



Integrating energy in urban planning processes – insights from Amsterdam/Zaanstad, Berlin, Paris, Stockholm, Vienna, Warsaw and Zagreb

Synthesis report of Work Package 4
“Innovative governance solutions for integrative urban energy planning”
(Deliverable 4.2)

July 2017



This project has received funding from the *European Union's Horizon 2020 research and innovation programme* under grant agreement No 649883.

PROJECT PARTNERS

Jérémie Jaeger ■ TINA VIENNA GMBH (COORDINATOR)
■ AGENCE PARISIENNE DU CLIMAT ASSOCIATION

- GEMEENTE AMSTERDAM
- BERLINER ENERGIEAGENTUR GMBH

Jérémie Jaeger ■ ENERGETSKI INSTITUT HRVOJE POZAR
■ VILLE DE PARIS

- STOCKHOLMS STAD
- MIASTO STOŁECZNE WARSZAWA
- MAGISTRAT DER STADT WIEN
- GEMEENTE ZAASTAD
- GRAD ZAGREB

Main author: Herbert Hemis (MA 20 – Department for energy planning, City of Vienna)

Review: Waltraud Schmid and Ute Gigler (Energy Center Wien, TINA Vienna GmbH)

Supported for the city chapters and with comments on the report by

Amsterdam: Geert den Boogert et al (City of Amsterdam, Department of Physical Planning and Sustainability), Saskia Müller

Berlin: Heike Stock (City of Berlin, Department of Urban development and Environment), David Uuong (BEA – Berlin Energy Agency)

Paris: Sebastien Emery, Elsa Meskel et al (City of Paris, Environment department); Pierre Weber and Jérémie Jaeger (APC - Agence Parisienne du Climat Association)

Stockholm: Lukas Ljungqvist et al (City of Stockholm, Planning administration)

Vienna: Stefan Geier (City of Vienna, MA20 – Department for energy planning)

Warsaw: Andrzej Olszak and Marcin Wróblewski (Infrastructure Department of Warsaw City Hall)

Zaanstad: Maria Santman et al (City of Zaanstad)

Zagreb: Sanja Malnar Neralić (City of Zagreb - City Office of Energy, Environment and Sustainable Development) and Nives Mornar (City Bureau for Physical Planning); Marko Matasović and Margareta Zidar (EHIP - Energy Institute Hrvoje Pozar)

This report is created as part of the H2020 action 649883: **Integrative energy planning of urban areas: Collective learning for improved governance - URBAN LEARNING** and reflects only the author's views. The *Executive Agency for Small and Medium-sized Enterprises (EASME)* is not responsible for any use that may be made of the information it contains.

Table of contents

1. Main findings and conclusions	6
2. The big picture of the cities’ approaches.....	9
2.1. Legal framework.....	9
2.2. Strategy for energy and urban planning.....	11
2.3. Organisation and actors	12
2.4. (GIS) Data.....	14
2.5. Planning requirements	14
2.6. Urban planning process.....	16
2.7. Energy planning and quarter management.....	21
3. Main findings in each city.....	23
3.1. Amsterdam	23
3.2. Zaanstad	24
3.3. Berlin.....	24
3.4. Stockholm	26
3.5. Paris	27
3.6. Vienna.....	29
3.7. Warsaw.....	30
3.8. Zagreb.....	30
4. Outlook.....	32
5. Annex.....	33

INTRODUCTION

The project URBAN LEARNING - Integrative energy planning of urban areas: collective learning for improved governance - gathers eight large cities across Europe, namely Amsterdam/Zaanstad, Berlin, Paris, Stockholm, Vienna, Warsaw and Zagreb, aiming to enhance the capacity of their local authorities on integrative urban energy planning.

Figure 1: URBAN LEARNING cities



Focus of URBAN LEARNING

The focus of the project is put on the governance processes related to the (re-) development of concrete urban development sites. In the context of URBAN LEARNING the „governance processes“ are understood as administrative management processes related to integrative energy planning as part of urban development, involving various departments of the city administration as well as their respective negotiating and/or contracting parties. “Integrative energy planning” in this context stands for integration of energy aspects into the urban design and planning process(es), including energy aspects of supply and demand and involving all relevant stakeholders as early as possible.

Analysis of current governance processes

In each participating city, the project team supported by a Local Working Group analysed its urban planning processes to find out how energy issues are currently dealt with. Furthermore, they analysed important factors influencing these processes either at city level or above (regional or national level). These analyses were summarised in internal working papers (“city reports”) for Amsterdam/Zaanstad, Berlin, Paris, Stockholm, Vienna, Warsaw and Zagreb. The results were collected and integrated in the synthesis report “Review of current governance processes of urban and energy planning (D4.1)”. See: <http://www.urbanlearning.eu/learn-and-exchange/deliverables/>

Upgrade of governance processes with respect to energy

Based on this analysis, the cities developed proposals for an energy-related upgrade of their governance processes. The output was approaches of upgraded governance processes in each city – originally called “blueprints”, but this term turned out to be misleading as there is not just one defined way for integrating energy aspects into urban planning processes. Nevertheless, it includes a set of ideas and suggestions as to how and where to integrating energy issues to meet the challenges of an energy transition. Moreover, the approaches are not only covering the planning process(es), but also the legal framework, strategies or changes in organisation. Most of the partner cities are referring to the entire urban planning process(es). Two of the eight approaches have a very specific focus – one city focuses on the development of the building stock at quarter level, whereas another city focused on integrated database and electric mobility.

The ideas and suggestions include new elements as well as adaptations of existing elements. The different elements are at different stages of completion ranging from proposals, advanced ideas, under negotiation, committed but not implemented, or already being implemented.

Focus of this report

This report provides the big picture and a comprehensive overview of all developed approaches. It is based on the city reports of the approaches, interviews, inputs of the Local Working Groups and beyond as well as on exchanges between the cities. The implementation plans as well as the experiences about testing new governance elements will be part of the next deliverable provided later.

1. Main findings and conclusions

The Urban Learning cities have climate/energy objectives and related challenges which are addressed by the upgraded governance processes as follows:

- dealing with the grid infrastructure – densifying, extending, reducing, open grids, smart grids
- increasing renewable energy generation for heating, cooling and electricity
- energy security and energy storage
- life cycle issues and embedded energy
- rollout of electric mobility

All these need coordination and planning – energy planning closely tied to urban planning. The integration of energy in the whole urban planning process and related governance procedures is needed. Based on the suggested upgrades of the governance processes of all partner cities, the following findings were identified:

Take responsibility for strategic energy planning

It is crucial that cities take responsibility to steer the changes of their energy system towards low carbon solutions. A strong and unambiguous legal and strategic framework is needed to integrate energy issues into city administrations. That could be ensured by laws such as an Energy Transition Law and/or integrating energy in the Planning Act or other important regulations. This is different to energy planning at the level of energy suppliers and grid operators.

Define a keeper for energy planning

According to our analyses of legal and organisational frameworks, a city should establish an administrative unit which is responsible for energy planning. That could be a department or a unit within a department. This unit could develop strategies, ensure integration at the operational level and enforce coordination between departments and external stakeholders like utilities and grid operators. For this, a clear mandate, resources and political support is needed.

Have a clear joint vision for energy

Each city needs a long-term strategy for a clear vision of the future of the energy system. Such strategies should describe the transition to a fossil free or low carbon future. It should also be connected to objectives at the European and the national level. Furthermore, the interrelationships to other strategic documents such as climate strategy or environment programmes should be clear.

Connect strategic and operational level

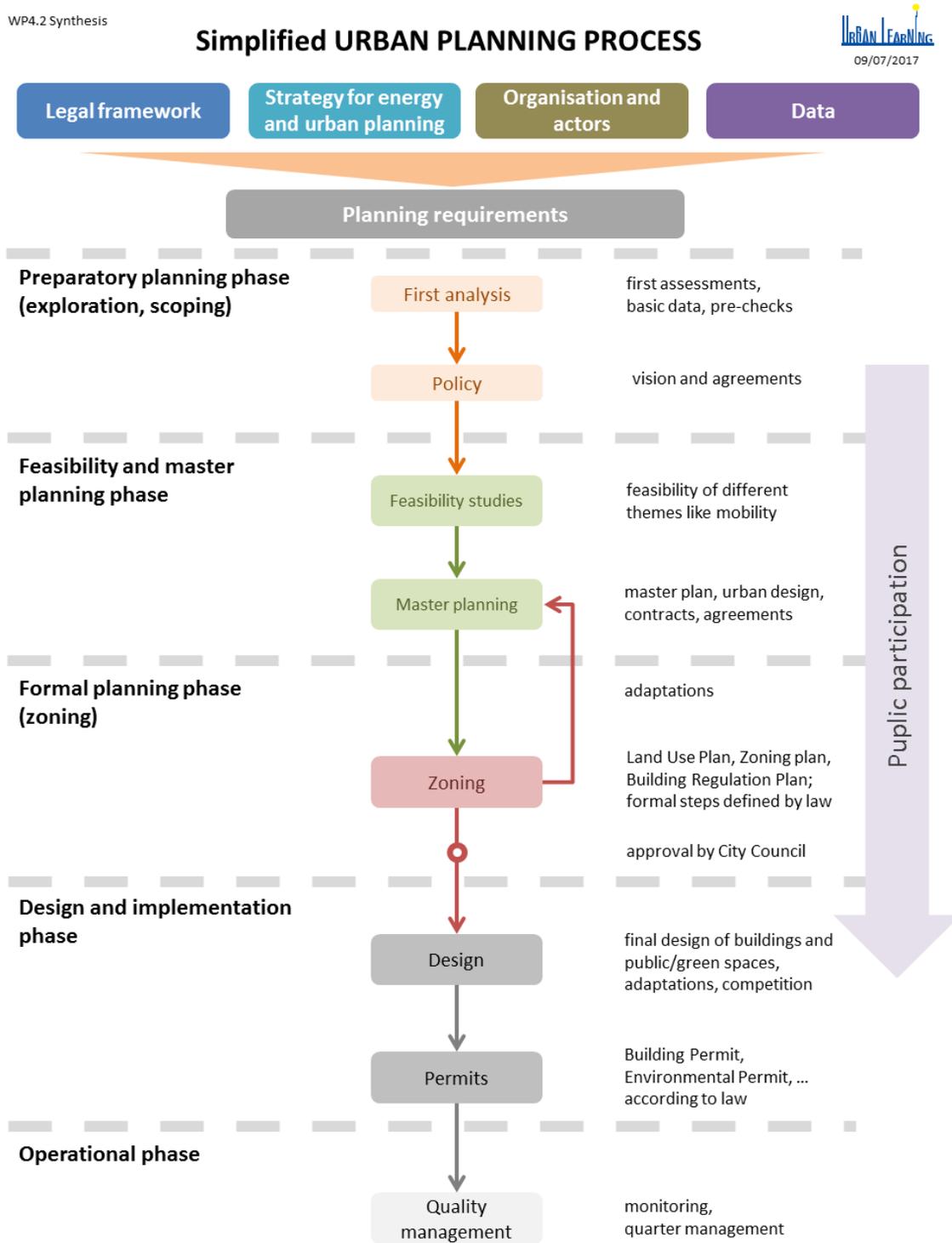
The energy strategy needs to be translated into an operational level by specifying mid-term and short-term issues (e.g. by using Roadmaps) and different spatial levels of the city. The objectives and defined measures could be linked to the tasks of city administrations. Finally, it is necessary to integrate different instruments at the operative level such as planning instruments at different spatial levels.

Integrate energy issues into the whole planning process

The starting point would be an analysis and a good level of understanding of the urban planning process for new areas as well as urban transformation areas. An understandable simplified process map will help in discussions with departments and stakeholders (see the following figure). The next step would be to identify the appropriate steps where and how energy should be integrated. Furthermore, the role of actors and stakeholders needs to be defined (e.g. who should decide what, which stakeholders are essential for what steps). It is also crucial to define the proposed position of selected instruments and tools such as energy calculation tools, feasibility studies or land use plans. Finally, it is important to integrate energy into all steps of the planning process: from the very beginning of a planning process (idea for development), planning,

zoning through the implementation (construction) to the operating phase (monitoring) – see chapter 2.4. It has been shown, however, that the initial phase is the most crucial phase with the strongest potential influence on the energy system for a given area.

Figure 2: Simplified urban planning process



Depending on the landownership select appropriate instruments wisely

Each city has to find the appropriate instruments for ensuring energy issues according to the objectives at the strategic level. For each phase of a planning process and every spatial level there are many instruments available. In some cases, it will be sufficient to define criteria at quarter level. In other cases, additional instruments to integrate energy are necessary for detailed planning. It strongly depends on the landownership which instruments are useful for integrating energy issues. For instance, if the city is the landowner, it is much easier to define energy criteria for an area or a plot in land sale contracts than negotiating them in contracts with private landowners.

Estimate the potential of planning instruments

Each city uses planning instruments. That includes urban development plans for a city or quarters or urban feasibility studies. But it could also be contracts. Nevertheless, the most important planning instrument from a legal perspective is the land use plan / zoning plan / building regulation plan which defines binding issues for each plot mostly on a scale of 1:2000. Energy issues could be integrated as criteria or zones such as grid areas. The use of renewables can also be integrated (for instance the use of solar energy). Therefore, some adaptations of the legal framework might be necessary. Each city has to estimate the potential to integrate energy issues in such binding documents. At a minimum, the linkage between planning of an energy system and zoning of an area should be accomplished. For some issues, especially the heating system, each city should investigate whether a separate energy planning instrument for energy zoning such as a heating plan is needed. Regardless, which solution a city will prefer it should foster low carbon solutions by providing enough flexibility for new technologies and planning security for all involved actors.

Pay attention to energy issues between the city and the building level

Most objectives and measures on energy refer to the city or the building level. However, for integrative energy solutions, it is crucial to include quarters and building blocks or groups of properties. Energy criteria need to refer to those spatial levels and should be integrated in convenient instruments such as quarter energy concepts. So, energy generated in one building could be used or stored in other buildings or properties and vice versa. That would increase energy efficiency with regard fluctuating energy consumption during the day and year as well as the availability of waste heat and energy storage. On the other hand, it is the appropriate level to identify grid and non-grid zones.

Provide sufficient energy related (GIS) Data

Sufficient energy data are essential for identifying the efficiency of the current energy system and the most convenient solutions based on energy scenarios. Such databases should incorporate the appropriate spatial levels in the form of GIS data and will consist of public and private data. This will include data such as energy consumption at building block level and basic information about buildings (e.g. year of construction, use and gross floor area). Based on these data, energy scenarios need to be developed. The assumptions for these scenarios need to be evolved by the city together with the grid operators and utilities. After clarifying data protection issues, measures or zones based on this data could be made. This will ensure sufficient basic research in a legal understanding, if criteria differ from area to area.

Ensure continuous management of quarters and districts

At the level of quarters, district quarter management is needed to ensure the integration of energy issues in the planning, implementation and operating phases. Quarter managers should be the keepers for energy in their responsible areas and assume a long-term perspective by providing feedback and advice, communicating between stakeholders, citizens and users as well as supporting and accompanying upcoming changes (e.g. shift of a heating system in some buildings). It could be linked to monitoring or a label system for quarters.

2. The big picture of the cities' approaches

This chapter provides insights of all approaches of the cities for upgrading their governance processes. This overview is organised into themes in a consolidated way. Most of these ideas are recommendations, some are under discussion or under development; in a few cases, first pilots of an initial ideas have been done. In some cases, useful existing good practice examples are mentioned. Furthermore, this chapter relates to selected aspects shown in the approaches because of their importance or exclusivity. It should be understood as snapshots and cannot cover all on-going discussions in the cities.

The elements of the approaches of the cities are grouped into following issues:

- **Legal framework and data** – elements referring to accurate framework conditions from a legal perspective
- **Strategy for energy and urban planning** – elements about the strategic level which defines the way for the energy transition of a city
- **Organisation and actors** – elements discussing adaptations of the city administration (structure and tasks) as well as cooperation with stakeholders
- **(GIS) Data** – elements about appropriate data as important basis for integrative energy planning
- **Planning requirements** – elements about inputs and requirements for urban and energy planning
- **Urban planning process** – elements referring to different phases of the urban planning process

This chapter is supplemented by some recommendations about quarter management and energy planning procedure.

An overview of chapters 2.1-2.5 is available in the annex – available in the annex on pages 33-34.

2.1. Legal framework

Objectives and responsibilities

All partner cities have rather ambitious climate goals (mostly to be climate neutral until 2040/2050). Hence, each city needs integrative energy planning and in order to achieve that should provide or develop an appropriate legal framework. The following elements for such a framework should include:

- Energy, energy efficiency, increasing renewable energy sources, decarbonisation, climate protection as one of the main objectives of urban planning (Planning Act / Building Code)
- Energy planning as a competence of a city (e.g. by Energy Transition Law)
- Urban planning as one related or affected sector/theme of energy transition and climate protection (e.g. Energy Transition Law, Climate Protection Law, Environmental Act)

This framework gives the city the mandate to integrate energy issues in planning procedures (energy planning and urban planning) and instruments. It is also matter of legal and planning security. The following table gives some provided suggestions. Although it is an important issue in all cities according to the discussions, not everyone mentioned it in their approaches, because competences are sometimes at the national level and in some cases adaptations are already on-going. Each city needs to discuss whether the existing regulation is sufficient.

Table 1: Examples of laws which give a city the responsibility for energy planning

City	Law or legal regulation	Level of legal basis	Energy relevant regulation
Paris	Energy Transition Law (2016)	<i>national</i>	Gives the cities and metropolitan regions the mandate for energy planning. They should develop an Energy Master Plan at city and regional level until 2019.
Warsaw	Law on Local Government and Energy Law	<i>national</i>	This law (Art. 18 § 1 pt 1) states that the municipality is responsible for planning and organizing the supply of heat, electricity and gas fuels within the administrative area. Based on this law, the utilities have to provide appropriate data and development plans to the city (Art. 16).
Berlin	Energy Transition Law (2016)	<i>provincial</i>	City of Berlin should be climate neutral until 2050. All activities of the city should be in line with this law and this objective. The Berlin Energy and Climate Protection Programme will define the way wherein integrative energy planning and urban planning is a part. -> See chapter 3.3.

Selected idea:

- **Vienna** – adapting the objectives of the Planning Act (Building Code) while integrating energy efficiency, renewables and climate protection; discussion about an Energy Transition Law or Climate Protection Law at the provincial level as is the case in Berlin.

Other legal regulations

Some existing regulations about energy issues at the national level contradict the strategy of the cities to be climate neutral or to reduce the energy demand of fossil sources. Therefore, these regulations need to be adapted. This is mainly the case for laws regulating the use of gas, which enables every landowner to get access to gas regardless of other available solutions. This regulation can make it much more difficult to utilise energy solutions that do not include gas. Furthermore, regulations about renewable energy generation need to be adapted to enforce systems solutions; e.g. by allowing the use of energy from renewables on different properties and buildings produced in other buildings (especially for photovoltaics). This is also the case for the use of waste heat.

Grid concessions

Some cities provide concessions to energy providers for the energy supply of their grids (in most cases concessions are in force for 20 or 30 years). New concessions should be related to energy goals and plans of a city and its urban development. If the city is not the owner of the grid, cities have the option to take over the grid again or to define legal ways for a joint strategy. In the latter case, it is crucial that the city ensures the integration of energy goals and strategies in the development strategy of the grid owner. In any case, a close cooperation and exchange of knowledge and data (e.g. forecasts) is crucial.

Selected ideas:

- **Paris** – adaptation of all upcoming concessions for the grids should be in line with the Energy Master Plan developed until 2019 (gas 2018, cooling 2021, heating 2024, electricity 2024),

- **Stockholm** – the city should enforce a close cooperation with the grid owner (data exchange, common decisions and concepts from beginning to implementation)

2.2. Strategy for energy and urban planning

The partner cities highlighted in their approaches that a clear vision for the future of the energy system set by an energy strategy is crucial. Furthermore, energy should be integrated in other strategic documents especially in an overarching strategy like the Viennese Smart City Framework Strategy or Stockholm City Vision. In these documents the relations between energy and urban planning are important.

Energy strategy or Energy Master Plan

Each city needs a joint long-term vision defined in an energy strategy. It should set the main objectives (e.g. decarbonisation till 2050 or share of renewables), the related steps and responsibilities as a framework for the development of the energy system. Urban planning and mobility should be core themes to be considered amongst others and integrated in the objectives. All objectives and measures should regard socio-economic impacts. Furthermore, there is a need to clarify the relationship of this strategy to other documents. The relation between climate strategies / action plans and city-wide urban development strategies appears to be very important. It could be useful to define a programme or a road map for the implementation of the energy strategy which also concerns short-term and mid-term objectives and measures. Sometimes, the distinction between strategy, plan and programme is not clear and depends on the understanding of these terms within the city.

Selected ideas:

- **Berlin** – Berlin Energy and Climate Protection Programme (BEK) which is the implementation plan for the Energy Transition Law (elaborated and currently updated).
- **Paris** – Energy Master Plan 2019 builds on elements of the Climate Action Plan 2018.
- **Stockholm** – Energy Strategy separate from Climate Strategy; needs to be integrated in urban planning instruments and in the Environmental Programme.
- **Vienna** – Energy Framework Strategy in addition to the already adopted Smart City Framework Strategy 2050 (under elaboration); it should specify the energy objectives and the path to decarbonisation; it refers directly to integrative energy planning.
- **Zagreb** – Overarching Strategy and Energy Strategy which define the long-term vision 2050 in addition to the SEAP (Sustainable Energy Action Plan) and ZagrebPlan (which is the urban development strategy).

Energy into urban planning and the importance of the quarter/district level

Energy needs to be addressed at a strategic level in urban development plans. The focus should be on urban development areas, districts and quarters to enforce system solutions at the appropriate level, e.g. small energy grids supplied by renewables. This approach can close the gap between the city level and the building level. Guidelines should help to break down strategic energy approaches for the operative procedures.

Examples:

- **Amsterdam** – Structural Vision Amsterdam 2040 – one of the six spatial tasks is “converting to sustainable energy”.
- **Vienna** – Urban Development Plan 2025 (STEP 2025) which directly refers to integrative energy planning (p. 57).

Selected idea:

- **Zagreb** – Energy is already mentioned in the ZagrebPlan but not in an integrative approach. This gap should be closed by Guidelines for Integrative Energy Planning at a strategic and operational level.

Regional perspective

Most of the energy activities should take the city region into account. Therefore, some strategies and measures will be developed together with the region as well as the metropolitan area. To develop integrated energy system solutions (decentralized energy generation, management of fluctuation for renewables, energy storage, etc.) planning and thinking beyond administration borders is necessary. That would be a win-win situation for the whole region.

Example:

- **Berlin** – Regional development concept “Energy and Climate Berlin and Brandenburg”(2010) which outlines strategic cooperation between the two federal states Berlin and Brandenburg in the field of sustainable energy supply and demand

Selected ideas:

- **Paris** – Metropolis Energy Master Plan; it is already defined by law to establish such a plan until 2019 (see Table 1).
- **Vienna** – Development of a regional energy strategy together with the surrounding provinces Lower Austria and Burgenland; coordinating issues of the Renewable Action Plan
- **Stockholm** – Regional Development Plan for energy issues to point out possibilities for joint ventures between cities.

2.3. Organisation and actors

Administration and responsibilities

The cities/municipalities need to take over more responsibility for strategic energy planning that is in line with climate and energy objectives. This is crucial because the utilities and grid operator are not responsible for these objectives, nevertheless they need to take them into consideration. Operative energy planning will be done by the utilities accompanied by the city. A city has to define a framework for energy planning. Therefore, a keeper (responsible unit or group of individuals) within the administration is needed. This could be a new department/division or it could be integrated as a new task in an existing unit. This responsible unit needs a clear mandate, support and resources. The department/unit should also closely collaborate with other departments such as environmental, planning and building department. This cooperation and the related tasks could be established through a document such as a development agreement.

Examples:

- **Amsterdam** – Team Sustainability in the Planning Department who takes care of energy in urban planning; it includes a city-wide thematic study for sustainable energy and the team also prepares heating plans.
- **Vienna** – Energy planning department (MA20) founded 2011 as part of the “Administrative Group Urban Planning, Traffic & Transport, Climate Protection, Energy and Public Participation”; this department is amongst others responsible for energy strategies and plans, for the integration of energy issues in the planning process as well as for handling subsidies for renewable energy sources.

Selected ideas:

- **Zagreb** – Establishing an Energy Planning Department which is responsible for energy planning
- **Stockholm** – Close cooperation and knowledge transfer between different departments, integrate energy as part of development agreements (land allocation agreements); energy indicators as part of the administrative integrated management system (ILS)

Cooperation beyond the administration

Aside from city-internal responsibilities, obligations related to energy planning should also be clarified externally. To achieve successful integrative energy planning, a close cooperation involving the following actors is needed:

- Energy providers / utilities
- Energy grid operators / grid owners
- Developers and construction companies
- Land owners
- Districts
- Provinces and municipalities (region)

Elements of this cooperation can include: to share data and strategies to understand the energy system, to develop scenarios and finally to reach the climate goals together; analyse and define integrated solutions for each area together; find the optimal choice for an energy system to increase planning security and trust early on (especially about grid-based systems); integrate this cooperation within the planning processes; ensure that commitments hold by e.g. applying wisely selected instruments (e.g. urban contracts or agreements). Nevertheless, public participation should be used and enforced wherever possible.

Examples:

- **Vienna** – Working group on energy supply for urban development areas – this group is composed of different departments, the main energy provider and grid operator – as first step the group tries to clarify potential solutions (especially about grids) for urban development areas before the planning has started;

Selected ideas:

- **Paris** – Energy board which assesses each urban project with regard to energy issues.
- **Stockholm** – Energy steering group at city level.
- **Vienna** – the mentioned working group can enhance its responsibility and also define some criteria for areas which could be integrated in planning documents or tender procedures.
- **Zagreb** – Counselling Body/Local Working Group to evaluate energy issues.

2.4. (GIS) Data

For all cities, it is important to have a comprehensive set of energy relevant data as part of its framework. This data should be available in GIS (Geographic Information System) format to link energy issues (e.g. energy consumption, kind of energy supply) with spatial units such as buildings, properties/plots or building blocks. It is an essential basis for assessing the energy system and developing appropriate scenarios. Furthermore, it is part of the legitimation for the designation of energy zones and related measures. To ensure this, it is essential to create a legal basis for exchange of data and a national standard for GIS data. If a voluntary exchange between utilities, grid operator and a city is not possible, then an obligation to provide energy data regarding data protection can help. In France, the Netherlands, Poland or Sweden those types of regulations or commitments for data exchange still exist.

Examples:

- **Warsaw/Poland** – The Polish Energy Code (national law) obligates utilities to provide energy data and development plans for the municipalities.
- **Amsterdam** – Energy Atlas and Decision Support Tool based on the energy data at the building level provided by utilities.

Selected ideas:

- **Berlin** – Development of an Energy Atlas; provide sufficient data as input for the selection of urban transformation zones.
- **Stockholm** – combining data about spatial structure and buildings with energy data; GIS Data standard at the national level; GIS data exchange at the regional level; GIS data as input for comprehensive and area plan; data linked to methods to calculate the energy performance of different plans; integration in feasibility studies and the zoning plan; further data input from monitoring.
- **Vienna** – working on a mutual data platform between city and the utilities and the grid operator; integrate data in an existing tool carried out together with universities, develop scenarios together which will be the basis for designations of energy zones; all this data and analysis are crucial for integrative energy planning and the use of instruments.
- **Warsaw** – developing an integrated database; integrating data from different themes and stakeholders (social, mobility, buildings, ...); developing forecasts helps to obtain detailed analyses of areas with energy supply deficits.

2.5. Planning requirements

All the mentioned elements about the legal framework, strategy and organisation need to be specified for the operative level of urban and energy planning. At the strategic level, energy requirements for urban planning could be defined. That is also essential for the procedure of the planning process.

Framework for urban development districts and areas

Energy objectives and strategies are normally defined at city level. There is a need to break them down to the borough level of districts, quarters and building blocks. This could be done by more detailed energy concepts for different areas of the city linked to different criteria or defined in a city-wide energy zoning concept. Hence, energy objectives are relevant for all areas; some issues need to be specified separately for each area because of different preconditions and possibilities (e.g. availability of waste heat or grids).¹ It needs to be clarified which criteria are necessary and how binding they should be (e.g. CO₂ thresholds

¹ See the Report of WP2 „Analysis of innovative technical solutions“ (D2.1) available on <http://www.urbanlearning.eu/>

depending on the area defined in contracts or in agreements). That is an issue of planning security for the developer, but also for the energy provider and grid operator.

Selected ideas:

- **Amsterdam** – Criteria for all areas carried out by the ‘Thematic Study’ for sustainable energy, these criteria could be fixed by Heating Plans (see chapter 2.5 and 3.1)
- **Berlin** – Criteria based on comprehensive data for selected urban transformation zones
- **Paris** – Defining criteria for urban planning in the Climate Action Plan 2018; integration in the guidance part for districts in the land use plan PLU
- **Vienna** – development of a ‘Thematic Concept for Integrative Energy Planning’ which defines the steps needed for integrative energy planning; development of an Energy Development Plan/Concept which will designate different zones for the whole city – mainly to distinguish between grid and non-grid operation areas; needs to be discussed whether this plan needs to be specified by District Energy Concepts
- **Zagreb** – Criteria for all areas carried out by an Urban Energy Study

Urban planning procedures

The energy transition will only be successful if it is integrated in the urban planning process(es). Based on the evaluation of the planning process, it needs to be defined which energy issues are relevant at which steps and phases. It will be a mixture of new elements (e.g. new instruments such as heating plans) and adapted elements. Moreover, it will also be a mixture of binding instruments and soft measures based on negotiations and cooperation. It is also very important to define working procedures between the different departments within a city (at which points which kind of exchange or collaboration are necessary). Furthermore, it should be clarified which stakeholders are crucial for which elements.

There can be roughly distinguished two procedures: for new development areas and for transformation zones (mainly building stock). The suggested elements for the planning procedures of the cities will be described more in detail in chapter 2.6 and 3. In the case of a separate energy planning procedure see chapter 2.7.

Selected ideas:

- **Amsterdam and Zaanstad** – New versions of the Plaberum for each city describes the planning process and should take into account energy issues in the whole process; need for a separate energy planning procedure which is linked to the Plaberum
- **Stockholm** – Well-developed coordination of stakeholders by using and enhancing the Ledstången (the Handrail tool) with energy issues which describes the responsibilities for the actors in every step of the planning processes
- **Zagreb** – Energy Planning Guidelines which will help the involved departments to include energy in all steps of the planning procedure

2.6. Urban planning process

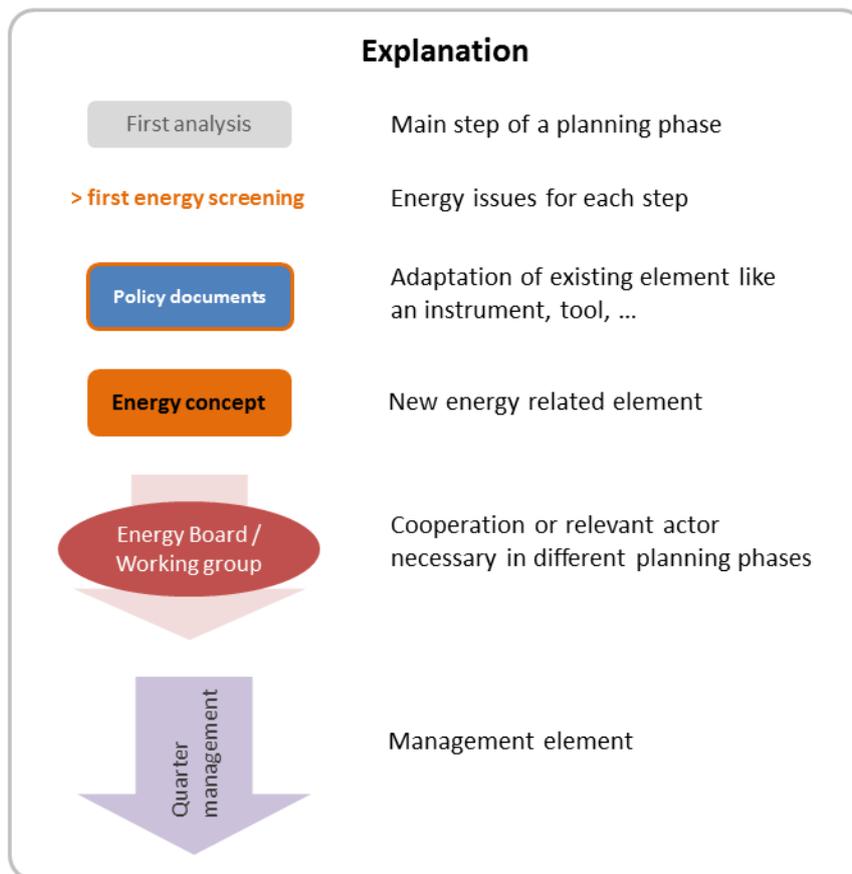
The following description refers to a ‘typical’ urban planning process mainly for new (re)-development areas. Nevertheless, a process for the transformation of the building stock could be similar but with a slightly different set of stakeholders and instruments.

Regardless of the differences of the process(es) between the partner cities it can be roughly divided into the following five phases:

- Preparatory planning phase (exploration, scoping)
- Feasibility and master planning phase
- Formal planning phase (zoning)
- Design and implementation phase
- Operational phase

This process is simplified presented on page 7, see figure 2. The following figure provides an overview of a typical planning process scheme and possibilities to integrate energy issues according to the ideas of the partner cities.

Figure 3: Explanation for figure 4



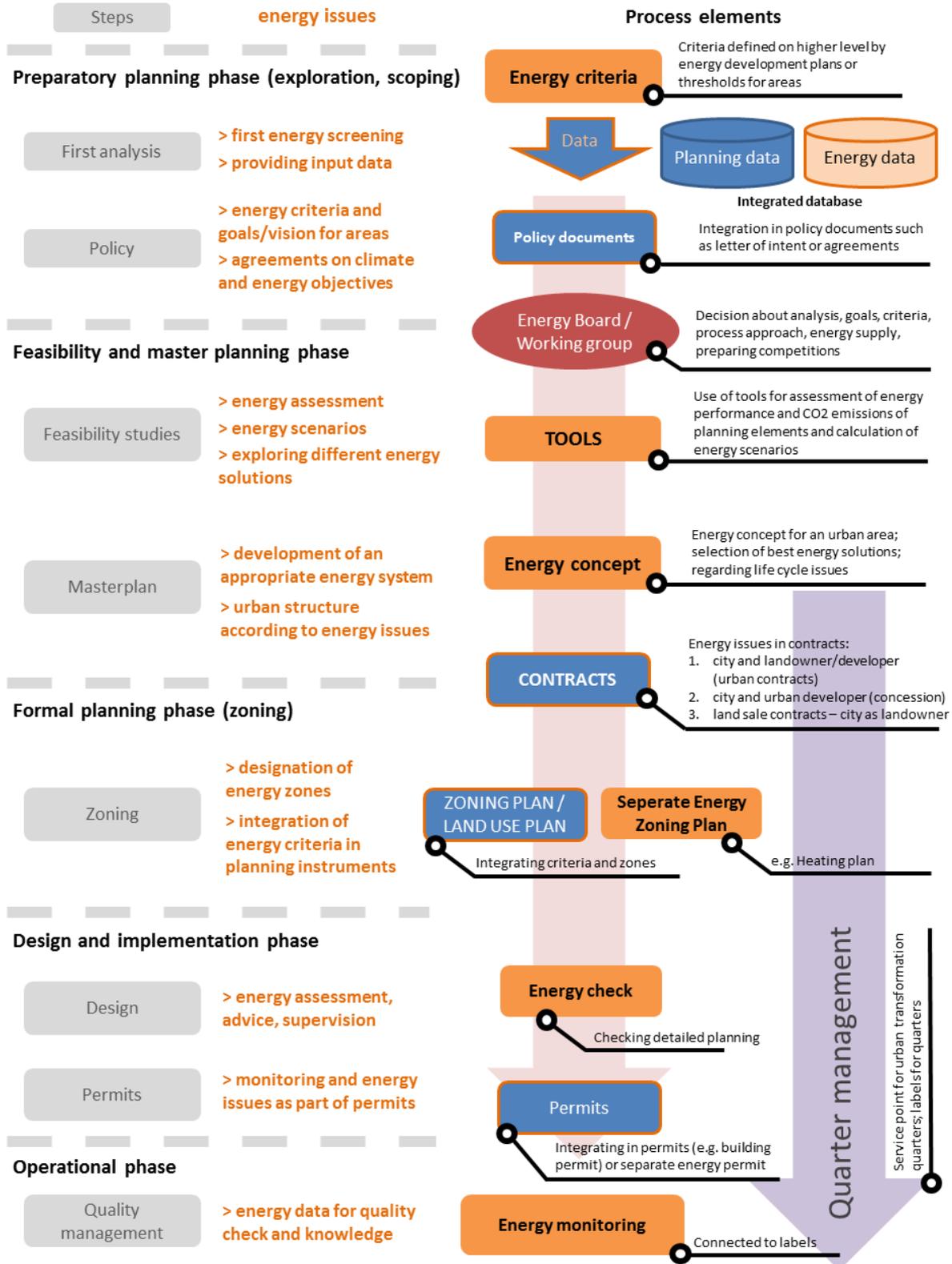
Source: City of Vienna – MA20 (Hemis)

Figure 4: Integrating energy in the urban planning process – selected proposals;
Source: City of Vienna – MA20 (Hemis)

WP4.2 Synthesis



Proposals for upgrade of the PLANNING PROCESS



Preparatory planning phase (exploration, scoping)

The process typically starts with a developer or the city wanting to realise an urban project in a certain area. Adaptations to the planning instrument (mostly the zoning plan) are often needed which kicks off the planning process.

First analysis (screening) of an area could be done utilising already existing information such as e.g. energy supply or soil conditions. Here it would be very helpful to provide comprehensive energy related (GIS) data for the experts involved from the city administration. These data could include e.g. combined data from buildings and the existing energy system (grids, type of energy supply in the surrounding area, potentials for renewable energy sources, ...). First assessments for energy-related issues might be done in this phase such as checking the potential of waste heat in the surrounding area. First options of energy supply can be clarified – e.g. possible energy supply by an existing grid according to the dimensions of the project.

In this phase visions could be set for different areas such as zero energy districts. Initially, policy documents are developed such as a letter of intent or agreements. Such documents should relate to energy objectives and a vision for the area; e.g. the amount of renewable energy or innovative solutions based on previously defined energy criteria. Furthermore, first stakeholders (mainly departments required and developers) can establish their collaboration for the area as well as which other stakeholders will be integrated (public participation). One of the partners – preferably the department who is responsible for energy planning – should take care of energy issues from the very beginning.

Finally, there should be a dedicated working group or a board for energy issues. Part of this group might be representatives of involved departments and from the deputy mayor/alderman staff. This group will specify energy criteria, commission additional energy studies and accompany the whole planning process – ideally until the area is in operation. This board should also collaborate with quarter management (see below) and other stakeholders like grid operator and utilities.

Selected ideas:

- **Zaanstad** – Integrate energy issues in the Letter of intent and the Anterior Agreement (=urban contract) that the city and the developer agreed upon
- **Amsterdam** – Integrate energy issues into policy documents
- **Berlin** – Service point for urban transformation in quarters; Energy Atlas as base information
- **Paris** – Energy Board which defines criteria for the area and decides which studies are needed; the board will also provide support in later planning phases
- **Stockholm** – Provide GIS based energy data as support for planners; define energy criteria in the development agreement

Feasibility and master planning phase

If the vision and rough dimension of an urban project are set, further feasibility studies for different themes such as mobility and ecology will be done (probably based on first assessments done previously). The dimensions (such as number of housing units or gross floor areas and heights of buildings) of the project will be specified according to the results of these studies. Then, a first design (structure of the buildings and densities, uses of the areas and buildings, public and green spaces, network of streets, ...) and the qualities for an area as well as the planning steps (like a working programme) are largely developed in this phase. The result is mostly a master plan or an urban planning guideline for the area. This could also be carried out by an urban development competition.

An in-depth energy assessment could be carried out as part of the feasibility phase and it constitutes the basis for developing the master plan. This assessment is the basis for identifying possible energy solutions and should be supplemented by defined energy scenarios. Appropriate tools to calculate the energy performance (regarding life cycle aspects and embedded energy) and scenarios of the project would support the city administration and stakeholders to find appropriate energy solution.²

Then, parallel to the master plan (final urban project) for the development area, an energy concept needs to be carried out by the developer and/or the city according to the identified energy solution. In this stage, the master plan should be fluently transferred into the draft of the zoning plan / land use plan and building regulation plan. Guidelines, manuals and tools provided from the city for developers and departments would enforce the integration of energy – e.g. definition of the outline, content and criteria of an energy concept. In the case of any competition, it is crucial to include energy criteria (e.g. master plan should ensure a high share of renewable energy sources as part of a tender).

Finally, some energy-related issues (for instance decision for a grid solution or use of waste heat) could be fixed in contracts (urban contracts, land sale contracts) or agreements which will be valid after the zoning plan is approved.

Examples:

- **Amsterdam** - Energy Atlas and Decision Support Tool from the EU Project TRANSFORM³
- **Vienna** – “Optionenstudie Donauefeld” feasibility study of different integrated energy solutions for a development area (5700 housing units), comprehensive comparison of common solutions (district heating, gas) with innovative energy solutions regarding life cycle aspects

Selected ideas:

- **Paris** – Project Accent which will provide important energy-relevant data for all areas; Concession contract with the developer (integrate ambitious criteria according to Climate Action Plan, the Land Use Plan PLU [strategic part for quarters] and Energy Board)
- **Stockholm** – integration of GIS Data and tools (e.g. CO₂ calculation for the whole area or Life Cycle Assessment)
- **Vienna** – Energy Concept for an area – guidelines about the content of this concept provided by the city; it could be similar to the feasibility study for different energy solutions of the development area Donauefeld (Optionenstudie Donauefeld)
- **Zagreb** – Guidelines for energy planning of areas; Criteria defined by Urban Energy Study

Formal planning phase (zoning)

Normally, during the master planning phase, a first draft of the Zoning Plan (Land Use Plan) and/or Building Regulation Plan is created. Then, it is being developed into a final draft by the responsible planning department. This draft is then the basis for official statements. After possible adaptations or additional internal checks, (e.g. about infrastructure or environmental protection) the final zoning plan will be published for everyone. Based on the statements, the zoning plan could be adapted again and then it will be submitted for approval to the City Council. The main steps of this formal procedure of adaptation are defined by the Planning Act.

² See also the deliverable 3.2 „Map and review of used instruments and tools“ as well as deliverable 3.3 „Showcase best practices instruments and tools“ on <http://www.urbanlearning.eu/learn-and-exchange/deliverables/>

³ EU project TRANSFORM (2012-2015) <http://urbantransform.eu/2014/04/23/energy-atlas-of-amsterdam-online/> and <http://urbantransform.eu/decisionsupportenvironment/>

Energy zoning: Up to now, energy has not been integrated in the zoning plan except for the designated location of energy infrastructure such as power plants or grids. Furthermore, the possible content of the zoning plan is limited by the Planning Act. Nevertheless, it is important that all energy-related decisions from the phases before will not be lost in the zoning phase and the following phases. Each city has to discuss whether the zoning plan should be extended by energy zones. Another option would be to use a separate planning document or concept for energy issues only such as a heating plan. In some cases, the instruments used before this phase are already sufficient such as contracts or a city-wide energy zoning plan/concept. Finally, a framework of binding instruments is needed to ensure that decisions related to energy issues will hold.

A possible content of energy related zones (for building blocks or quarters) could be:

- Priority zones and exclusion zones for district heating
- Retreat zones and exclusion zones for gas (or other fossil sources)
- Zones for innovative decentralized solutions
- Zones which are defining the amount of renewable energy sources
- Priority zones for using waste heat
- Zones with a threshold for CO₂ emissions of the energy supply in g per kWh and year

Selected ideas:

- **Paris** – Energy issues integrated in the Land Use Plan PLU – the energy criteria from the strategic part for quarters needs to be transferred to the operative part of zoning for each plot
- **Amsterdam** – Heating Plan - constitutes a separate document which will be developed parallel to the zoning plan – this binding plan defines the possible energy supply for an area (and excludes gas)
- **Vienna** – discussion which kind of zoning on which level would be helpful; the minimum requirement should be an energy zoning concept for the whole city including gas and district heating

Design and implementation phase

After the zoning plan has been approved, the design and detailed planning for buildings and plots (including public and green space) is initiated. In some cases (for instance in the case of social housing), competitions about design, architecture and technical systems for plots and buildings are done. The results of competitions or submitted planning documents from the developer are the basis for permits such as the Building Permit. All documents should be in line with the zoning plan / building regulation plan and the Building Code as well as Planning Act.

During the development of the design and details of the buildings, energy advice/supervision or energy checks of the documents would be helpful. It should be according to the energy criteria set previously. That could be the integration of solar energy in the architecture or development of a low temperature system with sufficient energy storage within the building. Therefore, a continuous dialogue between the experts of the city, planners and developers is crucial. Furthermore, a city should provide some guidelines about energy efficiency of buildings to support planners. Finally, the related energy issues should be taken into account in the permits; for instance that the foreseen heating system of the building is according to a low temperature system which is using waste heat and was carried out in the previous phases. It could also be a part of other permits such as a Building Permit or Environmental Permit or it could be accomplished through a separate Energy Permit. The permit should take into account the building level in the context to the surrounding area which is important when using integrative energy systems that are combined in different buildings.

Example:

- **Vienna** – Guidelines for the energy efficiency of office buildings and high-rise buildings as well as for different energy systems such as heat pumps and solar energy

Selected ideas:

- **Amsterdam/Zaanstad** - provide advice and supervision during the design of the buildings
- **Stockholm** – training of workforce during the construction phase
- **Vienna** – to regard energy issues as part of the building permit or to use a separate permit
- **All partner cities** recommend to have a form of energy check and supervision for detailed planning

Operational phase

In most cases, there is no check of the building or installed energy system after construction has been finalised. Moreover, there is no information on the energy performance. Therefore, it is recommended to install a monitoring system. That would enable to assess the performance of different energy systems and related instruments such as subsidies and to integrate those lessons/experiences to potentially revise procedures. Furthermore, this data can also be utilised to improve life cycle analyses and to enhance existing energy databases. The type of monitoring to be executed and the use of the ensuring data have to be arranged in previous phases and at the very latest in the implementation phase as part of the permit.

Example:

- **Stockholm** - Stockholm Royal Seaport Sustainability Portal – SRS monitoring system

Selected idea:

- **All partner cities** mentioned the necessity to install a monitoring system and to require the provision of the data in the first operating years; it could be connected to a Label system for the whole project area or quarter

2.7. Energy planning and quarter management

Energy planning

There are special situations as is the case in Warsaw: a city already has a separate energy planning procedure. In this procedure the city estimate the sufficiency of the energy supply in different areas based on the data from the utilities. Then, the utilities have to provide development plans for this area, which should be in line with the objectives of the city. If this would not the case the city has the legal power to develop own plans. This procedure is separated from urban planning at the moment. Nevertheless, each city has to estimate whether the integration of energy in urban planning procedure is sufficient or an additional separate energy planning is needed. However, it is important to link this procedure with the urban planning process.

Quarter Management

The development of an urban project at quarter level needs continuous management. It needs to be clarified as early as possible who is responsible (recommended in the master planning phase). It could be a consortium consisting of internal and external stakeholders or external contracting experts. This management goes beyond the implementation phase. It should ensure that the qualities/stipulations set in previous planning stages hold during the operational phase. Possible tasks are to help the users of a building to improve the energy performance of a building (kind of energy training), to establish a dialogue between owners, energy providers, tenants and other stakeholders or to collect and assess data from monitoring. Quarter management could be connected to labels for quarters, which need to be assessed in regular intervals.

For redeveloping the building stock, it is also recommended to engage in quarter management. The size of the quarter should be related to the age and structure of the buildings, the potential for refurbishment, socio-economic factors, ownership structure as well as the size of population. The managers responsible are liaisons between owners, tenants, utilities and the city administration. All activities will be linked to available subsidies for refurbishment.

Selected ideas:

- **Paris** – Eco Label – national label for quarters to enforce sustainable solutions
- **Berlin** – Quarter Management for selected transformation/redevelopment zones (service centre “Energetic Neighbourhood Development”) – the first pilot is on-going, see chapter 3.3

3. Main findings in each city

The suggested upgrades of the governance processes depict the framework of a city (legal and organisational issues) and all phases of the entire planning process for new urban development areas. Therefore, the focus was on how to best steer energy supply options (mainly heating and cooling) for these new areas rather than the transformation of existing ones. Nevertheless, the building stock in each city is a very challenging topic which all cities are well aware of. Most cities started with energy planning for new areas, because those buildings represent the building stock of the future. In a next step, many will focus more and more on the building stock which will need and affect other instruments and legal issues. However, the city approaches take into account the impact of new technical solutions (open district heating networks, decentralized energy grids, smart grids) as well as the relevance of energy storage and electric mobility. The partner cities underline the importance of integrative system solutions through connecting the different energy systems and also consider embedded energy as well as energy used for mobility.

Two cities have a special focus within the scope of Urban Learning. The city of Berlin emphasizes the urban transformation process of the building stock and related quarter management. Warsaw stresses the need for an integrated energy database and their integration in the existing energy planning procedure. Nevertheless, both cities also take into account other issues.

All other cities (Amsterdam/Zaanstad, Paris, Stockholm, Vienna, Zagreb) focus on the whole urban planning process and emphasize the importance to integrate energy issues in every phase/stage of the process. In all cases, a change of some framework conditions was recommended – that includes legal issues, need for basic data as well as organisational adaptations. Furthermore, a strong cooperation between different departments but also between city, grid owner, developer and utilities is necessary. There are differences in the cities' influence regarding energy supply options depending on the ownership of grids. This also holds true for ownership of the land. If the city is landowner the potential to integrate energy issues and to define energy criteria is much higher. Nevertheless, each city also needs soft, non-binding instruments such as agreements. It also needs to be discussed in each city whether the existing planning instruments (mainly the Zoning Plan/Land Use Plan or Building Regulation Plan) are sufficient to integrate energy issues. In some cases, additional instruments will be necessary – e.g. the Heating Plan in Amsterdam.

More details of the city approaches and their schemes of the integrative energy planning process will be published on <http://www.urbanlearning.eu/learn-and-exchange/deliverables/>.

3.1. Amsterdam

Energy is an issue in the newly adapted whole urban planning process (called 'Plaberum'). Sustainable energy should be an important issue early in the process (part of the agenda) to find a decision for an energy solution as well as the needed procedure according to the vision for an area. It is seen as a risk factor, because of the impact on time and costs for a development area. Nevertheless, it is crucial to regard energy as an element from the beginning till the final design in documents, working groups and used instruments. In some cases, new instruments become necessary. Moreover, monitoring of energy performance still remains in the life cycle.

The suggested elements are:

- **Thematic study** on sustainable energy (especially heat) for the whole city as guideline, input for each development area and basis for first energy checks (should be developed 2017).
- Check (supervision) and advice on energy issues at different points in all planning phases (project content, development strategy, project document, design)

- Integration of sustainable energy in existing instruments (mainly documents) like policy document of the project or design of blocks and buildings
- Improvement of tender for the design of buildings with added energy criteria
- Use of scenarios of energy systems for different settings of the project before the design is starting – as basis for further development, zoning plan and process approach (public or private)
- **HEATING PLAN:** Development of a heating plan as a separate binding energy planning document parallel to the zoning plan. This plan can avoid gas supply by defining criteria like share of renewables or CO₂ performance and shows alternative solutions according to scenarios developed before. If the new Environmental Act is in force in 2019, the Environmental Plan will replace the zoning plan, heating plan and other plans as one document.
- Installing monitoring linked to the environmental permit

There is a need for an energy planning process and then further revision of the planning process. Furthermore, it is important to distinguish between greenfields and brownfields.

3.2. Zaanstad

The planning process procedure (Plaberum) of the City of Zaanstad is very similar to Amsterdam. Both cities developed the upgrade of the planning scheme together as a **metropolitan region**. Therefore, the ideas on some issues are very similar. The potentials to integrate energy issues in selected instruments and procedures strongly depend on the landownership. Compared to Amsterdam the City of Zaanstad owns less land. Therefore, the City of Zaanstad emphasises negotiations, agreements and contracts by private law.

The suggested elements are:

- Integration of energy experts for checks and advice in all stages of the planning process (e.g. check of energy criteria in the on-going meetings of the experts of the city and developers)
- Letter of intent with energy aspects for each area agreed between the city and the developer
- **Urban contracts (Anterior Agreement)** between city and developer/land-owner by private law if the city is not the land-owner. This kind of contract is similar to an urban contract of other cities. Energy should be integrated in such contracts.
- Adjustment of the Zoning Plan regarding the energy grid infrastructure
- **Heating plan:** similar to Amsterdam, one heating plan is under elaboration
- Sustainability check of the Environmental Permit
- Installing monitoring systems

It very much depends on the Environmental Act which will be adopted in 2018 and come in force in 2019, which elements about energy and to what degree they could be integrated. All experiences in the existing new development areas are shared with Amsterdam.

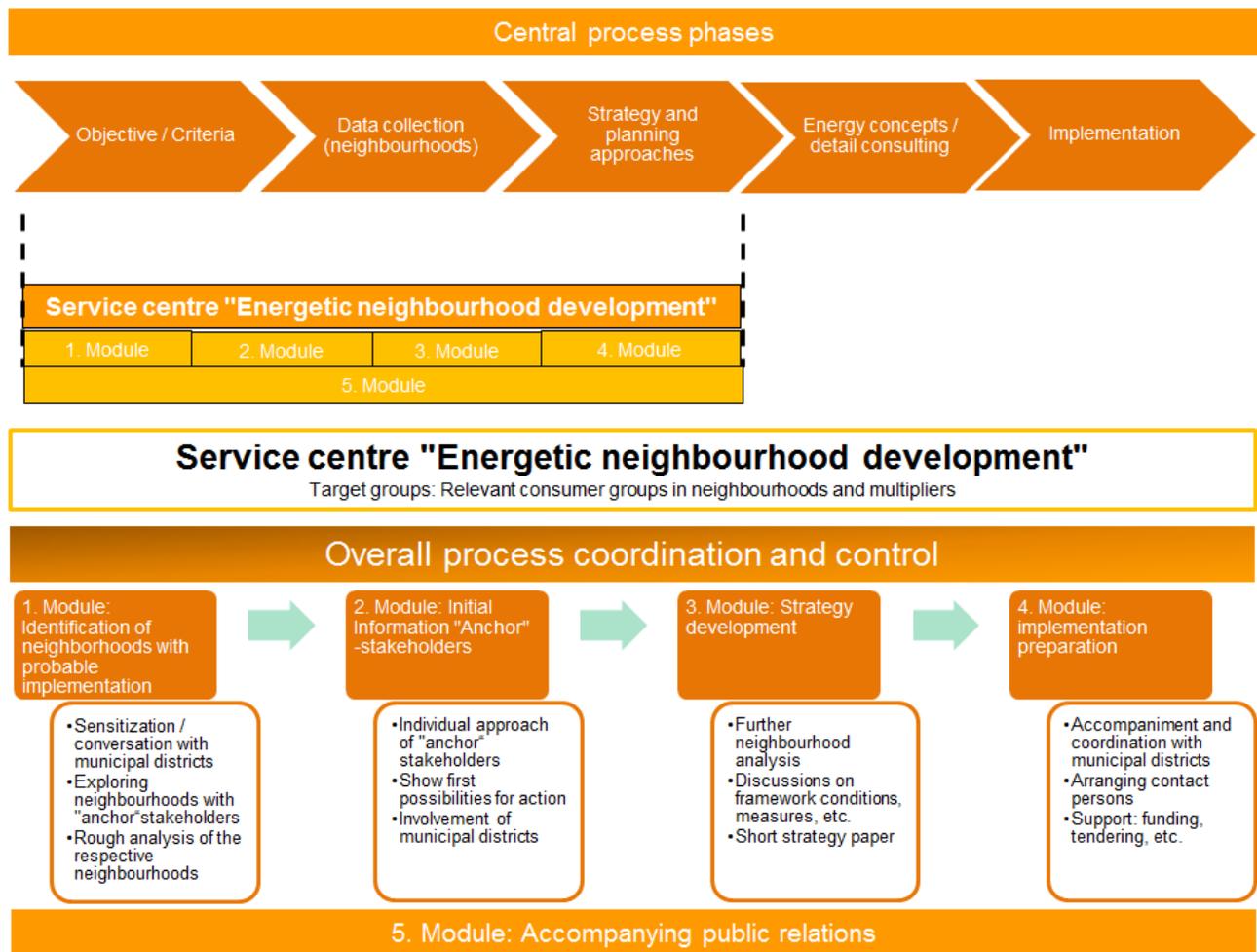
3.3. Berlin

Berlin wants to be climate-neutral by 2050. The Energy Transition Law adopted in 2016 obliges the City of Berlin to achieve this objective and carry out required actions. Therefore, the Berlin Energy and Climate Protection Programme (BEK) describes relevant steps and actions needed like a roadmap for the next years. Integrating energy in urban planning and related activities will be a central part of this programme which is currently being updated.

The focus of the upgrade of the governance process in Berlin is put on the transformation and refurbishment of the building stock. The idea hooks on the regular funding procedure for urban renewal (“Stadtumbau Ost/West”). Main element is the required promotion and initiation of **Energy Neighbourhood Concepts** in

selected areas, within urban renewal areas as well as outside. Therefore, a new organisational element is necessary, the **“Service Point for Energetic Neighbourhood Developments”**. It takes over a strategic role and points out interfaces between different planning instruments (e.g. Building Regulation Plan) and processes to integrate energy at the local quarter level. This service point should close the gap between the city and the district authorities and will support and guide the process with relevant stakeholders in selected areas. Furthermore, it will develop all relevant basic information and strategic paper as an important input for the Energy Neighbourhood Concept – see the figure below – or related urban energy actions. Finally, this organisational element will guide and give advice until the point of implementation, but it is not involved in competition procedures. There is an ongoing test of the service point in the selected quarter “Obstallee” (part of an urban transformation zone) in the district of Spandau.

Figure 5: Berlin - Service centre energetic neighbourhood development – phases and modules



Source: BEA (Berliner Energieagentur)

In addition, a city wide **“Urban Energy Planning Guideline”** document, which displays the potentials and concrete ways to integrate energy in urban development processes and instruments, is recommended. It should ensure that energy is an institutional issue of urban planning.

Energy Concepts for new development areas should be carried out at the beginning of the planning processes as (compulsory) element of urban development. Such energy concepts could be a central basis for the later planning steps and an important input for the building regulation plan.

For all these suggested elements, it is important to provide energy data in a sufficient quality. Therefore, the City of Berlin is working on an [Energy Atlas and interactive decision support tool](#) which can be used for all kind of concepts and enables discussion with different stakeholders. Such an energy atlas with underlying data will be beneficial for urban development and also promotes the idea of a “Growing Smart Energy City” through processes of digitalisation and big data.

3.4. Stockholm

The City of Stockholm will have to change and adapt the framework and the whole planning process to improve the integration of energy issues comprehensively. The main focus is to be fossil free in 2040. The development of the current system (i.e. district heating), low energy buildings, decentralised energy generation and storage as well as open grids (open district heating and smart grids) are important parts in this transition.

The proposal for upgrade of the governance process concerns the framework, all spatial levels and the whole urban planning process as well as an increased coordination between the departments within the city’s administration. It emphasizes the importance of the level between city and buildings (borough level) => quarters and building blocks. Another input is that, it is essential to regard energy issues (like energy performance calculation and coordination with the grid owner) from the beginning of the planning process beyond the final construction through the buildings life cycle.

The suggested elements (mostly proposals, some already in discussion or in progress) are:

- Changes in the (national) legal framework are necessary to strengthen the use of renewable energy sources for electricity between properties and buildings.
- A grid owned by the city could strengthen system solutions by adapting [grid concessions](#). When the city doesn’t own the grid, close cooperation (from beginning over zoning till construction) and data exchange (integrating forecasts) with the grid owner should enforce system solutions.
- **GIS based data** would increase the process effectivity on different spatial levels as main input and data exchange and basis for analysis over the whole planning process.
- The [regional perspective](#) is important while developing a regional development plan, coordinate energy issues beyond the municipal borders and exchange data (preferably GIS data)
- A broad agreed and coordinated [energy strategy](#) that is separate from the climate strategy needs to be developed. This strategy should enforce system solutions and should be specified for different planning steps from comprehensive plans over area plan to feasibility and zoning plan. Therefore, the integration of GIS data and methods for calculation are necessary as well as cooperation and dialogue.
- The energy strategy should be also integrated and specified in the [Environmental Programme](#) (e.g. defining requirements for tender procedures) and indicator system ILS of the city administration ([energy indicators](#))
- There are also [energy strategies for urban projects](#) necessary which define details on the energy demand, embedded energy, energy generation, storage and integrated supply. The results of these strategies will be the basis for the site allocations and possible agreements.
- A **city-wide energy group** needs to be established. This group can develop and coordinate specific statements and objectives for energy in governing documents (e.g. energy strategy) and for development projects at various stages.
- Well-developed coordination of stakeholders by using and enhancing the Ledstången (the **Handrail**) with energy issues which describes the responsibilities and steps in planning processes

- Methods and tools for calculation of energy and greenhouse gas performance of plans on different levels (comprehensive plan, area plan, feasibility studies, zoning plan), especially on block level. Furthermore a tool for the Life Cycle Assessment (LCA Tool) will be developed and tested 2017/2018 to regard also the embedded energy.
- A development agreement (land allocation agreement if the city is the landowner) between the city, executed by the development department, and stakeholders can fix the founded and negotiated energy issues as basis for detailed planning/design of the buildings and building permits.
- Increased inspection during the construction, technical consultation in the beginning of the construction and training of the workforce will help to increase the quality of the installed energy solutions
- Monitoring should be done for each building during a period longer than 2 years and could then be executed by the national authorities with an interval of 5 years.

Some of the above elements are already tested and/or under development mainly in the Royal Seaport area. One purpose with the royal seaport project is to test and develop new technologies.

Hence, public administrators from different departments participated in developing the ideas; however the timeframe was not sufficient for political participation and commitment in most cases.

3.5. Paris

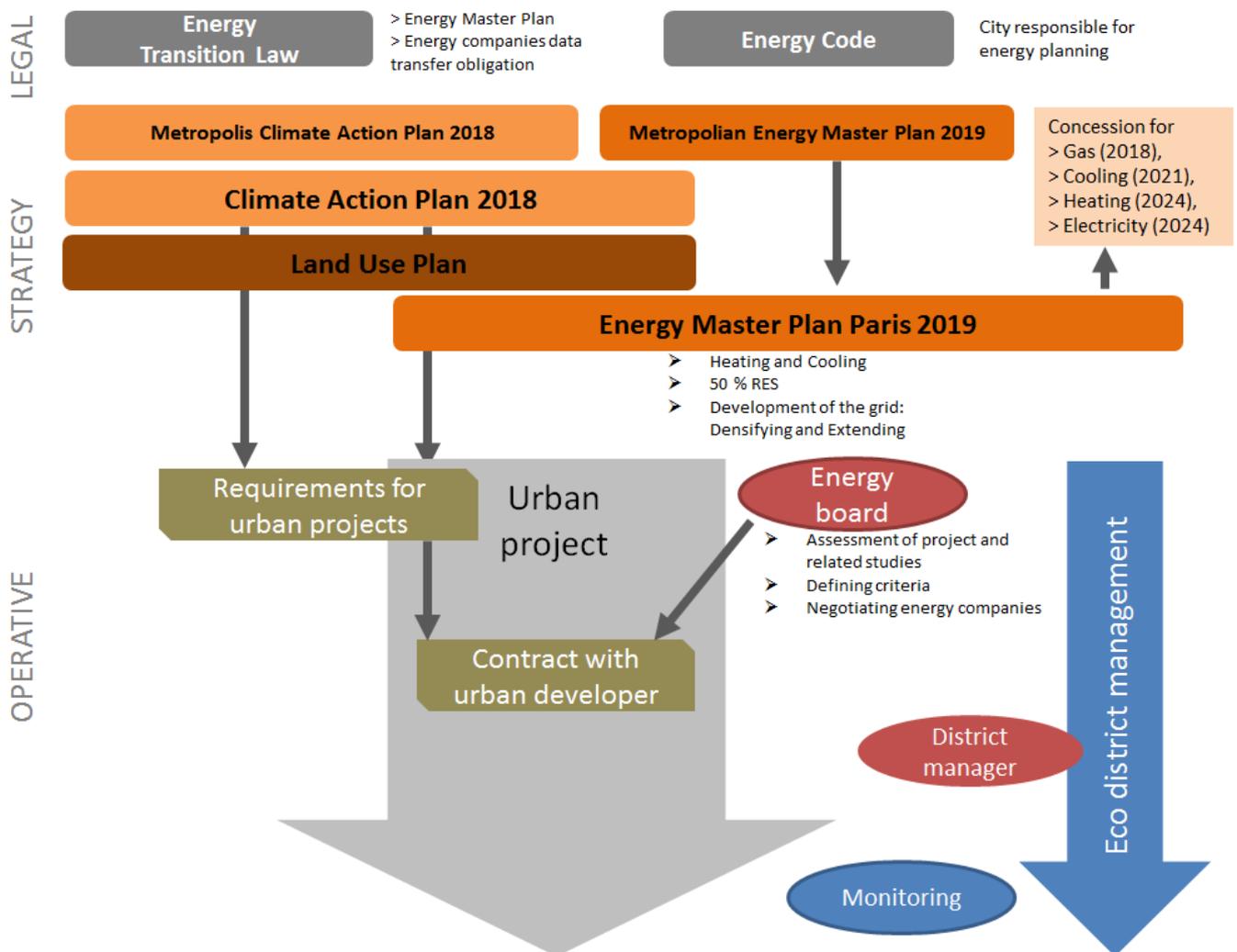
As a city, Paris has the responsibility to ensure energy supply as public service which is dictated by national law (Energy Code). So the City of Paris will develop new strategic documents which will set a new framework for heating and cooling in the city with an opportunity to also include gas and electricity. The metropolis has the responsibility to develop strategic documents on a wider scale for different energy sources (heating, cooling, gas and electricity). Furthermore, energy should be integrated in the whole planning process.

Some selected elements are:

- The City of Paris is developing a new Climate Action Plan 2018 (and a regional Climate Action Plan 2018) to establish a carbon neutral vision for 2050 and a comprehensive roadmap for 2030.
- Development of an Energy Master Plan for the city and the metropolitan region till 2019 according to the Energy Transition Law for Green Growth (Art. 194). These plans will regard heating and cooling with the aim to ensure 50% of the energy demand covered by renewable energy sources as well as the possibilities for densifying or extending energy grids.
- The Energy Master Plan is the input and basis for the new grid concessions (the City of Paris is the grid owner) with energy providers: gas (2018), cooling (2021), heating (2024) and electricity (2024).
- The mentioned strategic documents will define opportunities to develop, reinforce and optimize the grids regarding urban development. This will lead to energy supply orientations for the urban projects.
- The Land use plan PLU can set energy dedicated requirements for buildings, blocks and districts
- These orientations and requirements should be transferred into the concession contract between the city and the developer who is responsible for urban projects and is then executed in a tender procedure. The developer should ensure that these defined criteria are regarded from the beginning (assessments, studies) through planning (master plans with energy) to design and implementation.
- A dedicated Energy Board (different departments and deputy mayor staff headed by the General Secretary) should examine each urban project regarding energy criteria and fix the energy system very early in the planning process. They should also specify the requirements from strategic documents for an area and ensure that it will be part of the concession contract with a developer.

- The project ACCENT could help the city to assess different kinds of energy solutions (energy scenarios) and to find the appropriate decision for an area. The experiences and output of this project should be the basis to develop an Energy Atlas. Nevertheless, there is a need for tools and methods for energy scenarios.
- That is strongly linked to the Label Eco District which is a national tool. An “**Eco District Management**” can ensure that all energy decisions are according to the label beyond the implementation.
- Therefore, it is important to install and use a regular monitoring system for each area.
- The concept of Eco manager for urban projects is under development – its role should be to ensure the ownership of buildings and to collect different data (including energy) to monitor the project after the buildings have been constructed.

Figure 6: Overview of the integrative energy planning approach of Paris



Source: City of Vienna – MA20 (Hemis) and City of Paris

3.6. Vienna

The suggested upgrade of the urban planning process in Vienna aims at supporting the achievement of the climate and energy goals set by the Smart City Framework Strategy. An **Energy Framework Strategy** which defines the energy policy of Vienna is being developed and will be adopted soon. All further elements and instruments should build upon this strategy. The Urban Development Plan 2025 (from 2014) already points out the need of integrative energy planning. Therefore, the suggested **Thematic Concept for Integrative Energy Planning** is on track (planned for the beginning of 2018). This concept will show the way to find appropriate energy solutions for each area early in the planning process and help to steer the development of grid-based energy supply. It will lead to an **Energy Development Plan/Concept** which designates energy zones (e.g. priority zones for grid solutions or decentralised systems). The committees and working groups for developing this concept and plan are already installed and first meetings were held.

Further suggested elements for the planning process are:

- Integrating energy efficiency, renewable energy and climate protection in the **objectives for urban planning** of the Building Code (which is also the Planning Act of the province of Vienna)
- All energy criteria of the thematic concept and energy development plan/concept should be specified for districts and quarters (**District Energy Concepts**). It will provide more details on energy requirements such as possible energy solutions (if depending on a grid), share of renewables or CO₂ factors
- The **Energy Working Group** for urban development areas will discuss on potential energy solutions (especially whether the extension of grids is possible). This group composed of different departments, the grid operator and Vienna's energy company meets regularly and cooperates closely.
- **Energy Concepts for each urban development area** carried out by the developer and/or the city should be according to the criteria of the framework concepts (Energy Development Plan and District Energy Concepts). It will be developed parallel to master plans and urban feasibility studies, because there is a mutual impact (like density and orientation of the buildings). The City of Vienna wants to develop **guidelines/manuals for energy concepts** as support and to ensure a high quality of such concepts. Furthermore, it will increase the knowledge for integrated solutions.
- Some carried out criteria or solutions could be integrated in contracts. That could be the obligation to ensure sustainable energy supply by fixing e.g. a threshold for CO₂ gram per kWh and year or a specific grid solution such as district heating. There are two options in Vienna:
 - **Land sale contracts** if the city owns the land
 - **Urban contracts** based on private law between the city and the land owner / developer
- As mentioned above, **energy zones** need to be designated. That could be integrated in a separate (new) instrument such as a Heating Plan as is the case in Amsterdam or by an overall plan mentioned above (Energy Development Plan/Concept or District Energy Concepts) or as zones within the Land Use Plan/Building Regulation Plan. It needs to be discussed which solution is considered best or if other instruments such as contracts are already sufficient.
- All drafts of the Land Use Plan are examined by an independent Advisory Board. An expert for energy could be added to this board.
- To ensure the implementation of all decided energy criteria, it is recommended to integrate an **energy check as part of the building permit** or to provide a separate permit. Issues to be checked could include the planned heating system in each building (according to the plans before) and the integration of renewables.

- It is recommended that there are checks at several points during construction and thereafter as to whether the agreed upon criteria are being fulfilled – these points include the start of construction and at regular intervals thereafter. When construction is concluded, monitoring of energy performance should also be carried out in regular intervals. Monitoring results can be used to e.g. inform policy (efficiency of subsidies) or the setting of criteria for new buildings.

Most of the suggested elements need a comprehensive set of data (as part of basic research) and a good legal framework, especially if criteria are being defined for different zones. Therefore, it is important to integrate data from energy provider and grid operator on the best available level of detail (minimum at building block level). That means data about energy consumption but also about their forecasts. The city also provides basic data about buildings or potentials of renewable energy sources (preferably at the building block level). Based on these data, the city will develop appropriate scenarios with energy providers and grid operators. This is an essential input for designating energy zones and providing a frame for integrative system solutions.

3.7. Warsaw

The City of Warsaw has to deal with the absence of energy reserves and storages options as well as the huge planned roll-out of electric mobility. Under the perspective of energy safety and stability of the networks, it is important to connect the five different energy systems (gas, district heating, electricity, local energy storages, electric mobility) and increase storage solutions in areas with a deficit. The main focus of the upgraded governance process is to develop an integrated database. This database should connect data about energy demand, capacities, available storages, decentralised renewable energy generation which will be provided by energy providers and grid operators. Combined with data about urban development, socio-economic issues and emissions, the 'Assumptions for supply of heat, electricity and gas' will be developed. These assumptions are showing the energy demand, energy balance and forecasts until 2035 based on scenarios. Especially, these forecasts are the core element of this process. Therefore, areas with energy deficits can be identified. For these areas the energy development plan of the utilities should provide technical solutions which are economically feasible. If they are not in line with the assumptions the city has to prepare a public plan of supply with heat, electricity and gas according to the Law on Energy. A special challenge will be the new infrastructure for electric cars especially for the hot spots of charging. But they can also be used as storage for balancing the electricity grid.

Compared to other cities, Warsaw has the advantage that the Law on Local Government and Energy (Art 18 §1) gives the municipality the responsibility for energy planning. The city has an energy planning procedure and can provide its own energy supply plans if the energy companies development plans are not sufficient. Moreover, the utilities are obligated to provide plans and data.

3.8. Zagreb

The City of Zagreb will develop a framework for integrative energy planning. Based on general Energy Planning Guidelines, the path toward integrating energy at a strategic and an operational level will be defined. The following elements are important:

- Defining an Overarching Strategy and/or an Energy Strategy with long-term perspective until 2050 regarding the urban development in addition to the ZagrebPlan and Sustainable Energy Action Plan (SEAP).
- Until both strategies are developed, the gap could be closed with Energy Planning Guidelines (strategic and operational) which is adopted by the City Assembly
- Establishing an Energy Planning Department which is responsible for energy planning and an Counselling Body which evaluates energy planning activities

- Developing an **Urban and Energy Study** which results in binding energy goals as basis for the new Urban Plan and urban development areas. It will be integrated in the Decision “Make an Urban Plan”. This study should treat the following issues:
 - analysis and assessment of conditions for energy (energy demand, structure of users, mapping, ...)
 - potentials for such as reducing energy demand as well as renewable energy sources
 - scenarios for different energy and mobility solutions
 - economic feasibility
 - indicators for monitoring
- Integrating energy issues in the new Urban Plan based on the Urban and Energy Study
- Installing and ensuring monitoring

4. Outlook

All mentioned ideas and elements provided in this document are being discussed in the cities. Recent considerations in most of the cities focus on the following issues and questions:

- **Energy Planning** – How much energy planning should a city do and who should be responsible? Does a city need a separate energy planning procedure?
- **Gas** – How can cities deal with a possible gas exit? What about the future of the gas network?
- **District Heating** – Should the district heating grid be extended and densified? How can renewables best be integrated and what is the impact of open grids?
- **Data** – How can sufficient energy-related data be provided when data privacy regulations are observed? How can appropriate scenarios be developed?
- **Contracts** – How can energy issues be integrated in contracts? Are contracts the appropriate instrument?
- **Energy Zoning** – Do we need energy related zones and if so at what spatial level? Could it be integrated in the existing planning instruments or is there a need for new instruments? How can cities deal with the grid infrastructure in such plans? Which criteria should be related to such zones or at quarter level?
- **Energy and planning security** – How can cities find the balance between energy/planning security and flexibility? How can we deal with uncertainties in the future of the energy system especially dynamics on the energy market and the political level? How can a city set energy criteria which are open for different technologies?

The partner cities are in different stages of implementation of the provided approaches as well as in answering the questions above. Mostly, these are suggestions will need further discussion (e.g. about priorities) and finally achieve political commitment. Therefore, implementation plans are needed, which will be provided as next deliverable in autumn 2017.

Some ideas mentioned have already been tested in first pilot projects. These experiences will become available in the next months. Thus, the partner cities will provide information on these experiences together with the implementation plans.

The city approaches, other deliverables and results (e.g. process maps) will be available on: <http://www.urbanlearning.eu/learn-and-exchange/deliverables/>.

5. Annex

Figure 7: Approaches for energy upgraded governance processes – selected elements for legal framework, strategies, organisation and data;

Source: City of Vienna MA20 (Hemis)

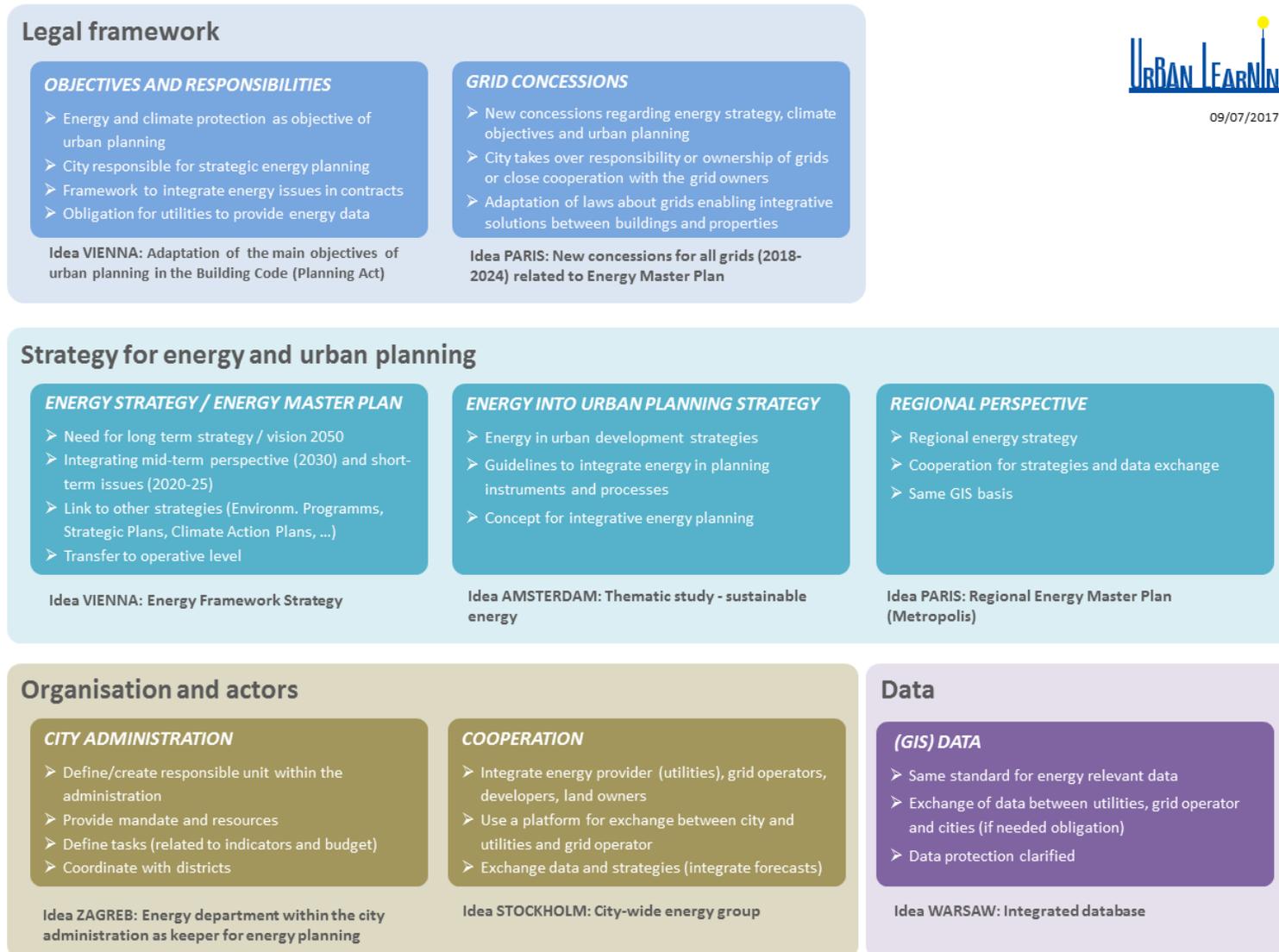


Figure 8: Approaches for energy upgraded governance processes – selected elements for planning requirements;
Source: City of Vienna MA20 (Hemis)

