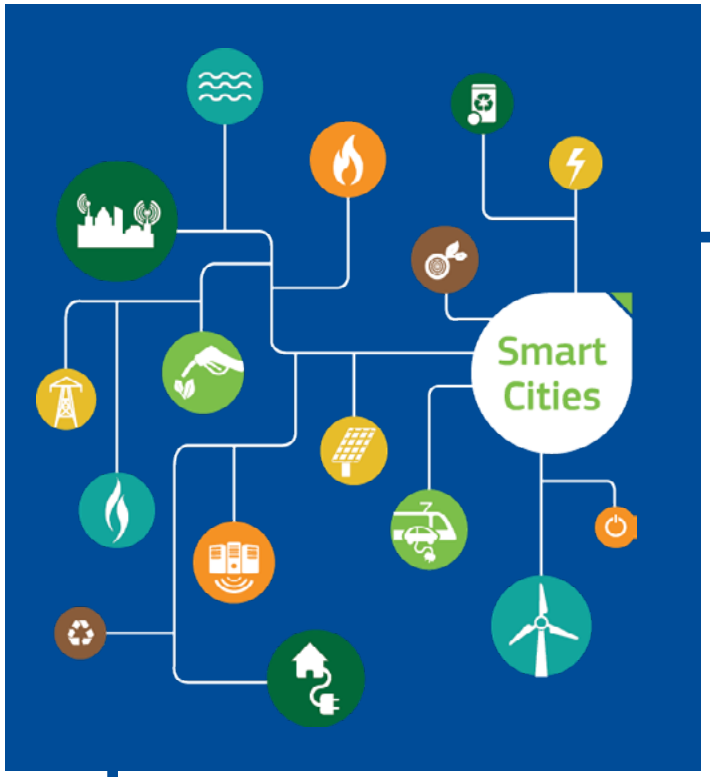
EU Smart Cities Information System

SCIS Smart Cities Information System | February 2020

FROM IDEA TO IMPLEMENTATION
SOLUTION BOOKLET

EU Smart Cities Information System



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WHAT IS THE SMART CITIES INFORMATION SYSTEM?

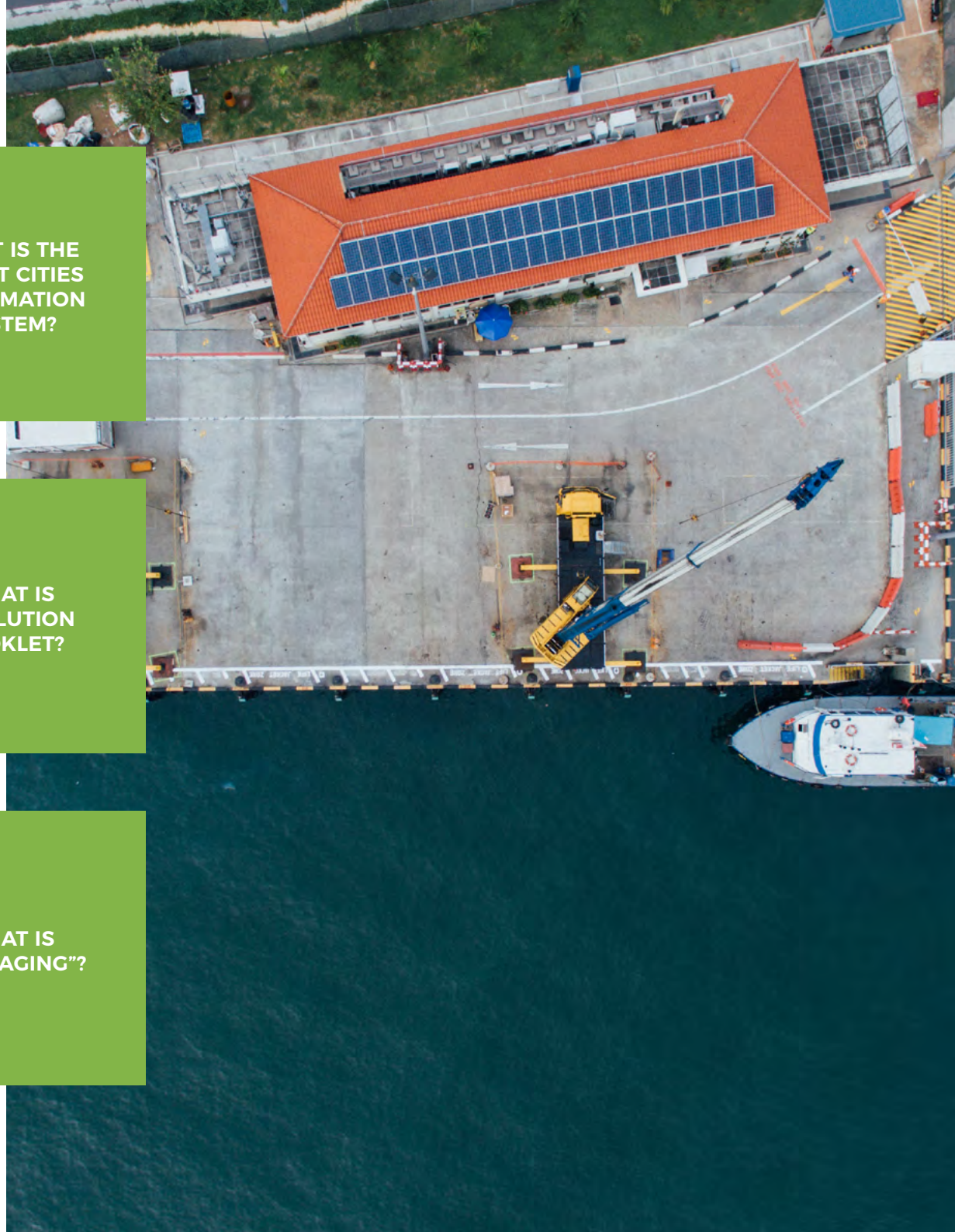
The Smart Cities Information System (SCIS) brings together project developers, cities, institutions, industry and experts from across Europe to exchange data, experience, know-how and to collaborate on the creation of Smart Cities and an energy-efficient urban environment.

WHAT IS A SOLUTION BOOKLET?

A Solution Booklet is a summary of the management framework, primarily written for cities. It seeks to reduce the effort, speed up the process, strengthen quality and confidence in outputs, align across disciplines, and generally prepare a city to engage the market to acquire a solution.

WHAT IS “PACKAGING”?

‘Packaging’ addresses the societal needs, technical solutions, business models and financing for a measure – and offers ways to put these in the particular context of the city/ cities in question. It is supported by a growing number of templates to speed up and make consistent the resulting output.



WHAT & WHY

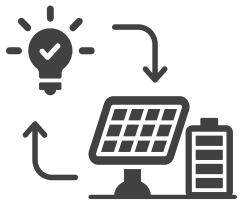
WHAT & WHY

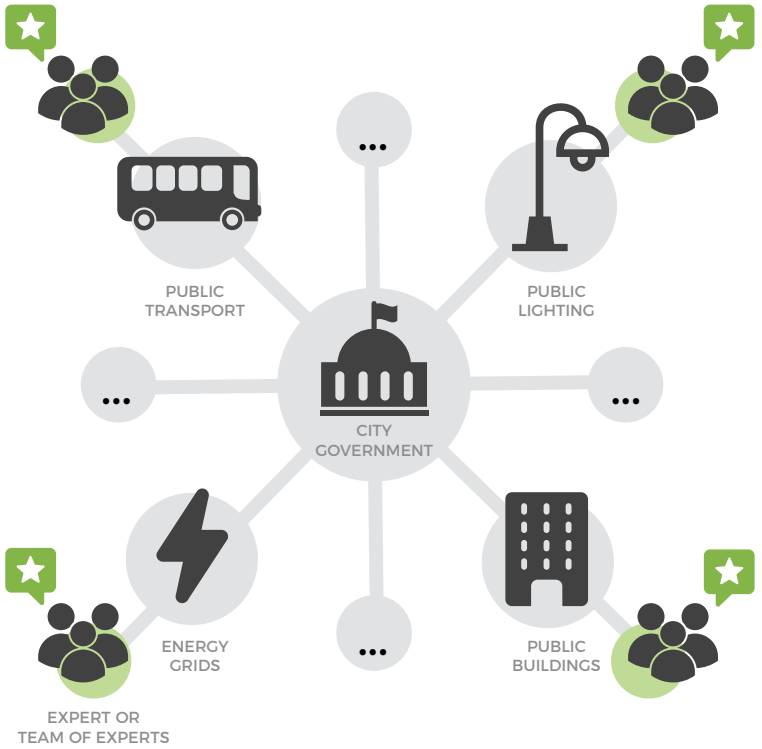
Cities and regions provide an agreeable and functional living environment and include a multitude of public services like public lighting, maintenance and renovation of public buildings, maintenance and expansion of the energy grids, public transport, ...

Updates and upgrades to the infrastructure and the services are needed because of new technological solutions or new insights in social science, environmental effects of urban design, ...

Besides that periodic renewal cycle, the currently ongoing energy transition with its ambitions to **climate neutrality** entails a massive need for **rethinking and reinventing established structures and solutions.**

An increasing pressure on the public administration is hence an expected consequence. It is thus very important for governments to be able to smoothly **go through the cycle of renewal and innovation.**





For each of these adaptations and improvements, a city or region has an expert or a team of experts who is in charge.

This person or team is responsible for **the maintenance, the collaboration with suppliers as well as communication and interaction with the inhabitants**. Additionally, their task includes to keep an eye on the market for **new and emerging technologies and the evaluation or even preparation of the implementation of these technologies.**

Specific expertise on tendering might be required when innovative concepts are offered by a limited number of suppliers or when co-designing the innovative systems with private partners potentially offering the innovation.

Besides these content-related challenges, a governmental administration is a professional environment for which new insights on collaboration and project management are published regularly and a city needs to stay up to date with the modern standards. This means **motivating its co-workers to challenge their way of working and trying new methods on a regular basis.**


Optimizer
The Planner
travelling together
2. PROBLEMS / PAINS
Which problems do you solve
There could be more than one
eg. existing solar solutions for
a good investment (1).
TOO MANY POINTS FOR COMPARISON
TOO MANY TABS
Hard to coordinate
CITY CONTEXT

CITY CONTEXT

The context in which a governmental city administration works, changes regularly. It's not easy to **stay up to speed** and especially not in a political climate where **budget cuts** are common. All these issues combined make an employee of a city administration or other governmental organisation often:

- swamped with work to keep up with everyday concerns;

- not aware of new technological options;

- need to collaborate with other teams on different aspects of a project, in a strictly vertically organised structure.

Sufficient **financial resources** are not always available and the employee is not aware of the **options for financing or funding**.

The citizen is often not happy with experiments and changes in his direct neighbourhood (the not in my backyard mindset).

In this text, a lot of peer-to-peer advice from other cities and regional administriation can be grouped and shared. This advice is focused on smart energy projects but **can be applied to a much wider variety of city development projects.**

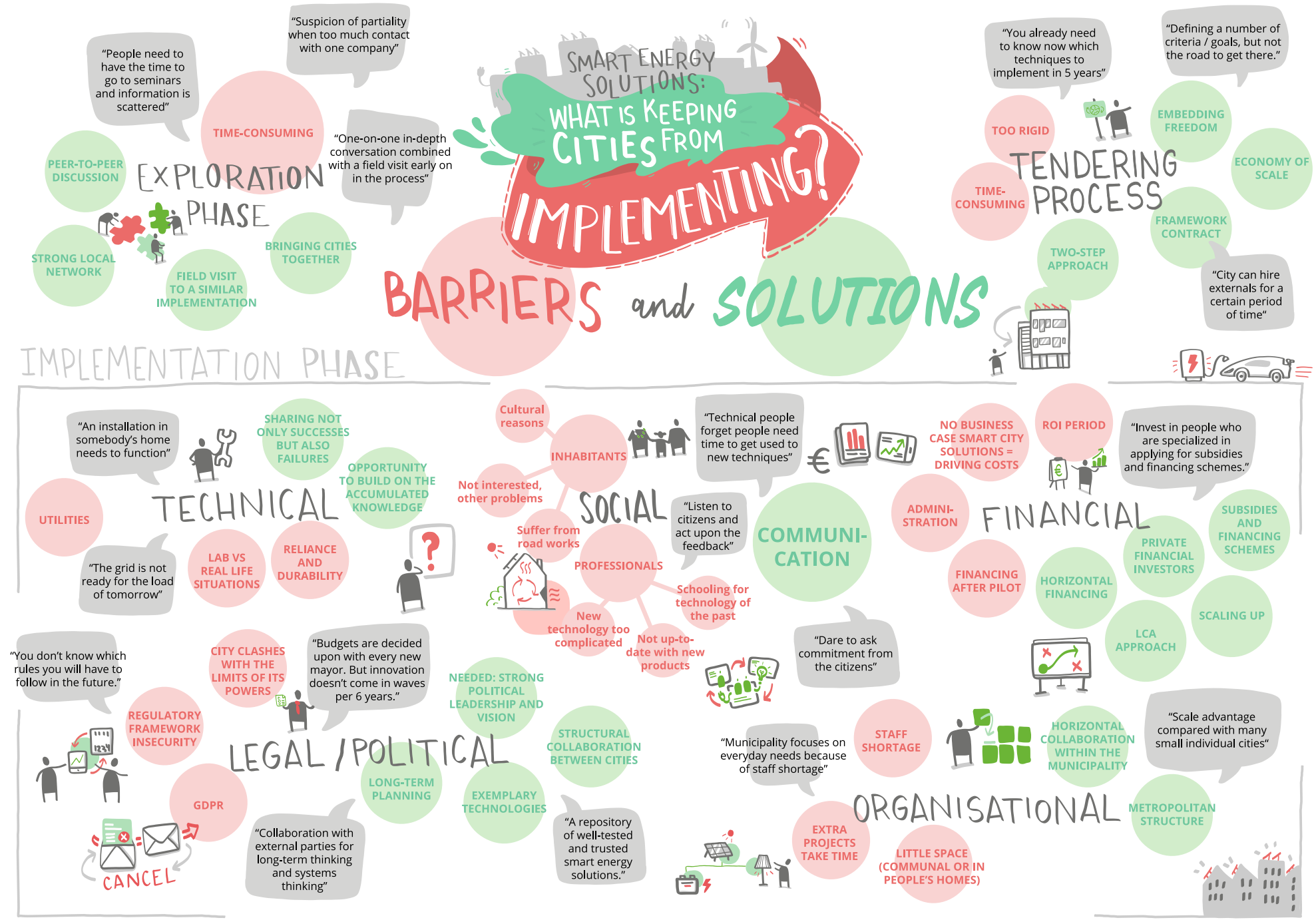
The advice is grouped according to the different types of barriers in a smart energy project – like technical, financial and regulatory barriers. It aims at giving hands-on advice to other administrations to overcome barriers and turning their (smart energy) projects into successful journeys.

Barriers in a smart energy project:

- **Social**
- **Technical**
- **Organisational**
- **Financial**
- **Regulatory**
- **Legal**
- **Political**

OrganiCity is a service for experimentation, which explores how citizens, businesses and city authorities can work together to create digital solutions to urban challenges.

Visual summary of Smart Energy Barriers made by Th!nk E for City-zen project in 2019:



SOCIETAL & USER ASPECTS

SOCIETAL & USER ASPECTS

Stakeholder Support

A first challenge is to get everyone on board for the acceptance and implementation of a project. Among the stakeholders are citizens, local businesses, technology providers, project developers operating in your city, public service operators like a DSO but also internally the personnel and colleagues within the city administration.

Some of the social barriers encountered in smart energy project development, are:

- **Citizens are afraid of the change** arising from the innovative projects. This results in **unwillingness to accept the city's decision, intolerance for trials and even lawsuits** to stop experiments (for instance: "**this smart street lighting experiment set-up is ugly and I don't accept it in my street**")

- **Cultural differences and sensitivities** can cause extra barriers that are unexpected for the people working in the administration (for instance: cooking on a gas stove is considered as a cultural important element for some cultures, removing gas connections is therefore a very sensitive topic).

- Up-scaling of projects transforms a city while **not all citizens are interested in city development.** This resistance to change is often related to local and personnel circumstances.
  Convincing these people to join and support a city development project, needs different incentives.

- City development projects cause nuisance when this means road works, building envelope refurbishment etc.
- Citizens are **unfamiliar with new technological products and concepts** and need time to get acquainted with them and trust them. (for instance: "a heat pump heats your house in a different operating regime compared to gas heating"). Or they do not trust themselves in using them – worried to break something – and do not use them.
- Not all employees in administration (or politicians) see the reason to change old habits or systems and structures, while it is really important that **all city employees are convinced and tell one story** to the outside world.
- Many installers of energy solutions are **not aware of the recent technological developments.**
- People implementing innovative technologies indicate having **trouble to find insurance.**

Many of the barriers from **citizens and city employees** are caused by **information asymmetry regarding the need for an energy transition.** Many citizens are not enough aware of the needs and challenges and how important they are for future-proof city life.

Therefore the key message to reduce these social barriers, is **COMMUNICATION**:

- **Involve and inform citizens** (and colleagues) from the initiation phase onwards.
- **Listen to the citizens,** actively use the feedback received.
- **Co-creation leads to ownership** - if citizens co-own (not in the literal sense) the interventions / measures implemented, the willingness to use them and accept them higher. This way, citizens can become more in charge of their own rights too.
- **Use attractive presentations** to explain very briefly what will happen, why, what is required from the citizens and what is the benefit for them.
- **Organize interaction moments on locations close to the citizens** or meet the inhabitants applying **a door-to-door-strategy.**
- **Use the urban structures and associations** that are in close contact with the citizens (especially for vulnerable people).
- Make sure city administration brings one **unique message towards the citizens**.
- In case of cultural barrier, **invest in project co-workers** who know the language and the culture.
- Involve the citizens through their **children and schools and intergenerational learning** (pester power).
- In case there is an innovation cell within the city administration, these colleagues should always keep in mind to **promote the innovative solutions** to the colleagues from other departments in an attractive and easily understandable manner. The easy way forward is business as usual: make the innovative solution worth the extra effort.

Companies with an office or plant in the city can be encouraged to invest in smart energy solutions by **collective initiatives** set up by the city or provincial government.

Higher level governments should make sure that (future) professionals are **trained for the installation of the techniques and products of the future.**

Citizen engagement

Citizens are the experts of their own neighbourhood. Therefore, it is decisive to involve them in city development projects from the outset. The main trigger in order to get citizen engagement is to put the decisions and initiatives in their own hands.

This could be by:

Giving them the tools for detecting or objectivising difficulties and hurdles.

Listening to their feedback and suggestions, co-creating where this is a feasible strategy.

Opening up project development zones for any interested citizen through a local contest.

Acting upon the best suggestions.

TECHNICAL BOTTLENECKS

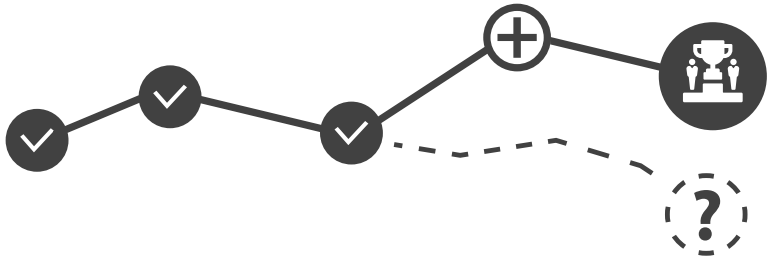
TECHNICAL BOTTLENECKS

Another challenge in the implementation of smart energy projects are the technical bottlenecks or challenges.

These challenges can appear in different ways. Sometimes the challenge is with the **product** or **process** to be implemented itself, but more often the challenge is with the **integration of the new product or process in the existing process, environment, interaction with people**. Depending on the type of challenge, another approach for overcoming it is needed.

The switch **from lab to real life** situations can cause difficulties:

- When a certain technology is already fully developed, but **the market is not ready** yet or the integration in the market is still limited.
- In a lab environment or a pilot project, it's tolerable that installations need to be tweaked or adapted and that they **break down** sometimes. In a roll-out to a big group outside of the experimental setting, this is not accepted. **Techniques and technologies need to be refined to a much higher level in order to become implementable and replicable.**

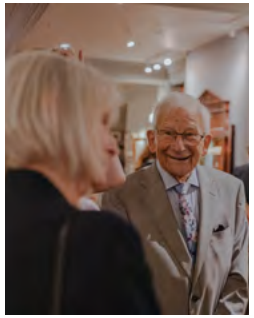


Projects bridging the gap from lab to real life, an **extra step in the implementation** process should be foreseen, i.e. a pre-field test to ensure stability and reliability. Integrating new innovative solutions before broad uptake in the market require additional resources from the implementing administration, but often **subsidising schemes** are available for administrations who take up this role.

Also in the move from lab to real life situation, the use of the new solution seems to be a hurdle. To an engineer or developer a **certain solution may seem easy or logical, but when implementing in a real life situation like social housing, the operation does not seem to be that straightforward.**

INNOVATION COMMUNICATION

This hurdle is very easily solved by communicating and interacting more with the citizens and inhabitants, but better is **prevention** of such misunderstanding. This can be done by **involving a wider variety of profiles in the project in an early stage.** Preventing this kind of challenges in the implementation of a project contributes to a better perception and a greater satisfaction.



Governments struggle with the **uncertainty on historically installed energy infrastructure and hence the overview of infrastructure needs** associated with the energy transition:

- Often the **asset management and implementation overviews are incomplete and not up-to-date.** So the question which extra underground pipes or cables can be added often stays unanswered until the works have started and it can be checked in real life. This brings an enormous **uncertainty and inevitable delays** to projects.

- The same problem goes for private domains – the **feasibility study of new installations** (like borehole fields) can only be done when the old building is taken down. Here too, **uncertainty and extra time** are the consequence.

Preventing this barrier is hard. Maintaining a **good relationship with as many local partners as possible substantially enlarges the circle of information sources**, but still, some data is just not available.

There are a couple of focus points / areas in order to **maximise the potential for implementation and replication** to other districts within the city or even to other cities. There are a couple of focus areas to take into account in any innovation implementation:

1. **Using standardised dimensions, products, components and communication protocols** make implementation and replication much easier.
2. The importance of **sharing not only successes but also failures.** Sharing barriers, mistakes and technical difficulties with other parties at the start of their project process gives them the opportunity to build on the accumulated knowledge and avoid making the same mistakes and hence wasting resources.
3. In the exploration phase of a city development project, it is imperative that the city employees have **easy access to trusted guidance and information**. Key is a strong local embedded ecosystem – with the grid operator, universities, neighbouring cities, …
   Such locally embedded ecosystem widens the potential sources of information.
4. The interviewed cities strongly recommend their colleagues in other cities to join or even set-up **peer-to-peer discussion** with neighbouring or resembling city administrations who have already made similar investments as the ones planned.
   To have an **in-depth conversation** about the investments gives a major head start regarding possible barriers and opportunities.
5. Although it may seem that the specificities of different cities prevents a good comparison, it is not. When taking a some distance from the details, **many issues are similar.** For exactly this reason a one-on-one in-depth conversation combined with a **field visit early on** in the process is the formula that is recommended mostly by the interviewed cities.

BUSINESS MODELS & FINANCE

BUSINESS MODELS & FINANCE

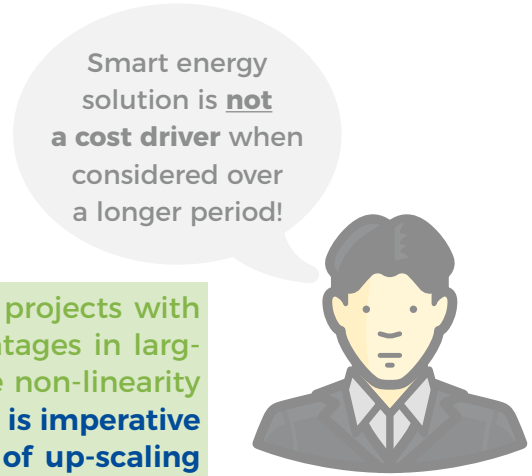
Description – possible business models

The main financial barrier for the implementation of smart energy solutions is simply that they are more expensive than standard solutions. This is not only for the purchase and installation cost but often includes a more labour-intensive maintenance when it concerns first of a kind technologies and concepts. This is why opting for new technologies often implies the business case to be less interesting at first sight.

The financial advantages are often on a **longer term** (for instance when the initial investment is higher, but the recurrent costs over the lifetime are lower) or they could be an **advantage for another party** (for instance a social housing company invests in smart energy solutions and the tenant has the advantage of a lower energy bill in the years following the investment).

When one needs to convince investors or other parties within the **city administration** to choose for the – initially – more expensive option, it is highly recommended to use the Total Cost of Ownership (TCO) to show that opting for a **smart energy solution is not a cost driver when considering a longer period.**

The energy transition further shifts the decision basis from merely financial to a combination financial criteria and climate-impact related performance. Broader assessment frames include among other the Life Cycle Assessment (LCA) approach.

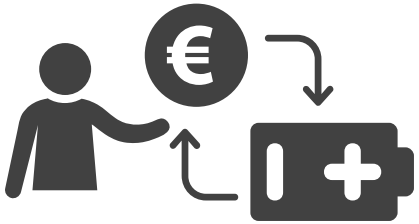


The focus in many cities is on pilot projects with a small scale. There are often advantages in larger scale implementations due to the non-linearity between price and number of size. **It is imperative to evaluate the the pros and cons of up-scaling to see what the economy of scale means for the project concerned.**

In many cities, the financing structure for projects is vertically structured in silos. This means that each team receives their (yearly) budgets and plans projects accordingly. This silo-thinking and working makes financing of cross-departmental projects difficult.

Horizontal financing of innovation projects can be a solution here, making it evident to collaborate and share budgets across different administrative cells.

Similar to the previous challenge, is the tendency to **spread development and implementation work over time.** For instance when three different types of projects need to be done in one street over the course of a couple of years. Considerable time and resource savings could be achieved, combined with a lesser impact on the neighbourhood, in case different departments and governmental organisations **group the works.** This combining of works also is the perfect way of making sure that not only the low-hanging fruit is chosen, but that the less financially viable investments with **long-term benefits** are done as well.



People working for cities sometimes **lack the financial background** to make and present business plans to convince investors, making them more **dependant on often slow and demanding subsidy programs.**

Expert knowledge about funding and financing options, combined with a sound network of private investors interested to be involved in **innovative investment programs** - banks, investemnt funds, rolling funds - could make a difference between concept and effective implementation. It hence pays off to invest in people who are specialised in these financing schemes and options. This expertise and network needs to be accessible to various departments within the city administration.

Use methodologies like **TCO (Total Cost of Ownership)** and **LCA (Life Cycle Assessment)** to highlight the advantages of the preferred option in the long run.

De-risking the investment project is another decisively important recommendation for making the smart energy city development project attractive to private investors.


GOVERNANCE
& REGULATION

GOVERNANCE & REGULATION

Encouraging innovation

A city-wide definition of climate sustainability goals with a measurable translation to each domain provides every co-worker in the administration a clear goal and a guideline when defining projects. This way, the challenge of vision alignment between city departments is avoided.

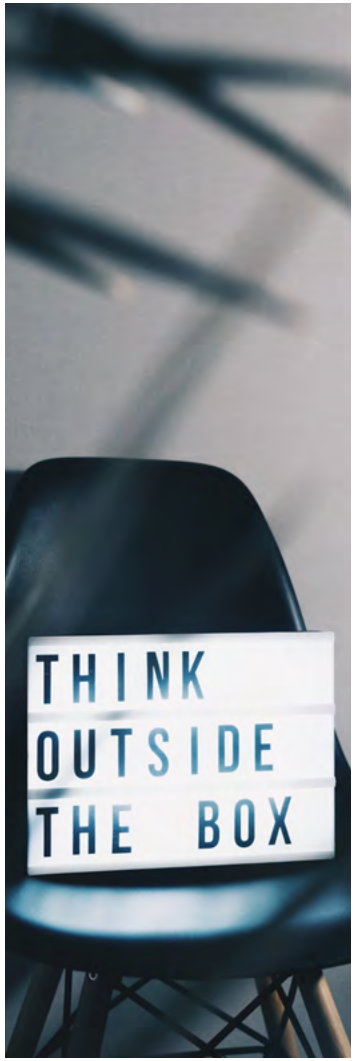
Communication between city departments or entities of a city is very important for **sharing information** about innovative solutions and **the importance of implementing them**.

In the interviewed cities, the information gathered by a certain team – for instance the innovation cell – does not always make it to the right people in another team. Moreover, not everybody working in the administration is as keen on innovation, change and the implementation of new technologies.

The advantage of several larger cities is the availability of a strategic / innovation team and aligned administrations for the different policy domains.

If the different co-workers and teams within the administration do not share information and insights on a regular basis, new techniques or concepts are not always known to the department that chooses the projects to be launched and that sends out the tenders.

For these reasons, an important point of attention is **horizontal collaboration** within the municipality. One innovation cell, or a collaboration of colleagues from different cells, can develop an energy vision with a high level of support within the city. Physically working in the same space on a regular basis improves the collaboration and like-mindedness of the different cells within the administration significantly. In addition, a **structurally embedded collaboration between different cells** makes synergy more likely and **cross-sectional projects** more feasible to succeed.



Colleagues from an innovation cell should always keep in mind to promote the innovative solutions to the colleagues from other departments in an attractive and easily understandable manner. The easy way forward is business as usual, **make your solution worth the extra effort.**

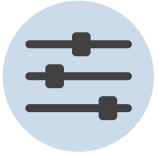
When a procurement exercise launched, a tender must be sent out. The rigidity of the tendering process for a new project tends to be an **impediment for innovation.** The party sending out a tender should be quite precise, often requiring a lot of information upfront. In a traditional tendering format, the degrees of freedom one can build in are rather limited.

One of the main challenges is **embedding as much freedom as possible regarding technologies.** In what follows, the creative solutions of the interviewed cities are listed:

1. **Define a number of criteria / goals, but not the road to get there.** In case of innovation this could mean stating explicitly that you are looking for innovative solutions (for instance X% of the energy must be renewable, without specifying how).
2. Acquire **external knowledge through a framework contract** in which the city can hire externals for a certain period or even more flexibly call upon them for small questions / assignments.
3. **Allow for variation** in the method of tendering according to the need.
4. **Follow a two-step approach**: first sending out of marketplace tender specifically focusing on innovation and next selecting the best suggestions for implementation tenders.
5. **Target economies of scale** through joint procurement with a number of cities.

Defined criteria / goals

External knowledge



Variation according to the need

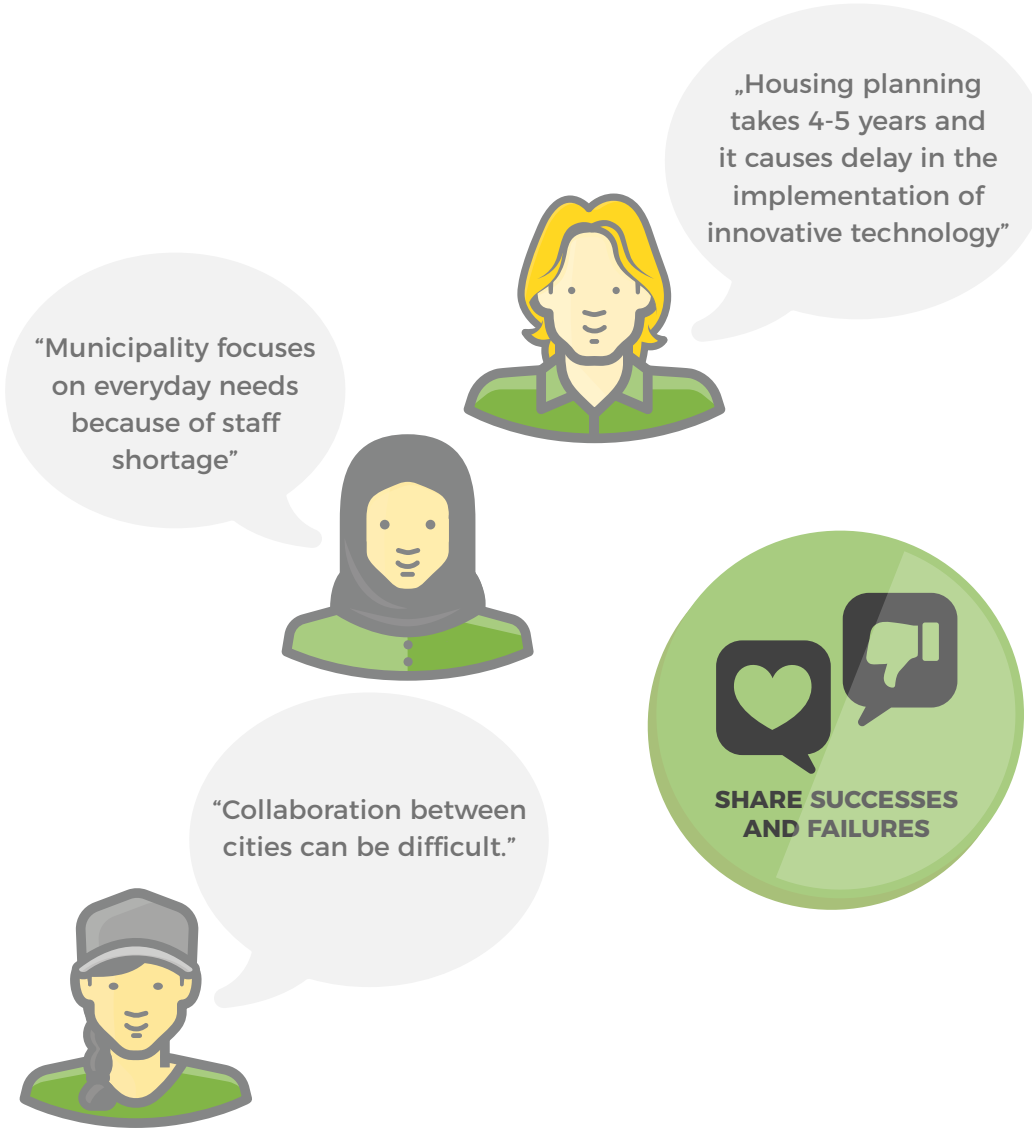
Two-step approach

Economies of scale

If the city is big enough, it is interesting to establish a **linked organisation focusing on innovation or sustainability.** Since the organisation is no governmental or public organisation itself, there is much more freedom in questioning the market, tendering and research. Moreover, such an organisation operates independently of political cycles and can thus focus more on long term thinking and structure thinking.

Towards the end of a project, it is an interesting lesson learned for both the city itself and other cities to distil some **tangible learning outcomes.**

Living Lab of Th!nk E - company focusing on smart energy solutions



Legal and political aspects

Regarding the political challenges cities encounter, the message among most of the interviewed cities was similar: there is a need for strong political leadership and vision, with the courage to choose a direction for going forward.

The political cycle of elections and legislatures determine the cycle of defining a vision and long-term plan. This can cause a barrier in project development for several reasons:

- People **wait with investing** until the government chooses a specific technology to put forward and support.
- At city level, budgets are decided upon with every new mayor (for instance: elections every 6 years). The **total budget of a city council is limited** and a vague budget item like budget reserved for innovative projects is easily cut. So there is often a lack of budget for innovative opportunities that arise.
- Upcoming elections can make it **difficult for politicians to make courageous decisions in fear of making unpopular decisions.**
- The duration of a project from idea to implementation easily takes up to 4-5 years. This often collides with a change of political leadership, creating the **risk of being dropped** as political statement.

What can help in this regard, is:

- Collaboration with and support from **strong leaders** within the city's administration and senior management that is not influenced by the election cycles.
- Collaboration with external parties for **long-term thinking.**
- A repository of **well-tested and trusted** smart energy solutions.
- **A structural collaboration framework** between different cities.

The competition between political parties and politicians can block collaboration between departments within a local authority, and even more between cities in a region. As a result, the administration in a city can be **blocked to replicate a promising innovation developed in a neighbouring city because of political tensions.**

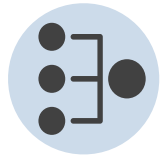
Once the administrations are **structurally linked,** the difference in political preference of the political leaders is not a hinderance anymore for a fruitful **exchange across administrations.**

And a metropolitan structure or other structural collaboration between different cities can create substantial added value on another level as well. As mentioned above, it can help **to overcome political barriers**, but it also provides a **scale advantage** compared with many small individual cities. Apart from that, **regular communication** and **visits between cities** have proven to enable a better understanding of what works and does not.

strong leaders

long-term thinking

trusted solutions



structured collaboration

GENERAL LESSONS LEARNED

GENERAL LESSONS LEARNED

The major barriers to the implementation and replication of a smart energy project are:

1. the **rigidity and time-consumption** (thus price) of the tendering procedures governments have to follow;
2. the big step **from pilot to up-scaled implementation:** from technical experimentation to flawless operation, from free-wheeling in a regulatory sandbox to compliance with all applicable regulation, from motivated volunteers to arbitrarily chosen tenants;
3. the political **lack of courage to choose the way forward** (including e.g. which technologies to support as government);
4. the **price difference between the innovative solution and the traditional solution** – making it hard for a politician with a limited budget to choose for the more expensive option;
5. the **staff shortage** in lots of cities – forcing them to focus on everyday needs.

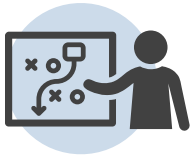
The best solutions used by the interviewed cities and regions are:

1. To find a neighbouring or similar city that implemented the same technology, have an **in-depth discussion** with them and go on a **field visit early on** in the project process;
2. **To communicate with the citizens** to understand their concerns and feedback and act upon that feedback. Make the citizens feel heard;
3. To enable more horizontal collaboration with the city, combined with **cross-departmental budgets for cross-departmental innovation projects;**
4. To use of long term **private investments** for the financing of city development projects with a guaranteed but longer ROI period.

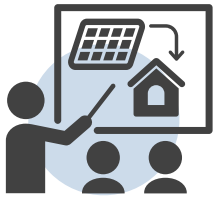
Some suggestions by the interviewees, directed to politicians and other governmental levels, are:

1. Appointing a higher level government of profiles who keep an **inventory of the innovations** being prepared or implemented in the different cities and who bring together cities for **peer-to-peer discussions;**
2. Allowing for **more flexibility** in the tendering process, following examples of pioneering projects;
3. Speeding up **legislatory adaptations** at national or regional level based on interactions with cities and using their findings;
4. Setting up structural inter-city collaboration allowing the city administrations to collaborate **independent of the political preference** and allowing for some **economy of scale;**
5. Adapting curriculum's for high schools faster to **teach the students of today to work with the technologies and installations of the future;**
6. Broadening the framework for **determining the ROI** of different city development solutions – taking into account other costs / savings (like health care, …).

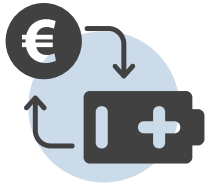
projects' inventory



tendering flexibility



innovation education



ROI framework

USEFUL DOCUMENTS

USEFUL DOCUMENTS

- City-zen - Lessons from international research
- Smart energy solutions: what is keeping cities from implementing?
- Why may replication (not) be happening - Recommendations on EU R&I and regulatory policies
- Organicity Playbook
  How to launch Experimentation as a Service in your city
- CITY-zen
- STORY
- ROLECS Roll Out of Local Energy Communities
- MUSE GRIDS

Smart City Guidance Package

The Smart City Guidance Package (SCGP) helps to plan and implement smart city and low energy district projects in an integrated way by describing common situations and giving real-life examples. It bundles the generously shared experiences and expertise of cities, businesses, citizens, research institutes and Non-Governmental Organisations (NGOs) that work together in the European Innovation Partnership Smart Cities and Communities (EIP-SCC).

Across the world, many cities and urban stakeholders have the ambition to create sustainable cities, adjusted to the era of digitalization, which are pleasant to live in. The wealth of urban data, the increased connectivity of urban objects through the Internet-of-Things (IoT) and advanced ICT, energy and mobility technologies, have opened new avenues for the application of smart solutions and the transition to clean energy and mobility systems in cities. Cities are looking into this potential, experimenting in living labs and applying smart technologies in ambitious integrated projects, such as the Horizon2020 SCC-01 lighthouse projects..

However, our current approaches to the integrated planning and management of smart city and low energy district projects are not sufficiently taking into account the full life-cycle of planned investments in the built environment, and the entire community influenced by them. This requires a genuine long-term perspective beyond the political cycle at the heart of any smart city or low energy district strategy, more inclusive participatory and consultation processes, novel business models and better collaboration within and across traditional policy and administrative boundaries. If these conditions are not in place,projects might be difficult to prepare and implement, underperforming in terms of reduction of CO_2 and energy use, or not valued by end-users.

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READ THE FULL DOCUMENT HERE

CONTRIBUTIONS:

EU Smart Cities Information System

SCIS

The Smart Cities Information System (SCIS) is a knowledge platform to exchange data, experience and know-how and to collaborate on the creation of Smart Cities, providing a high quality of life for its citizens in a clean, energy efficient and climate friendly urban environment. SCIS brings together project developers, cities, research institutions, industry, experts and citizens from across Europe.

SCIS focuses on people and their stories – bringing to life best practices and lessons learned from smart projects. Through storytelling, SCIS portrays the "human element" of changing cities. It restores qualitative depth to inspire replication and, of course, to spread the knowledge of smart ideas and technologies - not only to a scientific community, but also to the broad public!

smartcities-infosystem.eu

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