The making of a smart city:
policy recommendations
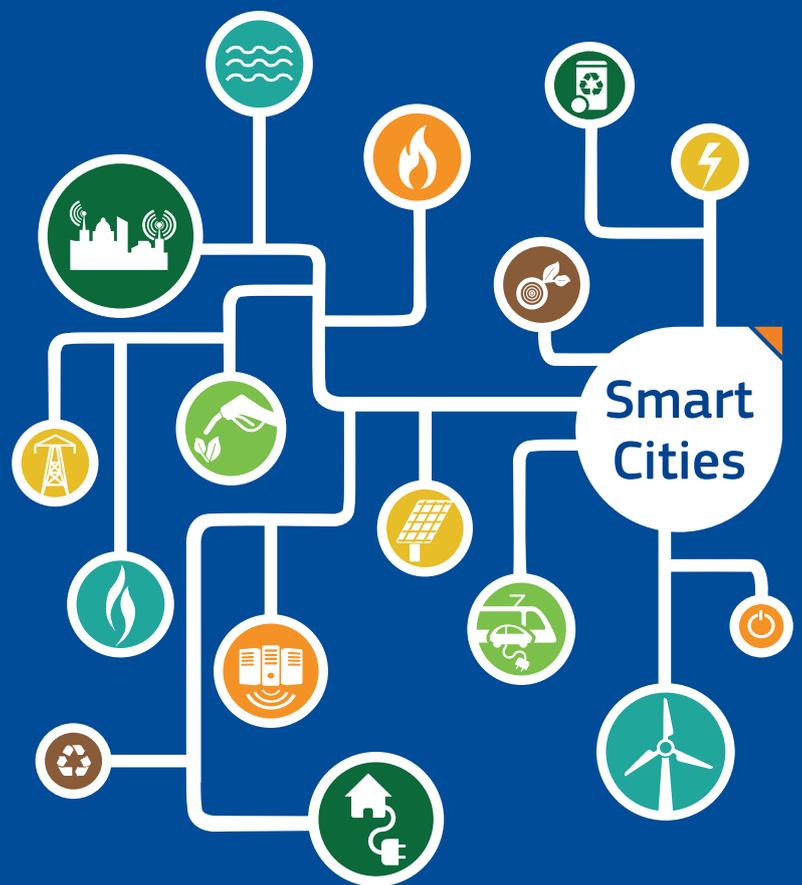
Smart
Cities

EU Smart Cities
Information
System

EMPOWERING SMART SOLUTIONS
FOR BETTER CITIES   www.smartcities-infosystem.eu

Energy

The making of a smart city:
policy recommendations

For decision makers at local regional, national and EU levels

Smart
Cities

EU Smart Cities
Information
System

ABOUT THE MAKING OF A SMART CITY:

policy recommendations

The purpose of this report is to share lessons learned and to provide policy recommendations based on feedback from projects as well as from other documentation on the policies needed to support Smart Cities. As such, it is a key deliverable in the Smart Cities Information Systems (SCIS) project, which aims to support and stimulate the replication of successful innovative technologies tested through EU-funded Smart Cities and Communities demonstration projects. The core target groups of this report are policy makers at the local, national and EU levels. It complements two other reports with information on all projects analysed '**The making of a smart city: best practices**', and one on potential tools to replicate innovations for city planners and policy developers '**The making of a smart city: technology replication**'.

The report goes over key policy issues affecting the deployment of innovations and reaches the following conclusions and recommendations:

Local administrations face considerable challenges to develop smart cities. Many lack the necessary policy competences due to their national frameworks. Some administrations are unable to use local fiscal incentives or are not responsible for key local issues affecting the city, such as the introduction of congestion charges or taxes on use of specific local resources. The landscape in the EU of the powers of local authorities is very heterogeneous. It is recommended that the multilevel governance structure in Member States is reviewed to ensure the right level of competences is transferred to the local level.

Local administrative capacity is often too low and we recommend a stronger advisory support. There should also be more regional events in closer geographical areas, cheaper and easier to reach and more adapted to their local challenges.

Administrative burdens prevail, often from obsolete rules. We recommend the adoption of coherent standard procedures across city departments to facilitate the introduction of innovations.

We recommend that stakeholder engagement is streamlined in urban development programmes and any larger smart innovation projects, as it is essential for their successful uptake.

Financing is one of the most serious challenges for cities today. On the one side, public capital is scarce and on the other private capital is difficult to mobilise. Public grants are limited, but methods to expand the use of EU financial instruments, European Investment Bank loans and collaboration with national promotional banks should be further promoted.

As urban development needs become more complex, multifaceted and integrated Private Public Partnerships (PPP) are becoming a necessity. A number of Member States and local authorities are still ill equipped to address the needs of such arrangements and should turn to advisory services on PPPs that the EU offers.

The stability of the regulatory environment is of paramount importance. Without a stable policy framework, investors may keep away from EU markets.

The analysis at EU level highlights the need to bring further coherence between funding sources to be able to efficiently combine resources.

While the development of Smart Cities fit well into EU objectives, national and regional strategies for the use of EU funds do not prioritise enough their development. There should be more emphasis placed on cities as after all without cities, the energy and climate goals will not be reached.

Public procurement rules need to be reformed to ensure procurement based on results becomes possible, including lifecycle costs and benefits. It is recommended that innovation procurement is reformed promoting also the use of a two-stage process, with first an expression of interest asking for ideas, awarding funding for small scale feasibility studies to further define the most promising solutions. The second stage would be followed by selecting more than one project, encouraging collaboration and competition.

Solid standards should be required in procurement, otherwise the evaluations of projects proposals will not be based on clear indicators.

All projects for Smart Cities need to have a robust monitoring protocol that should include clear specifications for the planning, installation and operation phases of the monitoring system. This includes providing a common and reliable set of KPIs.

For the Horizon 2020 programme, the Smart Cities and Communities project participants have raised the following additional recommendations specifically to the European Commission:

Horizon 2020 could introduce call for tenders for more open questions in which a problem at district level is presented opening the call for various alternative solutions. This approach has started to emerge, but can be explored further.

Studies exploring the public private partnership business models should also be more prominent in Horizon 2020 calls, as these will be the backbone for many replication efforts.

During the last two calls there has been a move towards more themes beyond hardware implementation, but the expected impact is still based on emission reductions and energy. Further calls could include some other relevant indicators for the additional requirements.

Some project coordinators raised the concern that Horizon 2020 calls fail to fully recognise the organisational complexity of the new demands for integrated projects. This leads to difficulties in keeping up with the expectations placed on the project.

The focus on presenting figures on payback times has been criticised, because in first of a kind innovations returns to investments tendo to be weak. Costs fall with further replication. Such results may give an erroneous image on the potential of the solutions tested.

Heavy procedures and lack of flexibility to amend contractual project description are seen as a growing concern, uncertainty in research and innovation does not fit strict timetables and risk averse and rigid rules.

There is a sense that more recognition of the social dimension is needed in future Smart Cities calls.

Table of Contents

1. INTRODUCTION

The purpose of this report is to share key lessons learned and to provide policy recommendations on how to support Smart Cities projects development. It is the third of a series of SCIS Reports in the Smart Cities Information Systems (SCIS) project, which aims to support and stimulate the replication of successful innovative technologies tested through EU-funded projects. The SCIS project brings together project developers, cities, institutions, industry and experts from across Europe to exchange data, experience the know-how and to collaborate on the creation of smart cities and an energy-efficient urban environment.

This report presents policy recommendations for local, national and EU level policy makers. It covers the main areas influenced by policy, namely regulatory environment and finance. The report also offers a final specialist section dedicated to innovation policy for EU authorities related to Smart Cities. Smart City Planning and project implementation issues, which are the domain of city planners and promoters, are covered by the SCIS report on technology replication[1].

This report complements SCIS information database that is focused on the projects themselves, by presenting an analysis of the barriers encountered by projects caused by policy framework conditions in place. It also proposes s some potential policy solutions.

This report is thus to some extent the reverse of the coin of the technical replication study and will show therefore a number of synergies.

The report is based on several main sources of information:

- Technological, policy and financial analysis of Smart Cities and Communities FP7 and Horizon 2020 projects in the areas of energy, mobility and transport and ICT, co-financed by the European Commission[2];

- Insights, shared by Smart Cities projects coordinators during dedicated workshops;

- Insights from other Smart Cities platforms, such as the European Innovation Partnership on Smart Cities and Communities[3];

- Literature review and other sources.

The report has the following structure:

Chapter 1 Introduces the report;

Chapter 2 provides overview of the policy challenges to be addressed by authorities and policy makers at the three levels of governance in the area of innovation and replication;

Chapter 3 focuses on policy actions needed at national and local level;

Chapter 4 Focuses on EU level policy aspects.

---

[1] SCIS (2017). "The making of a smart city: replication and scale-up of innovation in Europe", European Commission.
[2] See Annex 1 – policy and finance questionnaire for SCIS projects
[3] European Innovation Partnership on Smart Cities and Communities - https://eu-smartcities.eu/about

2. OVERVIEW OF KEY POLICY CHALLENGES TO INNOVATE AND REPLICATE IN THE EU

The SCIS technology replication study already mentions a number of barriers city authorities, planners and developers face in the project preparation and implementations phases. Shifting cities to a low carbon future presents major technological, economic and social challenges, this includes reforming and adjusting policies at all levels. The framework conditions need to be created to facilitate the adoption of new solutions and promote innovation. This requires a flexible, but also a stable positive policy environment.

At the local level the following aspects are key difficulties that can be addressed by policy actions:

- Inappropriate level of local competences;

- Inappropriate level of local administrative capacity;

- High administrative burdens;

- Inappropriate procurement rules;

- Inappropriate Stakeholder involvement;

- Access to capital;

- Public Private Partnerships;

- Inappropriate Regulatory environment at national level.

At EU level the following main areas are addressed:

- Need for policy coherence across sectors;

- Reinforcing the Horizon 2020 programme.

All of the aspects listed above can be influenced by appropriate policies and the aim of this report will be addressing those. Where possible, experience from SCIS projects and particularly the experience from Lighthouse projects will be presented.

3. POLICY ACTIONS TO PROMOTE SMART CITY INNOVATION AT NATIONAL AND LOCAL LEVEL

The development of a smart city ultimately relies on the ability of introducing the necessary changes at local level. Incentives at EU and national level are very important, but without implementation capacity on the ground, those incentives can become largely meaningless.

Inappropriate level of local competences

It is a feature in many Member States that local administrations lack the necessary competences to manage effectively a number of areas central for the development of smart cities. The responsibilities on roads and public transport at national, regional and local level may not allow for coordination, or limit the capacity of the local authorities to address some key aspects related to for example traffic flows. Some municipalities may find it impossible to handle efficiently traffic in their communities, due to main roads crossing the municipality but managed by regional authorities.

Another area where multilevel governance is deficient in some countries is in the ability to introduce local fiscal incentives to curb emission, for example for transport in the form of congestion charges. There is a very strong variation of fiscal decentralisation in the EU.[4]

In other cases, the public administration can be much centralised and, for larger projects, the negotiations with the public authorities have to be conducted in the region's or the country's capital city. Ultimately, this can result in significant delays in project implementation.

Member States should review their multilevel governance structure to ensure that the division of competences allows an efficient and rational decarbonisation process.

Inappropriate level of local administrative capacity

Global developments in the areas of climate change adaptation and mitigation are increasingly requiring a tailored local response. Efficiency in the energy and transport sectors, and generally in all uses of resources, needs ever growing knowledge on the part of local authorities. They are required to understand the importance and interplay between key energy and environmental indicators and the technological options available. It also reinforces the need for strong coordination across departments, as well as high levels of ICT integration. This is an important change in the required involvement of city administrators and their competences. The need for innovation in the financing and procurement of projects requires also highly skilled managers to develop the right contractual terms and procurement systems.[5]

[4] The Committee of the Regions explores the level of fiscal decentralization in the EU: https://portal.cor.europa.eu/divisionpowers/Pages/default.aspx

For many administrations attracting the right skills is not easy, particularly in administrations that cannot offer the conditions of the private sector for such skills. This is particularly problematic in poorer Member States where the wages of the public sector are considerably lower than in the private sector.

From a policy perspective, administrations should take advantage of managerial training programmes and exchange of good practices with more advanced cities. To reduce costs collaboration between cities in close geographical groups would be an advantage. This would also help bring together experiences from cities with similar needs and experiences, helping the exchange of locally relevant knowledge. Large meetings in big cities in wealthier Member States, and well as events in Brussels, may be interesting, but their relevance to local needs may not be as positive. Creating local city networks can also increase the transfer of knowledge considerably, as well as help in developing projects showing economies of scale, more attractive also to investors.

City administrations should take advantage of managerial training programmes and exchanges in good practices with more advanced cities.

The European Commission could increase efforts to provide such training in different geographical areas to make training and exchange of experience easier and more locally relevant.

High administrative burdens

Administrative burdens very often represent a significant inhibiting factor for the development of low-carbon, renewable energy and energy efficiency projects. One such problem is the number of permits and approvals that must be obtained before the initiation of a project. In some cases, the processing of permits and approvals involves numerous different state agencies. Depending on the location and on the technologies used, energy efficiency project developers can be required to apply for noise, visual, spatial, ecological, heritage and drilling approvals, which can cause major delays if the authorisation process is inefficient or fragmented amongst administrations operating in silos.

The administrative burden for the project developers can become even more intense when faced with a lack of coordination among the different responsible governmental bodies, and when there is confusion about each body's responsibilities. This is a consequence of the lack of coordination mentioned earlier. This can lead to inconsistencies in the bureaucratic requirements to project developers required by different local government authorities.

In other cases, the public administration can be much centralised and, for larger projects, the negotiations with the public authorities have to be conducted in the region's or the country's capital city. Ultimately, this can result in significant delays in project implementation.[6]

Authorities should ensure that requirements across city departments are coherent and in line with modern technical options. Long delays in the bureaucratic procedures should be avoided.

REMOURBAN

Tepebaşı[7] demo-site Turkey (2015-2019)

The Tepebaşı municipality has limited jurisdiction over important topics such as overall mobility planning and urban infrastructural decisions. The decisions regarding the path of the extended cycle routes for instance, are one of the examples where there are overlapping authorities (metro municipality and Directorate of Highways under the Transport Ministry) and where up front agreement is critical for the project, This situation can cause delays and bureaucratic burden.

A difficult situation has been caused at local level by the lack of communication between the Terebaşı municipality and the higher level Metropolitcan Municipality of Eskişehir (hierarchically above Tepebaşı) especially where approval from Metro Municipality is concerned.

[5] Public procurement for innovation is a primary focus of the European Commission and a central concern in the focus to transform the energy and transport systems of cities. More guidance can be found at: https://ec.europa.eu/digital-single-market/en/public-procurement-innovative-solutions

[6] See example of the Next Buildings demo-site in Lyon (France), where long procedure of issuing permits has caused six months delay in PV installation http://www.smartcities-infosystem.eu/scis-projects/demo-sites/next-buildings-site-lyon

[7] REPLICATE is a European research and development project that aims to deploy integrated energy, mobility and ICT solutions in city districts. The REPLICATE model takes into account an integrated planning through cooperation between citizens and local authorities and business models in accordance to the urban areas' challenges that can be applied in other cities. www.smartcities-infosystem.eu/scis-projects/demo-sites/remourban-site-tepebaşı

Special status of historical or esthetical buildings/areas

Preservation of the original features of buildings is often a requirement for any type of renovation works. Although those requirements preserve the historical and esthetical values, they might cause additional difficulties and work in designing and implementing the renovation works.[8]

In many areas regulations limit the shape, size and materials to be used for new buildings to keep the esthetical value of an area. While there is merit in preserving the esthetical value of localities, many of the rules may be out of date and too restrictive, such as on the use of modern materials for energy efficiency or solar production, which can integrate well with the character of the area, but fails to fulfil requirements which were drafted well before such solutions existed.

Regulations on the preservation of the historical and esthetical value of localities have to be up to date with modern techniques to avoid unnecessary restrictions.

Need for better innovation procurement processes

Public procurement should not be based on the price to deliver on a specified product or service but on calling for solutions to urban challenges – in order to promote innovation. This has to be done in conjunction with a change to the evaluation scoring of the tenders – so that the performance of what is procured is valued as well as the price quoted.

In some cases, more could be done by public authorities to integrate certification standards of new technologies in their procurement rules. Outdated procurement requirements constitute a significant barrier in obtaining the required approvals for initiating a project. In order to facilitate investment, public authorities need to show flexibility in adapting to these rapidly evolving technologies and show consistency in the application of standard requirements across projects.

Based on stakeholder consultation of project developers across the EU, there is a view that procurement rules need to be reformed to ensure procurement based on results becomes possible, including the lifecycle costs and benefits. Procurement should also use a two-stage process, with firstly an expression of interest asking for ideas. This could be linked to funding and allowing small scale feasibility studies to identify the most promising solutions. By selecting more than one project for this stage it encourages competition and also collaboration.

The second stage could involve selecting for the wining project 2 or 3 companies that will work with the Municipality and each other in order to optimise the outcomes from the process. The emphasis is on collaborative working so that the sector raises its innovation and skills levels not just one or two companies.

Public procurement rules should be aligned with the needs of innovative solutions. More innovative procurement allowing for more competition as well as collaboration between alternative ideas should be tried.

Inappropriate Stakeholder involvement

Lack of appropriate consultation has been identified as a considerable problem when introducing new technologies. The uptake by citizens of innovations and the way these are then used do often fail to correspond with expectations. More involvement by stakeholders can ensure a more successful result.

Lack of consultation with other relevant city departments may also cause inefficiencies and even conflicts within the administration. Stakeholder involvement should always be performed with clear objectives of reaching consensual solutions. This issue is addressed in the SCIS technical replication document (SCIS, 2017). City planning and project creation should take advantage of the benefit of co-creation approaches that, while time consuming, bring benefits in terms of uptake of innovative solutions and their impact.

Member States should promote stakeholder consultation and have public administrators take part in training to manage and run those consultations.

---

[8] See example of the School of the Future demo-site in Drammen (Norway), where technical solutions were limited due to historical value of the building www.smartcities-infosystem.eu/scis-projects/demo-sites/school-future-site-drammen

REPLICATE

Florence demo-site
Italy (2016-2021)

The stakeholder engagement process in the REPLICATE project started with the definition of the Smart City Plan developed in the FP7 STEEP framework following the "STEEP open source methodology"[9] in the three cities: San Sebastian, Florence, and Bristol. In particular, the Smart city plan has been developed and co-produced with local stakeholders in each of the cities to achieve ambitious results and to take into account all relevant actors in the fields of Energy, Mobility, ICT and Infrastructure.

The Smart City Plans will be reviewed in each city by the stakeholders to follow up the implementations and to update the Plans in terms of progress, achievements, results and new potential projects.

Stakeholder engagement plan in Florence demo-site

Novoli urban park, the biggest park in Florence, is at the very centre of the town with a mix of residential, business and industrial uses. Technological interventions include smart lightning, energy efficiency in buildings and sustainable mobility actions.

In Florence, the model chosen foresees a steering internal group playing the role of the owner of the planning procedure and interacting with several "habitat teams" formed by specific stakeholders and citizens. Every member of the internal steering group is in charge of a thematic subgroup: the subgroup leaders refer to the steering team about the results.

The communication plan to engage stakeholders and citizens was created on the basis of two primary tools (non-stop institutional communication and direct participation). Citizens have been reached through social media activities and by interacting with associations and representatives.

A public debate, the 'Maratona dell'Ascolto' (Listening Marathon), has been organised to close the development phase, while a previous one was focussed on the district where the pilot action is implemented. The event was open to anyone interested in providing feedback or receiving information and more than 130 people attended. After the 'maratona', comments and contributions have been collected and a final version of the plan has been developed and will be submitted for formal adoption.

The consistence of the interventions, timing, phases and expected results will be illustrated during on site assemblies. An in-site contact point with the tenants provided by Casa Spa in under consideration, able to give technical answers with a friendly approach.

Tenants are to be informed by the building manager together with the municipal technical staff and the university. The sustainability helpdesk office Sportello ECOEQU[8] is available for answering questions on incentives, environmental and financial benefits and at the disposal to the citizen to explore and find all the opportunity close to the need expressed.

Technological solutions that require any behavioural changes of the users 300 families will be provided with the Smart Info device to control the electric demand. A gaming app will be at disposal to increase awareness and monitor the overall energy consumption of families, trying to change consumption behaviours. The gaming app under development is designed to support the awareness of the pilot action tenants as well as to improve awareness and share good practices. A little friendly competition provided by the app will stress the impact of our choices on energy consumption and bring to a new sustainable behaviour (to be on top of the list of the "Energy Hero").

The communication with tenants/owners/other relevant stakeholders will be with building managers and associations. There is also an in-site info point and a sustainability helpdesk in charge of providing information. The communication strategy is based on two channels:

- direct contact with public assemblies and meetings;
- media information (video clips,, social media, municipal website, e-bulletin, etc.

[9] www.smartsteep.eu/deilverables
[10] http://ambientesostenibilita.comune.fi.it/SportelloEcoEquo/tematiche/energia_sostenibile.html

Financing

The local, regional and also national authorities have faced a complicated financial situation, particularly since the financial crisis hit. The problem also expands to the private sector, which has reduced investment in innovation due to higher uncertainties given the economic conditions in Europe. Compared to the US and Japan, Europe lags behind, and at a level well below the 3% of EU GDP target in research and development for 2020. Particularly weak is the private investment levels in research and development affecting medium and long-term competitiveness.

Financial and economic barriers are among the main obstacles to the implementation of projects to develop low-carbon and renewable technologies in urban areas and improve energy efficiency in buildings.

Both the financial costs and risks associated with innovative technologies are impeding access to capital, dis-incentivising project developers and all public and private stakeholders from innovating or replicating innovative solutions.

In this context, conventional energy sources often continue to be more cost-effective particularly in terms of initial capital investment, which means that without preferential access to capital, investors tend to avoid developing renewable energy projects. City authorities themselves will be tempted to procure known technologies with low capital costs ignoring the lifecycle of innovative projects and wider socio-economic benefits, be it for pilot innovation or for the replication of tested solutions.

There are three specific aspects of low-carbon technologies, renewable energy solutions and energy efficiency projects that restrict their access to capital:

- High upfront costs: The benefits from renewable energy production in addition to reducing the environmental footprint, is close to zero marginal costs of power production. The costs are concentrated in initial capital costs. In addition, sometimes adopting a renewable energy solution requires changes in the grid. Similarly, for energy efficiency, the benefits are energy savings over time. The difficulty is to cover the upfront capital costs, which tend to be higher than in the fossil sector per unit of energy produced, even if lifecycle costs ensures a positive return to investment.

- Long-payback times: Depending on the technology, the payback times may be much longer than in conventional energy systems. This is due to the higher upfront capital costs.

- Risk and perceived risks: The financial risks in the renewable sector are often higher or at least perceived riskier than in the conventional fuels sector. This is mainly due to the higher upfront costs, but also because of the innovative nature of the technologies and the lack of a skilled workforce. Financiers are often not able to evaluate in-house the proposed technologies.

- Different business models from traditional energy systems: A particular problem of attracting investors into investing and deploying for new renewable energy solutions are the business models that such investments need.

Access to capital

Access to capital or the lack thereof, is a major issue for low-carbon technology, renewable energy and energy efficiency projects. This barrier is compounded by the relatively high upfront costs of innovative low-carbon technologies projects for urban-based solutions, compared with traditional technologies, despite their often considerably lower lifecycle costs.

This has posed a serious challenge to developers, as the traditional models of procurement and lending do not fit these solutions (the first seeking lower capital costs, and the second based on returns to investment in terms of finances generated and not for costs saved).

In addition, the lack of experience and knowledge of potential clients and lenders, hamper the deployment of such solutions. Renewable power production also has the added difficulty of intermittent production and entering a highly regulated price market dominated by large power suppliers.

The following options to overcome the financing barriers are presented in the following sub sections.

PUBLIC GRANTS AND SUBSIDISED LOANS

Grants are of course the most basic and traditional of solutions, but full financing is only applicable to basic research and development. Grants may be a suboptimal system to finance demonstration or replication projects, when they require private risk sharing to allocate risks and rewards efficiently. This is the case of Horizon 2020 which has its own Smart Cities and Communities calls[11] and other calls which can be linked to Smart Cities. For replication of already demonstrated projects, there is also support by the EU through the structural funds and subsidised lending schemes, which are listed in the Covenant of Mayors quick reference guide[12]. But there are a number of additional solutions available.

---

[11] Information on Horizon 2020 can be found in the participants portal: http://ec.europa.eu/research/participants/portal/desktop/en/home.html

[12] Covenant of Mayors quick reference guide, Financing Opportunities for Local Climate and energy Actions: www.covenantofmayors.eu/IMG/pdf/Quick_Reference_Guide_-_Financing_Opportunities_updated2016.pdf

The EU offers funding through the structural funds and can be combined with EIB (European Investment Bank) debt and equity instruments. Guidelines on how to combine instruments can be found in the European Commission's 2014 document on the use of these funds.[13] In addition, for innovation and replication the EIB's and European Commission joint Innovfin programme is successfully helping research and demonstration fund the breakthrough to the market.[14]

Member States can also support innovation, but the support, especially for innovations close to becoming commercial, are subjected to state aid rules to avoid covered national subsidies. Social subsidies to tenants for energy efficiency can be introduced though. Many Member States also have national promotional banks which finance close to commercial innovative projects. These banks often collaborate with the EIB.

The policy aspects of these funds are discussed in the section reserved for EU policies, but what are the recommendations from a national and regional policy level? The first is to help local administrations to build their understanding on different financing possibilities. The European Commission runs many information events and Innovfin has an advisory hub[15] which can provide support to authorities looking for EU investment funding options. However, concerns have been raised that the advisory hub size is too modest in relation to the needs, and should provide more local and accessible training, as mentioned above.

EU funding is not the only avenue available to local authorities to fund Smart City projects and several options have been presented in the SCIS replication study[16]. However, using those options may need an active involvement of national and local administrations.

Member state and local authorities should build capacity to use the different options to combine EU grants and financial instruments, as well as combinations with national support. The EIB and European Commission's Innovfin advisory hub is a first important place to get informed.

PUBLIC SUBSIDIES BASED ON MONETISING POSITIVE SPILLOVERS

A problem in the energy sector is that the (environmental) damage produced by fossil fuels is not monetised, nor are the benefits of energy efficiency and clean energy taken into account by authorities. If the benefits to society can be valued, such as benefits to health, this can open avenues to new business models. The benefits of Energy Efficiency are well described in a European Commission report[17]. The 'Build Upon Horizon 2020' project has been exploring how to monetise the wider benefits of housing renovation which then can be used to calculate subsidies, issue certificates or rent price BPIE[19]. This makes offering policy recommendations very difficult.

There are, however, legal provisions on the rights and obligations of the tenants and owners that are more conducive to building renovation; Member States should consider adapting the legislation based on good practices to facilitate deep renovation. This would also help towards the implementation of the Energy Performance of Buildings Directive (2010/31/EU) and the future proposed Directive (COM/2016/0765 final) if adopted. The rights and obligations of tenants and owners have key influence on the ability to renovate buildings.

Member states should adapt their legislation to good practices in front-runner member states to ensure that the benefits generated by investments in energy efficiency benefit those implementing the actions. Adopting the appropriate rights and obligations of tenants and owners are key for this.

FISCAL INCENTIVES

The returns to investment in the energy sector are strongly affected by the fiscal regime. Tax incentives can be introduced to promote the adoption of renewal energy solutions and energy efficiency. These may be changes in local taxes or at a national level. Local authorities, however, often do not have fiscal competences to use such tools.

Member States should review the level distribution of competences in line with the subsidiarity principle in order to increase the adoption of smart solutions and allow the creation of tailored fiscal incentives depending in line with needs in local areas.

[13] European Commission (2014) 'Enabling synergies between European Structural and Investment Funds, Horizon 2020 and other research, innovation and competitiveness-related Union programmes", guidance for policy-makers and implementing bodies, DG Regio, Brussels. http://ec.europa.eu/regional_policy/sources/docgener/guides/synergy/synergies_en.pdf

[14] For more information on Innovfin: www.eib.org/products/blending/innovfin

[15] For information on the advisory hub: www.eib.org/products/advising/innovfin-advisory/index.htm

[16] SCIS (2017). "The making of a smart city: replication and scale-up of innovation in Europe", European Commission.

[17] European Commission (2016), "The Macroeconomic and Other Benefits of Energy Efficiency", Final Report for the European Commission: https://ec.europa.eu/energy/sites/ener/files/documents/final_report_v4_final.pdf

[18] For more information on Build Upon: http://buildupon.eu/wp-content/uploads/2016/11/Recommendations-for-Swedens-Renovation-Strategy.pdf

[19] BPIE (2016), "Boosting Building Renovation. An Overview of Good Practices – Renovation Requirements and support programs in the EU and other selected regions", November 2013, Brussels.

PUBLIC PRIVATE PARTNERSHIPS (PPPS)

The financial challenges of the public sector combined with the need to achieve climate objectives create a very difficult situation for local authorities. Solutions need to be found to develop solutions which are effective, integrated and of scale. The knowledge, technical and financial for new innovations or for replicating them is often in the hands of the private sector. Financial management skills for such projects are also not necessarily found in administrations. For the development of smart cities the need for public private partnerships (PPPs) is growing.

PPPs can provide significant benefits, but are very challenging for the public sector, especially if not accustomed and skilled to such arrangements. The European Investment Bank with the collaboration of the European Commission and the Member States has created the European PPP Expertise Centre (EPEC)[20] which can assist national and local authorities in setting up such arrangement.

PPPs are practically unavoidable to manage the needed urban transformation. Urban Funds, which were presented in the SCIS technology replication study[21] and ESCOs are already forms of PPPs. But other options are possible to provide services, maintain infrastructures or provide other public goods.

The difficulty of PPPs is that they need to be well designed to balance the private interests and the public objectives, with a risk distribution between the two that is appropriate. In case of innovations the European Commission's (2013) Business Innovation Observatory document on PPPs for Large-Scale Demonstrators and Small-Scale Testing Units is a very good reference material. This document highlights the necessary framework conditions. Many Member States administrations, as well as local administrations still need to build capacity and understanding to venture into PPPs.

Member States' and local administrations need to build the capacity to set up successful PPPs. Authorities should refer to the European PPP Expertise Centre (EPEC) to build up capacity in this area.

Regulatory environment

at national level

The regulatory environment impacts both enabling factors and barriers with regards to successful implementation of smart city projects. A regulatory environment is normally understood as the laws, rules, and regulations put in place by federal, state, or other government entities and civilian organizations to control the behaviour and actions of business activities. In this chapter, key aspects of the regulatory environment that impact Smart Cities project developments are highlighted, presenting three Lighthouse demo-sites cases to illustrate the challenges that the projects face and their solutions.

Presently, several Member States are facing difficulties due to the instability of their policy framework. The cause of this is the already mentioned risk of spiralling costs of feed in tariffs if not well designed. This has been the case in some countries, and the financial crisis led to a dramatic cut in subsidies. This has led to negative effects for many energy investments including smart city projects. The most radical cuts happened in Spain leading to billions in investment losses and difficulties in the renewables sector, as well as a large number of court cases against the state.[22]

A stable policy framework is important for the success of projects, and to attract investment in the sector. Stakeholders affected and their legal representatives consider that the changes have violated the rights of investors. While the new regimes have been approved by the European Commission as compliant to state aid rules, the mode and transition need to be designed more carefully. The European Commission is in the process of refining the directives to avoid such situations, but ultimately it is at national level that the stability and quality of the state aids regime should be ensured.

[20] www.eib.org/products/advising/epec/index.htm

[21] SCIS (2017). "The making of a smart city: replication and scale-up of innovation in Europe", European Commission.

[22] Egenhofer C., M. Alessi, J. Núñez Ferrer and A. Hassel (2016), "Why the future of European renewables policy may be decided in Washington and not in Brussels", CEPS Commentary, 13 July 2016

DIRECTION - Cartif III[23]

**Valladolid demo–site
Spain (2012 -2015)**

This project in Spain consists of setting up a very low emission building with PV panels supplying energy to the building and the grid. Controversial changes in the support schemes in Spain in 2010, 2013 and 2014, first abolished the feed in tariff and then introduced a fee to provide electricity to the grid. Over-production is no longer a revenue generating option.

As the buildings have no energy storage capacity, it was necessary to install regulators on the panels in order to limit electricity production, which means losing energy. An attempt has been made to divert some of the extra energy to other uses, such as making sure in advance that the building will not overheat during the summer. Nevertheless, the viability of the project has been affected negatively.

Another case of problematic changes in the regulatory Framework that has affected one of the SCIS projects is the case of the cut in renewable energy subsidies and housing policy in the UK, affecting the REPLICATE project.

Member states should offer a stable regulatory framework to attract investments for renewable energy solutions and energy efficiency. Reforms should ensure non disruptive transitions to new regimes.

REPLICATE[24]

**Bristol demo-site
UK (2016-2021)**

Regulatory framework – challenges and solutions

There were a number of unexpected changes to renewable energy subsidies and housing policy taken in the UK after the project launched in February 2016. The UK government has announced to cut small scale solar panels subsidy by 65%.[25] This impacted on projects linked to the REPLICATE Project in Bristol and particularly affected the business case on which the original district heating scheme was based.

There were two additional significant policy changes that have made the original district heating proposal no longer viable:

Reduction in rent revenue - a reduction in rent revenue from the Council's social housing meaning that there is significantly less funds available to convert housing blocks from electric heating to a 'wet' system. This work was required for the original project proposal.

The Welfare Reform and Work Act 2016 imposed an obligation on social landlords to reduce rents by 1% per year from April 2016 for a four year period. Previously the Council had a very different rent settlement from government of 10 years of increases based on the Consumer Price Index (CPI) plus 1% each year from April 2015.[26]

In summary, the Council was budgeting for 10 years of rent **increases** and then shortly after this changed to 4 years of rent **decreases**. The result of this was a significant negative impact on the Council's Housing Business Plan and as a consequence the developers had to undertake a major review to perform the necessary cuts to expenditure.

---

[23] This Spanish demo site is located in the centre of Spain. This demo site is a very low energy building that integrates different strategies and solutions for energy saving, therefore improving the overall energy efficiency.

[24] The REPLICATE project has the aim to generate smart city business models, and tailor-made solutions in the areas of energy, transport and ICT. There will be pilot actions in energy efficiency, efficient and sustainable transport and integrated infrastructures.

[25] Changes to renewables subsidies in the UK https://www.gov.uk/government/news/changes-to-renewables-subsidies

[26] Rent reductions – supporting implementation www.housing.org.uk/resource-library/browse/rent-reductions-supporting-implementation

4. SMART CITY POLICY ASPECTS AT EU LEVEL

An array of programmes and financial instruments are available at EU level for cities and communities that wish to move towards more sustainable low-carbon scenarios and develop and adopt innovative technologies. These have been mentioned in the *'Access to capital'* section. In addition to Horizon 2020, European Structural and Investment (ESI) Funds, Cohesion Policy, the EU's Competitiveness and Innovation Funds (CIF), COSME and to some extent the Connecting Europe Facility (CEF) can be combined to support the development of smart cities.

In addition, the EU is also expanding the set of financial instruments, which can complement EU budget and attract private investment and a large investment tool, the European Fund for Strategic Investments (EFSI) has entered the scene.

However, the combination of different sources of funding is very complex and can create a multiplication of bureaucratic processes and multiple auditing as analysed in ample detail in High Level Group on simplification by the European Commission[27] and the challenges of innovations attempting to use ESI Funds are well exemplified by Dutch local authorities[28]. In addition the use of the Cohesion Funds has become increasingly complex with regulations and guidelines increasing threefold in volume[29]. Unfortunately, the mid Term Review of the Multiannual Financial Framework (MFF) by the Commission aiming to simplify the implementation of the budget does not appear yet to provide a simple framework.[30]

One of the key recommendations for the European Commission would be to continue the streamlining of all financial sources and increase their coherence, as the multiple challenges facing Europe require efficiency.

It is not only about Smart Cities, but for the increasing need to develop circular economy solutions and reduce the environmental footprint. This means the interlinkage between all economic sectors and infrastructures. No longer can projects be financed in silos.

Besides supporting the scaling up of projects, a strong push for synergy between EU financing programmes is needed to:

1. secure the financial sustainability of projects, intended as a pre-requisite for their scalability;

2. promote the engagement of private investors in areas and sectors affected by a shortage of specialized fixed capital formation.

Over recent years, the Commission has moved important steps towards clearing up the rationale for linkages and synergies between different funding sources[31] but presently the focus has been mainly axed on the interplay between ESI Funds and Horizon 2020 programmes with little or missing attention to other relevant programmes and instruments.

---

[27] HLG (2016a), Cross-cutting audit issues, 3rd meeting of the High-Level Expert Group on monitoring simplification for beneficiaries of ESI funds, 30/01/2017.

[28] Interprovinciaal Overleg (2015), "Dutch Provinces for better EU regulation", The Hague.

[29] Rossbacher, J. (2016), "Panel 3: 'Further simplification of Cohesion Policy and the future perspectives', presentation at the Slovak Presidency – EU Cohesion Policy Conference on Past Evidence, Current Experience and Future Perspectives, 15 September, Bratislava (https://www.vicepremier.gov.sk/wp-content/uploads/2016/10/RossbacherSK-PRES-Conference.pptx) last accessed 3 September 2017.

[30] See Núñez Ferrer J. (2017), "New financial rules applicable to the general budget of the European Union – Impact on Local and Regional Authorities", Report for the COTER Commission, Committee of the Regions. http://cor.europa.eu/en/documentation/studies/Documents/New-Financial-Rules.pdf

[31] See for instance European Commission (2014), Enabling synergies between European Structural and Investment Funds, Horizon 2020, and other research, innovation and competitiveness-related Union programmes – Guidance for policy-makers and implementing bodies, Directorate-General for Regional and Urban policy and European Commission (2016), EU Funds working together for jobs and growth – Synergies between the R&I Framework Programmes and the European Structural & Investment Funds, Directorate-General for Research and Innovation.

Strengthening 'Smart' policy

coherence for EU-backed projects

The study of the European Parliament on "Mapping Smart Cities in Europe"[32] confirms that there is generally an alignment between the objectives of most Smart City developments and EU climate policy and sustainable growth and employment goals.

With the ongoing programming period, the European Commission has introduced a great deal of novelties which are also impacting the smart city process. The 'Common Provisions' Regulation No. 1303/2013 for the MFF 2014-2020[33] has moved in the direction of promoting integrated strategies at local, regional and national level, based on a closer coordination between cohesion policy, research and development, rural and urban development, maritime & fisheries funds.

Furthermore, the 11 thematic objectives identified in the Common Provisions Regulation to feed the structural and investment funds strategy programmes have many elements which can support the inclusion of smart cities elements within regional strategies. The European Regional Development Fund (ERDF) Regulations also opens the way for a stronger role for cities as a prism to drive integration within the programming of cohesion policy. According to Art. 7, par 1 of ERDF Regulation in fact, the fund is meant to support sustainable urban development by means of integrated strategies that tackle the economic, environmental, climate and social challenges of the functional urban areas. This can define a double tier integration: from the one hand EU resources are to be allocated with an integrated approach that looks at the multiple challenges facing the targeted area; on the other hand, EU-backed projects in urban areas must be integrated into the broader objectives.

Nevertheless, the potential of Smart City initiatives and the rationale of the integrated approach at the urban level do not seem to have permeated into the national and strategies put forward by Member States. Even though the identification of such strategies remains a responsibility of national and regional authorities, there is still room for the EU to exert a certain degree of influence and support the emergence of urban development strategies based on the Smart City rationale. After all, without the full involvement of cities, the energy and climate goals cannot be achieved.

Reinforcing the Horizon 2020

programme and its synergies

with other EU policies

A number of recommendations from SCIS project developers have been submitted to us with recommendations to the European Commission:

Horizon 2020 and procurement processes could be tendering for more open questions in which a problem at district level is presented opening the call for various alternative solutions.

More specific calls for the studies on the use of public private partnerships are needed. They are crucial for the demonstration and deployment of innovations, but there is still a lot of uncertainty on how to address these partnerships in the area of innovation and replication.

There has been some concern that in the last two calls of the H2020 Smart Cities, there has been a miss-match between the expected impact and the foreseen actions. Originally, the programme was an energy programme, but has during the last two calls been moved to cover cross-cutting themes in addition to hardware implementations (e.g. refurbishment) and more on ICT systems. This is a positive

---

[32] See European Parliament (2014), Mapping Smart Cities in the EU, Study – Directorate General for Internal Polcies.

[33] See Regulation (EU) No 1303/2013 of 17 December 2013 available at http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32013R1303&from=EN.

development, but the expected impacts are still on greenhouse gas emissions and energy use. Further calls need to have a more realistic match between the foreseen actions and what these can achieve in terms of impact, also to understand what is expected from the wider aspects of the project. A concern was expressed that the expectation that projects integrate many wider non-technical aspects may not lead always to value creation in all cases. Non-technical aspects, such as social aspects and stakeholder engagement, often differ by location. Technologies are by definition neutral, incorporating local social aspects in a technology will not necessary it more adapt for deployment in other regions. The same technology can be used differently with local approaches at deployment

However, in opposition to the technology neutrality point just raised, some project developers did consider that more recognition of the social dimension is needed in future Smart Cities projects. The projects may have a deep impact in the everyday life of citizens, which today is only marginally recognised. Technology solutions may lead to unexpected outcomes of social exclusion, due to costs, complexity of the technology, etc. Long term success requires a serious recognition. It is also clear that this is relevant in the demonstration stages, but it has nevertheless to be clear that what is true for one demonstration site may not be true for other sites.

Heavy bureaucratic processes of EU Horizon 2020 projects have been raised as a concern by project developers, with too much focus on process and less on the actual reaching of results. Uncertainty in research and innovation does not fit strict the timetables of regular reporting and risk averse and rigid rules.

The increasing focus on payback figures has been criticised, because long payback times in first of a kind innovations are a frequent result and are expected to fall, if the technology is replicated. The figures may be misinterpreted and discouraging the deployment of innovations. A high cost demonstration site does not mean the technologies tested will not develop into marketable solutions. Without acknowledging this, there will not be sufficient investment that goes beyond existing state of the art.

Previous calls on smart cities do not recognise the organisational complexity of integrated projects. While the integrated approach drives cities to create a collaborative environment in order to achieve success, these processes are time-consuming and have an element of trial and error, which often collides with the very rigid time plan set in the calls. This is something that should be improved to allow demonstrations to be implemented in a more flexible

and realistic way. This also allows a more flexible way of choosing components. It is important to note that even during a project's implementation some technologies used as components may have evolved.

Projects need a robust monitoring protocol that should include clear specifications for planning, installation and operation phases of the monitoring system. This includes providing a consistent and reliable set of Key Performance Indicators (KPIs) that will allow assessment of the performance of projects (i.e. buildings and energy systems), together with the means to obtain the data required to perform the measurement. Define approaches (e.g. estimation procedures for missing and erroneous recorded data) to solve missing or inaccurate data. It is important to reach a common understanding on the definition and calculation method for the KPIs. SCIS together with projects such as Citykeys seeks to ensure common standards are used.

The Horizon 2020 Smart City projects of the future should strenghten their focus on solving large scale problems at district and city level using new business models such as PPPs.

Care has to be taken to have a good balance between technical and non technical requirements and the wider objectives beyond energy and greenhouse gas emission reductions of the projects.

Expectations on the projects have to be in line with the inherent characteristics of research and development, such as their complexity, their often weak returns to investment, unexpected complications during implementation.

The development of a robust monitoring protocol and consistent and reliable Key Performance Indicators are essential to assess projects.