BUILDING SMART CITIES TOGETHER

SHARINGCITIES

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REPLICATION ROADMAPS

Start date of the project: 1 January 2016

Duration of the project: 60 months

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EXECUTIVE SUMMARY

The fellow cities (Bordeaux, Burgas and Warsaw) have been involved from the very beginning of the project in all activities and events of Sharing Cities.

Productive cooperation between lighthouse and fellow cities was achieved from the beginning of the project, thanks to multiple events, activities and co-authored documents, including a replication strategy, a replication workshop, a training manual, various thematic webinars, city baseline reports, peer-learning visits, national peer-learning events and work-shadowing visits.

EUROCITIES, as replication lead, has developed together with all six cities city baseline reports and captured developments in the lighthouse cities (smart city solutions) and interests from fellow cities. This process of capturing was combined with deeper knowledge and capacity building for the fellow cities, such as webinars, peer learning visits and workshops.

The participation in those events has offered fellow cities insight into the whole process, including challenges, barriers and enablers of implementation within the lighthouse cities. This is a unique approach as most projects first deploy the solutions and then cities are expected to look at the results. In Sharing Cities, a close involvement and better understanding of the factors which support implementation are considered essential for the fellow cities to know how to replicate. EUROCITIES had regular evaluation and input collection from the fellow cities and produced the draft roadmaps based on information received from them. The strong involvement of fellow cities will guarantee replication by ensuring ownership of the process, tools and methods, and not only of the final results expected at the end of project.

All these activities and exchanges have contributed to the completion of these replication roadmaps, identifying the innovative solutions that have inspired them and the ones that they already plan to replicate. Fellow cities could not commit to replicating all smart city solutions implemented in the lighthouse projects but had to identify and select those most likely to respond to their own local reality and challenges. These replication roadmaps firstly look into what cities have learned, and then focus on what each fellow city has already planned to replicate. Each city has also indicated what could be the barriers for the replication of the smart city solutions identified, and what they would need to ensure successful replication (from their own administration, from the lighthouse projects, from the national legislation and from investors).

Fellow cities will use these roadmaps as their guiding document, fostering a shared vision amongst their colleagues in different areas and departments. This will create internal buy-in and guarantee that the services and experts within their cities take ownership in replication.

Partners of the consortium will use these reports to understand better what fellow cities will need and EUROCITIES will ensure that the necessary connections and capacity building activities are organised.

Scale-up cities will use this to understand better what the three fellow cities have found relevant and replicable, giving them some indication about which of each other's solutions they might also be able to replicate.

The replication roadmaps will serve as a basis for the implementation reports to be produced by each fellow city. The mentoring visits hosted by the fellow cities and organised by EUROCITIES will help to confirm precisely which actions fellow cities need to take, what will be replicated and how in their own local context. Since the implementation of solutions in the lighthouse cities is still in progress and there are external factors that may influence the evolution of the fellow cities' smart city strategy (e.g. change of political mandate), the replication roadmaps are not to be seen as documents 'set in stone'. Rather, they are a starting point for replication in practical terms, enabling design and implementation of the relevant measures.

BUILDING SMART CITIES TOGETHER

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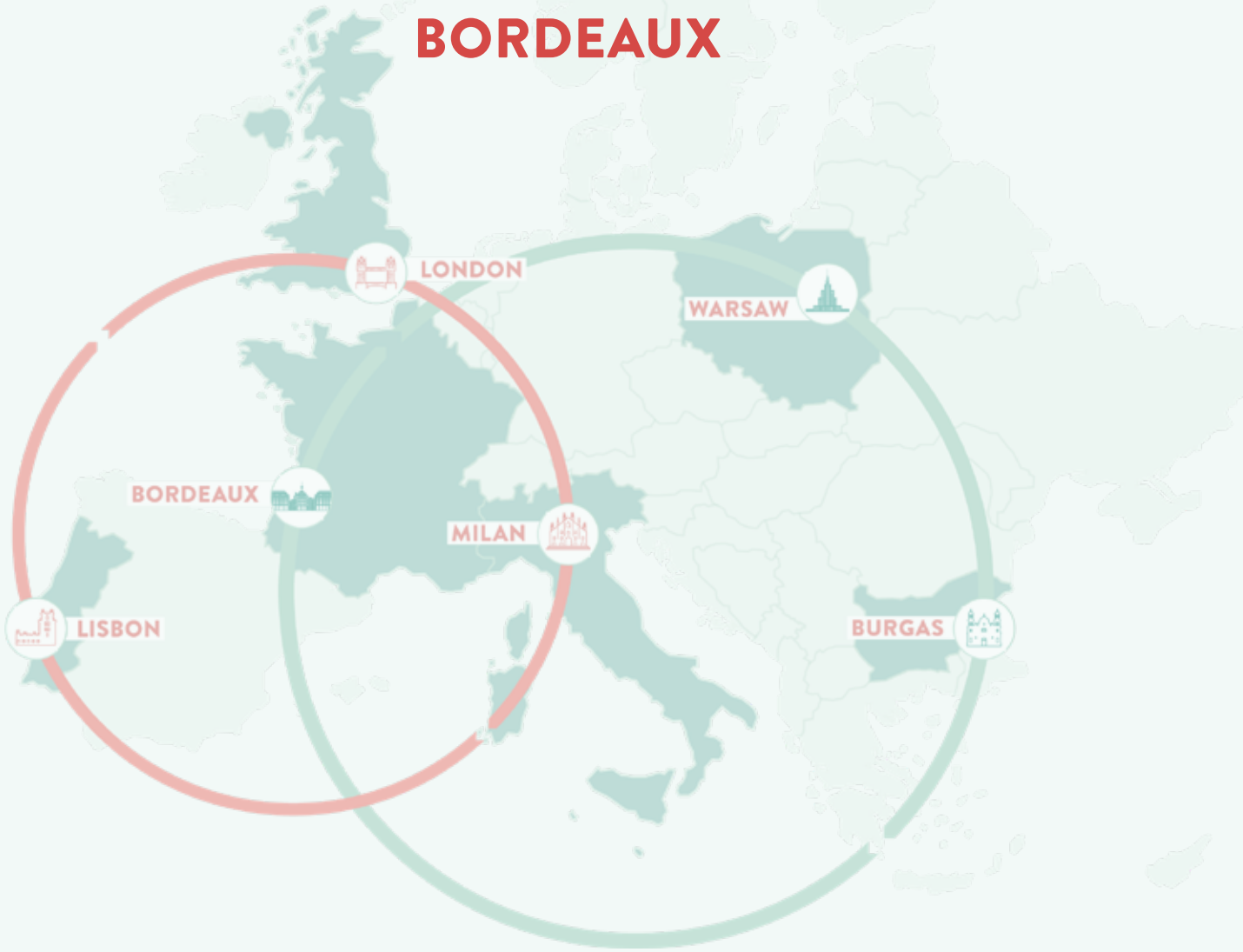
REPLICATION ROADMAP

BORDEAUX



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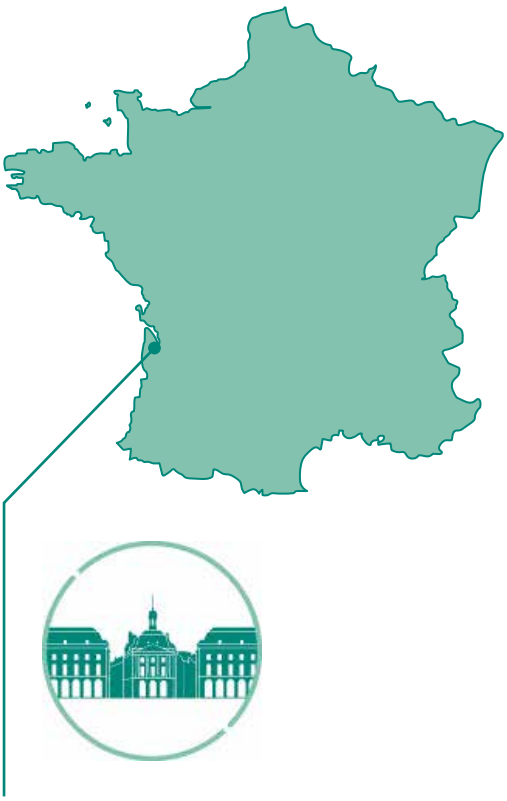

Bordeaux metropolis has benefited from intense (re)development over the past 15 years.

The city has undergone a spectacular urban and economic metamorphosis, which included major structural projects. The city's first urban planning project, launched in 1995, laid the foundations of a city comparable to major European metropolises. Today it is one of the most connected French cities thanks to the combination of public institutions' actions and a dynamic and innovative digital business ecosystem. This, along with its lively approach to its heritage, makes Bordeaux one of the most active urban labs in France.

Thanks to the vitality of its regional excellence sectors and globally recognised clusters; to the renowned fertility of its research and higher education centre (more than 80,000 students); and to its strong presence in innovative industries and high added value markets, Bordeaux has never lost its spirit of adventure. Collectively, these have converted a sea and river-based city into an open and thriving place. The city has become a point of reference for the aircraft industries, and in the fields of laser and atomic research, math, science, and wine making. It is also renowned for its emerging clusters, such as wood treatment, video games, and e-health. Capitalising on its strength, the city is proving to be a pioneer and experimental territory for several urban management systems using the most advanced connectivity features and NFC technology.

Bordeaux intends to use these technological assets to complete one of its major objectives: becoming a sustainable city. Thus, the city has set some priorities, such as developing alternative means of transport, promoting short supply routes for products, preserving air quality and biodiversity, and striving towards a locally produced energy mix. All those objectives must be attained in compliance with, and for the improvement of the quality of life for residents, to generate local economic activity and solidarity.

These objectives are very much aligned with what Sharing Cities aims to achieve and bring to the 6 cities involved in the project. The involvement in the Sharing Cities project was meant to bring solutions to Bordeaux on how to make the most of its assets while undertaking its transformation as a smart city. The examples offered by the 3 lighthouse cities bring inestimable knowledge and experience to the representatives of Bordeaux who can take inspiration from what has already been achieved.

2.
INSPIRATION

Building retrofit

On building retrofit, Bordeaux has already launched multiple initiatives to engage and activate residents to reduce their energy consumption or improve the energy efficiency of their dwellings. Those initiatives have proved to be successful but will be difficult to scale up in a cost-effective way.

The example of Milan for engaging with citizens is particularly relevant as it permitted substantial progress on energy efficiency in public and private buildings. The process involved private companies to pursue the retrofitting work, and especially tenants or owners who were encouraged to collaborate for more significant results. The idea was to bring the owners to consider their flat as a part of the urban infrastructure; the building retrofit project is developed at the same time as the overall regeneration programme of the district, and shares the same principles of energy efficiency and digital first approach. Thus, the building owners were invited to participate at the same time in co-design sessions both for the regeneration project and for the building retrofit process. This methodology to engage tenants and owners, informing them about the benefits of retrofitting their building, is an inspiration for Bordeaux.

Mobility

Taking inspiration from the mobility hubs in Lisbon or the mobility islands, Bordeaux would like to install public slow and fast charging points for bikes and cars. Alternating the slow and fast charging points will be the best approach to respond to the demand of users, who will not all require a fast charging process.

Bordeaux has shown a particular interest in the Lisbon strategy regarding electric vehicles. Lisbon has planned the large scale deployment of charging stations for electric vehicles which is part of a wider strategy to increase the number of electric vehicles in the city. One of the measures which attracted Bordeaux's representatives' attention was the possibility to link parking and free charging. The idea of offering a

free charging point to electric vehicles at certain parking spaces scattered around the city is particularly relevant for Bordeaux as a way to stimulate the demand for electric vehicles instead of fuel ones. The rates to apply for this idea are still being considered, in order to make it economically sustainable for the city and at the same time encourage users to switch to electric cars.

Like in Lisbon, this system would be made possible thanks to a card which would allow users to connect to the terminal and take advantage of the available free charging points. At the same time, such a system would be useful for the monitoring of usage by subscriber and per station, in order to adapt the service to the observable usage trends.

Bordeaux metropolis has been looking for years for ways to tackle the last mile delivery issues in its city centre. Bordeaux has been observing the different solutions set up in the lighthouse cities for the demonstrators of e-vehicle logistics solutions. The project has allowed Bordeaux to analyse in more detail the pros and cons of implementing such green delivery services.

Congestion charge

Bordeaux, like many cities in Europe is suffering from traffic congestion and has been receptive to initiatives meant to diminish it in other European cities. Likewise, the city of Milan was experiencing a similar issue in the past and in 2010 started to implement drastic measures which have improved the traffic flow and air quality within the city. The most effective measure implemented in Milan was the congestion zone, which prevents access to private vehicles to a delimited area of the city centre. Considering the similar nature of the problem and a comparable physiognomy of the city, Bordeaux has expressed interest in getting more information on how this was set up. It sees multiple advantages in this congestion charge, such as: improved air quality, reduced traffic and accidents, improved commercial speed and frequency of CTs, but also in terms of public spaces (pedestrianisation) or productivity gains for deliveries.

Thanks to Sharing Cities, representatives and experts from both cities have had several opportunities to in discuss more detail the implementation, the advantages and the challenges to overcome for setting up such a system. Thus, Bordeaux has made some significant progress in its plan to set up a congestion charge restricting the access of cars to the city centre. Three different aspects were particularly interesting for Bordeaux to learn about:

- High level of adhesion of the inhabitants (79% of yes to the referendum)
- Citizen mobilisation and press support
- Progressive implementation

General

(structure of the administration)

Bordeaux has been seeking new ways to improve its innovation process, as its actual system seems to often be non-adapted for rolling out and implement new solutions. The public administration is not the best equipped to implement solutions; complicated procurement procedures and heavy bureaucracy prevent any rapid action. Bordeaux sees Lisboa E-nova as the armed wing of the city to respond to calls for national and European projects which benefits from a certain freedom in its actions. The light and agile structure of this 16 employee organisation (50% in fixed-term contracts in 2017) offers the responsiveness and links with the relevant partners to undertake major projects and raise funds for innovative projects which could trigger sensible changes to the city.

3.

MEASURES TO BE REPLICATED / IMPLEMENTED

SMART LAMP POSTS

A smart approach to lampposts is to consider how to develop business models and funding mechanisms that incentivise implementation of 'smart' measures (wifi, air quality, parking, EV charging, etc) alongside lighting exploiting what is typically a considerable network of existing assets. Benefiting from the experience of other cities, especially in Sharing Cities (London, Milan), the city of Bordeaux in planning to replace or adapt the existing lamppost infrastructure, depending on what will be the most economical.

Bordeaux is particularly interested in Milan's work on that matter and how they were able to engage both stakeholders and administration in the process. However, as Bordeaux is not funded by the project to implement, the deployment scale will be closely linked to the level of external financing the city will be able to get.

It also seeks an innovative business model, for instance a public-private partnership for deployment at a large scale. As lampposts are already in vast numbers, it will be possible to carry small base stations and provide electricity to those base stations. A collaboration with telecommunication companies is foreseen.

4.

CHALLENGES / LIMITS

Since 2016, however, the city has been undergoing some administrative changes that are giving more powers to the metropolis and mutualising services of the city and the metropolis. Those changes, imposed by French law, have hindered the development of an aggregated common smart city strategy for the metropolis.

Some departments, which used to be dedicated to the city of Bordeaux only, are now shared with other smaller municipalities that are part of the metropolis. Even though this happens to be cost-efficient regarding public expenditures, sharing services with other municipalities requires a different approach. The measures to be implemented have to be deployed at a bigger scale and respond to multiple realities in the territory. Dissonant interests can lead to additional procedures and eventually a delay in implementation.

5.

NECESSARY INFORMATION

From the administration

As underlined above, the administrative change imposed by the French law has added some additional complexities in the last year to the daily work of the city's administration. The new system in place requires some new ways of working and will only be fully functional in the years to come, once all departments have completed their transformation process. As several departments within the administration are still undergoing some structural changes, the connection between them has not been optimal.

Better communication between the departments involved in Sharing Cities and the vanishing of silos work would benefit the project. This can only be fostered with strong political support, which seems to be on track.

From another city

On building retrofit, Bordeaux could benefit from more details about the Milan's example. The methodology was of interest and seems to be replicable in Bordeaux but it will require more information, especially on including private condominium unions in the energy renovation process of their collective housing parks. Milan seemed to have gathered a lot of experience for that and could share it, especially when it comes to a context of energy and social precariousness.

From investors

As explained above, the city of Bordeaux would like to improve the coverage of 5G within its territory and imagines coupling it with the refurbishment of its lampposts. This could be done by integrating cells into lampposts to enhance 5G coverage and capacity, which will be of interest to telecommunication companies, which will be enthusiastic to have access to an existing structure able to host. Those companies could therefore contribute to the investment for the replacement or refurbishment of lampposts across the city. In the United Kingdom, several cities have signed a contract which gives to a company exclusive access rights to street lampposts and made them suitable to improve 4G network coverage. A similar contract, based on initial investment from companies, could then grant them the access to a broad city infrastructure to develop their 5G networks. This would firstly represent a less consequential investment from the city, and in the long run a possible source of incomes for the local authority.

The city of Bordeaux has been learning a lot about the car sharing schemes implemented in lighthouse cities, particularly in Milan. Until now the city of Bordeaux has hosted two different types of car sharing models: Citiz/Yea! and Bluecar, which are not interoperable between them. While many arguments are in favour of car sharing schemes in cities where they are already functional, this new concept requires a trial period to create its own demand. In large cities, such as Milan, this necessary demand for car sharing schemes to be economically sustainable can be attained, although it appears to be less interesting for companies to deploy those schemes in smaller cities.

A city like Bordeaux would perhaps need investors to launch, for instance, a trial period in order to present and offer to their citizens the advantages of such a scheme, which are often not considered because of the lack of information.

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REPLICATION ROADMAP

BURGAS

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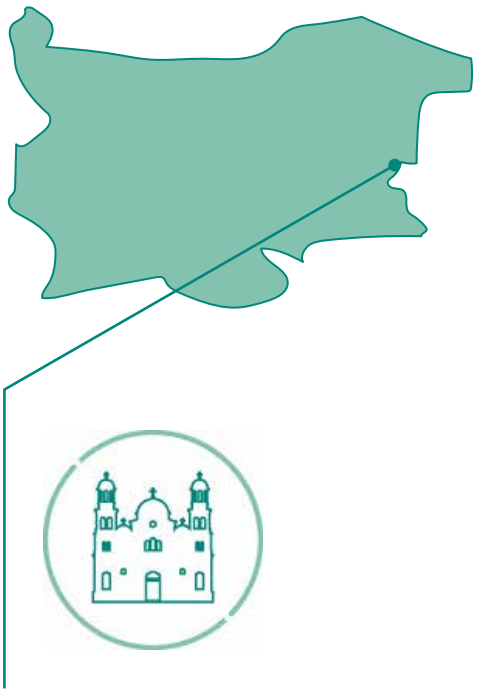
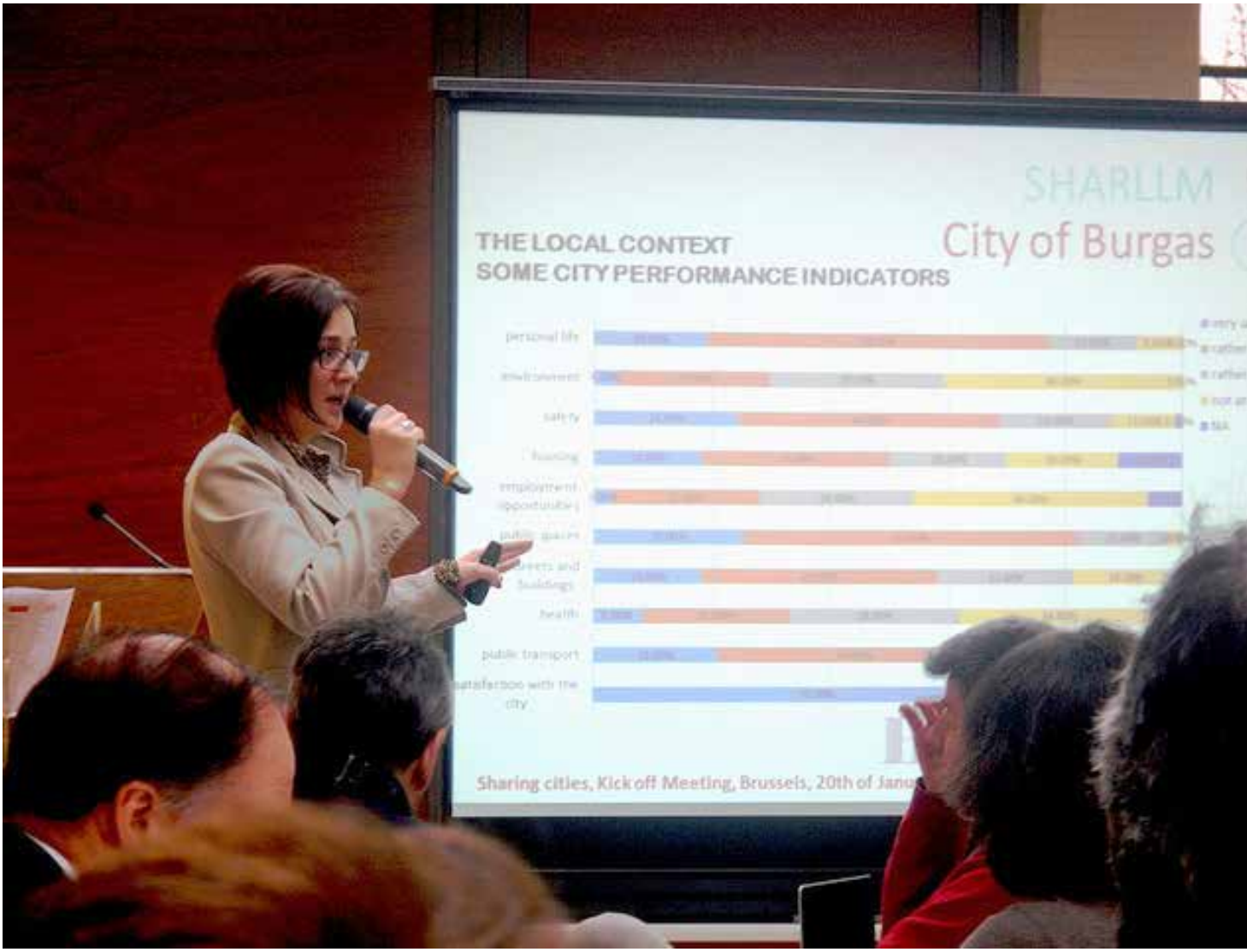


Burgas is the fourth biggest city in Bulgaria, situated on a large bay on the Black Sea coast and its location determines its role as a major logistics point in the country. The city is part of the Orient/East-Med corridor of the Trans-European transport network and provides good road and railway connectivity. In combination with Burgas Airport, which represents a distribution hub for international and domestic tourism and four marine ports, it ensures excellent logistic connectivity of the municipal territory for commercial, economic, trade and tourist purposes. At the same time, more than 43% of the territory of the municipality is part of the ecological network NATURA 2000 as three wetlands are part of the city area with exceptional biodiversity, especially of birds. The city is taking advantage of these propitious conditions in order to develop its territory in a resilient and balanced way. Therefore, main priority for Burgas consists in preserving existing ecosystems without compromising the sustainable urbanisation and further improvement of the infrastructure, making the city smarter and achieving equitable economic growth and enhanced human well-being.



Burgas municipality has realised important achievements related to the amelioration of the urban environment, the mobility, the waste and water management and energy efficiency in an integrated manner. During the last few years a 'growing smarter' approach has been adopted in order to introduce smart city solutions into the urban environment thus amplifying the value of these achievements.

Enhancing the use of innovative technologies and IoT, and establishing networks of sensors and software in order to connect up existing infrastructure and all components and layers across the city will allow the city to derive data and provide relevant services aiming to meet the needs of the citizens and improve their quality of life.

For that purpose, within the framework of the Sharing cities project, Burgas municipality has produced a baseline report analysing the current situation and where the city stands as to its transformation into a smarter city. Then the applicability of key measures implemented by lighthouse cities to be replicated has been identified and included in this roadmap. A further step that Burgas municipality intends to undertake is to develop a smart city strategy with the support of JASPERS assisting the city during the whole process of establishing a long-term vision, key priorities as well as corresponding measures taking into account the main assets of the city enabling it to enhance its development in a smarter way.

2.
INSPIRATION

Building retrofit

The city of Lisbon is currently retrofitting the city hall – a historical building that is part of the cultural heritage of the city. Public works include the installation of photovoltaic panels on the roof, replacement of windows and optimisation of the heating system. Similar energy efficiency measures and a sustainable energy management system will be implemented in the city hall of Burgas Municipality – also a building that is part of the cultural heritage of the city – taking good practices and examples from the achievements of the city of Lisbon.

The retrofitting activities of multi-property buildings in Milan, in combination with SEMS and USP, is particularly interesting for the city of Burgas as certain measures in the field of energy consumption monitoring and energy savings have been introduced during the public works. The example of Milan was especially relevant as to the involvement of the residents in the whole process but also as to the privacy of data management.

Mobility

Digital islands in Milan: those areas offer numerous hi-tech services on one spot such as free Wi-Fi, charging of electrical devices, recharging of private electric vehicles, intelligent lighting and video surveillance. This is particularly interesting for the city of Burgas in terms of intermodality combined with relevant services for the citizens.

The creation of a congestion charge 'Area C' in Milan as a restricted traffic zone limiting the access to the historical city centre represents a perfect tool to improve the public transport networks, reduce noise and air pollution and raise funds for the establishment of alternative and more sustainable mobility modes.

Milan is also an example regarding the e-car sharing system established in private condominiums, in which residents can share the use of electric vehicles.

The shelters with photovoltaic panels in Milan used for e-vehicle and e-bike charging is particularly relevant for Burgas as the city is currently enlarging its bike sharing system, augmenting the number of e-bikes and searching for innovative solutions for the creation of new charging stations.

Measures implemented by the city of Milan in the field of smart parking are very relevant for the parking system in Burgas especially as far as the integration of the sensors' information from parking zone to the existing LoRaWan network is concerned.

The network of smart city incubators such as BASE Milano and Smartcity Lab is also impressive, providing opportunities to develop and carry out innovative projects by entrepreneurs.

Burgas Municipality has particular interest in the legislative framework of the city of Lisbon in the field of mobility. On the one hand, the adoption of specific measures in terms of urban spatial planning, completely reorganising and redirecting the traffic flow out of the city centre by transforming the street networks, represents, from a strategic and planning point of view, a very good example for Burgas municipality. Also, Lisbon has adopted a Municipal Plan for Electro Mobility aiming to encourage the use of electric vehicles in the city. The city of Burgas was particularly interested in the system MOBI.E related to the introduction, among other measures, of on and off street charging points and the establishment of a Green Parking Badge in the Lisbon Parking Regulation as Burgas is currently examining different relevant opportunities for the optimisation of the 'blue zone', a paid parking system within the municipality.

Lisbon also provided valuable information regarding the tendering procedures for the establishment of a new bike sharing system, which is currently being analysed in Burgas as far as the technical specifications, especially for e-bikes, are concerned.

The creation of a green zone (eco-zone) restricting the access to Lisbon city centre of the most polluting vehicles is considered as a key solution to reduce air and noise pollution as well as city congestion and parking difficulties.

Getting acquainted with how the London traffic control centre operates was very useful for Burgas Municipality. It allowed the city to compare with the existing system set up in Burgas. Some measures in the field of traffic light management represent particular interest for Burgas as the city is preparing a new project that will upgrade the already implemented 'Integrated urban transport project' of Burgas. The ambition of the city is to have a system that will include sensors to measure traffic flow and cameras able to read number plates. The data flow will be collected into the Traffic Centre of the city where a new traffic management and control system will be installed to work together with the existing CCTV control system. At a later stage, Burgas envisages introducing a prediction and event awareness system connected to the national platform of the MIA, providing information for crime prevention and better safety.

Royal Borough of Greenwich is also one of the pioneers offering the possibility to service providers to operate on its territory with autonomous e-vehicles. This is inspiring in terms of safety and air pollution but also in terms of regulation as the implementation of this kind of innovative solutions is often related to challenges linked to infrastructure, circulation and safety law-making.

The EV car clubs functioning on the territory of the Royal Borough of Greenwich represent a specific example of innovative smart service for the citizens and limiting the traffic and air pollution of the targeted city area.

Smart lampposts

The Milan example for smart lampposts is an inspiration for Burgas, as it combines LED, environment monitoring services, electric vehicles charging and LoRaWan coverage.

Urban Sharing Platform

Milan's Monet energy management system represents an advanced solution, developed by Siemens, providing real time data in numerous fields, offering various opportunities for forecast and energy consumption saving models. The interoperability of the SEMS and the USP is particularly interesting and could be taken as an example for future plans in Burgas.

Citizen engagement

Burgas had the opportunity to exchange with the city of Lisbon on engaging citizens in local community. Lisbon involved residents from targeted neighbourhoods for the implementation of particular measures. This showed promising examples of how to motivate people to undertake energy efficiency and building retrofit works, to save energy and to monitor energy consumption thanks to affordable solutions. The participatory budgeting schemes will also be an inspiration for Burgas in other projects.

Milan also gave great examples of how to engage citizens thanks to bottom-up approaches including local information events and meetings. This citizens' led approach, with co-design activities, constitutes a great example of methodology for Burgas to engage with citizens.

General

The adoption of integrated implementation of all measures, the citizens' engagement and involvement of stakeholders at all levels of decision making is a demonstration of how to successfully manage the whole process of the balanced and smart development of the city.

3.

MEASURES TO BE REPLICATED / IMPLEMENTED

The measures to be implemented correspond to a large extent to the measures mentioned as inspiration above part.

BUILDING RETROFIT

Regarding public building retrofit, Burgas is planning a full refurbishment and the introduction of energy efficiency measures such as photovoltaic solar panels, heating and lighting system optimisation in the main building of Burgas Municipality in combination with the establishment of a Building Energy Management System (BEMS). The work already done in Lisbon on this matter will be particularly beneficial.

Regarding private buildings, retrofit work and energy efficiency measures (where possible combined with a BEMS) will be carried out. The experience from Lisbon and Milan will be helpful to apply bottom-up approaches and involvement of citizens as much as possible throughout the whole process.

MOBILITY

Regarding e-mobility, the city of Burgas plans to replicate the smart digital islands as they were designed and created in Milan. Those areas will combine transport intermodal solutions, e-vehicles and wheel chair charging points, e-bike sharing schemes, smart lampposts, free Wi-Fi and video surveillance.

Burgas is also working on the creation of a parking area with sensors, delivering real-time data on availability of parking places like it was done in Milan and Lisbon. The exchanges with Lisbon on parking zone management helped Burgas a lot to develop the city's first project initiative for the implementation of a system aimed at improving the management of a 'paid blue zone', using parking sensors embedded in the road.

Based on experience from Milan and Lisbon, the city will purchase electric vans for the needs of the municipal companies, which will contribute to advance in implementing e-logistic solutions.

Burgas envisages the enlargement of its existing bike sharing network, with the creation of new bike stations with e-charging spots and the augmentation of the number of e-bikes, taking inspiration of what was done in Milan. Burgas was inspired by the free-floating bike scheme developed in Milan and the city has started preliminary studies for the introduction of a trial version of a similar system.

Burgas will work on the installation of photovoltaic shelters with e-charging spots for e-vehicles and e-bikes, as was done in Milan and Lisbon.

In order to reduce traffic in the city centre, Burgas is also in process of establishing a low speed zone (30km/h) within a residential area, and creating a green parking zone to reduce the traffic in the central part of the city as already done in Milan and Lisbon.

SMART LAMPPOSTS

The humble lampposts projects in Lisbon, Milan and Bordeaux were a great example for Burgas to understand how to optimise the efforts of the city in order to realise a new project for street lighting in one of the city's residential areas. The project includes the replacement of lightbulbs with 2,000 LEDs, the introduction of several smart lampposts and the upgrade of the existing street management system by adding a new web-based application. Burgas is now in the middle of the realisation of a pilot project on Bogoridi street, a renovated pedestrian area in the historic centre of the city, where smart lampposts with different features and functionalities will be installed. The street, thanks to the new light poles, will provide free internet access, collect environmental data as to the air pollution, video-surveillance, spots for electric charging of mobile devices and disabled people's wheel-chairs (inspired from London), and an info-media-management system.

URBAN SHARING PLATFORM

The city of Lisbon is currently developing its own platform with Altice. The company has proposed to take Burgas' data and integrate it on the existing platform. This will be a replication test, which might be developed at a greater scale in the future, once the needs for Burgas have been identified.

4.

CHALLENGES / LIMITS

SEMS and buildings retrofit

A national programme is in place, providing 100% financing for private building retrofit (blocks built in an industrial method). The lack of interest of flat owners in investing in the installation of additional features that would improve the energy efficiency of buildings (e.g. photovoltaic solar panels reducing the costs of energy for heating) is limiting the expected effect.

When there is not a 100% funding scheme in place, the difficulty of motivating flat owners to invest in energy efficiency measures is even greater. This is particularly true for SEMS, which does not seem to convince owners of its added value.

The new rules established by the GDPR will hamper the work related to data collection and processing. For example - all detailed information of energy consumption for each home will require express consent of owners to grant access to private data. Therefore, the municipality will be only able to operate by aggregated data at building level which might represent a limitation for accurate measuring and subsequently for the implementation of smart measures.

Mobility

E-car sharing systems developed in lighthouse cities do not seem applicable in the local context of Burgas Municipality, probably due to the size of the city.

E-logistics is an important issue as the city does not have the mechanism to motivate and stimulate logistic companies to use e-vans or e-lorries to provide delivery services within the city centre.

General remarks

The lighthouse cites are currently nearing the stage of full completion of all measures. It is important for all follower cities to acquire a full picture once all solutions are implemented and to benefit from the experience of lighthouse cities. Burgas Municipality has already identified the main measures suitable to be applied at local level, but in order to deliver smart replication models it is crucial for the city to have adequate feedback – monitoring and assessment – of the real output of these measures in lighthouse cities.

Financing of the implementation of replication measures is challenging for Burgas Municipality as no funding for this is foreseen within the budget of the project. At the same time this is an opportunity for the city to explore new business models to deliver innovative solutions involving stakeholders from various sectors and thus creating a propitious environment for sustainable and intelligent growth.

The municipal administration is still working in silos and it remains difficult to ensure coordination and an integrated approach even if significant progress has been achieved during the few last years. Involving all stakeholders (e.g. utility companies, public bodies, business, universities, NGOs and citizens) in the whole process of making the city smarter is challenging. This means additional efforts on behalf of the municipality in order to create a working mechanism to evaluate efficiently citizens' needs and boost the private sector to meet these requirements.

Projects like Sharing Cities are driven by the city together with local stakeholders involved in the project, but the success of the project depends a lot on the existence of people or organisations that will bring it to a new level. Burgas is looking for those 'game changers' which would make a significant difference in the local implementation of the project. Beyond the political commitment, those game changers could give a new dimension to the project and embrace the potential of a smarter city. Citizens are playing a major role in the development of the project. They must be taken on board, but this could only happen through behavioural change.

Despite the very good examples of citizen engagement and citizen participation in the lighthouse cities, there is still a sort of gap between citizens and the administration. Evaluating citizens' needs and setting up an efficient way to gather their expectations is challenging. People do not engage actively with the administration and they can sometimes be suspicious of any change proposed by the city.

5.

NECESSARY INFORMATION

From investors

Regarding the lack of interest of e-vehicle car sharing companies to develop any service in smaller cities, a city such as Burgas would benefit from trial periods of those companies. Trial periods would be useful to test the citizen's reaction to new services and could eventually lead to the design of an adequate business model.

E-bike scheme – as the city of Burgas is searching to upgrade the existing bike sharing system with more e-bikes and to facilitate the users while renting bicycles, the Municipality is interested in exploring innovative solutions in both fields.

From another city

Specific and technical information will definitely be needed from the lighthouse cities when Burgas starts the implementation of measures that they would like to replicate.

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BUILDING SMART CITIES TOGETHER

SHARINGCITIES

REPLICATION ROADMAP

WARSAW

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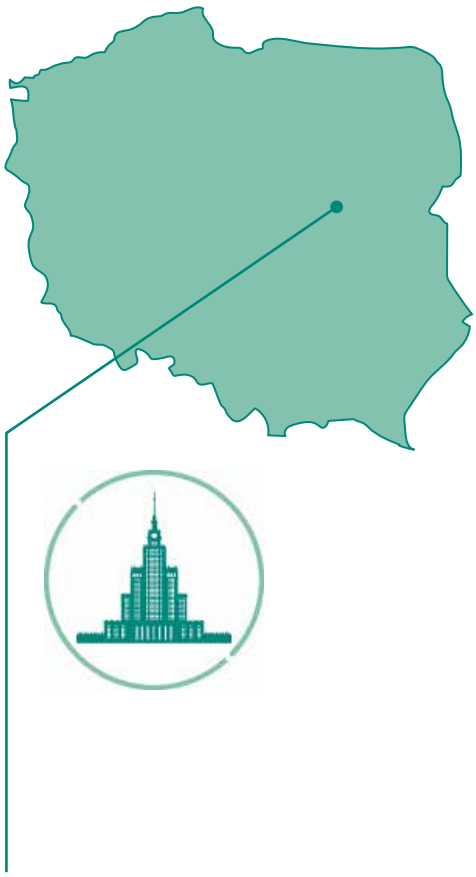
VISION



Warsaw does not have a specific smart city strategy, and it has no approved formal plans to develop one in the near future either. However, smart city ideas are present in some of its documents, such as the Low-Carbon Economy Plan. The city's Infrastructure Department expects the Sharing Cities programme, thanks to the information of lighthouse cities, to give new impetus to Warsaw's work on such a strategy in the coming years. It was expected that a decision on the creation of a separate smart city strategy would be possible after adoption of a new 'Development Strategy of Warsaw until year 2030', which occurred on 10 May 2018. This strategy contains references to smart city ideas. As for year 2018 it is envisaged that the relevant document resulting from the Development Strategy will focus not on local implementation of smart cities solutions in general, but rather on digital transformation of Warsaw. Smart city related aspects of specific sectors like energy or transportation will be successively added/ further developed in the relevant sectoral strategic documents of the city.

The city signed the Covenant of Mayors in 2009, and completed its Sustainable Energy Action Plan (SEAP) in 2011. In its SEAP, Warsaw committed to reducing CO_2 emissions by 20% by 2020 compared to 2007; cutting final energy use by 20% by 2020 compared to 2007; and increasing the share of renewable energy sources (RES) to 20% by 2020. In 2014, the city management approved a detailed RES action plan, which was drafted within the framework of the EU Cities on Power project. It was consolidated with a broader Low-Carbon Economy Plan (PGN), which was adopted by the City Council in December 2015. This document covers both municipal and external projects. It envisages investments to the tune of €4 billion in projects aimed at improving energy efficiency and air quality (including investments in RES and in smart grids). The document focuses on investments with funding already secured; the majority of them are to be implemented by the city and its companies, but projects of external entities are also included, like energy companies active in the Warsaw agglomeration.

2.
INSPIRATION

Thanks to its active participation in multiple events and other exchanges (like webinars) organised in the framework of Sharing Cities, the city of Warsaw has collected valuable information from the lighthouse cities. The experience and knowledge gathered by other partners has inspired Warsaw with new ideas to achieve its goals for its Development Strategy for 2030.

Building retrofit

The city of Warsaw is looking at the creation and development of large-scale retrofit programmes, including standardisation of solutions and large-scale procurement allowing for a reduction of costs. The creation and development of a large-scale retrofit programme would include different aspects such as standardisation of solutions and large-scale procurement allowing for a reduction of costs (e.g. when there are numerous buildings connected within the same areas and with similar technologies). Warsaw could learn more about public-private partnerships to deliver that kind of project.

In order to achieve this, it is also interested in learning more about energy performance contracting, including detailed financial measures and contract provisions which do not put the municipality at risk. Warsaw is also identifying relevant energy audits to be conducted to ensure sound preparation of retrofitting projects.

While continuing the processes already launched in Warsaw in connection with the Sharing Cities cooperation, its city representative will use the results of the on-going cooperation as an inspiration for its future plans and actions. Exchange with partners from lighthouse cities were fruitful as they gave a new perspective, for instance that a lack of ambitious national standards on energy-efficient buildings may give more flexibility to the city to design and implement its own solutions. Those solutions can be more customised for the needs of each city.

Information was also collected on the technical preconditions of implementing measures related to building retrofit. It appeared to be paramount to take into consideration the planning law, and as a consequence to include negotiations between investors, inhabitants, city and the decision making at an early stage to make the process more effective. It was also noted that the participation of experts from academia helps a lot.

The project itself is based on assumptions of replicability of various solutions related to smart cities and particularly building retrofitting. Thus, such solutions - developed, enhanced or integrated in cooperation with the project's lighthouse cities and their scientific and industrial partners - are being analysed and discussed by follower Warsaw and their local partners, with the purpose of possibly adopting those or similar solutions in future.

SEMS

Warsaw is envisaging the development of a Smart Energy Management System (SEMS). The city is taking inspiration from the lighthouse cities to create and develop a monitoring system for energy consumption in various categories of municipal buildings, and will conduct parallel research into the best tools to use and ensure the training of people to make the most of the new installations. Warsaw is looking at how to further develop and automate an existing monitoring system for energy consumption and its associated costs in various categories of municipal buildings. This question includes the issues of providing detailed energy certification for these buildings, automation of the process, and providing training for building users and managers.

As the electric grid in Warsaw is under a heavy burden as to coping with the demand, working with narrow safety margins, the city has started a reflexion on its energy security in the context of the local energy mix. The system of production and distribution of energy is majoritively centralised, so one major breakdown may lead to large part of the city being cut off from supply of electricity. In turn, a small share of dispersed energy production and renewable energy sources in the market does not offer backup for large quantities of energy in emergency situations. All these technical questions were discussed with the experts of lighthouse cities, who brought valuable inputs to circumvent them. One of the methods of coping with this problem could be development of electric mobility with functions of vehicle-to-grid and/or storage-to-grid (in cases where V2G is not practical, e.g. due to operational profile of e-buses). Those functions – which increase the energy security of local communities - require technical adaptation of EVs, their charging points and the grid itself. They also require necessary amendments to corresponding legal provisions regulating fields of energy and transportation.

Mobility

The city of Warsaw would like to increase the e-mobility (e-cars, e-bikes) offer for its residents and has been observing several innovative solutions in lighthouse cities. One question that emerged was related to business models, as so far in Warsaw the schemes do not seem to be economically sustainable on their own (even though that might change after additional incentives resulting from the new Polish law on electromobility).

Warsaw also pays particular attention to the ways of involving all relevant stakeholders in the process as this was considered to be a major success factor in lighthouse cities. As mentioned above, the city will also have to find solutions for a good forecast of the energy demand and a coherent deployment of charging stations in accordance with the grid.

Another question of interest is the co-existence of e-vehicle sharing schemes and fossil-fuel vehicles schemes, the latter being for now still more cost-efficient. This information is deemed particularly relevant to find the right business model which will ensure the electric vehicle schemes can compete with regular car sharing schemes, which may require additional incentives. The example of Milan was particularly enlightening on this matter and brought some ideas to Warsaw. Milan's experts also shared useful information on innovative solutions to integrate the energy storage and charging points in the city, where there is limited room for new physical infrastructure.

Warsaw is also interested to know about any alternative system that applies to professionals and delivery companies, which might have different needs than regular citizens using electric cars. The experience gathered by the three lighthouse cities on the cooperation they have developed with national administrators, energy providers and e-car sharing operators to install their charging points could clearly benefit the city of Warsaw, which will also look into specific schemes for delivery companies.

Congestion charge

The congestion charge in Milan has helped to reduce the number of cars in the city centre which allowed the city to increase the frequency of public transport. It also provides a reasonable amount of money from car drivers which can be used for improving public transport or bike infrastructure. They introduced a Low Emission Zone that proved to be very effective to decrease the pollution level. Moreover, it permitted them to provide very good public transport and bike infrastructure inside the congestion charge zone, providing efficient parking spaces outside the zone and P&R facilities. All these success factors represent clear evidence of the advantage of a low emission zone, which could eventually be set up in Warsaw.

E-bikes

The city of Milan has joint stations for both classic and electric bikes, which appear to be efficient and cost-effective and this could be replicated in Warsaw, where the current system is subsidised by the city. It should be added that Warsaw first added 100 e-bikes to its city bike system in 2017, but as for 2018 these vehicles are using dedicated stations.

The possible additional free-floating bike scheme is a very good means of transport covering ‘first mile’ and ’last mile’ of journeys, especially in suburban areas. To make free-floating bike-sharing successful in Warsaw a study should be done which states who is willing to use it, for what purpose, etc.

General

The city of Warsaw has learnt from Milan’s representatives that public surveys are very important and help citizens to understand proposed changes (e.g. congestion charge). Those surveys should be very extensive and when possible engage every group of citizens.

Moreover, it was noted that controversial changes should be firstly developed as pilot projects, establishing a period of time during which they should be evaluated. The evaluation can be useful to decide if the changes should be permanent or if the city should go back to the previous situation.

3.

MEASURES TO BE REPLICATED / IMPLEMENTED

BUILDING RETROFIT

Inspired by the building retrofit related initiatives undertaken (e.g. in Milan), the city of Warsaw is preparing similar processes to involve citizens in the design of the work to be pursued. This was considered as a key element in Milan and will be very helpful in Warsaw. The preparation will take 6 months, followed by 2 months to start the process, and another 6 months to realise it. Several stakeholders will be invited to participate in the discussion, ensuring the design of measures approved by all. Thus investors, key decision makers, and experts from academia and from companies, will take part in these meetings, to be informed citizens. Similar meetings already started in 2018 for two Warsaw areas undergoing revitalisation/urban transformation: Port Żerański and Żerań-FSO.

More generally, the city of Warsaw has learnt from Milan that the implementation of any technical solutions should be properly communicated to future users. This came out as being as important as the technical issues of a measure. Warsaw is preparing workshops on new housing areas in the city and will be using these measures as much as possible.

SMART LAMPPOSTS

The city of Warsaw was aware before the start of Sharing Cities of the advantage of replacing its lampposts but after first inventory it appeared that the lampposts are in a different state of repair, and this makes it difficult to identify areas where street lighting could or should be modernised. Some of the lampposts would require thorough modernisation, which would go beyond the PPP-EPC (public-private partnership, engineering, procurement, and construction) financial framework. Despite the return on investment from energy savings, adding further functionalities to lampposts would be difficult. The experience of Lisbon showed that proper preparation was needed for smart lampposts measures, for instance when it comes to preparing a functional and sound data infrastructure for the city.

Some analytical work started in 2017 will lay the groundwork for the replacement or refurbishment of lampposts in the city in a formula different from the earlier planned PPP-EPC. The experience of partners like London is to be utilised here as well. The funding will probably come also from external sources such as EU funds.

DATA

Since 2017 the city of Warsaw has been integrating the process of data management. The municipal staff deals with implementing data warehouses, reviewing procedures and preparing new data portal to shift the way we open our data for wide range of stakeholders.

Warsaw data city platform will refer to other platforms (partially already launched and partially still under construction as for 2018): communication platform, Internet of Things platform and e-services platform. The Warsaw employees redefined basic assumptions of a city data portal. It will not go on as a place created only for developers. The Warsaw staff is implementing a richer concept of openness to give open access to city data for all who might use this data for many purposes each day. The staff divided local stakeholders into three groups related to digital competences. There are developers interested in access to online data sets (M2M formats). Right next to them are those who need data and who know how to use it. They will analyse data if its needed, they will visualise, process and share it as well, and so on. Finally, there is a major group of people called 'everymen'. The city staff expect they will not use data as such. But maybe they will gladly use the tools (based on this data) if it will bring some added value. The Warsaw employees want to fill in the local platform with such tools.

4.

CHALLENGES / LIMITS

Mobility

The main challenge related to e-mobility today is to develop public infrastructure that will allow sufficient electric charging, using the experience of cities like Lisbon and London. As explained above, the issue is two fold: the grid will have to provide enough electricity for a bigger demand coming from e-vehicle charging stations. Batteries for charging stations could lighten the demand pressure on the grid but those need to be integrated in an urban environment which is already lacking space.

General

Moreover, connecting different measures like smart lampposts and e-vehicle charging stations within a single project is even more challenging in Warsaw than in lighthouse cities since the city relies to a large extend on EU funding for new projects. The different measures to be implemented have to be separated, differentiated according to EU assistance measures and regimes, which don't permit the deployment of holistic approaches and interconnected measures.

Like in many projects, there is not enough time to finish a project focusing on technology, as there should be more time foreseen to involve users in the design of measures.

Citizen engagement and data

Citizen engagement is one of the most important pillars of Warsaw policy. The city is already in general quite advanced in the field of involving citizens in actions related to clean energy, climate, sustainable transportation, spatial planning or other issues related to sustainable development. However, a comprehensive citizen engagement methodology requires a lot of resources and the local staff is not always in a position to focus primarily on that matter, which can be relegated to a status where it is not considered.

As to digital issues, the Warsaw staff also focus on citizen engagement. The idea is to involve people in delivering data and info related to Warsaw ('citizen data', 'citizen as a sensor'). The intention is to use various tools located on the communication platform in order to acquire valuable data from citizens (the first project in this field has already been launched).

Another topic connected with this matter is e-services, to be implemented taking into account results achieved by cities more experienced in this field like London. Delivering mature solutions in this field to citizens and other stakeholders is an important element of Warsaw's plans. The city envisions the launch of an e-services platform ("Moje 19115") and of Integrated City Card (interface allowing for access to various municipal services, including public transportation).

Building retrofit

Multiple challenges arise when it comes to organising complex thermal retrofits aimed at higher energy efficiency standards. Firstly, securing appropriate energy behaviour of users and inhabitants is particularly challenging in social housing, in which users do not feel concerned. The Polish law doesn't impose strict energy efficiency standards for buildings, which doesn't encourage significant changes and progress towards more energy efficient buildings.

Finally, the financial assistance schemes related to building retrofitting are only addressing the simpler thermal retrofit actions such as insulation and window replacement. Furthermore, those schemes are only available to a limited extent for building renewable energy installations. The financial assistance does not incentivise comprehensive retrofit processes which would attain higher performances enough. Therefore, Warsaw started assigning certain funds from its own budget for both RES installations in municipal buildings and financial assistance for such installations delivered to citizens.

Certain issues have delayed implementation of a low-carbon area, including national legal provisions related to energy efficiency actions in spatial planning documents and initiatives; the challenges involved in financing and coordinating such a large and complex project; and finding an optimal area to implement a project of this size and complexity. Warsaw's participation in the Sharing Cities project greatly helps the city to clear some of these hurdles, since Warsaw (or any other Polish city) does not have experience with designing and implementing such simultaneously large, multi-layered, costly and innovative megaprojects. It also requires intensive collaboration with multiple external stakeholders, which is another challenge. A lot more could be done to convince Polish/Warsaw citizens, decision-makers and other stakeholders as to the value of public-private partnership contracts on buildings, as it is hard to conduct thermal retrofits without their support.

Among the most important barriers or risks in the implementation of those measures are the political controversies. Introducing standards as to improving buildings energy efficiency to a higher level than the current one (already partially Sharing Cities-inspired) is risky, although it is planned to be introduced in connection with the new 'Warsaw Housing Policy until 2030'. This strategic document was adopted on 14 December 2017 and the resulting work on the Warsaw Housing Standard is ongoing as of 2018. It is possible that this work will be assisted by an additional separate analysis specifically utilising outcomes and results of the Sharing Cities project. Certainly, a useful aid will be work conducted on building standards in lighthouse cities (e.g. in London – Greenwich).

5.

NECESSARY INFORMATION

From regional and national authorities

Changes in the legislative and regulatory framework would be more than welcome if they brought better support for renewable energy sources and smart city measures on national and regional level in Poland. Such changes already started to happen in 2018 in relation to e-mobility in connection with adoption of a new national law on electromobility (Warsaw participated in public consultations about this legal act, using knowledge obtained due to Sharing Cities).

Changes in legal provisions on data privacy in Poland, which take into account challenges resulting from urban data platforms and their sensors like those installed on lampposts.

From investors

Reaching agreement with external companies as to financing smart lighting projects in return for access to data from lampposts' sensors (depending also on legal changes mentioned above).

Regarding e-mobility, convincing companies to invest and present to citizens the advantage of electric mobility.

From the city of Warsaw

Work on technical preconditions to prepare for changes to come. New investments are needed in electricity distribution grid in case of large-scale investments involving EV charging (for pilot projects taking place for the time being the current capacities are sufficient). In accordance with the scheme introduced by the law on electromobility, general development of charging infrastructure for passenger cars will not be a direct duty of Polish municipalities; however, Warsaw will still participate in this process, cooperating with electricity distributors and other external stakeholders. Moreover, the city will remain directly involved in construction of charging infrastructure on some of its own land (like next to municipal buildings and at P&R parking lots, where the first pilot charging points became operational in December 2017 at Młociny P&R.

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