CEPPI

ENERGY INNOVATION PROCUREMENT

A GUIDE FOR CITY AUTHORITIES

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Energy innovation procurement
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Publisher
ICLEI – Local Governments for Sustainability, European Secretariat

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Design
EMGE DESIGN GbR

Acknowledgements
This publication has been produced as part of the CEPPI project, which has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 649720.

Preface

The CEPPI project (coordinated energy-related PPI actions for cities) aimed to demonstrate how European cities can achieve better energy-related outcomes through the strategic use of public procurement. Five cities of different sizes and cultures – Birmingham (UK), Budapest (Hungary), Wroclaw (Poland), Castellón and Valencia (Spain) - participated in the project, which provided them with action-learning support to adopt, and where necessary adapt, public procurement of innovation (PPI) methodologies in forthcoming tenders.

By enabling such practical interventions, the project was very much a **'Living Lab'** in that it provided evidence of what can be achieved and the existing barriers. In all cases, the participating cities attempted to intervene in particular tenders where there was potential scope for innovative energy solutions. In some cases, they also highlighted energy 'hot-spots' and attempted to make the economic case for future tenders. The lessons learned and methodologies therefore have wide relevance to City authorities across Europe and are summarised in the complementary **CEPPI Case Study Report**.

One of the key findings from the project is that pro-innovation procurement is difficult to achieve in any public administration unless the **'Framework Conditions'** are both supportive and influence operational practice. For example, does the City authority have a clear requirement, such as climate targets, to reduce energy consumption in the city and/or to increase the use of renewable energy? If so, is it sufficiently embedded to influence operational and investment behaviour? Through project experience, it became clear that a methodology was needed to provide City authorities with direction on how to improve the framework conditions for energy-related innovation.

This Guide therefore commences with the methodology that was created, and applied, within the CEPPI project known as the **'Flexible Framework for Energy Innovation Procurement'.** It provides a multi-level approach for ambitious City authorities that wish to achieve transformational energy outcomes across the city.

Executive summary

Three quarters of global energy use can be accounted for by Cities, making Cities key players in the energy transition that is underway. We are moving from fossil fuels to renewable energy sources and shifting from the internal combustion engine to zero emission vehicles. This transition is driven by a combination of low carbon, air quality and economic policies. Innovators in the public and private sector are responding to the challenge by adopting new solutions and taking action across the energy spectrum from generation to end use.

Whilst often overlooked, Procurement is a key tool in driving innovation. By adopting, demonstrating and disseminating procurement practices and processes that encourage innovation, City authorities can help to create an innovation eco-system and achieve better energy outcomes across the City.

This Guide provides practical tools, information and insights from the CEPPI project to help City Authorities take positive action in enabling innovation in support of the energy transition.

It shows how to create the conditions for energy innovation in the city authority and wider city eco-system, and provides methods for identifying and planning specific actions to bring about change. The guide then demonstrates approaches to enable and support supply chain innovation in the procurement process. It concludes with supporting information referencing demand pull mechanisms and financial and technology innovation.

PREPARE - CREATING THE CONDITIONS FOR INNOVATION

The Flexible Framework for Energy Innovation Procurement was developed within the CEPPI Living Lab to address the need for City Authorities to prepare and create the framework conditions for Energy Innovation Procurement (EIP). It provides a practical organisational development tool for City Authorities to support them in taking a positive and progressive role in energy transition. The framework can help your City Authority to progress from a focus on internal operations and energy efficiency, to embracing your role as a leader for the energy transition and market transformation.

The Flexible Framework has five levels of achievement in terms of energy transition, innovation and procurement. The aim is for your City Authority to progress through these levels in a way and at a pace that is suitable for you. Each level creates a firm foundation for the next step.

Level 1: Foundation: Operational Energy Efficiency - Allows Innovation
Level 2: Developing: Energy Hot Spots and Renewable Energy – Encourages Innovation
Level 3: Embedding: Embedded Energy – Demands Innovation
Level 4: Expanding: Influences City Energy Choices – Drives Innovation
Level 5: Inspiring: Strategic Energy Management - Transforms the Market for Energy Innovation

Assessment of your organisation's EIP Level is made against five categories of indicators, reflecting the necessary framework conditions for EIP. Questions relating to each indicator are asked, prompting the city authority to assess where they are in terms of energy innovation. These categories are:

Vision and leadership – creates a firm foundation for EIP
Policy and targets – how EIP is enacted in the organisation
Roles and responsibility – everyone knows the part they need to play
Capacity and capability - making sure that the right people have the right skills and resources
Procurement practice – procurement is aligned with vision and policy, and underpinned by skills and responsibilities.

The Flexible Framework can be used to bring into focus specific actions that will drive the process. Action plans should ideally contain the scope of your activities and the targets set, together with any political commitment made by your authority. It should also include a description of stakeholders and their assigned responsibilities, and relevant progress indicators with a time frame.

PLAN – NEEDS IDENTIFICATION AND PLANNING

Without knowledge of where energy is being used within a city it is difficult to start prioritising actions with any degree of certainty. An important first step is therefore to identify what information you already hold on energy use within your city and, if necessary, develop your understanding. Your city authority will have most influence with the energy it uses directly.

Once the energy hotspot areas are identified you should then investigate if there are any planned procurements for these areas. A starting point for this is to engage with those responsible for procurement in the relevant areas of energy use. This may be a centralised procurement department in your city authority or a dedicated procurement department for a municipal owned/controlled company. Your planners will also be aware of major private sector projects. If there are procurements being planned then consideration should be given to interventions aimed at improving energy outcomes.

In addition to looking for opportunities to use procurement based on the energy hotspot identified, it can also be useful to consider a wider range of planned procurements. By systematically identifying and analysing procurement plans, potential areas where it may be possible to influence energy use can be identified.

Consider developing a plan to summarise the required actions for better understanding of city energy use, the hotspots of energy use and the potential procurement opportunities that could be used to achieve better energy outcomes. Include activities to:

- Investigate energy consumption hotspots
- Identify, prepare and influence procurement opportunities
- Assess finance for investment
- Evaluate the wider driving and enabling role of the city authority

ACT – PROCUREMENT INTERVENTIONS

Making simple changes to what might be called the 'regular' procurement process can trigger innovation. These changes include demanding goods and services that are not already in the market, or not available in the form or at the price point that is acceptable. This can also allow new and emerging technologies to compete on a level playing field with established goods and services.

Innovation and pro-innovation procurement - the principles

Innovation is risky: There has to be a clear reason to innovate, but if we keep buying the same goods and services there is no market for innovation.

Understand the supplier's perspective on innovation: Creating a credible demand is the key task of pro-innovation procurement. It is this new demand that drives innovation

Innovation takes time: It is important that customers communicate their needs early and allow time for suppliers to innovate.

Pro-innovation procurement practices

Suppliers are highly creative when given the opportunity, particularly when they need to retain or gain market share. Pro-innovation procurement means undertaking the procurement cycle in a way that unlocks the creativity and innovation potential of suppliers to deliver better and cost effective outcomes.

This means changing the way you think about procurement and changing the way procurement is perceived in the organisation, i.e. as a strategic rather than a back room function.

A parallel case study report from the CEPPI project shows how preparing, planning and acting can be undertaken, including the barriers and potential solutions that cities face when starting their journey towards the goal of strategically using innovation to transform energy systems.

Energy transition: the need for innovation

The world has embarked on an irreversible transition in the way we generate, distribute and use energy. There are powerful forces driving this transition including climate change, urbanisation, pollution, energy security, information systems, technology, poverty and new economic opportunities. These will have far reaching impacts on the energy system and beyond.

We are entering a new world of energy. The expected growth of low carbon and decentralised generation means the electricity system will need to change[1].

The old energy system is being recognised as unsustainable. It is using polluting fuels to generate energy inefficiently and expensively in central power stations. These use a costly distribution system that cannot yet support the introduction of new clean technologies such as electric cars. It is widely appreciated that the future lies with clean, highly distributed renewable energy generation, smart energy management and integrated energy storage, combined with more focussed energy efficiency at the point of use. These changes have consequences for the way we live and work that are not easy to predict or manage.

ENERGY TRANSITION AND CITIES

Cities are not simply observers in this transition. Currently they account for three quarters of the energy the world uses[2] and with increasing urbanisation will account for even more in future[3]. As Cities become bigger and more complex, energy issues can no longer be treated in isolation. According to the World Business Council for Sustainable Development (2018):

> **"the city of 2030 will need to comprehend and manage a much more complex set of interdependencies between diverse aspects of city operations, infrastructure, platforms, and priority issues such as health, mobility, sustainability, and economic development. This requires new networks for collaboration between cities, utilities and other energy sector players, as well as transportation providers, building owners, telecommunication companies and technology suppliers."**

[1] Future Energy Scenarios in five minutes, National Grid, July 2018
[2] Energy in Cities, Arup 2015
[3] Urbanisation in China is projected to rise from 50% today to 70% by 2025 https://www.weforum.org/agenda/2016/08/can-cities-handle-an-electric-car-boom/

Changing the energy system will have profound impacts on the City and society. A 2015 study[4] found that nearly 11% of the EU's population are not able to adequately heat their homes at an affordable cost. Simply getting enough remotely generated energy into cities via an aging grid has become difficult and expensive[5]. This is encouraging distributed energy generation within the city and improvements in energy efficiency at the point of use.

Up to 65% of generation capacity could be local by 2050[6].

City Authorities therefore have no choice but to engage in this transition or risk making cities worse places to live for many sections of the population. Proactive management on the part of cities has many benefits. The World Health Organization (WHO) estimates that 1 out of 9 deaths worldwide are due to air pollution. Improved local air quality will mean healthier populations and lower healthcare costs. More robust energy security will mean less exposure to risks of future energy price rises and supply failure. Improved energy efficiency of building stock will help reduce costs for organisations and address fuel poverty of citizens. A cleaner and greener City will also contribute to attracting future talent to support economic growth[7].

ENERGY EFFICIENCY AND BEYOND

The energy focus for most public sector organisations has, to date, largely concerned energy efficiency, delivering both cost and carbon savings benefits, and the adoption, where possible economically, of renewable energy. For the most part this approach treats energy as a commodity, with cost being the decisive factor. However, the new energy systems coming into place are more agile and diverse than their larger, more uniform predecessors and reveal a wider range of costs and benefits. As scale becomes less important, all players require speed of change and the ability to develop new partnerships.

Energy efficiency gains, for example, can have wider benefits to the energy ecosystem than simple cost savings to the user. The benefits, however, are fragmented. They can include health and societal gains, energy resilience and security, reduced infrastructure investments and reducing demand so that renewable energy generation capacity is sufficient to supplant fossil fuel generation. The fragmented nature of these benefits make investments that treat energy as a commodity based on a simple cost benefit analysis[8] inadequate. The difficulty is compounded by the rapid pace of change in technical, financial and societal dimensions. Managing this complex landscape is proving difficult for the national and EU level market regulators when many of the impacts are felt locally. This is very apparent in cities.

Action on heat, power and transport is essential and needs to gather pace in the 2020s to meet carbon reduction targets. A mix of low carbon heating and power solutions and increased energy efficiency is needed[9].

A clear problem for city authorities is that only a small fraction of city energy use is directly under their control. Nevertheless, the city authority can act as a leader in the areas it controls. A city can gain many benefits by encouraging the development of new technologies and pioneering innovative business models to develop new energy ecosystems. Street lighting and traffic management are obvious areas of practical focus. However, to affect the much larger city wide energy system the city authority must use its convening power and policy levers to create the framework conditions that allow far reaching partnerships with other players.

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[4] Energy poverty and vulnerable consumers in the energy sector across the EU: analysis of policies and measures, INSIGHT_E, 2015
[5] Power Trends - New York's evolving Electric Grid 2017. New York's fleet of power plants has an average age of 36 years. Over 80% of New York's high-voltage transmission lines went into service before 1980. Since 2008 energy supplied by the grid has decreased while energy supplied from distributed sources (e.g. solar) has increased
[6] Source United Kingdom National Grid, 2018
[7] https://ccbriefing.corporate-citizenship.com/2017/04/13/air-pollution-business-concern/
[8] One method is Levelised cost of electricity (LCOE), also known as Levelised Energy Cost (LEC). It is the net present value of the unit-cost of electricity over the lifetime of a generating asset and is often taken as a proxy for the average price that the generating asset must receive in a market to break even over its lifetime.
[9] Source United Kingdom National Grid, 2018

WHY INNOVATION FOR ENERGY SAVING?

Energy infrastructure has long lifetimes and once created it is hard to change. Today, across the developed world, energy infrastructure is both old and requires major expansion. This together with new societal challenges and new technical options, has created a once in a lifetime opportunity to change the energy system for the better. New energy systems offer the potential not only for more efficient use and lower cost of energy, but for pollution reductions and a fairer, more inclusive society. Conversely making the wrong choices, for example retaining old energy generation and wasteful energy use, can lock out the potential benefits for decades to come. Not innovating will be costly for the public purse, citizens and society. We must embrace energy innovation and guide it towards good societal outcomes. This will require new approaches in the way city authorities think about energy, innovation and procurement and positive action to be taken.

> **"It is in cities that [...] decentralised renewable energy production will take off and smart buildings in energy positive neighbourhoods will be constructed. This research and innovation agenda will create a pathway to channel existing funding commitments around research and innovation and develop a new research pipeline that will mobilize resources and knowledge generation for cities."**
> *Maroš Šefčovič (Vice President of the European Commission)*

CREATING THE CONDITIONS FOR INNOVATION

Innovation for social and environmental good doesn't just 'happen'. Society needs to intervene where the market alone fails to deliver what society needs and where new goods and services that are needed do not reach the market. City authorities therefore need to create the conditions where innovation can happen and suppliers have a commercial justification to innovate by creating a demand pull. The most well-known demand pull mechanisms are legislative or fiscal, or involve standards or regulation (see Box 1 for other demand pull mechanisms). Historically public procurement has been less recognised as a tool to drive innovation.

BOX 1: Demand pull mechanisms for the energy transition

1. Demanding regulation and legislation, for example:
- Zero Emission Zones and other vehicle restrictions
- Building regulations for energy efficiency
- Planning controls on energy supply for new buildings
- Rental controls on energy efficiency

2. Progressive standards, for example:
- Energy efficiency standards for vehicles and buildings

3. Fiscal demand supporting measures, for example:
- Differential tax rates
- VAT reductions / exemptions
- Subsidies and incentives
- Scrapping premium
- Feed-in tariffs

4. Other demand supporting measures, for example:
- Mandatory eco-labelling schemes
- Voluntary eco-labelling schemes
- Energy labelling schemes
- Green public procurement - GPP
- Emission trading schemes (tradable rights to emit greenhouse gasses)
- White/green certificates - certification on use
- Voluntary certification (charter, EMAS, ISO)
- Awareness/information campaigns

Adapted from source: DG Environment[10]

CEPPI closely explored pro-innovation procurement. Pro-innovation procurement requires undertaking part or all of the procurement process, in a way that encourages and enables suppliers to invest in and deliver innovative goods and services, that better meet the organisation's needs.

[10] Directorate General Environment, The Potential of Market Pull Instruments for Promoting Innovation in Environmental Characteristics Final Report, February 2009

It involves adopting a mix of different tools and methods that fit the situation and procurement at hand to deliver the best possible outcomes in the short to medium term. CEPPI explored in detail the process of pro-innovation procurement from needs identification to tendering and through to contract management.

In complex ecosystems and high risk sectors, like energy and transport, one of the key lessons from CEPPI was that pro- innovation procurement works best when other demand pull mechanisms are also in play. In addition to Box 1, Chapter 4 provides examples of the type of supporting mechanisms cities are putting in place, such as low emission zones, as well as highlighting technology and financial innovation options.

All these demand pull mechanisms operate in the same way. By introducing a credible societal demand that was not previously expressed, they change market conditions. This new demand drives innovation and supply chain investment towards the needs of society.

THE ROLE OF CITY AUTHORITIES

The challenges appearing before society require City Authorities and other public bodies to adopt new roles. Providing public services at the lowest possible cost is no longer adequate. Instead cities must develop the skills and capacity to manage change and innovation in the complex integrated energy systems that are evolving. Procurement is one of the most important tools for supporting and driving innovation. The procurement problem for cities mirrors the complexity of the new energy systems. All these demand pull mechanisms operate in the same way. By introducing a credible societal demand that was not previously expressed, they change market conditions. This new demand drives innovation and supply chain investment towards the needs of society. We can imagine a spectrum of responses ranging from simple improvements in operational energy use, to bringing together consortia, to address the citywide issues of energy generation distribution and use throughout the City Ecosystem.

Given that most public organisations are not set-up to innovate, business as usual will not deliver the necessary energy transition and enable innovation. It will take leadership, progressive policies and an organisational shift, including changes in procurement practices and processes. This will require new approaches in how City Authorities think about energy, innovation and procurement and positive action needs to be taken. The Flexible Framework described in Chapter 1 of this guide provides a tool to help enable this shift.

> **"Castellón City Council works on a global strategy to promote energy efficiency and increase renewable energy. We are convinced that from the public sphere we must lead the actions that serve as an example of a change towards a more sustainable model and committed to the environment."**
> *Amparo Marco Gual (Mayoress of Castellón)*

The timing and rate of this energy transition are subject to many uncertainties but it is clear that cities face strategic choices that will affect their competitiveness. Cities staying ahead of the curve will benefit from healthier populations, energy security, higher inward investment and more resilient economies. Those that fail to anticipate the changes will suffer and become relatively less attractive.

THE ROLE OF PROCUREMENT: CREATING A CREDIBLE DEMAND

Public procurement of innovation is becoming a cornerstone of innovation policy[11]. This is part of the move towards more demand based innovation policy, mentioned above.

> **"Innovation procurement opens the door to higher quality and more efficient solutions that value environmental and social benefits, better cost-effectiveness; and new business opportunities for enterprises."**
> *European Commission (2018)[12]*

[11] Georghiou, Luke & Edler, Jakob & Uyarra, Elvira & Yeow, Jillian. (2014). Policy instruments for public procurement of innovation: Choice, design and assessment. Technological Forecasting and Social Change. 86. 1–12. 10.1016/j.techfore.2013.09.018.
[12] European Commission, 2018, Guidance on Innovation Procurement: https://ec.europa.eu/docsroom/documents/29261

Procurement of innovative products and services can make public services more effective and more efficient, and encourage users of the services in society to become more innovative and creative. Public demand for innovation incentivises industry to invest in new ideas and research. City authorities can be influencers in this process by introducing a credible demand into the market.

A key finding of the CEPPI living labs was that putting in place the framework conditions for encouraging innovation is a vital precursor for enabling pro-innovation procurement. Successful pro-innovation procurement for energy transition requires that these framework conditions are in place.

BOX 2: Changing framework conditions in Birmingham

The need to address the use of older diesel vehicles for transporting children from home to school had been re-visited several times over a number of years by Birmingham City Council. This led to some changes in logistics planning but no significant progress being made. A shift in the framework conditions has now enabled action to be taken, including:

- a new green transport policy put in place,
- greater recognition of the problems of air pollution and the impact on children's health,
- the prospect of low emission zones,
- introduction of air pollution fines,
- increased awareness about innovation procurement and access to coaching,
- innovation highlighted as a theme in the new commissioning strategy.

Together these factors opened the door for a new approach to deliver 'people centred, low-emission home to school transport'.

This guide therefore introduces the concept of **'Energy Innovation Procurement (EIP)'** that goes beyond simply adjusting procurement practices to be more pro-innovation.

Energy Innovation Procurement involves creating the framework conditions necessary for energy transition as well as undertaking the procurement process itself in a way that stimulates the supply chain to innovate to meet the unmet needs of an organisation.

When considering the use of procurement to encourage support and enable innovation we need to keep in mind that the role of public procurement is to purchase, at the best price possible, the goods and services an organisation needs to perform its function, at the best price possible. In other words procurement exists to fulfill the needs of the organisation and does not operate in isolation within your organisation.

> **"The use of innovation procurement must accommodate the raison d'être of procurement, which is that a public organisation purchases goods and services that it needs to perform its function."**
> *Georghiou et al (2014)*

It is not possible for procurers to act contrary to the policy framework or organisational directives in which they operate; nor should they. Consequently, in order to fully engage with innovation procurement, public organisations need to have in place policies and procedures that are not only open to innovation, but ambitions that actively require innovation. In other words, a policy framework requiring innovation is a key framework condition for EIP.

The flip side of this is that the purchase of goods and services to meet the needs of the organisation should support the organisation's policy and vision. Yet, often procurement prioritises financial best value and fails to deliver innovative goods and services to meet the strategic policy ambitions and climate targets of your City Authority.

"To stimulate demand and enable innovations to be adopted, new approaches to the way goods and services are procured is required. Not only that, in order to mobilise procurement in this way the right policies, practices and capabilities need to be in place."
Gaynor Whyles (JERA Consulting)

In addition, know-how and skills may not be sufficiently developed to undertake energy innovation procurement. These need to be developed and built upon if procurement is to fulfil its strategic potential. Solutions to the energy problems are possible. Innovation can occur across all parts of the city energy system and can involve both technical innovation and innovative ways of financing the use of solutions by the public and private sector (i.e. financial innovation). However the conditions have to be right for this to happen.

Working with different public sector organisations in the CEPPI Living Lab we can distinguish a spectrum of energy policies; from being 'energy efficient' through to 'leading an energy transition'. The more ambitious an organisation, the more likely innovation will be needed, and the more likely they will need to adopt pro-innovation procurement processes. At one end of the spectrum, EIP may involve simply removing barriers to innovation, and at the other, driving market transformation.

ENERGY INNOVATION PROCUREMENT: A GUIDE FOR CITY AUTHORITIES

This guide provides practical tools, information and insights from the CEPPI project to help city authorities take positive action in enabling innovation in support of energy transition. It suggests how to:

- prepare and create the conditions for energy innovation in the city authority and wider city eco-system;
- plan specific actions to bring about change;
- act to enable and support supply chain innovation in the procurement approach; and
- discover how to get the most from innovation approaches by reviewing demand pull mechanisms, financial resources and technological options

Figure 1 shows the structure of the Guide and how it can be used. The content of the Guide is supplemented by a series of supporting documents and training materials:

CEPPI Pro-Innovation Slide Pack – a series of webinars sharing pro-innovation tools and practices
CEPPI Case Study Report - provides a report of the CEPPI ,living-lab experiment, methodologies and captures learning.

These resources can be found on the CEPPI website[13].

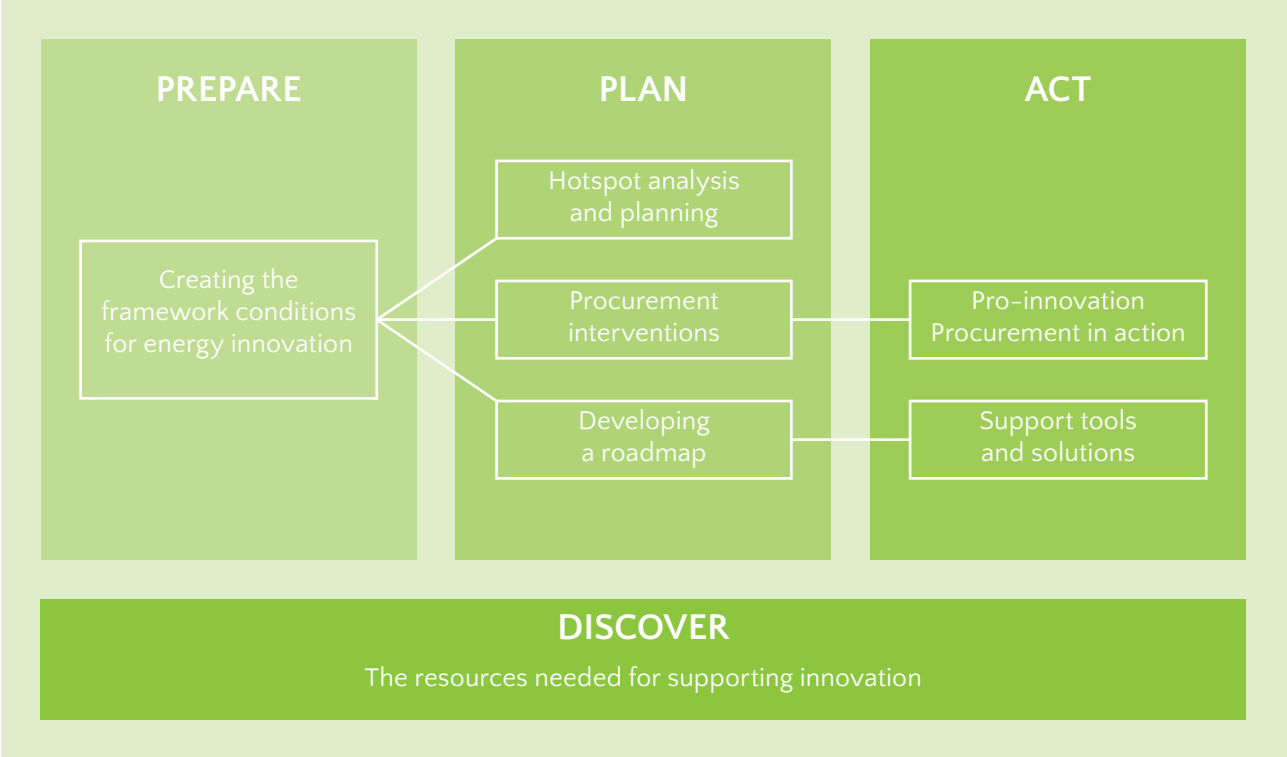

Figure 1: CEPPI Guide structure and flow

The next chapter of this guide outlines the preparation phase for enabling energy innovation.

[13] http://www.ceppi.eu/guidance-learning/

Chapter 1:
Prepare – Creating the conditions for innovation

The previous section underlined the importance of innovation for energy transition and how favourable framework conditions within a city authority are crucial if procurement is to play a part in driving innovation. This section focuses on the how a city authority should begin the journey towards being a transforming actor in the energy set-up of their city by adopting the CEPPI Flexible Framework for EIP. The section is structured according to the assessment, planning and review cycle of the Flexible Framework, showing how the tool can be used for each phase of the cycle for creating and improving the conditions for innovation.

CEPPI FLEXIBLE FRAMEWORK

The Flexible Framework for EIP was developed within the CEPPI Living Lab to address the need for City Authorities to create the framework conditions for EIP[14]. It provides a practical organisational development tool for City Authorities to support them in taking a positive and progressive role in energy transition. The framework can help your City Authority to progress from a focus on internal operations and energy efficiency and enabling innovation, to embracing their role as leaders for energy transition and market transformation.

It is a practical organisational development tool designed to help city authorities put in place the necessary framework conditions for energy innovation procurement and create a roadmap to progressively develop their energy transition and market transformation potential. It provides a framework for a systematic assessment of your current position and stimulates the creation of an action plan, against which progress can be monitored.

The Flexible Framework assessment, plan and review cycle creates momentum for your City Authority to progressively develop. As Figure 2 shows, the Flexible Framework creates a virtuous circle of improvement. As each city authority will have different procedures and structures, as well as different levels of experience, the framework should be seen as providing flexible guidance rather than as a prescriptive model. Self-assessment and target setting, for example, could happen at least partly in parallel.

[14] The CEPPI Flexible Framework was inspired by and based upon the Flexible Framework developed by Sustainable Procurement Limited (http://www.sustainableprocurement.eu.com) and the Scottish Government Flexible Framework Assessment Tool (https://www.gov.scot/Resource/0042/00421301.xls)

Figure 2: The Flexible Framework cycle

The next sections of this chapter go into detail about how the Flexible Framework can be used for each of these steps.

LEVELLING UP YOUR ENERGY INNOVATION: SELF-ASSESSMENT WITH THE FLEXIBLE FRAMEWORK

The Framework has five levels of achievement in terms of energy transition, innovation and procurement, as shown in Figure 3. The aim is for City Authorities to progress through these levels in a way, and at a pace, that is suitable for them. Each level creates a firm foundation for, and anticipates, the next step.

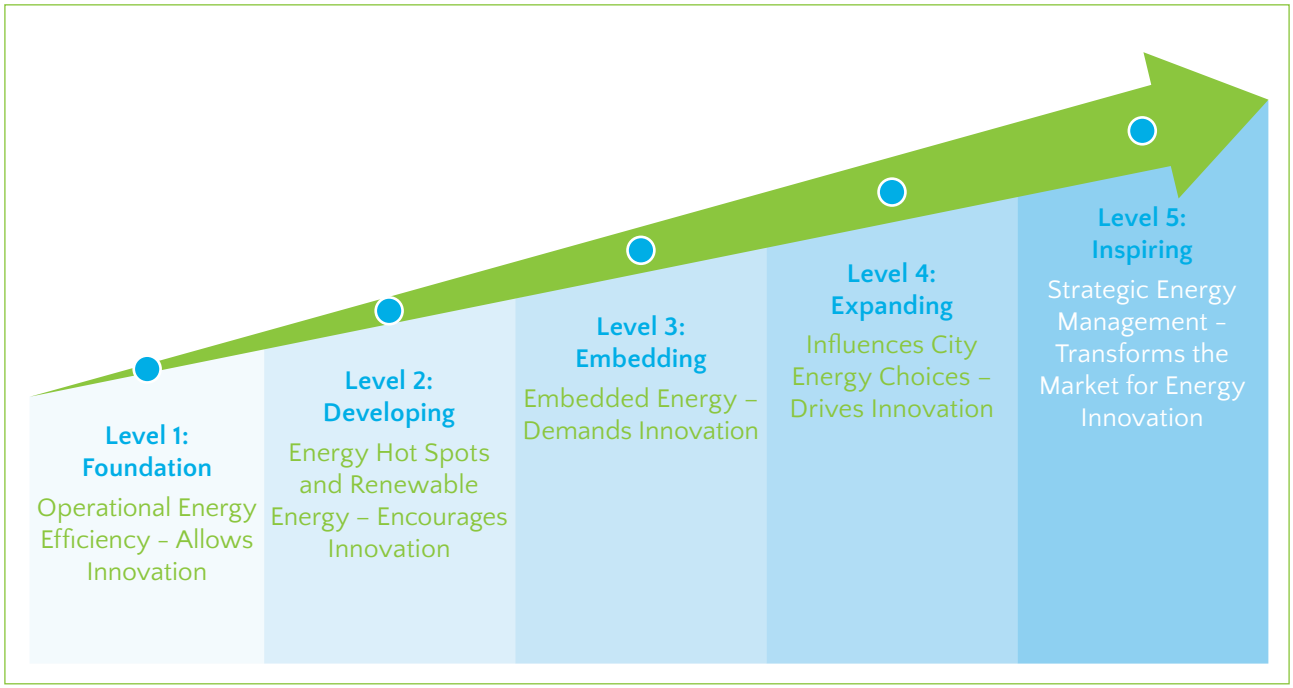

Figure 3: Five levels of energy innovation achievement

Table 1 outlines the criteria for a city authority to assess their current level. These criteria can also be used for target setting, by determining what policies, strategies and actions need to be applied in order to create the framework conditions for achieving the next level. For example, some organisations may even self-assess that they are not yet Level 1, so can use the criteria in Level 1 to set first targets.

Table 1: The indicators for the levels of energy innovation achievement

LEVEL 1: FOUNDATION: OPERATIONAL ENERGY EFFICIENCY – ALLOWS INNOVATION
· The organisation is energy efficient in its operation and open to innovation. · The focus is on the organisation's direct energy consumption and removing barriers to innovation in the procurement process. · Staff and suppliers are aware that they are expected to be energy conscious. · An energy efficiency champion has been appointed. · Suppliers are asked to show how they will improve energy efficiency of their offering.
LEVEL 2: DEVELOPING: ENERGY HOT SPOTS AND RENEWABLE ENERGY – ENCOURAGES INNOVATION
· The organisation has addressed all the 'low hanging fruit' in terms of energy efficiency and is now systematically addressing its energy hotspots and actively seeking opportunities for adoption of renewable energy. · An energy hotspot action plan is in place. · It is actively encouraging supplier innovation in the procurement process. · Innovation procurement methods are adopted in its major contracts. · Staff and suppliers are encouraged to find new ways to save energy and use renewable energy where possible. · The Authority is beginning to consider and plan for the introduction of wider demand pull measures that would support energy transition.
LEVEL 3: EMBEDDING: EMBEDDED ENERGY – DEMANDS INNOVATION
· The organisation is progressing from a focus on operational energy and recognises the embedded energy footprint of its operations, the goods it buys and the services it commissions. · It is proactive in creating a demand for supplier innovation and staff are adopting pro-innovation procurement methods. · Energy awareness is embedded in the organisation's philosophy. · Staff are encouraged to be energy aware at work and at home and are actively encouraged to be innovative in their role. · Suppliers are required to show how they are reducing embedded energy and carbon in their operations and offerings.
LEVEL 4: EXPANDING: INFLUENCES CITY ENERGY CHOICES – DRIVES INNOVATION
· The organisation recognises the need for City wide cooperation in energy transition and encourages cooperation.

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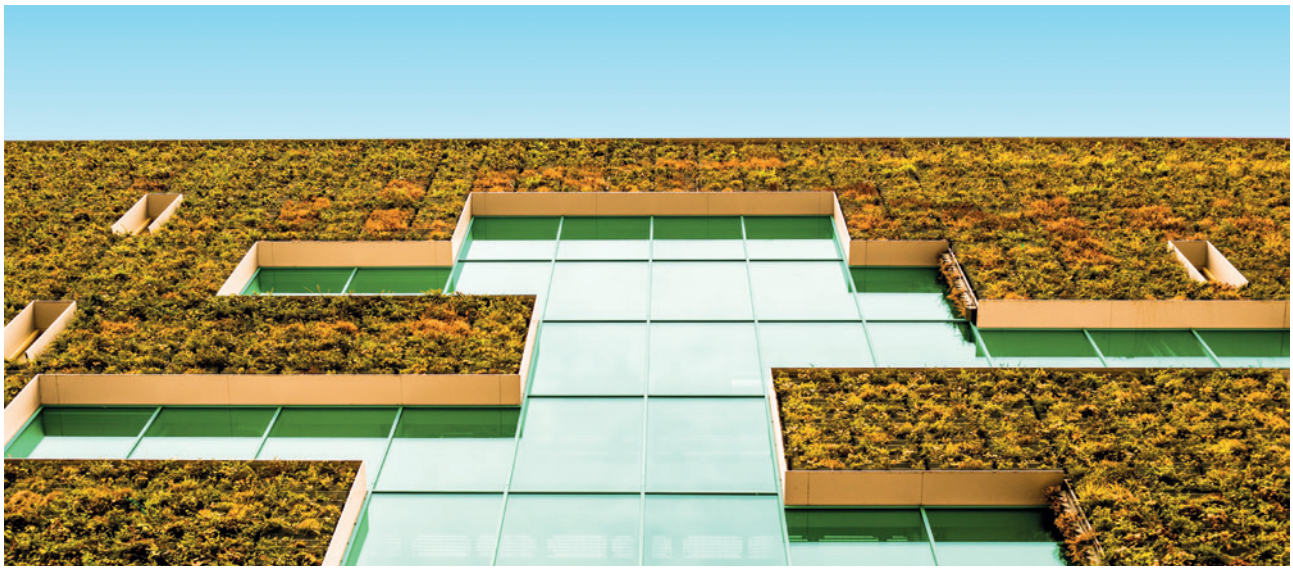
- It acts to create markets to drive energy innovation within its own operations and among City stakeholders.
- Staff are encouraged to seek out innovation and share good practice and are comfortable in the adoption of pro-innovation procurement practices.
- Suppliers are confident that the procurement process will enable innovative solutions to compete on a level playing field.
- Procurement is seen as a tool to help deliver energy transition and all departments have an energy innovation champion.
- An energy transition champion has been appointed. Citizens are encouraged to be energy conscious via public information campaigns.
- Several demand pull measures have been introduced.

LEVEL 5: INSPIRING: STRATEGIC ENERGY MANAGEMENT – TRANSFORMS THE MARKET FOR ENERGY INNOVATION

- The organisation takes a leadership role in the City's energy transition and works actively to transform the market for energy innovation.
- Innovation is welcomed at all levels of the organisation.
- All department heads are conscious of the need for innovation and understand the role of procurement in delivering energy transition.
- Pro-innovation procurement methods are seen as normal practice.
- Procurement is seen as a strategic function and the organisation seen as a centre of energy transition and pro-innovation procurement good practice at a regional and national level.
- Energy transition is a Board level role.
- A comprehensive set of demand pull measures are in place with progressive targets in place.

Using indicators to assess your level and target plan

Assessment of your organisations EIP Level is made against five categories of indicators, reflecting the necessary framework conditions for EIP. Questions relating to each indicator are asked, prompting your city authority to assess where you are in terms of energy innovation. Table 2 outlines the broad categories, whilst the individual questions relating to the categories can be seen in the flexible framework[15] itself.



[15] Download the Flexible Framework at http://www.ceppi.eu/guidance-learning/

Table 2: Categories of indicators for self assessment and action planning

VISION AND LEADERSHIP – CREATES A FIRM FOUNDATION FOR EIP
This indicator considers the position and commitment of leadership in terms of energy transformation and assess where your organisation lies on the energy spectrum. This may be evidenced by statements in policy documents, annual reports or similar. It should also reflect the vision and leadership in terms of innovation.
POLICY AND TARGETS – HOW EIP IS ENACTED IN THE ORGANISATION
This indicator is about how the vision and leadership are translated into organisational policy and targets.
ROLES AND RESPONSIBILITY – EVERYONE KNOWS THE PART THEY NEED TO PLAY
This indicator is about how staff roles and responsibilities reflect the EIP vision and leadership and policies and targets.
CAPACITY AND CAPABILITY - MAKING SURE THAT THE RIGHT PEOPLE HAVE THE RIGHT SKILLS AND RESOURCES
This indicator is about how the vision and leadership and policies and targets are backed up by the development of staff capacity and capability in EIP.
PROCUREMENT PRACTICE – PROCUREMENT IS ALIGNED WITH VISION AND POLICY, AND UNDERPINNED BY SKILLS AND RESPONSIBILITIES.
This indicator is about how the vision and leadership are translated in terms of procurement practices and processes. In this context procurement is about the whole process of commissioning through to tendering.

An EIP Action Plan is then developed to address the gaps. It is unlikely that an organisation will be at the same level for each indicator. For example, there may be a Level 4 vision, but policy and capacity may be at Level 2. In such a case, the action plan will provide a mechanism to consolidate the vision with policy and capacity.

Table 3 shows a snapshot of the flexible framework and how it can be used to assess the different indicators. Always remember – this is a Flexible Framework: it can be fine-tuned to your own organisation and context.

> **"As signatories to the Covenant of Mayors targets, we had an ambitious vision to reduce greenhouse gas emissions. The Flexible Framework process highlighted this problem and gave us a structured way to tackle delivering the city's vision in practice"**
> Luis Gargon Reverter (Municipality of Castellón)

Table 3: The CEPPI Flexible Framework

INDICATORS	LEVEL 1	LEVEL 2
VISION AND LEADERSHIP	We are an energy efficient organisation that seeks to progressively improve its energy efficiency over time	We are systematically addressing our energy and carbon hot spots to deliver progressive reductions in energy consumption and carbon
POLICY AND TARGETS	Energy efficiency targets are in place, a plan to deliver them has Board backing, and we monitor and report on our performance	A Hot Spot and Renewables Action Plan is in place, has Board backing and we monitor and report on progress at Board level
PROCUREMENT	Energy efficiency included as evaluation criteria in relevant tenders; We aim to buy the most energy efficient goods and services; Our suppliers know that energy efficiency is important in the choices we make.	Aspects of pro-innovation procurement good practice are introduced in the procurement of major contracts; Procurement is seen as a supply chain management function
CAPACITY AND CAPABILITY	Staff trained in whole life cost analysis and introduced to innovation procurement concepts.	Staff trained in the theory and practice of innovation procurement and introduced to key tools (user engagement, market engagement and outcome based requirements). Board level briefings on pro-innovation procurement as a strategic delivery tool.
ROLES AND RESPONSIBILITIES	Energy efficiency included in staff induction and job descriptions. An energy efficiency champion is appointed.	A middle management energy manager is appointed to develop, deliver and monitor hot spot and renewables plan. Roles of staff in the delivery of the hot spot and renewables plan included in their job description.

LEVEL 3	LEVEL 4	LEVEL 5
We actively create market demand for sustainable energy solutions	We create the market conditions to support energy transformation and the uptake of innovative solutions.	We take strategic actions and actively innovate to transform the energy market for the benefit of citizens, the environment and the economy.
Carbon reduction and renewables targets are in place and a plan of action is monitored and agreed at Board level. An innovation policy and plan is in place and monitored. We are aware of the wider City energy roadmaps and initiatives and the different stakeholders involved.	Medium term sustainable energy plan is in place. It includes demand side measures aimed at improving market conditions for city energy transformation. Delivery of the plan is a Board level responsibility. Actively engaged with other stakeholders in delivering wider City energy roadmaps and initiatives.	Long term energy transformation strategy is in place and delivery is a Board level responsibility. We play a leading role in addressing the challenges and opportunities of the wider City energy system.
Evaluation of tenders includes embedded carbon and embedded energy consumption of goods and services. The procurement process and tender evaluation encourages and enables innovation. Alternative financing is adopted.	Innovation procurement methodologies are seen as normal. Demand side measures support and enable sustainable energy procurement in the wider City network. We promote the use of innovation procurement approaches among partner organisations.	Procurement is a strategic function that supports energy transformation and actively creates the market conditions for innovation in the organisation and beyond. We are seen as a good practice leader in innovation procurement.
Staff trained to understand the significance of embedded energy and carbon in the supply chain and in its use in specification and evaluation of tenders. Middle management trained in pro-innovation procurement and its role in delivering organisational objectives.	Peer learning and exchange among staff and with other organisations is facilitated.	Staff trained in energy transformation and strategic supply chain management. Internal and external recognition and publicity for achievements
A pro- innovation procurement Champion is appointed. Innovation is seen positively by senior management.	Director level responsibility for the development, delivery and monitoring of the energy transformation plan. Staff encouraged and enabled to innovate by their line management. There is clearly established responsibility for engaging and working with stakeholders in the wider City energy system.	Director level responsibility for development, delivery and monitoring of energy transformation strategy. Director level responsibility for enabling and driving Innovation in organisation and City wide.

KNOW WHAT YOU NEED TO DO: FRAMEWORK PLAN FOR ENERGY INNOVATION

Actions are needed to prepare the ground for the future. For example, if a levelling up target involves 'reaching Level 3 in four years', awareness and training around embedded energy and training in pro-innovation procurement will be needed in advance.

BOX 3: Budapest sets policy, targets and actions

In August 2017, CEPPI city Budapest announced a series of new procurement targets, which declare the intention of realising innovative and sustainable procurements. A target for 100% sustainable procurement processes means that every procurement shall contain or shall be driven by at least one issue, item, or contractual obligation under the umbrella of sustainability.

Action targets:

- 100% of the procurement processes will integrate sustainability and green aspects by 2020
- At least 30% of the evaluation criteria in the procurement processes will be determined upon sustainable principles by 2020
- 70% of the newly purchased public transportation vehicles in Budapest will be clean by 2020
- 1100 electric vehicle chargers will be implemented in the city by the end of 2018
- 21% reduction of CO2-emission and increased energy savings by 2020
- At least one procurement training programme per year will be accomplished for employees by 2020

Budapest has linked its training programme commitment to the innovation procurement training that has taken place during the CEPPI project. The targets are part of the Budapest Environmental Program (2017-2021), which was accepted by the General Assembly on the 30th of August 2017.

The Flexible Framework can be used to bring into focus specific actions that will drive the process. Action plans should ideally contain:

- the scope of your activities and the targets set, together with any political commitment made by your authority;
- a description of the stakeholders to be involved;
- a description of the assigned responsibilities;
- a breakdown of the resources available;
- a description of the implementation measures and procedures;
- relevant progress indicators; and
- a time frame

The action plan should have some form of 'standing' in the organisation, for example sign off at a senior level and a senior manager 'owner' responsible for its delivery. You need to decide how the action plan will be communicated, to whom it will be communicated and how ownership will be established.

FROM PLANNING TO DOING: MONITORING ENERGY INNOVATION PROGRESS

Like any action plan, it will need to be reviewed and monitored. For example, an internal cross department group may meet every six months to reassess and update the action plan.

Once an action plan is in place, monitoring is simply a question of regularly checking how things are progressing, and making adjustments to the plan as needed to stay on track or adjust to new circumstances.

Conducting regular updates of the action plan progress will help to both ensure it is on track to meet the targets and encourage those tasked with its implementation to continue to consider energy innovation in their procurement.

Meetings with the procurement team, management team and other relevant stakeholders should be carried out periodically. The meetings should focus on reviewing progress made, challenges and potential solutions, and successes to be built upon.

COMMUNICATING PROGRESS TOWARDS INNOVATION: REPORTING AND REPLICATION

This step serves to assess whether the targets set by the city authority have actually been achieved, identify any problems encountered and develop solutions. It should also be used as an opportunity for communicating progress and raising general awareness to external stakeholders such as local users of public services, suppliers and other energy using organisations in the city.

Reporting can help ensure that the process is embedded in the organisation, success is celebrated and lessons learned. Case studies and examples provide a valuable communication tool.

The review process represents the end of the first cycle, at which point you should return to Step 1, with a reassessment of where you are now.

A peer learning EIP Network has been created on the Procurement Forum[16]. Here you can share information, exchange ideas, and share action plans, good practice examples etc.

[16] https://procurement-forum.eu/

Chapter 2:
Plan – Identifying needs and procurement opportunities

The previous Chapter explored the preparation phase of Energy Innovation Procurement (EIP), including the use of the Flexible Framework to assess and create the framework conditions that are necessary to enable pro- innovation procurement. This Chapter covers the needs identification and planning stage with regards to procurement.

IDENTIFYING ENERGY USE AND HOTSPOTS

Without knowledge of where energy is being used within your city it is difficult to start prioritising actions with any degree of certainty.

An important first step is therefore to identify what information you already hold on energy use and, if necessary, develop your understanding. In some cities there may already be a well-developed audit of energy use, perhaps related to the implementation of climate commitment, such as the Covenant of Mayors[17] commitments. In other Cities there may be more limited information on energy use available.

Your city authority will have most influence on the energy it uses directly. With a share of energy use of less than 5% this will only account for a small proportion of overall energy use in the city. A wider range of commercial, industrial, residential and other public sector stakeholders will be responsible for the vast majority of energy use and this is outside of a City authority's direct control.

The implication of this is clear: addressing overall energy use in your city is necessary to make a significant impact. Some cities already have established stakeholder group(s) with a remit of addressing energy and carbon reduction. If this is not the case in your city then it may be a useful activity to start engaging with other public and private energy users in addition to looking at the city authority's own energy use.

One key output of this activity is to attempt to identify areas of relatively high energy use, or 'hot-spots' by creating an energy baseline with the documentation of:

1. Cities **final energy use** in MWh per year
2. Cities **primary energy use** in MWh per year

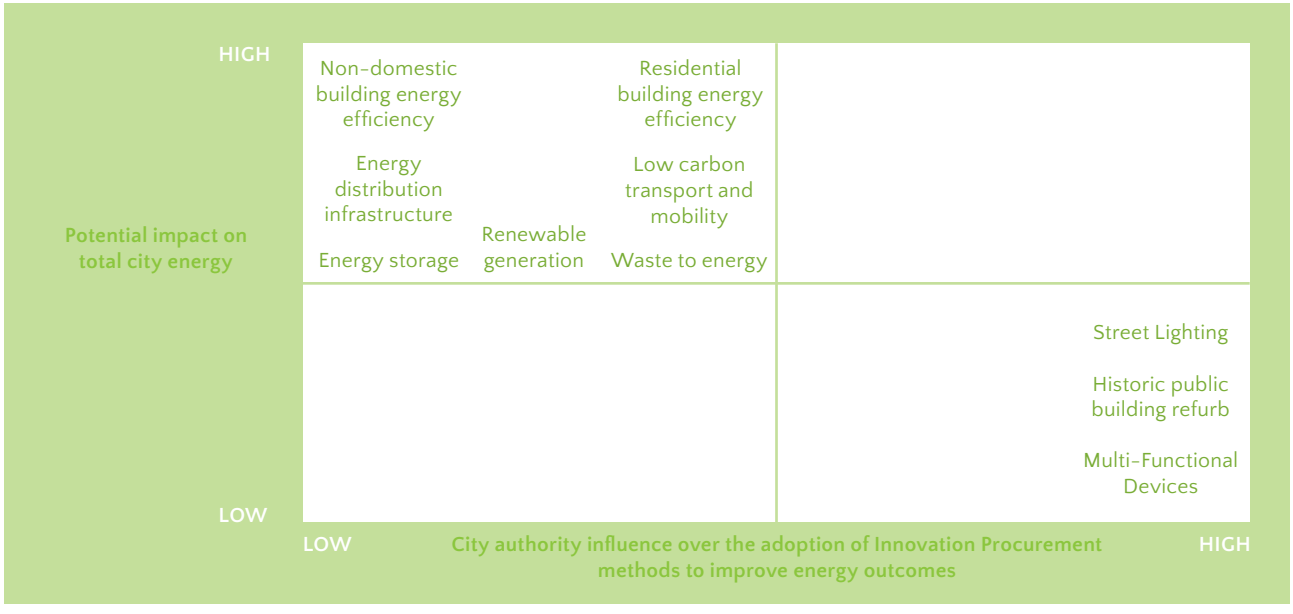


Figure 4: Energy impact areas and City authority influence

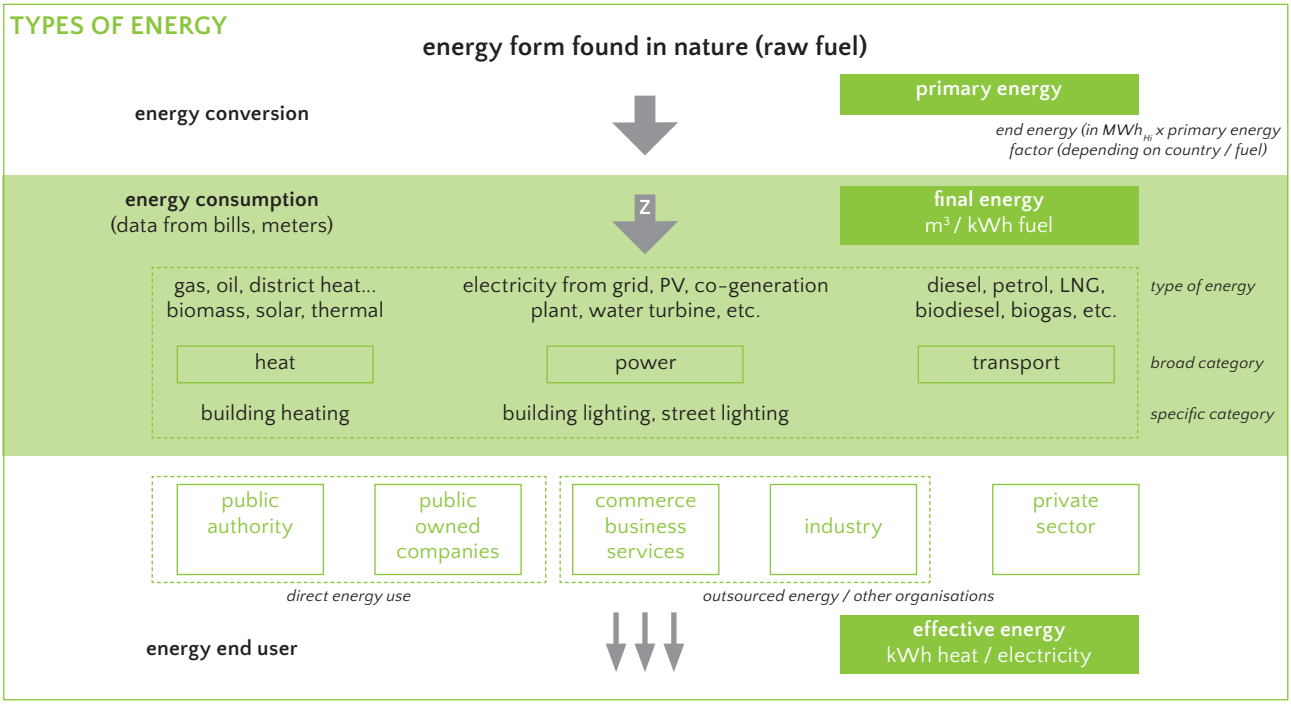


Figure 5: Types of energy, conversion and use, source: STZ EGS

Final energy is the quantity of electrical energy, gas, oil or diesel delivered as stated in energy bills. Final energy does not include any generation or transmission losses from the original fuel to the delivered energy. This is taken into account by converting the final energy into primary energy with the help of conversion factors. Conversion factors are country specific and take into account the energy mix according to energy production of the country. The CEPPI approach was to use a general EU-wide average with conversion factors for electrical energy = 2.5 and others = 1.1.

In order to create the specific energy baselines, your city authority can construct a series of spreadsheet tables to record the quantity and source of energy used for different service areas (see Figure 5: Types of energy, conversion and use, source: STZ EGS), divided into:

1. Type of energy used (gas, oil, district heating, electricity from grid, renewable energygeneration from PV plants, diesel etc.)
2. Broad category of energy used (heat, power, transport)
3. Specific category (building heating, building lighting, street lighting, public transport etc.)

For 'types of energy' information it is useful to start with procurement data such as grid electricity and grid gas billing statements. This provides data expressed as final energy. Procurement information regarding purchases of oil, diesel, petrol, etc. will also provide important data. This will require some conversion of units (e.g. cubic meters of gas, litres of oil, etc.) so the data can be compiled in a common format, such as MWh, to allow energy use to be expressed as a 'broad category' (heat, power or transport). In some cases the calculation of energy use in these broad categories is relatively straight forward. For example, if the gas purchased is used as an input to steam boilers to produce heating and hot water then all of this can be classed as 'heat' energy. However, if the gas is used as an input to a combined heat and power generator then part of this will be allocated to power and part to heat dependent of the system.

Depending on the degree to which individual consumers are separately metered (and the relevant readings monitored on a regular basis) it may also be possible to identify 'specific categories' of energy consumption. For example, separate metering data may be available to identify the energy used by street lighting. Where separate metering data is limited it is

[17] www.globalcovenantofmayors.org

possible to conduct an energy audit of specific energy consuming systems or products.

Different cities will have different scopes of services delivered to citizens and some of these may be operated by dedicated companies owned or controlled by the authority. In these cases it may be necessary to work with each individual municipal company to identify their energy use. In the same way high energy using stakeholders (from both public and private sectors) can be engaged to discuss to what extent they could make their equivalent energy data available.

Once the available energy data is collated and converted into comparable units (either kWh or MWh of primary energy use) the areas with highest energy use can be identified as energy hot-spots. This provides a focus for energy efficiency, energy management and renewable energy generation.

UNDERSTANDING OPPORTUNITIES TO USE PROCUREMENT

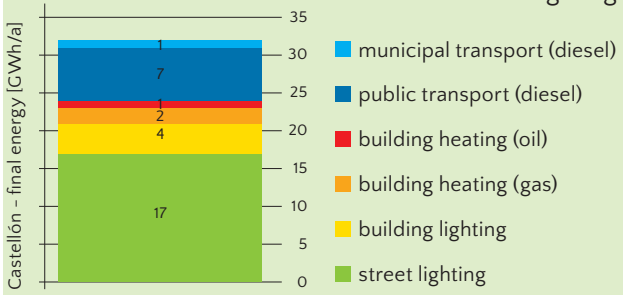
Once the energy hotspot areas are identified it is then useful to start by investigating whether or not there are any planned procurements for these areas. A starting point for this is to engage with those responsible for procurement in the relevant areas of energy use. This may be a centralised procurement department for the city authority or a dedicated procurement department for a municipal owned or controlled company. Your planners will also be aware of major private sector projects. If there are procurements being planned then consideration should be given to interventions aimed at improving energy outcomes (see Chapter 3). If not then it may be useful to use the data gathered to have a discussion with the budget holder for the relevant area about whether there are any pre-procurement plans to address the significant energy use.

Generally, the earlier you can intervene in the procurement process, the more scope you can have to influence the energy outcome. If no such plans exist then consideration should be given to working with the relevant budget holder to investigate whether a business case could be developed to address the energy hotspot. The ease with which such a business case could be made is linked to the degree to which action would align with policy, whether leadership is committed to the activity, etc. These underlying supportive framework conditions were described in Chapter 1.

In addition to looking for opportunities to use procurement based on the energy hotspot identified, it can also be useful to consider a wider range of planned procurements. By systematically identifying and analysing procurement plans, potential areas where it may be possible to influence energy use can be identified. Although the energy savings may be modest compared to some of the hotspot areas, these procurements can provide the opportunity to test some of the intervention methods (described in Chapter 3) and begin to demonstrate that innovation is possible and beneficial.

BOX 4: Hot Spot action planning mobilising action in Castellón

An energy opportunities exercise in Castellón identified street lighting as an energy hot spot. The first action was to approach the person responsible for street lighting to share the findings and ask if there were plans to up-grade the cities lighting infrastructure. The response was that there was no financing available and suggestions from the CEPPI regarding innovative financing were rejected as too risky. However, the significance of the finding was such that the local facilitator provided an information briefing for his line manager who subsequently brought this to the attention of the Mayor's office.
Over the course of the following year discussions continued, financing options were investigated and local studies carried out. Ultimately this intervention led to a decision to 'invest to save' in up-grading the street lighting and a forward plan adopting pro-innovation methods for the renewal of street lighting.



A third route to understanding opportunities to use procurement to improve energy outcomes is to identify planned infrastructure investments. These may not be related to energy hotpots but the scale of some infrastructure investments can potentially lead to significant future energy use. These could include infrastructure such as transport links, commercial buildings, residential buildings, city authority vehicle fleet, etc. Ways in which future infrastructure investment can be identified include discussion with planning departments and with those responsible for planning European structural funded projects.

Finally, a longer term view of potential procurement opportunities could be developed by considering what infrastructure needs to be in place to support the future city vision in areas such as air quality and climate targets. A possible source of inspiration for this is to consider the actions other cities are taking to help achieve longer term visions for these types of areas. Chapter four considers some examples of procurements carried out by other city authorities and wider stakeholders that may be useful to generate potential ideas.

DEVELOPING AN ACTION PLAN

Consideration could be given to developing a plan to summarise the required actions for better understanding of city energy use, the hotspots of energy use and the potential procurement opportunities that could be used to achieve better energy outcomes.

BOX 5: Hot Spot action planning in Valencia

An energy opportunities exercise identified street lighting as an energy hot spot. The local facilitator in Valencia worked with the City Authority energy team to encourage them to address this issue. This included regular meetings, introducing pro-innovation approaches, enabling their attendance at a PPI Conference, and a Peer Learning Workshop in Glasgow where the City Council has successfully completed a collaborative street lighting up-grade with neighbouring cities.

Your city authority may have its own format for developing action plans. If not, there is an action planning template and guidance document available on the CEPPI website[18]. It provides examples of the different types of actions that could be included and key questions to consider when constructing a plan. The key areas in such a plan could include activities to:

- **Investigate energy consumption hotspots:** to set priorities by understanding both your city authority energy use and that of wider stakeholders. An energy opportunities exercise identified street lighting as an energy hot spot. The local facilitator in Valencia worked with the City Authority energy team to encourage them to address this issue. This included regular meetings, introducing pro-innovation approaches, enabling their attendance at a PPI Conference, and a Peer Learning Workshop in Glasgow where the City Council has successfully completed a collaborative street lighting up-grade with neighbouring cities.
- **Identify, prepare and influence procurement opportunities:** focus on those with potential to improve energy outcomes
- **Assess finance for investment:** consider both standard procurement budgets and innovative forms of finance (see Chapter 4 for examples)
- **Evaluate the wider driving and enabling role of the city authority:** include the use of 'demand pull' measures such as regulations and policy as defined in Box 1 and in Chapter 4.

These activities can be combined with those developed to 'level-up' through the Flexible Framework as described in Chapter 1. Together these actions could provide a useful focus to progress Energy Innovation Procurement in your city.

[18] www.ceppi.eu/fileadmin/user_upload/Resources/CEPPI_-_City_Specific_Foresighting_Roadmaps_-_guidance_and_template_document.docx

Chapter 3:
Act – Procurement interventions

The previous two chapters outlined how a city can prepare the framework conditions necessary for innovation procurement and then plan which areas of energy innovation procurement should be prioritised. This chapter outlines how the procurement interventions can be implemented.

In order to adopt pro-innovation procurement practices in a way that is most effective and appropriate to the sector and situation, it helps to understand certain principles and the customer-supplier dynamic.

Delivering societal objectives, such as sustainable energy systems, requires new solutions that are either not available in the market or are available but at excessive cost. A critical factor for supplier investment in developing new solutions is confidence that a scalable market exists. Without a credible demand from customers, solutions do not receive the investment required to enter and be competitive in the market. The future customers of the new products can significantly affect investment decisions by making their demand for them explicit, credible and compelling for suppliers. This creates a more certain future market.

Procurement processes that enable customers to make their future needs visible and credible, creates the market conditions that allow innovations to reach the market.

Making simple changes to what might be called the 'regular' procurement process can trigger innovation, by customers demanding goods and services that are not already in the market, or not available in the form or at the price point acceptable to the customer. Making changes to the procurement process can also enable customers to respond positively to innovation, by allowing new and emerging technologies to compete on a level playing field with established goods and services. It does this by attributing value to aspects that are normally excluded from the procurement specification. For example, this could be the environmental or social advantages of renewable energy, predictable energy costs thanks to renewable energy production or the resilience benefits of distributed power or energy storage. In many cases it can open the way for new business models, such as providers of intelligent[19] energy services.

INNOVATION AND PRO-INNOVATION PROCUREMENT: THE PRINCIPLES

Innovation is risky

Sensible procurers worry when they hear the word 'new', even if followed by the word 'improved'. New goods and services have risks. They may not work as expected, not be delivered on time or at all, cost more and above all they have no track record. Innovation is risky and so it is sensible to try to avoid it. There has to be a clear reason to innovate. And this is the case in relation to bringing about a new paradigm in energy systems. If we keep buying the same goods and services we will fail to rise to this challenge.

> **"Customers often reflect on the risk of innovation, but rarely consider the risk of not innovating."**
> *Gaynor Whyles (JERA Consulting)*

Understand the suppliers perspective on innovation

From the supplier's perspective, innovation is also risky; it involves technical risk and requires investment of time and money. A rational supplier only innovates to protect margins, or to win or gain business. Technical and resource risk is under the control of the supplier; the risk they cannot control is having invested to develop a new product, will someone buy it? Creating a credible demand is the key task of pro-innovation procurement. It is this new demand that drives innovation.

Commitment and consistency are crucial to convincing suppliers that the demand being articulated is credible.

[19] Through intelligent energy services such as Demand side response (DSR), services, businesses and consumers can turn up, turn down, or shift energy demand in real-time.

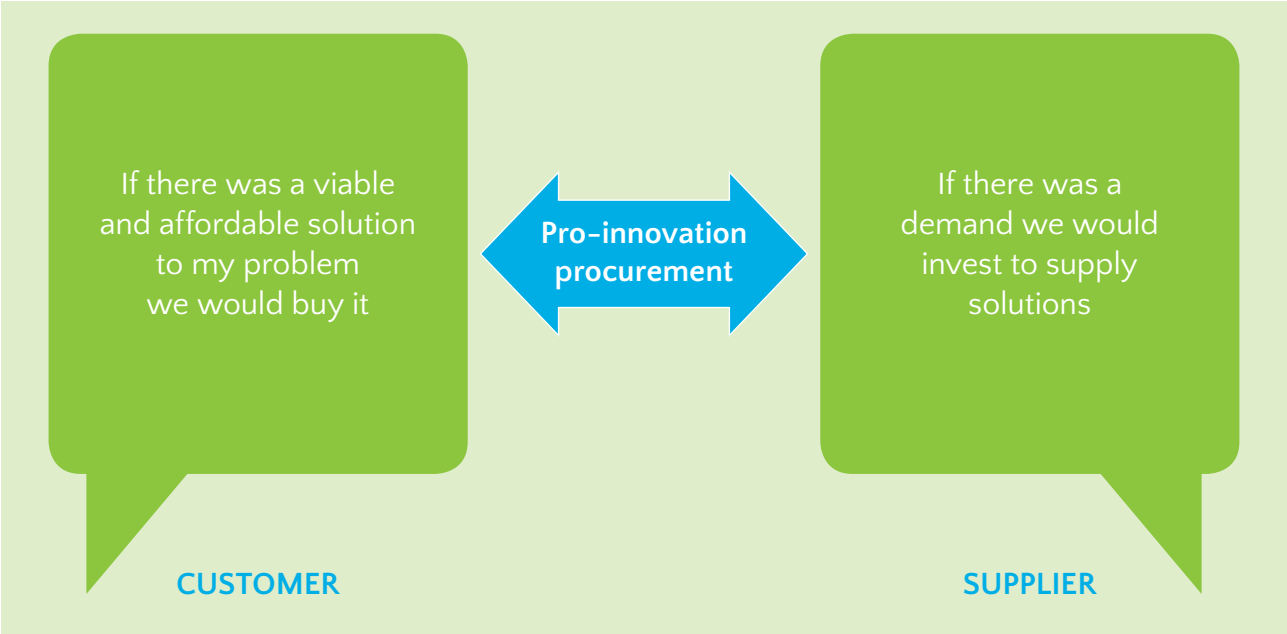


Figure 6: The buyer-supplier paradox

The response of the supply chain will depend on the extent to which the supplier is convinced that the customer has a genuine need, puts out consistent messages and can show that it is committed to meeting that need.

The buyer-supplier paradox

Customers typically buy what is available on the market, rather than asking for what they need. Suppliers respond to customer demand. Pro-innovation procurement aims to resolve this paradox (see Figure 6).

> **"It would be better for all parties if customers expressed their needs to suppliers, and having done so enabled innovative solutions to compete on an equal playing field with established offerings."**
> *Gaynor Whyles (JERA Consulting)*

Attribute value to innovation

What do we mean by innovation in the context of EIP? The definition of innovation adopted in the CEPPI project was:

"The process of translating an idea or invention into a product or service that creates value for which customers will pay."

In the public sector what is valued may be better societal outcomes or improved economic outcomes. Any procurement process therefore needs to be able to attribute this value to an innovative solution when tenders are being awarded. Awarding on criteria that does not recognise whole life-cycle costs and benefits of externalities will fail to drive the uptake of innovations.

Create a credible demand for innovation

As discussed in the opening section, pro-innovation procurement is all about introducing a credible demand that was not previously expressed into the market; this new demand drives innovation. This means doing what is necessary to create a credible, genuine market opportunity and convincing suppliers that you are a serious customer.

For example, CEPPI projects in Castellón and Wroclaw for energy refurbishments of public buildings were relatively small tenders. To make them more attractive for innovative suppliers, they were set up as 'pilot projects'. Follow-on phases for several buildings were planned, creating the scope for suppliers to compete preferentially for future projects and encouraging them to treat the pilot phase as an investment rather than a stand-alone project.

Enable suppliers to compete on factors other than price

In a modern economy all suppliers understand that they need to be price competitive; however making the

goods and services they sell commodities rarely supports investment in innovation. Rather suppliers look to differentiate themselves from the competition by providing features that the customer values. Intelligent customers give their suppliers the opportunity to do this by clearly articulating their unmet needs and desired outcomes and supporting the suppliers to understand and deliver better goods and services. Changing the question posed to suppliers allows different or valuable answers but without implying additional costs. Or if there are additional costs, being able to identify the added value can justify these.

Innovation takes time

Bringing new goods and services to the market takes time as well as investment. This is particularly true when the sector has long development cycles, is highly regulated and is part of a complex city eco-system, as in the case of transport and energy. It is therefore important that customers communicate their needs early and allow time for suppliers to innovate.

PRO-INNOVATION PROCUREMENT PRACTICES

The CEPPI partners defined pro-innovation procurement as:

"Undertaking the procurement process in a way that stimulates the supply chain to invest in developing better and more innovative goods and services to meet the unmet needs of an organisation."

Suppliers are highly creative when given the opportunity, particularly when they need to retain or gain market share. Pro-innovation procurement means undertaking the procurement cycle in a way that unlocks the creativity and innovation potential of suppliers to deliver better outcomes, cost effectively.

As a consequence there has to be a change in the way organisations and individuals think about and undertake procurement i.e. as a strategic rather than a back room function.

It also means that the 'procurement conveyor belt', meaning the automatic re-issuing of the same tender specification, needs to be halted.

Halting the procurement conveyor belt and beginning the procurement process well in advance of the solution needing to be deployed is a necessity if innovation and greener options are to be considered. Otherwise simple time pressures will lead to 'more of the same' in the short term.

> **We needed to 'stop the procurement conveyor belt' to halt the automatic renewal of tenders and move the conversation beyond 'more of the same', or 'more of the same but a bit more energy efficient'.**
> *Extract from the CEPPI Final Case Study Report*

Identify and engage internal and external stakeholders

Much of the work of pro-innovation procurement is undertaken in advance of the tendering process and begins with defining what is needed. The accurate identification of the unmet need and definition of a requirement is the first step in the process. This requires the engagement and consultation of stakeholders.

BOX 6: Stakeholder engagement in the identification of unmet needs and challenges at the University Hospital, Wroclaw

Several stakeholder workshops were organised over a period of 18 months. They brought together people from across the hospital, including facilities managers, hospital managers, the procurement team, medical staff, and patient representatives. The workshops built awareness about innovation procurement, shared case examples from other hospitals in Poland and stimulated discussion on the importance of energy efficiency and where improvements were needed. The workshop process uncovered a number of problems with heating and lighting across the hospital estate and gathered information about how this affected the safe and effective delivery of patient care.

There are a wide-range of internal stakeholders involved in and affected by any procurement. For example, the budget holder, the operational managers, end-users, environmental managers and finance managers and of course procurement staff. These stakeholders have an investment in the solution and

are best placed to determine the shortcomings with existing solutions and what the solution needs to deliver. It also helps to ensure that any objections or risks can be identified early in the process. Failure to consult and engage staff at this stage can hinder the acceptance of new solutions.

Your city authority's task is to serve the needs of its citizens, who are very often end-users of the goods and services procured. Engagement with external stakeholders helps to ensure that the new service or solution will meet citizen´s needs and be accepted.

BOX 7: Stakeholder engagement in the identification of unmet needs and challenges in Valencia

The local facilitator in Valencia organised a series of stakeholder workshops with staff in the central fire station to discuss the problems associated with energy efficiency and the comfort of the building. The workshops involved all the building users, including cleaners, fire fighters, and station managers. It was soon uncovered that additional stakeholders in the Municipal Authority responsible for the maintenance and control of the heating system and those responsible for the Fire Stations budget needed to be fully engaged in the process.

Engaging with all the relevant stakeholders on board enabled the current situation to be accurately understood, not only in relation to energy efficiency but also to create a comfortable and productive environment for the staff.

"We consulted all the people who used and worked at the fire station, including cleaners and maintenance staff. The level of interest and insights was greater than we had anticipated. Working with stakeholders on the definition of unmet needs has been a most positive and enlightening process."
Francisca Hipólito, Local Facilitator, Valencia.

Stakeholders have practical insights into the current situation, how requirements may need to change to adjust to future conditions and how the current solution or service could be improved. The following questions can help to provoke stakeholders to think beyond current solutions and be ambitious in defining what they need:

- What works with the current solution?
- What are the problems with the current solution?
- What are the future challenges that you anticipate?
- What is likely to change in the future?
- If you could imagine your ideal solution what would it look like?
- Complete the sentence..."wouldn't it be good if"....

However, not all stakeholder engagement succeeds or may need to be re-visited in the course of a project. Where stakeholder engagement fails this is most often an indicator that the framework conditions are not in place. In contrast, once the framework conditions are present, stakeholders and project owners have a mandate to act and often relatively rapid progress can be made.

BOX 8: Engaging citizens in the energy efficiency refurbishment of Przedmiescie Olawskie public housing development in Wroclaw

When the Municipality of Wroclaw wanted to refurbish homes for better energy efficiency, it conducted a consultation event with the residents of the housing development. This involved explaining the refurbishment programme, conducting a survey and carrying out interviews. The findings served as an important pre-curser to the planned refurbishments. The process helped the residents to take an active involvement, whilst informing the municipality about their expectations and perspectives. Residents naturally perceived a connection between the use of energy-saving solutions and lower housing maintenance costs. Knowledge of solutions was low, so workshops to introduce energy-saving solutions will be carried out.

Adults naturally perceived a connection between the use of energy-saving solutions and lower housing maintenance costs but made only a limited connection between energy saving in the home and protection of the natural environment. The knowledge of residents about the cost and impact on the natural environment mainly related to problems and solutions publicised by the media e.g. smog and replacement of tile stoves for gas or electric heating. Thermo-modernisation or LED lighting are not widely known concepts. Further actions to disseminate information on the refurbishment will be taken prior to works beginning to discuss concerns over construction noise, disturbance, parking spaces etc.

This intervention shows the importance of engaging and educating citizens when public sector institutions implement similar investments. It will be recommended that in future, workshops with the employees of these institutions, emphasise the need to explain to citizens the benefits of energy saving solutions for them and the environment and consult on ways to minimise disruption during the implementation.

Market engagement

Market engagement is a cornerstone of pro-innovation procurement. It takes place before a formal procurement tendering begins. Its purpose is to assess the appetite, capacity and capability of the market to respond to the customer's requirements. It is never used to assess or evaluate suppliers.

BOX 9: Market sounding communications in Valencia

The local facilitator put together a comprehensive package of market communication materials that explained the requirements for the Fire Station Refurbishment (MSP), promoted the project (leaflet and video), and collated responses (electronic response form).

The materials were designed to generate interest in the procurement and simultaneously promote and raise awareness about innovation procurement. The publication of a PIN ensured that the tender was widely communicated across member states. Key to success was the proactive research and communication to suppliers and other stakeholders.
See www.ceppi.eu/tenders/ for more details.

BOX 10: Market sounding communications in Castellón

A market sounding regarding the innovative transformation of the youth schools of Castellón attracted interested from more than 20 suppliers, 14 of whom attended a launch event and site visit. A local facilitator stated: "We were really pleased with the response and ideas generated during the site visit and the suppliers appreciated the opportunity to ask questions and get first hand insights into the problems we are facing."

The market engagement process should ideally provide early warning of forthcoming tenders as innovation takes time. The process helps to answer two fundamental questions:

- Can the supply-chain deliver what we need, when we need it and at a price commensurate with the value the organisation places on it?
- How can the organisation support and enable them to do so?

"Prior engagement with the market can be a concern to some procurers. However, it is positively encouraged in the revised Public Procurement Directives"
SPP Regions Market Engagement Best Practice Report[20]

What makes for a successful market engagement exercise? Above all, customer and demand credibility is at the heart of successful market engagement. Suppliers need to believe that the customer demand is credible and that they are serious about buying a solution that meets their needs. Box 9 and Box 10 show the market sounding approach taken by Valencia and Castellon in the CEPPI project.

Develop a pro-innovation procurement strategy

Pro-innovation procurement means conducting the tendering process in a way that gives innovative solutions a chance to compete on a level playing field. It is essential that the tendering process is designed to support and enable innovative solutions to be presented and given due consideration.

A useful tool at this stage in the process is a 'pro-innovation procurement strategy' (PIPS). This is designed to allow suppliers' scope to bring innovative solutions to the table and an opportunity to distinguish their products and services on factors other than price alone. When pro-innovation procurement is new for those involved in the tender evaluation and award process a formal document, agreed by the project team and signed off at Board level or equivalent, provides a 'touch stone' and a common point of reference for the evaluation committee. The strategy should describe in practical terms a summary of "what we will do to enable and encourage innovative solutions in the tendering process". PIPS are therefore based on innovation procurement good practice. The time taken to develop the strategy is usually well spent, providing a valuable framework to bring together internal stakeholders around common objectives and address any divergences of opinion before the formal procurement process begins.

A 'pro-innovation procurement strategy' (PIPS) is one designed to allow suppliers' scope to bring innovative solutions to the table and an opportunity to distinguish their products and services on factors other than price alone. When pro-innovation procurement is new for those involved in the tender evaluation and award process a formal document, agreed by the project team and signed off at Board level or equivalent, provides a 'touch stone' and common point of reference for the evaluation committee.

PIPS, taking into account the results of market sounding or technical dialogue, were developed for several of the CEPPI intervention projects. In all cases it was the first time that such an approach had been taken.

"We found that the discipline of thinking through how to structure the tender and conduct the process really helped to get our minds clear and make sure everyone involved in the award team agreed the approach." *Joanna Kot, Wroclaw*

BOX 11: What might a pro-innovation procurement strategy document include?

- Introduction to the project
- How it is being financed
- Purpose of the PIPS and its aim
- Project team responsible for delivery
- How any conflicts within the team will be resolved
- Summary of preparation activities and the results of prior market engagement
- Pro-innovation strategies could include:
  - *Outcome based specification*
  - *Incorporation of trials and demonstrations in the procurement and use of conditional contracts*
  - *Motivation of suppliers (e.g. pilot projects, performance incentives, wider market development, contract structure, progressive improvements)*
  - *The type of procurement procedure to be adopted and why (e.g. Competitive Dialogue)*
  - *Balanced based award criteria and how they will be applied and consistency achieved*
  - *Price assessment takes into account total cost of ownership (TCO)*
  - *Rewarding sustainability and circular economy*
  - *Direction of travel messaging*
  - *Risk management*

[20] http://www.sppregions.eu/resources/publications/

Defining the need in terms of outcomes

Outcome based requirements are a well-known cornerstone of enabling innovation in the procurement process. An outcome based specification focuses on the desired outcomes that are required from goods or services rather than a detailed technical specification. This allows potential suppliers scope to propose innovative solutions that might not have occurred to the delivery team. Outcome based specifications are also sometimes known as 'functional specifications'.

The CEPPI interventions distinguished 'outcome based requirements' as those communicated in the market engagement process, with 'outcome based specifications' meaning the specifications within the tender documents. The outcome based requirements are revisited in the light of market engagement or technical dialogue and refined to reflect new market knowledge.

The energy efficiency refurbishment of the Central Fire Station in Valencia focused on two key outcomes: to increase the comfort of the employees and maximize energy savings. The required outcomes were as follows:

- To reduce energy costs.
- To improve the working environment and well-being of the fire officers and other staff
- To maximise energy efficiency of the building and to reduce energy consumption.
- All this must be done without compromising the operational capacity in the Fire Station both during and after the refurbishment

BOX 12: Green and sustainable requirements in tender documents

A Birmingham City Council development scheme including retail, leisure and residential use adopted green and sustainable requirements in its tender documents. The document included this text:

The following green and sustainable principles for Birmingham Smithfield to be covered in the outline strategy referred to under Tender Questions include:

Reduced Energy Demand

- Efficient buildings with low heat and power demand

Low Carbon Energy Supply

- The scheme should utilise options for low carbon energy supply and harness opportunities for generation of energy on site

Smart Grids

- Consider use of Smart Grids to balance energy generation and demand.
- Integration of electric mobility.

Increased Resource Efficiency:

- Water management strategy should identify options for the efficient management of water, including wastewater and portable water.
- Maximising the use of sustainable drainage systems should be considered as part of the overall development, including impact from / on surrounding areas.
- The development should seek to maximise the use of building materials from sustainable resources.
- The development should seek to design out construction waste and seek to achieve a 100% recycling rate.
- A full embedded carbon assessment of the development will need to be undertaken.

Promote Low Carbon Connectivity:

- Seek to prioritise low carbon means of connectivity through cycling and walking, including, for example, a bike share scheme.
- Seek to provide infrastructure for ultra-low emission vehicles.

Thinking in terms of outcomes rather than specifying solutions can be challenging and the translation of the unmet need or challenge into an outcome based or function requirement pre-supposes a high degree of competence on the part of the procuring organisation.

> **"The prior analysis enabled by stakeholder engagement will help to ensure that the requirement expressed to the market is as accurate as possible and has internal credibility. This underpins a successful result".** *Gaynor Whyles (JERA Consulting)*

Wider market development

Although the articulation of demand from one customer is helpful, an expression of a common demand from several customers presents a more attractive and convincing proposition to suppliers. Customers can encourage suppliers to respond to their unmet needs by demonstrating that there is a wider market demand, and that they are taking steps to create this wider market.

Such 'wider market development' can begin early and continue throughout the procurement process. In practical terms, it may include reaching out to other buyers once an unmet need and requirement is identified to stimulate them to communicate the same or similar need; inviting other potential customers to join in market engagement activities; enabling other customers to buy the solution through the creation of a public tender; and promoting the solution once purchased.

Identifying and bringing other customers on board demonstrates to suppliers that there is a wider market demand and really helps to motivate suppliers. Similarly, showing that the tender in question has opportunities for scaling and replication within the tendering organisation and beyond helps to motivate suppliers in what would otherwise have looked like relatively small supply opportunities.

Looking beyond operational energy

Taking into consideration operational energy consumption as part of whole life cost is becoming more common. But this is only a fraction of the energy consumed over the life of any given product or service. The embedded energy consumed in the manufacture, distribution, servicing and end of life management is considerable.

This can be difficult for a customer to assess and compare, and requires some thought, but simple questions to suppliers can be surprisingly effective. For example: what steps are being taken by your organisation to reduce energy consumption in your operations? How will you minimise the vehicle emissions in the delivery of this contract? Do you have energy efficiency targets in place and do you monitor progress?

Including trials and demonstrations within a procurement process

The problem with trials and demonstrations is that even when they are successful, the chances are that they will fail to reach the commercial market unless the demonstrations were integrated into the procurement process with a direct route to being purchased if they are successful.

Reward suppliers that exceed minimum standards and incentivise progressive improvements

The use of minimum standards in procurement specifications in relation to energy efficiency is not unusual. This can help to ensure a certain standard is reached. But on the other hand, minimum standards can inhibit suppliers investing to exceed this standard unless there is a clear competitive advantage. By rewarding suppliers that exceed minimum standards, and putting in place a requirement for progressively higher standards, it is possible to provide this competitive advantage.

It is also possible to stimulate ongoing innovation within contracts. This is particularly true in longer term projects. For example, over the course of a 10 year street lighting contract the technology will advance and improve in terms of efficiency and operations. It therefore makes sense to build in a 'technology updating requirement' and ensure that the contract is flexible enough to accommodate these developments.

Enable new and innovative solutions to compete on an equal playing field

All the work of pro-innovation procurement is wasted

unless new and innovative solutions are allowed to compete on an equal playing field with established goods and services. Typically this requires being able to identify the value of innovative solutions. A narrow specification of the procurement requirement prevents other valuable features from being rewarded. The specification needs to allow other value-adding aspects to be included and rewarded in a supplier's offering.

BOX 13: Tendering specifications can unintentionally exclude new solutions

In the UK, city authorities are responsible for maintaining highways, including management of drains and gullies.

Innovative solutions are now available that can improve the effectiveness of gully management and reduce costs. Their adoption can achieve reductions in the cost of gully and flood management of between 30-40%.

However, typically tender specifications are for the operation of a strict management regime, requiring the contractor to visit each gully and drain a fixed number of times per year. Payments are based on a 'per gully visit' basis, rather than on outcomes. Such contracts are of course easy to monitor, yet, data collected so far from millions of gullies shows that around 80% of gullies are clean and running and require no attention. Yet the continued use of specifications based on the per gully per visit basis persist, meaning that the additional value and cost savings of investment in new technology remains hidden to the procurer and are a significant barrier to their wider uptake.

"Tenders should encourage and be open to innovation, for example constructing tenders and contracts to operate on the basis of outcomes rather than dictating regimes of inspection." Supplier of smart highways solutions

Direction of travel messaging and forward commitments

Providing long-term and consistent messages to suppliers within tender documents about future trends, not only gives advance notice to suppliers to enable them to adapt, it shows how they can gain competitive advantage within current and future tenders by investing in innovation. For example, a city authority should continue to reinforce the message that it seeks progressively more energy efficiency solutions over time and will reward suppliers for demonstrating measures taken to reduce energy consumption, reduce vehicle emissions etc. Box 14 shows this in action in CEPPI city Castellón. The key is to provide a genuine commitment to procuring with higher standards than today.

BOX 14: Demonstrating commitment to energy efficiency and innovation in Castellón

When Castellon renewed a printing and copying contract the municipality ensured the commitment to energy efficiency was communicated. By engaging stakeholders in the idea of changing their standard approaches, even in a simple tender when time for intervention is limited, messages about the strategic direction can be used to drive better energy and innovation outcomes in the medium term. This tender included direction of travel messages to suppliers regarding progressive improvements in energy and carbon performance and requested ideas for innovation and energy efficiency in future contracts:

- In future tenders the Council will look for ongoing and progressive improvements in energy efficiency
- In future tenders the Council will reward supplier who can demonstrate carbon reduction in their operations, carbon reduction in their supply chain and reduction of embedded carbon in the products and services supplied

Progressive suppliers will aim to demonstrate that they can deliver even in the existing contract term if they can see that this will give them a competitive advantage.

Dialogue based procurement processes

The majority of procurements that require innovation are complex because they involve doing something

differently. In order to bring out the best in suppliers in terms of creativity and innovation and establish what is possible and cost effective a dialogue phase in the tendering process is extremely valuable. Arguably, not allowing time and space for dialogue increases the risk for the customer and supplier.

For example, the competitive dialogue procedure provides scope for client / supplier dialogue and this is invaluable when innovative solutions are being sought. It allows discussion with suppliers and innovators to determine how their solution meets the need expressed and how it can be developed to the point of supply. Using the Competitive Dialogue process enables customers and suppliers to discuss options and solutions and for both sides to achieve greater clarity of what is needed and what is feasible within the constraints of the tender process before proceeding to final bids.

The competitive dialogue process aims to increase value by encouraging innovation and creating competitive pressure. The new EU procurement directives should make competitive dialogue more freely available to customers where innovation is sought from suppliers (see Box 15).

BOX 15: Opportunities under the 2014 Procurement Directives

The 2014 Directives open up a number of opportunities for pro-innovation procurement, while maintaining the basic requirements of competition, transparency and equal treatment. The reform is linked to the Europe 2020 strategy for smart, sustainable and inclusive growth[21], which identified public procurement as one of the market based instruments needed to achieve the 2020 objectives for employment, climate change and energy sustainability, research and development, education and poverty reduction.[22]

Non-price based award criteria

The purchase cost of goods and services is often only part of the costs of operation and ownership. Value for money is the optimum combination of whole-life cost, or total cost of ownership, and quality to meet a customer's needs. Innovative solutions may (but not always) cost more initially but deliver real savings and benefits over the course of a contract.

The selection of goods and services based on price alone is still widespread. This means that the real value of an innovative or more energy efficiency option is invisible to the buyer.

The setting of the award criteria is of upmost and fundamental importance in a tendering exercise. The award criteria should be balanced, based on the required outcomes and not simply based on price, and evaluation of price should be based on the 'total cost of ownership', including maintenance, energy consumption, end of life management etc. Suppliers should be ask to show how their price has been arrived at.

> **"What suppliers really value is the opportunity to differentiate themselves from competitors on criteria other than price since this allows them to gain or keep market share by providing better value for the customer at a competitive cost."**
> *Gaynor Whyles (JERA Consulting)*

Make the title of the tender work for you!

A simple but effective way of signposting innovation and energy efficiency is to put it up-front in the title of the tender. This gives a clear and unambiguous message to suppliers and invites them to distinguish their offering on factors other than price. For example, "People centred, low emission home to school transport".

The insights and the practical approaches suggested in this chapter helped to overcome the real and perceived barriers to pro-innovation procurement within the CEPPI cities and opened the door for the use of procurement as a strategic tool to deliver better outcomes and better value.

[21] COM (2010) Europe 2020: A strategy for smart, sustainable and inclusive growth
[22] The specific targets adopted, and Europe's progress to date, can be seen at: http://ec.europa.eu/eurostat/web/europe-2020-indicators/europe-2020-strategy/main-tables

Chapter 4:
Discover: the extra edge for energy innovation

The previous three chapters outlined the CEPPI approach to taking positive action in enabling innovation in support of energy transition. They showed how to create the conditions for energy innovation in the city authority and wider city eco-system, identify and plan specific actions to bring about change, and enable and support supply chain innovation in the procurement approach. This chapter concludes with support for getting the most out of the CEPPI approach, including utilising demand pull mechanisms, financial innovation and technology innovation. This chapter does not aim to be comprehensive but rather is designed to stimulate and inspire.

BOX 16: Useful procurement of innovation resources

- **Procurement of Innovation Platform**
  www.innovation-procurement.org
  An online hub that helps public authorities, procurers, policy makers, researchers and other stakeholders harness the power of public procurement of innovation (PPI) and pre-commercial procurement (PCP).
- **The Procurement Forum**
  www.procurement-forum.eu
  A space for procurers and related stakeholders to discuss, share and connect. Documents, images and videos can be uploaded and questions or comments posted. Users can also create groups to coordinate projects.
- **Eafip (European Assistance for Innovation Procurement) Toolkit** www.eafip.eu/toolkit
  Eafip provides support to policy makers in designing PCP and PPI strategies, and to procurers and their legal departments in implementing such procurements.

DEMAND PULL MECHANISMS TO SUPPORT ENERGY TRANSITION

As discussed earlier in this report, the changing energy landscape means that the role of city authorities is widening, beyond simply being a user of energy. Although city authorities represent a small proportion of energy use in a city they can influence energy policy, infrastructure, generation and use in the wider city landscape.

In the previous chapter we considered how city authorities can adjust their procurement processes to trigger innovation and respond positively to innovation. However, driving demand via the procurement process can be enhanced when used in conjunction with other demand side measures (see Box 1). These help to create markets for innovative energy solutions and systems through for example investment choices, planning policies and local regulations.

This may be direct action, such as setting up energy companies and investing in infrastructure, or indirect action by creating the framework conditions that favour sustainable energy. These framework conditions typically remove barriers and create incentives for innovation.

For example, planning laws under local authority control encourage new developments to take pressure off the grid by favouring those with distributed energy solutions. Ultimately, however, they are all concerned with increasing demand for more sustainable energy options, helping to create a wider and credible demand for innovative solutions.

Another example is the growing number of cities that are moving towards smart zoning practices. These allow critical public services to be located in residential zones, nearer to where people live. This is a shift away from traditional zoning that restricts mixed-use developments and multi-occupancy dwellings in favour of single-family units[23]. Local Policy Measures for transport are increasingly used as a way to reduce both pollution and congestion. They include:

- Certification schemes for regulated vehicle types (e.g. taxis, freight logistics, City buses)
- Zones – either Environmental or Congestion management zones

- Other regulation, such as for access to rail stations and parking spaces in new developments

These measures can influence standards and labels by demanding standards, such as for vehicles of a given environmental performance. However, they do require extensive consultation prior to set up and the implementation phase needs to include measures to police and verify the actions.

BOX 17: Carbon reduction policy drives demand in Denmark

The Capital Region of Denmark is working towards a 60 % reduction in CO_2 emissions by 2025. Several initiatives have been launched in order to reach this goal, including phasing out fossil fuel in the Region's transport sector. To underpin this overall political aim the Unit for Logistic and Supply looked towards green alternatives when they needed to replace a fleet of diesel-driven vehicles. The authority procured 44 vehicles (34 vehicles running on natural gas, 6 electric vehicles and 4 hybrid vehicles).

The entire tendering process was initiated by a needs analysis, carried out to map the specific transportation needs within the region. Secondly, the purchasing authority engaged with the market to identify possible electric and natural gas driven vehicles that could fulfil the tender specifications and required driving range. The contract was awarded in February 2017 and will lead to an estimated annual reduction of 3.3 tonnes CO_2 emissions[24].

Environmental performance measurement and environmental certification schemes provide a useful tool for cities when it comes to differentiating between the environmental credentials of different fleet operators when they bid for the supply of services. One of the better established environmental certification schemes is the ECO Stars Fleet Recognition scheme[25], developed in a region of England but now has schemes operating across Europe.

Some City authorities are actively involved in wider energy and carbon reduction initiatives, working alongside other significant energy users in the City, ,from public and private sectors, to adopt an approach that is comprehensive and using collaboration to achieve more substantial results.

TYPES OF TECHNICAL INNOVATION

An important factor in using energy innovation procurement methods is to first understand what solutions are already available on the market. This includes the latest technical developments that offer improved energy outcomes and enable energy transition. The following subsections showcase what could be possible in a selection of sectors.

Efficiency first by reducing energy demand of buildings

- High thermal quality of building envelope through with highly efficient insulation materials and windows (U-value window: ≥ 0,8 W/(m²*K), U-value glass ≥ 0,6 W/(m²*K)) is possible
- Integration of ventilation systems with heat recovery (heat recovery factor ≥ 75 %)
- Low-Energy Heating Systems with low supply temperatures such as underfloor heating systems, heating systems with inside insulation and integrated wall heating system (for renovations) as a base for renewable based heat supply
- Pre-fabricated façade elements with integrated heating, cooling and ventilation network and energy-generating technologies (see BIPV below)

Renewable energy generation

- BIPV roof and facades: building integrated photovoltaic modules
- BIPV windows: building integrated photovoltaic glass
- PV floor: walkable photovoltaic floor
- PV streets: integrated photovoltaics modules in streets with optimized surface

[23] Cities and Climate Change – National governments enabling local action, OECD/Bloomberg Philanthropics, 2014
[24] Download the tender model: www.sppregions.eu/fileadmin/user_upload/Tenders/Region_H/Capial_Region_of_Denmark_tranport_of_goods_ENG_final.pdf
[25] https://www.ecostars-uk.com/

Efficient heat supply with a high share of renewable energy and CHP

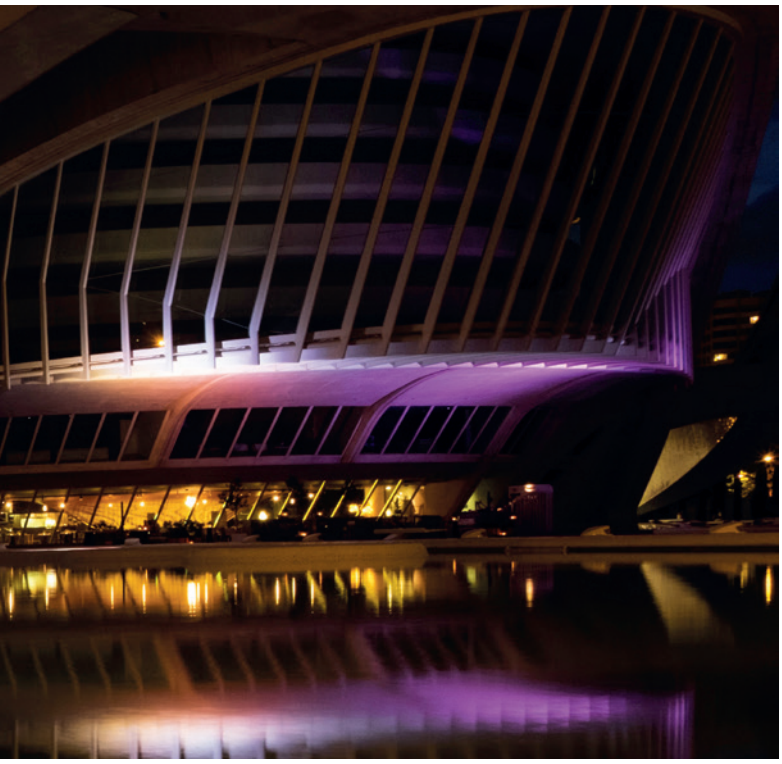
- Building heating with heat pumps in combination with photovoltaic modules. Tthermal sources for heat pump are f.ex. ambient heat, geothermal heat, agrothermal heat, waste heat from sewer or industrial sources
- Building heating with CHP (Combined heat and power) for larger buildings or properties with high electrical energy demand such as public buildings, hospitals etc.
- "Hot" district heating network for districts or large properties based on a combination of technologies: CHP, high temperature heat pumps or solar thermal energy in combination with seasonal heat storages
- Cold local heat network using industrial heat, waste heat from a nearby sewer or geothermal heat as thermal source and decentralized heat pumps in buildings

Energy storage and interconnection of sectors heat, power and transport

- Short term storage with batteries (Li-Io, Redox-Flow, etc.)
- Seasonal storage of power (P2G) and heat (ground storage)
- Integration of electric mobility by public car sharing stations

Best practice examples

- The multi-family building "Aktiv-Stadthaus" in Frankfurt a. M., Germany produces more electrical energy than it needs thanks to building integrated photovoltaics (BIPV) on its roof and southern façade. A Li-Io-Battery-system increases the direct use of the produced energy in the building. This includes the electrical energy demand of the heat pump which uses waste water heat from a nearby sewer to generate heat for building heating and hot water demand.
- The energy supplier Mainova, Frankfurt a. M., has installed Germans first Organic Photovoltaic (OPV) plant in an advertising tower. The technology enables integration of PV in windows with different transparency and flexible application in lightweight construction of canopies.
- The heating supply of the residential district "Terrot-Areal" in Stuttgart, Southern-Germany (20.000 ^{2} living area) is based on an innovative heat and power concept with renewable energy. A heat pump uses waste water heat from a nearby sewer to generate heat for building heating and hot water demand. The electrical energy demand from the heat pump and the remaining heat demand is covered by an additional CHP plant.



- The school "Willibald-Gluck-Gymnasium" in Bavaria, Germany uses agrothermal heat and energy activated piles to provide heat with a heat pump. Photovoltaics on the buildings roof provide electrical energy for the heat pump. A Vanadium-Redox-Flow-Battery increases the direct use of the produced energy in the building and contributes to the relief of the public grid.
- With 267 MW produced renewable heat in 2018 solar thermal energy in combination with seasonal heat storages plays an important role in Denmarks district heating systems.
- In Haßfurt, Germany a 1,25 MW PEM-electrolyser stabilizes the local electricity grid. Excess power from wind and solar systems is extracted and used to produce hydrogen which is fed into the local gas network on site. The Power to Gas (P2G) project is realized without public funding.
- Trial sites for PV streets where inaugurated in France's Auvergne Rhône-Alpes and the state of Utrecht, Netherlands. The energy producing PV-Panels with an optimized surface are applied directly to the existing road surface.

FINANCING INNOVATION

Finding money to invest in projects to improve energy outcomes is not an easy process for many city authorities. Lack of internal capital budgets, restrictions on borrowing and competition from other public service delivery operations frequently lead to energy related projects not being progressed, even in cases where significant savings could be made. City authorities therefore need to be creative and pro-active in sourcing financing. This may involve innovative financing mechanisms or grant financing.

Types of financial innovation

Beyond their own budgets, city authorities have traditionally used financing from sources such as EU Structural Funding, European Investment Bank, Energy Performance Contracting and dedicated national funding. In addition to these there has been innovation in the sources from which city authorities fund energy related investments. Examples of this financial innovation include:

- The City of Oslo issuing Municipal Green Bonds to allow a wide range of projects to be funded including phasing out fossil fuels for heating in commercial buildings and private households by 2020 and having the entire public transport system driven by renewable energy sources by the same year
- The Ile-de-France region launching a semi-public Energy Services Company to finance deep energy efficiency retrofits in apartment buildings
- The town of La Grange in Spain used crowdfunding to finance fast charging stations for electric vehicles with solar powered renewable energy generation
- A citizen-led energy group in Edinburgh worked with Edinburgh City Council to install solar panels on over 25 Council owned buildings. The finance for this was raised by issuing shares to local residents and a proportion of the profits are used to tackle local fuel poverty
- A citizen-led energy group based in Flanders has raised finance from the local population to fund energy efficiency and renewable energy projects. All citizens are eligible to join the cooperative and become co-owners of the project via share issue. The group is looking to expand this approach to fund LED replacement of public street lighting

Other innovative approaches to financing are being developed to help access investment from financial institutions (such as pension funds). This includes the work of the Energy Efficiency Financial Institutions Group – established by the European Commission Directorate-General for Energy and the United Nations Environment Programme Finance Initiative. One output of this work is the 'Underwriting Toolkit' which helps project developers create a more investable proposition for funders[26].

BOX 18: Securing ESIF Funding

Securing the allocation of European Structural and Investment Funds (ESIF) for CEPPI interventions was another way to overcome financial barriers in Castellón and Wroclaw where it was used to co-finance energy refurbishments of public buildings, in these cases youth schools and housing.

It is clear that a variety of financial innovations can be used to fund energy efficiency projects. This ranges from large scale strategic project finance by a greater use of municipal bonds to smaller local projects funded by citizen co-operatives.

City authorities have demonstrated a willingness to use innovative forms of financing to achieve improved energy outcomes. Engaging with local citizens and solution providers to identify where this is suitable for projects can be equally as innovative as developing new technical solutions.

Grant support

Grants provided at the national and the European level is a critical enabler for innovation. Often innovation grants focus on the supply-side. Intelligent procurers will seek to mobilise this supply-side support for the innovations they need, in for example the new procedures in the EU Procurement Directive such as `Innovation Partnerships'. Nearly all supply-side innovation support can be improved by demonstrating genuine customer needs and particularly when these represent major societal problems.

In addition, the provision of direct co-financing procurement support for customers is increasing and its necessity recognised for public sector buyers. Financing can also be crucial for improving the capacity and capability of a public organisation to manage innovation procurement. The Mutual Learning Exercise[27] on innovation related procurement concluded that:

"Financing will continue to be necessary, both to overcome first-mover disadvantages and redress the risk-reward ratio for the public procurer and to address the capacity gap on the part of public customers and suppliers. Finance should therefore encompass both co-financing and enabling aspects and work jointly to fulfil the ultimate aim of innovation-related procurement, namely securing the best possible public services and driving an innovative growing economy. Co-financing for the procurement of goods and services is a cornerstone of financing for innovation-related procurement, being a good mechanism to both incentivise and mitigate risk" European Commission, 2018.[28]

City Authorities should make use of both national and European grant programmes to enable their energy innovation procurements. More information and contract points about national programmes can be found in the report 'Mutual Learning Exercise on Innovation related procurement. Financial Mechanisms in support of Innovation-enhancing Procurement and Pre-commercial Procurement, Thematic Report, Topic C'[29].

To find out more about European Commission grant programmes, get in touch with your national contact point. The European ESI Funds[30] are another valuable source of financing for enabling innovation and innovation procurements.

[26] http://www.eefig.com/index.php/underwriting-toolkit
[27] Mutual learning exercises focus on specific R&I challenge of interest to several Member States and Associated Countries and draw on a hands-on project-based exchange of good practice. Its aim is to identify good practices, lessons learned and success factors based on robust evidence.
[28] Final report of the Mutual Learning Exercise on innovation related procurement, European Commission, 2018.
[29] https://rio.jrc.ec.europa.eu/en/policy-support-facility/mle-innovation-related-public-procurement
[30] The „European Structural and Investment Funds" or „ESI Funds" is the common designation for five European funds: the European Regional Development Fund (ERDF), the European Social Fund (ESF), the Cohesion Fund (CF), the European Agricultural Fund for Rural Development (EAFRD) and the European Maritime and Fisheries Fund (EMFF), which operate under a common framework (i.e. the CPR) as well as under fund-specific regulations.

ANNEX I: GLOSSARY OF TERMS

CEPPI sought to clarify and distinguish the terminology, arriving at the following definitions:

Procurement is the business management function that ensures identification, sourcing, access and management of the external resources that an organisation needs or may need to fulfil its strategic objectives and fulfil its function. Procurement exists to explore supply market opportunities and to implement resourcing strategies that deliver the best possible supply outcome to the organisation, its stakeholders and customers.

Tendering is the point in the procurement process when bids are invited to supply the goods or services in question.

Purchasing is the process of how goods and services are ordered. Purchasing can usually be described as the transactional function of procurement for goods or services.

Strategic procurement relates to the strategies and mechanisms used to approach and interact with the supply market that take account not just of immediate needs but also what the organisation's business future needs might be. Strategic procurement requires an active approach to market building with regard to the acquisition of goods and services that are critical to an organisation's viability. It reflects the belief that the buyer can and should influence the behaviour of the supply chain rather than accept it the way it is.

Pro-innovation procurement, literally 'procurement in support of innovation', is defined here as undertaking some or all of the procurement process, in a way that supports the up-take of innovative solutions, and/or stimulates the supply chain to invest in developing better and innovative goods and services to meet the unmet needs of the customer. It reflects was is possible and/or necessary given the situation at hand. It is a strategic use of procurement.

Innovation in this context is defined as the process of translating an idea or invention into goods and services for which customers will pay.

Innovations are new solutions that enter the market.

Sustainable or 'green' procurement is the purchase of environmentally friendly products and services, the selection of contractors and the setting of environmental requirements in a contract. This typically means buying the most environmentally friendly competitive solution that is available on the market.

PROJECT PARTNERS