Secure, Clean and Efficient Energy. Deadline for submitting proposals is 7 May 2014 at 17:00 (Brussels local time). The call text is attached as Annex 1.

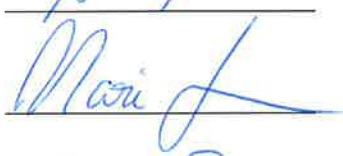
On behalf of Fortum Power and Heat AB we confirm our intent :

- To treat all information, whether oral, written or otherwise, that is supplied in the course or as a result of the proposal preparation as confidential and to disclose only information received in the context of the proposal preparation to non-members of the project consortium which is clearly indicated for wider dissemination.
- to use all the material received from the coordinator or any other member of the project consortium during the preparation phase only for this specific proposal and not to disclose it in any form to third parties without approval of the Proposal Coordinator and the providing consortium members.
- To provide all information required from my organisation by the Proposal Coordinator and the consultant Sweco within the agreed time scales and at high professional quality.
- To participate only in this consortium for this call for proposals.

This Agreement, or the supply of information referred to before, does not create any licence, title or interest in respect of any Intellectual Property Rights of the disclosing party.

If this Proposal leads to a Contract with the European Commission, a Consortium Agreement shall specify the organization of the work between the Contractors, organize the management of the Project and define the rights and obligations of the Contractors. For the avoidance of doubt, participation in the proposal or the signing of this Letter of Intent in no way binds Fortum Power and Heat AB to enter into such a Consortium Agreement.

It is understood that all members and industrial partners of the project consortium as well as the coordinator will sign a similar Letter of Intent before participating in the call for proposal.

Date and place:	6/5-14	
Signature:		
Name in print:	MARIE FOSSUM	Göran Hult

Coordinator:
ewf institute
Dipl.-Kfm. Herbert Köpplinger
Becker-Gundahl-Str. 19
D 81479 München
Telefon +49 (0)89 7489-9669
h.koepplinger@ewf-institute.com

Munich, May 5, 2014

Letter of Intent concerning market up-take of innovative and energy saving smart solutions in Europe

Concerning: GrowSmarter proposal to Horizon2020 call SCC 1 – 2014/2015: Smart Cities and Communities solutions integrating energy, transport, ICT sectors through lighthouse (large scale demonstration - first of the kind) projects

20 Industrial partners, comprising i.a Skanska, Rheinenergie, Philips, Schneider, IBM etc, will together with the Lighthouse cities Barcelona, Cologne and Stockholm show ways to set up Smart Solutions that can be developed into business cases which will make their way into Europe on their own merits, with no need of additional funding.

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I, the undersigned, hereby declare that ewf institute - NoAE, is committed to co-operate with the GrowSmarter proposal in spreading and replication of the successful methods demonstrated. This promise will be realised in case the proposal would be accepted for funding by the European Commission.

Yours faithfully,

Herbert Köpplinger

Ewf institute – NoAE

Germany/Munich – May 5, 2014

BRF Årstakrönet

Letter of Intent concerning market up-take of innovative and energy saving smart solutions in Europe

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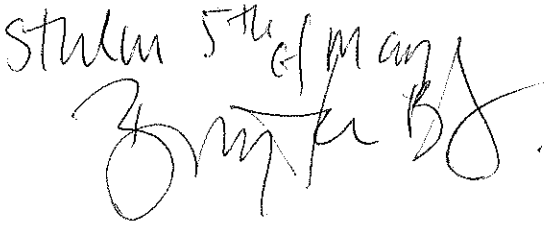
Project proposal title: GrowSmarter

I, the undersigned, hereby declare that ***BRF Årstakrönet***, is committed to co-operate with the GrowSmarter proposal in spreading and replication of the successful methods demonstrated. This promise will be realised in case the proposal would be accepted for funding by the European Commission.

Yours faithfully, on behalf of the board of BRF Årstakrönet
Name: Birgitte Bork Sörensen
Titel: Treasurer in the board of BRF Årstakrönet
Organisation: BRF Årstakrönet
City and date : Stockholm 5th of May 2014



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I, the undersigned, hereby declare that St1 is committed to co-operate with the GrowSmarter proposal in spreading and replication of the successful methods demonstrated. This promise will be realised in case the proposal would be accepted for funding by the European Commission.

Yours faithfully,

Jonas Sidenå
Managing Director
St1
Stockholm 2014-05-07