

# URBAN LEARNING – Joint Learning towards Integrative Energy Planning in European Cities

*Herbert Hemis, Marko Matosović*

(Herbert Hemis, City of Vienna – Department for energy planning (MA20), herbert.hemis@extern.wien.gv.at)  
(Marko Matosović, Energy Institute Hrvoje Pozar – Department for Energy System Planning, mmatosovic@eihp.hr)

## 1 ABSTRACT

This paper gives insight about EU project URBAN LEARNING (H2020 energy call) which began in March 2015 and will be concluded in August 2017. The article carries out the idea and structure, first results and expected outcomes.

The project includes seven capital cities across Europe (Vienna, Berlin, Paris, Stockholm, Amsterdam, Warsaw and Zagreb) and the city of Zaanstad (NL) which all face the challenge of considerable population growth while being committed to significantly reduce fossil energy consumption and CO<sub>2</sub> emissions. E.g. Stockholm grew by more than 12.000 people/a (1.5%); in the next 10 years Vienna has to build for 200.000 new people.

Efficient and effective planning processes will be crucial for addressing this challenge. The project cities aim to enhance the capacity of their local authorities on integrative urban energy planning in response to new challenges from EU EPBD (Directive 2002/91/EC and 2010/31/EC), EED (Directive 2012/27/EU) and RES (Directive 2009/28/EC) directives as well as to changes of technologies and market conditions and the pressure to provide sufficient, affordable housing.

The project emphasizes governance processes related to the (re-)development of urban areas. While some cities already started ambitious urban development projects, the institutionalisation of these experiences is missing. The cities are aware and willing, but lack of knowledge, lack of time and sometimes less collaboration across city departments impair this development. External stimulus is needed to overcome these barriers. Project partners address these issues collectively with key stakeholders, such as network operators and energy suppliers and share their findings amongst all cities.

Focus is on multi-disciplinary learning - the project concentrates on innovative technological solutions, instruments and tools and most importantly focuses on innovative governance elements. This will provide potential approaches toward integrative urban energy planning. Developed tools and process improvements will also be implemented in the inner circle of smaller cities under the guidance of each national partner.

In each city a local working group, comprised of experts of various city departments and stakeholders involved in the planning processes, was installed. These groups will help to ensure the implementation of results and outcomes.

## 2 STRUCTURE AND CONTENT OF THE PROJECT

This EU-project is divided into four main work packages:

- analysis of innovative governance solutions for integrative urban energy planning and improvement of that process,
- innovative technological solutions,
- analysis of instruments and tools used,
- development of governance models for replication.

The first, and key work package „Innovative governance solutions“, will be explained in the next chapter with first results of the analysis.

„Innovative technological solutions“ include technological options on the demand side (low-energy to nearly zero-energy buildings and quarters including on-site use of renewable energy sources) as well as the whole spectrum of innovative supply technologies and systems including innovative district heating and cooling solutions (low exergy or energy networks, fed from various renewable energy sources and/or waste heat, decentralised combined heat and power, etc.), smart grids and new storage possibilities. Of particular interest for the analysis are aspects of system integration and its implications for the planning process.

The core of this task is a SWOT analysis of selected innovative solutions and combination of technologies. Input is provided from experiences from ambitious (re-)developments in the city, new findings from national

research and demonstration as well as interesting examples of other cities. A crucial step of the analysis will be the identification of implications from innovative technological solutions for the process of designing and planning urban (re-)development projects.

„Instruments and tools“ relate to instruments and tools currently in use and those that might be needed in the future to integrate energy aspect in the spatial planning/urban planning process as well as in the planning of urban areas, the latter being the core of the analysis.

All local partners mapped currently used instruments and tools, and analysed them based on a common grid developed by the project partners. The analysis focused on the effectiveness of the current instruments and tools for integrating energy aspects into the planning processes and identified the influencing factors. It considered different tools from the perspective of the different stakeholders involved in the process. The following figure shows an overview of the analysed instruments and tools by type and spatial level in Zagreb.

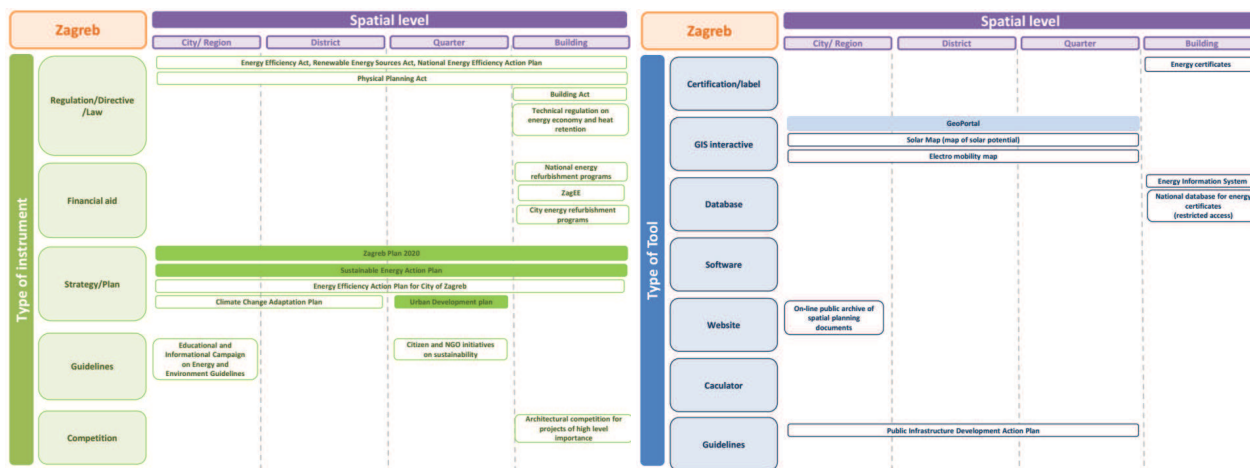


Fig. 1: Simplified mapping grid for used instruments and tools in Zagreb

In the above figure, left grid depicts relationship between spatial level and type of instrument (legal documents, financial aid, strategies and plans, guidelines, competition) used in spatial and energy planning. Spatial level spans from the City/Region level to the individual building. The right grid in the above figure shows same level of information, but for different tools which are used in the planning process – such as GIS tools and interactive maps, databases, software, websites, or calculators. The highlighted instruments and tools will be considered more in detail.

Mapping and analysis are shared between the cities to identify common elements as well as shared interests in current practices of other cities. The experience from other cities will be used to include an outside view on the current state of the art process in each city.

Project partners have so far undertaken most of the foreseen analysis and stocktaking work, and are now focusing on research of innovative solutions and ways to improve current governance process.

### 3 ANALYSIS OF CURRENT GOVERNANCE PROCESSES

#### 3.1 Urban planning and energy planning as governance processes

In the context of the project the „governance process“ is an administrative management process related to integrative energy planning as part of the design and planning of urban areas, involving various departments of the city administration as well as their respective negotiating and/or contracting parties. Mostly it includes the adaptation of urban planning instruments such as Land Use Plan.

„Integrative energy planning“ in this project is defined as the integration of energy aspects into the urban design and planning process(es). That includes energy planning of supply and demand and involving all relevant parties as early as possible.

The analysis focuses on the way urban planning of (re-)developments takes place in the city administrations today, and in that way provides the baseline and stocktaking of current situation, procedures, pros and cons, and identification of best cases, by addressing the questions:

- which planning instruments are used and how is the procedure of adapting them,
- how, at which moments and by whom energy aspects are addressed,
- how key target groups are being involved,
- how it should take place for effectively integrating energy aspects in the planning processes.

One main outcome is a readable process map of the this/these identified planning process(es) and tables of assessing energy aspects for each process element. The following figure shows one example of such a process map for Vienna. For the implementation phase and the case of subsidized housing additional process maps exist which will be developed and adapted as ‘living maps’.

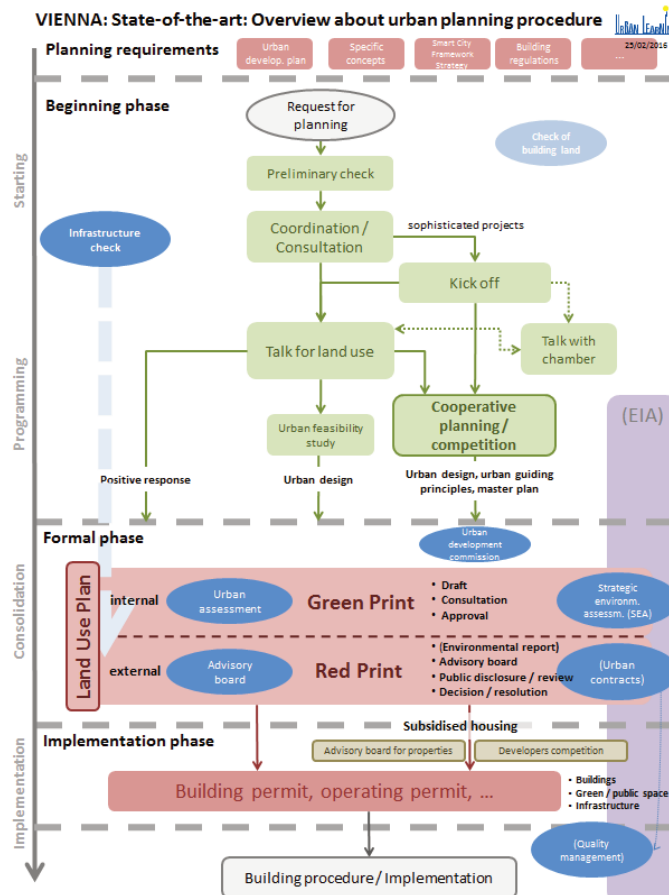


Fig. 2: Simplified process map of the urban planning process in Vienna (draft)

One lesson learned in this project is that using figures of simplified process maps is very helpful for communication, knowledge transfer and identifying information gaps. It also makes the loss of specific requirements defined in the beginning of the process more transparent.

### 3.2 First main findings

The urban planning process is predominantly similar in the reviewed cities. The development of urban areas needs much consultation and negotiation over years. The latter is the main focus in Amsterdam and Zaanstad. Results of this phase fixed within the Land Use Plan and/or Building Regulation Plan. This/these binding planning instrument(s) exists in each city on a scale of 1:1000, without regarding energy matters. Differences in the planning process were identified as follows: in the duration, adaptation procedure of the planning instruments, use of other planning instruments or tools, involvement of districts due to competencies (especially in Berlin where the districts are responsible for the Building Regulation Plan) and level of public participation.

Energy is mostly a subtheme of climate protection (mitigation) or sustainability. Hence, the environmental departments are mostly responsible for general energy activities, but have no competency for energy planning. Warsaw, however, does have an energy planning approach headed by the infrastructure department. Energy planning is predominantly done by the energy provider.

Therefore, energy is not a highly relevant issue in the planning process at the moment. Other themes/issues such as green space or mobility have more importance in the planning process than energy. Therefore, up to now no partner city follows an integrative energy planning approach. That means urban planning and energy planning are not regularly connected or energy is not an essential part of urban planning. Energy solutions for new developed areas or buildings are decided by energy providers or commitments are made between developers and utilities. There is no steering of centralised energy systems such as district heating by the city (for instance by defining zones) or defining general energy criteria for districts and quarters. Possible reasons for this situation are missing legal framework that energy should be an integrative part in urban planning or seeing the responsibility for energy planning lies with the energy provider (especially due to privatization). Furthermore, the developer or property owner wants to avoid additional costs when high energy standards going beyond national regulations need to be fulfilled. So there is no support from the private sector.

However, there are voluntary possibilities to integrate energy matters in urban development processes. Some partner cities already have lighthouse projects that include first approaches toward integrative energy planning. A good practice case is the development area Clichy Batignolles in Paris where energy is part of the planning process. The following figure shows an overview of the phases for urban development and the orange points indicates where energy could be regarded. In the beginning phase (“Preliminary studies”) an energy assessment of energy needs and scenarios was done. Based on these results, possible energy solutions were identified. Aims for energy like share of renewables for heating were fixed by a development concession contract between the city and the responsible urban developer carried out by tender. Later in the operational phase these scenarios were further developed by using a multi-criteria analysis grid (as part of “Feasibility”). The input of this assessment provide a basis for energy criteria of land sale contracts as well as for tender of developer competitions in the implementation phase (see points “Design” and “Delivery”). Finally, there is an energy check of the building permit. Follow-up monitoring is planned. Such lighthouse projects can serve as drivers and urban living labs. Nevertheless they are difficult to replicate due to funding or special interests for an area.

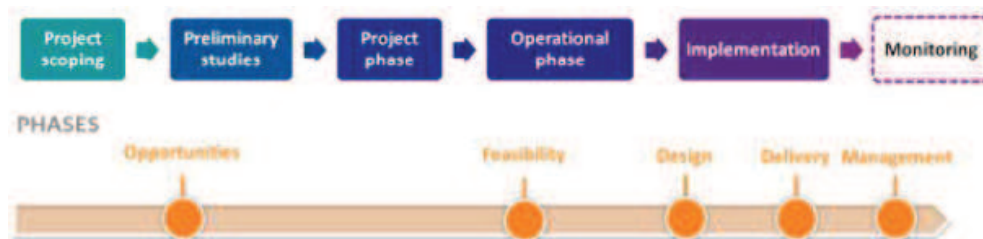


Fig. 3: Urban development process and integrated energy issues in Paris

That leads to the next finding: a city can define and ensure high energy criteria beyond national regulations (e.g. heating demand for buildings) if they are land owner. For instance, Stockholm defined 60% energy efficiency of the national requirements for new buildings (e.g. heating demand) in the Royal Seaport area since 2009. This requirement is already applied by the Environment Programme 2012-2015 throughout all developments in Stockholm. Criteria like this example could be part of land sale contracts. A high share of land owned by the city, as is the case in Stockholm, Paris and Amsterdam, is an advantage for developing integrative energy planning procedures. In the case of private landownership, the city could integrate energy issues in voluntary contracts. This possibility is not used; however private owners have less interest in additional criteria beyond national regulations, which could lead to high investments.

A further finding was there are a lot of energy guidelines and tools available such as potential cadastre for geothermal energy or solar energy, but little knowledge or support to apply them.

Finally, urban planning has already a strong indirect impact on energy efficiency for instance due to regulation of the building density and mixture of uses or the accessibility of public transport.

The results and findings of this analysis will be published in a synthesis report on the project homepage (see references).

#### 4 CONCLUSIONS & OUTLOOK

The projects cities have ambitious goals to reduce greenhouse gas emissions – for instance Berlin want to be climate neutral till 2050 (-85% of GHG till 2050) or Stockholm set the objective of being fossil free in

2040. In addition, the cities face strong population growth and boosting prices for land as well as rent. With these framework conditions it will be a challenge to reach the energy-relevant objectives.

For achieving the defined ambitious energy-relevant objectives, it is necessary to strengthen the use of renewable energy sources instead of fossil sources. The cities recognize a need for more collaboration or cooperation with the energy provider to find the best solution for urban development areas and to change the energy sources used (e.g. to integrate waste heat into an existing district heating system). It is useful to steer and designate which areas are applicable for centralised or decentralised energy systems in a long-term view. The hardest challenge will be improving the existing energy system within the building stock. The cities have to coordinate refurbishment activities with changes in the energy supply and integration of renewables especially solar energy.

Some project cities – at the moment strongly Amsterdam and Zagreb - face a change in the planning system relating to responsibilities, instruments, planning levels and processes. This might be a window of opportunity to integrate energy matters. The project cities will support each other with experiences and knowledge.

The project cities will integrate experiences of other cities and lighthouse projects in the planning processes. This should lead to an upgrade of the planning process(es) and testing of new governance elements or instruments as well as tools. For instance, a city can use an energy assessment in the beginning phase for an urban area to identify different options for energy solutions depending on waste heat sources, potentials for renewable energy sources and existing energy infrastructure. The best solutions can be achieved through urban contracts or concessions. Further exemplary possibilities for integrating energy issues could be:

- energy studies similar to mobility assessments
- energy as objective and important part of the planning law
- assessing planning instruments for inclusion of energy matters and related procedures
- use synergies (green space, mobility, ...)
- using legal instruments especially urban contracts
- help and guidance in applying tools and instruments

However, most important will be the insight on which points in the process which energy criteria are most crucial and with which instruments and tools can help to ensure. It is important to know which building density avoid or enable which kind of energy supply. This has a strong influence for the possible usage of renewable energy sources for heating and cooling. The challenge is to assess and consider long-term impacts of energy solutions about costs and emissions within a fast-paced market. The development of areas has a long duration and needs the coordination of different building phases. Moreover, cities also have to include the security of energy supply in their considerations. Finally, the result of this step in this project will be a blueprint of upgraded governance processes till the end of 2016. Based on these blueprints an implementation plan and models for replication will be developed as a final result in the summer of 2017. The involvement of city administrations, the local working groups and stakeholders should ensure the implementation in each city after this project.

## 5 REFERENCES

The content of this paper based on the results generated within the project by the involved experts from the cities and their partners.

More information on: <http://www.urbanlearning.eu/>

Following deliverables of the EU project will be soon available on this webpage:

- > Deliverable 2.1 Analysis of innovative technological solutions for ambitious urban (re-)development projects, Urban Learning, 2016
- > Deliverable 3.1 Instruments and Tools – Common analysis grid, Urban Learning, 2016
- > Deliverable 3.2 Map and review of used instruments and tools, Urban Learning, 2016
- > Deliverable 4.1 Analysis of the current governance process – Synthesis report, Urban Learning, 2016