

Innovative Approaches to Integrative Energy Planning – Experiences and Results from the EU Project Urban Learning

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1 ABSTRACT

Many cities in Europe and worldwide are searching for answers and effective approaches to the challenges of implementing ambitious climate objectives in liberalised energy markets while having to accommodate growing populations. Providing new infrastructure, jobs and affordable housing for city dwellers in urban areas offers unique chances for introducing renewables and largely decarbonised energy systems. At the same time, cities struggle with high building costs, urban planning approaches that only partially factor in energy planning as well as governance systems that would require much more collaboration and cooperation between key stakeholders involved in urban energy planning.

The EU project Urban Learning (March 2015 – November 2017) involved seven capital cities across Europe (Vienna, Berlin, Paris, Stockholm, Amsterdam, Warsaw and Zagreb) as well as the City of Zaanstad (NL) and focused on enhancing their capacity to work towards integrative energy planning through improved governance processes. All cities concentrated their efforts on improving governance processes in new development and transformation areas to fulfill their commitments for reducing the consumption of fossil fuels and to respond to the immediate pressure of population growth.

The consortium analysed innovative technical solutions and their implications for planning processes, evaluated existing instruments and tools and explored ways to develop governance solutions that contribute to more effective integrative energy planning. In order to improve communication and interdepartmental exchange between key stakeholders from e.g. planning, sustainability or environmental departments, each partner city installed a so called Local Working Group. Intrinsic to the project design was a strong emphasis on learning from each other and on exchanging insights, barriers and lessons learned regularly between members of the consortium, with local working group members and with other associated cities from all partner countries throughout the entire project period.

After 33 months of collaboration, a number of insights and results surfaced that can be passed on to other cities facing similar hurdles and wanting to improve their own (integrative) energy planning practices and capacities. Without a clear legal base and strategy for energy planning, integrating energy and urban planning will not work. Clear, long-term decarbonisation strategies further support cities' paths toward achieving more integrated energy planning. It also showed that more awareness is required about the need for public energy planning competences in city administrations and beyond. A key success factor includes a constantly high level of cooperation and collaboration among and across city departments and with stakeholders such as energy system operators, energy suppliers, developers and planners. This paper describes lessons learned, insights and results from the Urban Learning project highlighting concrete examples from different partner cities.

Keywords: cross-departmental collaboration, governance, energy planning processes, decarbonisation, integrative energy planning

2 INTRODUCTION

Many European cities are facing similar challenges in their quest to fulfill very ambitious climate change objectives in liberalised energy markets, while having to provide affordable housing and jobs for increasing populations. Cities are interested in finding new and innovative approaches to decarbonise their energy systems by providing energy infrastructure based on renewables in new housing developments, but are often lacking adequate tools, instruments and governance approaches.

In order to respond to these challenges and work towards more integrative urban and energy planning and enhance their governance capacities, seven European capital cities (Vienna, Berlin, Paris, Stockholm, Amsterdam, Warsaw and Zagreb) as well as the City of Zaanstad (NL) collaborated in an EU Project called Urban Learning. Major emphasis was placed on increasing communication and collaboration across city departments involved in urban or energy planning to work towards more integrated planning processes. To

that end, cities created multi-stakeholder working groups who have been ideal platforms for exchange at city level.

Cities benefit greatly from a thorough analysis of existing instruments and tools and from creating a complete scheme of their urban planning processes in order to better understand where energy aspects are missing, what adaptations might need to be made and which external stakeholders should be involved. An adapted, upgraded version of processes including energy aspects then serves as the basis for implementation plans.

This paper describes a number of important lessons learned and key insights from the Urban Learning project that can be passed on to other cities interested in a more efficient and more integrative urban and energy planning approach.

3 THE SCOPE OF URBAN LEARNING

The core objective of the Urban Learning project was to enhance existing governance processes in eight different European cities in order to achieve more integrative energy planning. Please refer to figure 1, which depicts the steps in the project described in the following chapters.

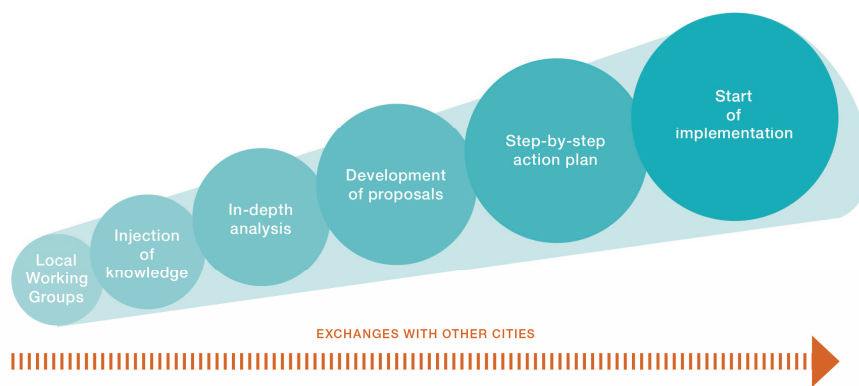


Fig. 1: Main steps in the Urban Learning project: Source: Schmid, 2018

3.1 Why integrative energy planning?

One of the major reasons for all partners to participate in this project was that it was very difficult in day-to-day planning activities to integrate energy issues as a rule into existing planning processes. With an eye on climate objectives, however, cities are very much interested in finding appropriate energy supply solutions for (new) urban developments. These include building/ developing low-energy buildings/quarters and using on-site renewables on the demand side to implementing innovative district heating and cooling systems (low-energy networks, etc.), smart grids and new storage systems on the supply side. Moreover, it includes also the finding of criteria for steering the development of renewable sources and grid-bound energy carriers, mainly gas and district heating, in an efficient way. A focus on system integration also requires to consider implications for the planning process in a timely manner. Urban planning processes and the way buildings are being constructed (volume, surfaces, uses) as well as the whole structure of quarters (densities, location of grids and possible storage systems) very much impact energy demand and energy use. Thus, urban planning and energy planning need to be much more interwoven than they have been in the past.

In the Urban Learning project, the consortium used the term ‘Integrative energy planning’. For purposes of this project, it is defined as an institutionalised means to integrate energy aspects (demand and supply-side) in more or less standardised urban planning processes. Investing in energy infrastructure also requires a more integrative approach since it is installed for the long-term and often rather costly. In order to achieve such an integrated approach, urban and energy planners, energy utilities, local decision-makers, investors, developers and other stakeholders need to collaborate during all phases of the planning process and in particular at the very beginning.

3.2 The role and lessons of multi-stakeholder groups

One of the major vehicles of the project to improve the status quo of urban and energy planning in each of the Urban Learning cities, was to set up and install a so-called ‘local working group’ in order to initiate an interdisciplinary dialogue across various city departments and support institutional capacity building. These groups typically include representatives of all relevant city departments such as e.g. urban and energy planning, mobility, environment, sustainability, etc. Some cities such as Berlin included other stakeholders highly relevant to an integrative approach to planning such as energy suppliers and grid companies or housing and tenant associations from the very beginning (Schmid et al., 2015). Others including Vienna chose to work with a core group of representatives from city departments initially. In the course of the project, Vienna formed a new working group that also included representatives from energy and grid companies, because it enabled faster decision-making.

Specific topics discussed at the local working group meetings vary and are tailored to the needs of each of the cities. The number of times they convened also varied from a few times a year to once/month. E.g. the group in Stockholm met about once/month because it was a small executive group of individuals who discussed project specificities that affect the Royal Seaport area and also ensured that lessons learned were directly transferred to the city level (Gigler et al., 2016).



Fig. 2: Local working group meeting in the City of Zagreb: Source: Gigler et al., 2017

Since local working groups played such a key role in the projects, all cities invested considerable time in selecting representatives for the groups that were to work together for years to come. Efforts were also made to foster trust between members, create stable attendance and high levels of motivation. Attention was also paid to allowing for a good transfer of personal learning from members to their respective institutions/organisations who are then responsible to make the necessary changes (Schmid et al., 2015). In particular, the groups focused on increasing understanding of framework conditions in each others’ respective organisations and they spent considerable time in drafting the cities’ planning processes as they currently stand.

3.3 Lessons from other means of exchange and vehicles for learning from one another

Aside from the local working groups, the project consortium very much focused on maximising possibilities for exchange and discussion during project meetings and it reached out to different groups throughout the project in order to spread new insights and to learn from one another. Workshop formats and time for bilateral meetings between cities and individuals were the preferred means of exchange during consortium meetings. As the project progressed, this time for in-depth discussions became more and more valuable to all partners.

All cities also went on several (inter)national study tours and collaborated with so called ‘inner circle cities’ in their respective countries to learn from each other (Uong et al, 2017). Each partner city selected a number of cities within its own country to pass on project insights and obtain information from participating cities on e.g. effective tools and instruments or new and innovative combinations of technologies. The dialogue which ensued during those meetings was highly valued by project partners and will continue even beyond the end of the project.

Communication in local working groups, with inner circle cities and in local/regional/national workshops took place in the partners' native languages which was a great advantage given the highly complex nature of the subject matter. Comparing planning systems from seven different countries or different tools and instruments and how they function, understanding advantages and drawbacks proved to be very difficult in English. Therefore, it took the consortium considerable time to understand the ins and outs of all systems/tools/instruments and to find common ground.

4 ANALYSES OF URBAN (AND ENERGY) PLANNING PROCESSES

The starting point of the approach was an in-depth analysis of instruments and tools as well planning processes. Based on the insights of these analyses, each city developed an approach to integrate energy into the planning process and adapted the related framework such as regulations. Finally, each partner created implementation plans containing concrete steps and a time-frame.

4.1 Results from the status quo analyses of instruments and tools

The main task at the beginning of the project was to thoroughly analyse the status quo of how urban and energy planning actually was done in each of the cities. To that end, an analysis of instruments and tools currently used was undertaken. In parallel, cities began to assess their current governance processes for new developments or transformation areas (see figure 4.2). Initially, all partner cities focused on gathering all relevant tools and instruments that might be relevant to integrative energy planning at all spatial levels (city/region, district, quarter, building). In this process, a total of over 170 instruments and tools (104 instruments and 66 tools) surfaced. A more detailed analysis reduced that number to 22 tools and 22 instruments which proved to be most relevant to urban and energy planning in each of the cities. The majority of instruments have strategic character (partly mandatory) or they are mandatory regulations and laws (Meskel et al., 2017).

A thorough analysis across all cities resulted in a number of findings (Meskel et al., 2017):

- Adequate instruments for energy planning are still lacking
- Missing frameworks hinder the integration of energy issues in contracts or competitions
- Diagnosis tools for early planning phases need to be improved
- Monitoring tools after the implementation phase are rare

Cities are already in the process of developing new ideas to overcome the above described current limitations. Amsterdam has developed an Energy atlas which serves as a database for the TRANSFORM tool (Decision support environment utilizing the power of energy data) which is used to generate maps based on energy and urban planning data and is going to be adapted for use all across the country (<http://urbantransform.eu/decisionsupportenvironment/>). The City of Stockholm wants to further develop their SRS Monitoring tool which is currently used for the Royal Seaport area only, but is intended to be adapted and applied city-wide. Vienna is using public property development competitions to ensure a high level of quality in the subsidised housing sector in 4 different areas (economy, ecology, social, architecture). All the above examples demonstrate that a number of valuable instruments and tools that consider energy aspects already exist. In many cases, they need to be either adapted or streamlined or made available in more than one context (e.g. subsidized housing and beyond) (Meskel et al., 2017).

4.2 Insights from the status quo analyses of urban (and energy) planning processes (governance processes)

During local working group discussions, city departments realised that urban planning departments were only partially aware of their respective complete planning processes and how energy issues are currently being handled. Therefore, each city embarked on drafting what the process currently looked like in a step by step manner for any given development area from the initial idea to project implementation. This step required detailed interviews with experts responsible for different planning phases, single elements, decision-points, instruments, subprocesses, etc. of any given phase. The following figure provides a simplified overview of an urban planning process which is the common denominator of all cities' planning processes.

Simplified URBAN PLANNING PROCESS

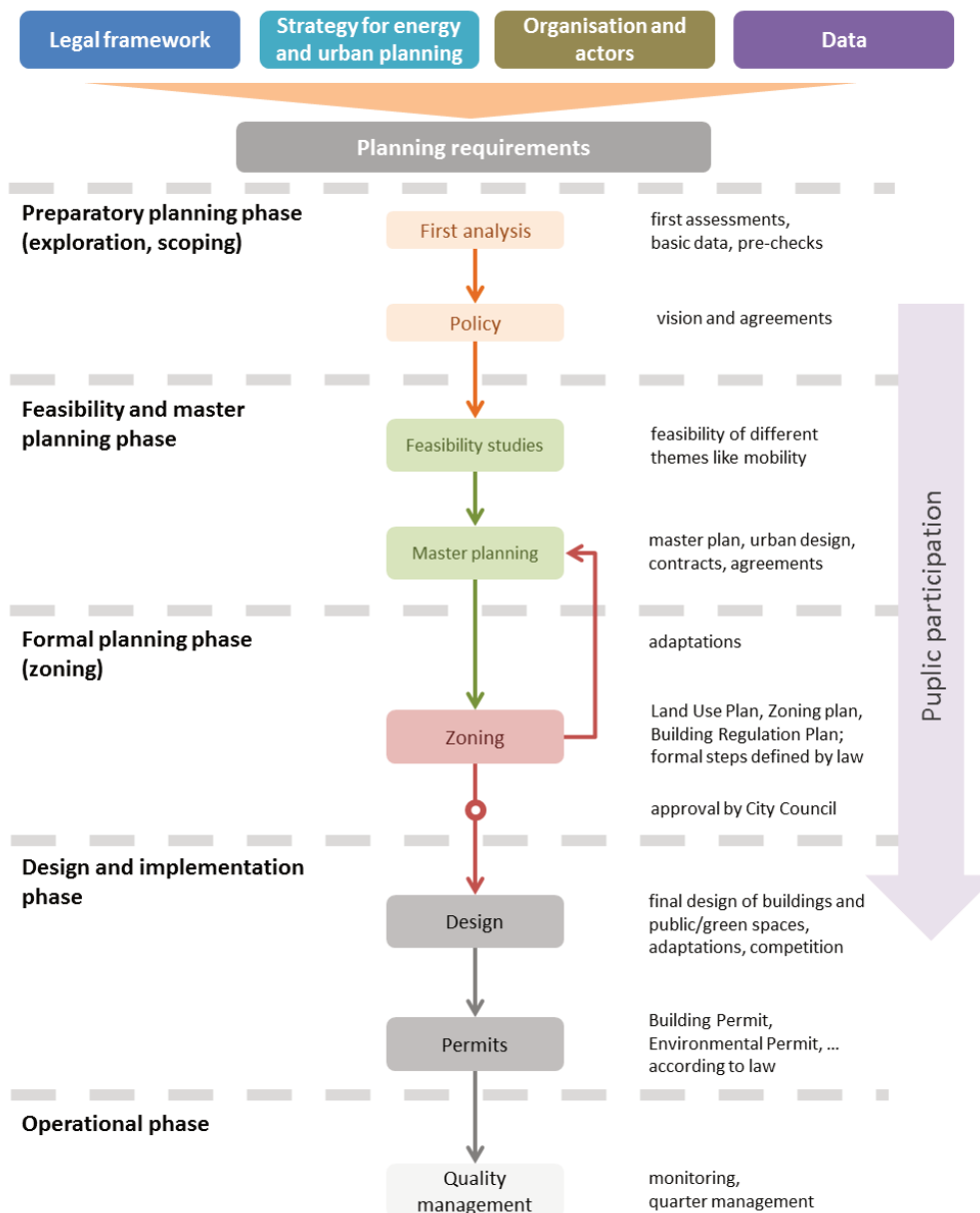


Fig. 3: Simplified urban planning process; Source: Hemis et al., 2017a

This process turned out to be much more time-consuming than anticipated and at the same time tremendously valuable for all city partners, because these governance processes ended up being the basis for all further steps in the project (upgraded integrated energy and planning processes and implementation plans). Discussions about integrating energy and urban planning centered around energy supply for an area. The complete process overview also allowed each stakeholder/city department who may only be responsible for one particular element to understand the entire process, the terminology and all its individual steps and enabled stakeholders to become aware of potential deficits and losses of qualities regarding the need to conduct integrative energy planning (Hemis et.al, 2016).

4.3 Cities in need of upgraded governance processes

In a second step, the cities focused on developing proposals for an upgraded governance process that included new and adapted approaches towards more integrative energy planning. The upgrades not only included changes that affected planning (processes) directly, but rather the legal framework, strategies or potentially required changes in organisation as well (refer to the top of figure 3). For each phase, the changes could include a number of options: completely new instruments (e.g. separate energy zoning plan) or

adaptations (e.g. integration of energy in urban contracts), new tools (assessment tool of the energy system for different planning stages), new stakeholder(s) or new elements (e.g. a consortium which assesses energy aspects for each project). Figure 4 indicates a number of options according to the urban planning phases.

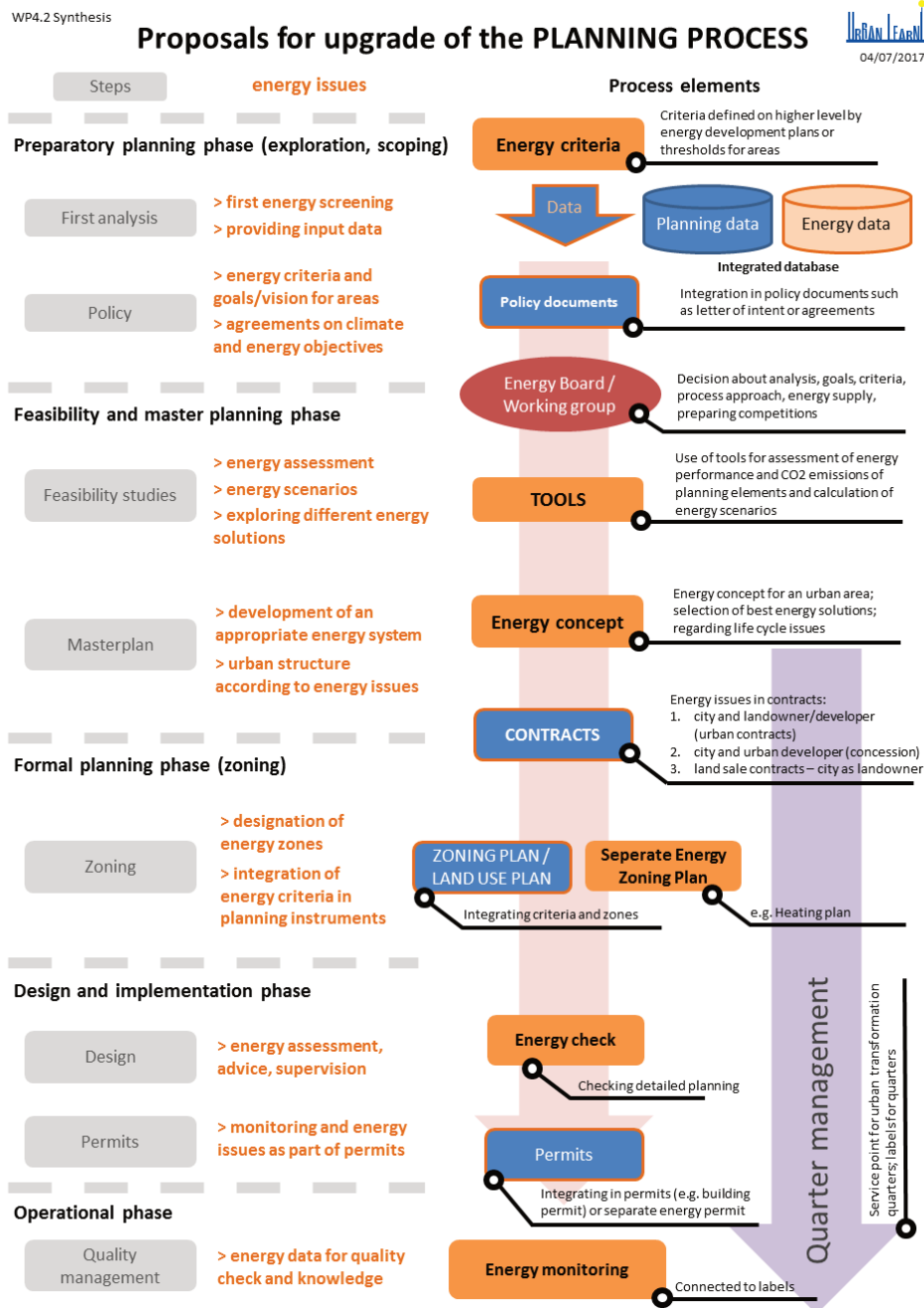


Fig.4: Proposals to upgrade urban planning processes; Source: Hemis et al., 2017a

This process turned out to be crucial for the cities and took a significant amount of time for a number of reasons:

- the cities are very much under pressure to fulfill their objectives to decarbonise the energy system: new developments are thus being observed closely and often carry a high potential to install low-carbon energy infrastructure. Decisions need to be made at the very beginning of the planning phase whether grid infrastructure is being installed or a combination of different renewable energy sources.
- the legal framework and strategic level were highly relevant to the entire process and needed to be linked to the operational level (Hemis et. al., 2017a).
- governance processes need to focus on the quarter or the district level rather than just the city or the building level to optimise possibilities for energy generation and storage across buildings and quarters (Hemis et. al., 2017a).

- each proposal for an adaptation of an existing tool or a proposal of a new process element required negotiations between a number of internal and external stakeholders and different municipal departments before it was adopted into the draft planning process.
- in several instances, different cities were inspired by good practice process elements from another city and proposed its implementation (e.g. SRS monitoring tool from Stockholm, Ecolabel from the City of Paris, etc.)

Case study from the City of Paris

The City of Paris is in the process of developing a new Climate Action Plan (2018), which will contain a carbon-neutral vision for 2050 and a comprehensive roadmap for 2030. Based on discussions in Urban Learning, those objectives will be part of the Land Use Plan (PLU) which can set requirements for buildings, blocks or districts. This link between a strategic document and the land use plan is very important in order to place binding requirements in the PLU. As depicted in Figure 4, the City is also currently developing an Energy Master Plan (adopted in 2019) for the city and the metropolitan region. This plan will include requirements for heating and cooling and at least 50% of the future energy demand needs to be covered by renewable energy sources. Potential changes on the district heating grid are also included in the Energy Master Plan (Hemis et al., 2017a). It will be the basis for new concessions between the City and energy providers.

Another very important element in the operative phase, which was initiated during the project period, is the Energy Board whose responsibility it should be to assess development-related studies, define criteria and negotiate with energy companies regarding supply options. Concessions contracts with developers and land sale contracts will then include the negotiated elements. Throughout the entire operative phase of an urban development project, a so-called eco-district management should be in place with district managers responsible for assessing progress and coordinating stakeholders. Once the project is concluded, it is planned to install a monitoring regime to make sure that the objectives set in the planning phase are actually achieved during the operative phase (Hemis et al., 2017a). These elements were already used in the area of Clichy-Batignolles and should be transferred to other areas.

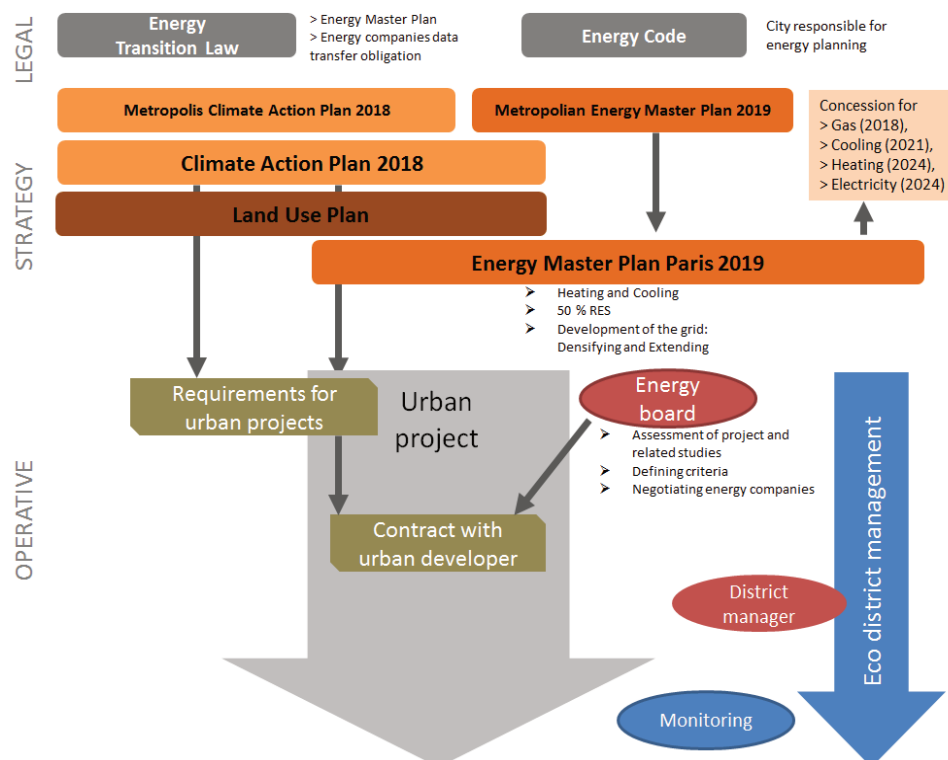


Fig. 5: Overview of the integrative energy planning approach of Paris, Source: Hemis et al., 2017a

4.4 Towards implementation

In a last and final step, the cities drafted implementation plans which built on the previously developed approaches of the upgraded governance processes. At first, each city selected key elements that should be

part of the plan such as strategies, instruments, tools or monitoring requirements, etc.. Thereafter, necessary decisions and actions as well as responsibilities were defined to ensure that the necessary steps towards realisation are carried out. Lastly, a suggested timeframe was added which ended up being a phase of several months to a number of years depending on the element. Each city spent considerable time in discussions with high level administrative and political representatives before defining elements of the plan. All cities committed themselves to implementing elements of these plans step by step in the coming years.

The synthesis across all cities showed that certain elements were particularly important to have in implementation plans in most cities. Energy data and studies provide a necessary basis to understand a situation in a given development/city and is necessary to make energy-related decisions especially in the case of using binding instruments (Energy Atlas Berlin, Paris 3D model integrating energy, etc.). Similarly important are visionary documents and strategies that have an integrative function and guide cities in their energy policies (Agenda Sustainable Amsterdam, Energy strategies for urban projects in Stockholm, etc.). Some cities also intend to define new/adapted administrative responsibilities for integrative energy planning, because appropriate administrative units do not yet exist (Zagreb) (Hemis et al., 2017b).

Finally, the implementation of a certain energy supply system for an area should be ensured by using planning instruments. That could be a new instrument such as a heating plan (Amsterdam) or an adaptation of existing ones (e.g. by integrating energy zones within the zoning plan). Also, the use of contracts between the city and the developer (concession contracts) or the land owner (urban contracts or land sale contracts if the city is the land owner) plays a crucial role (Paris, Zaanstad, Warsaw, Vienna). Tools are important to support the city administration to assess and find energy solutions for an area. Monitoring (Stockholm Royal Seaport Area Monitoring) will help to assess the efficiency of the chosen energy system and can serve as a quality management tool.

5 KEY INSIGHTS AND RESULTS

There are a number of important lessons learned that can be passed on to other cities which are in the process of working toward more integrative energy planning and a largely decarbonised energy system.

Successful integrative energy and urban planning needs a strong focus on clear legal and strategic frameworks such as long-term decarbonisation strategies or on defining the energy planning competences and goals of a city in legal instruments (e.g. in the Planning Act). It is equally important for cities to create a supportive and efficient organisational framework and to dedicate sufficient staff with clear mandates, responsibilities, financial resources and political support to the process. Such a unit or subunit/group in an organisation would assume the role of a ‘keeper’ for integrative energy planning for the long term. (Hemis et al., 2017a). During the analyses it became evident that there is a need to increase energy planning competences in city administrations and beyond to ensure that there is sufficient understanding of all key elements and decision-points in the process and support for the integrative energy planning approach.

It became very clear early on in the project, that excellent data management and comprehensive energy and urban planning databases (GIS) across departments are invaluable for cities. This is needed to increase the knowledge about energy, to have a basis for decisions on the energy supply and finally to justify any measures and regulations for energy. Additionally, there is a need for good models that help in assessing and evaluating the situation in different planning phases and in developing forecasts and scenarios (Hemis et al., 2017a).

Developing planning processes charts that depict the status quo of governance processes and illustrate all relevant elements/decisions points/boards/stakeholders is an important first step for cities to obtain a visual overview and have a tool available that can easily be shown to internal and external stakeholders. In a second step, cities need to add energy-related aspects and create an upgraded urban and energy planning process with a focus on integrative energy planning which is then the basis for an implementation plan. (Hemis et al., 2017a). This approach could be transferred to other important processes (e.g. building permits or other instruments).

Since energy planning is a cross-sector topic, interdepartmental collaboration within administrations and a continual dialogue and cooperation with external stakeholders such as energy providers, grid operators, developers, planners, etc. has proved to be highly relevant in the overall process. To that end, cities can

establish working groups which meet regularly and exchange/decide on integrative energy planning aspects for development areas (Schmid, 2017).

Particular attention needs to be paid to the early planning phase, because decisions on the type of energy supply need to be made very early on in any development project. This is especially true for grid-bound infrastructure such as district heating. It is important that energy is integrated in every step of the whole process till implementation and to reduce losses of qualities between phases while using appropriate instruments and tools.

The important spatial level for integrative energy system solutions is the quarter or building level, which enables to handle energy demand, generation and storage of different buildings and to increase overall efficiency. At the level of quarters, district quarter managers who function as keepers of the development process are required to ensure that all energy planning aspects are carried out as planned in the different planning phases. Since such developments are often long-term, management continuity is key to a successful approach.

All cities agreed that monitoring the performance of buildings at several time-points after completion is necessary, because it would provide an invaluable check whether objectives have been reached/not reached or even overachieved. Feedback from monitoring serves as an instrument for quality management and can be used to adapt policies, energy performance requirements, etc.

The above list constitutes a condensed version of important insights and results that the Urban Learning consortium in cooperation with all its city partners and external partners gained throughout the project period and beyond. A number of the above lessons have already been tested or are already being applied in Urban Learning cities. In the coming years, cities will strive to implement their plans as set out during this project.

6 CONCLUSIONS AND OUTLOOK

In response to the need to decarbonise their energy systems, cities are looking for innovative approaches to utilise innovative district heating and cooling systems and to increasingly install renewable energy technologies when planning and constructing new housing developments. However, existing urban planning approaches often do not sufficiently include energy planning aspects and lack governance systems with a high level of interdepartmental and cross-sector collaboration.

Therefore, the Urban Learning consortium joined efforts to find new and innovative governance approaches towards more integrative energy planning. One of the major success factors towards that goal were multi-stakeholder groups, installed by each city, with the explicit aim to increase collaboration across planning departments thereby increasing their capacity towards better integration of urban and energy planning. The consortium also strongly emphasised continuous learning – through exchange at city level, with other national and international cities as well as through numerous dissemination activities and strongly benefitted from that approach.

It is also crucial that cities draw up their own planning processes and integrate energy aspects into the existing process. Involving multiple stakeholders and making potential deficits and chances visible to internal and external stakeholders through these process schemes, carry a high potential to speed up the implementation and change process.

Examples from cities such as Paris illustrate the importance of having a strong legal and strategic framework guiding the governance process and establishing clear links to the operative planning level by changing the land use plan and installing an energy board with key competences and decision-making power for urban development areas.

Installing strict monitoring regimes to assess whether the actual performance of buildings after completion correlates with objectives set in the planning stages is very important for cities, because insights gained can be directly used to adapt existing policies or requirements.

This project has kicked off a large number of processes, connected individuals across departments, generated numerous ideas and recommendations that can be invaluable for cities who are interested in improving their governance capacities and implementing more integrative approaches towards urban energy planning. More details for interested individuals and city partners on all aspects described in this paper and beyond can be found on www.urbanlearning.eu (e.g. deliverables, publications, toolbox, videos, etc.).

7 ACKNOWLEDGEMENT



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