



Implementation plans 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 4.3)

November 2017



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

PROJECT PARTNERS

- TINA VIENNA GMBH (COORDINATOR)
- AGENCE PARISIENNE DU CLIMAT ASSOCIATION
- GEMEENTE AMSTERDAM
- BERLINER ENERGIEAGENTUR GMBH
- ENERGETSKI INSTITUT HRVOJE POZAR
- VILLE DE PARIS
- STOCKHOLMS STAD
- MIASTO STOŁECZNE WARSZAWA
- MAGISTRAT DER STADT WIEN
- GEMEENTE ZAANSTAD
- GRAD ZAGREB

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

Review: Ute Gigler (Energy Center Wien, Urban Innovation GmbH),

Anna Austaller (MA 20 – Department for energy planning, City of Vienna)

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

Amsterdam: Marijke Godschalk (City of Amsterdam, Department of Physical Planning and Sustainability), Saskia Müller

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

Paris: Sébastien 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, Herbert Hemis (City of Vienna, MA20 – Department for energy planning);
Waltraud Schmid (Energy Center Wien, Urban Innovation GmbH)

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.	Overview of the implementation plans and outlook	6
2.	Amsterdam	10
2.1.	Framework and impact.....	10
2.2.	Implementation plan	10
2.3.	Experience from testing new governance elements	10
3.	Zaanstad	11
3.1.	Framework and impact.....	11
3.2.	Implementation plan	11
3.3.	Experience from testing new governance elements	12
4.	Berlin	13
4.1.	Framework and impact.....	13
4.2.	Implementation plan	14
4.3.	Experience from testing new governance elements	16
5.	Paris	18
5.1.	Framework and impact.....	18
5.2.	Implementation plan	18
5.4.	Experience from testing new governance elements	22
6.	Stockholm	26
6.1.	Framework and impact.....	26
6.2.	Implementation plan	26
6.3.	Experience from testing new governance elements	28
7.	Vienna.....	29
7.1.	Framework and impact.....	29
7.2.	Implementation plan	29
7.3.	Experience from testing new governance elements	32
8.	Warsaw.....	35
8.1.	Framework and impact.....	35
8.2.	Implementation plan	36
8.3.	Experience from testing new governance elements	38
9.	Zagreb.....	39
9.1.	Framework and impact.....	39
9.2.	Implementation plan	39
9.3.	Proposal for testing new governance elements.....	41

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 1.1: 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 these analyses, the cities developed proposals for an energy-related upgrade of their governance processes. The output was approaches of upgraded governance processes in each city. They include a set of ideas and suggestions as to how and where to integrate energy issues to meet the challenges of an energy transition. Moreover, the approaches are not only covering planning process(es), but also the legal framework, strategies or changes in organisation. 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, issues under negotiation, committed but not implemented, or already being implemented. 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 “**Integrating energy in urban planning processes – insights from Amsterdam/Zaanstad, Berlin, Paris, Stockholm, Vienna, Warsaw and Zagreb (D 4.2).**” See: <http://www.urbanlearning.eu/learn-and-exchange/deliverables/>

Focus of this report

According to the approaches of integrative energy planning, the partner cities developed implementation plans. These implementation plans are suggestions that delineate the next steps in the process for selected elements. In some cases, they represent updated such as new information or ideas. Furthermore, some cities provided a time schedule and responsibilities. This report provides an overview and all implementation plans of the cities. The following content has not been committed to by the cities and should be seen as suggestions or pathways for implementing integrative energy planning.

1. Overview of the implementation plans and outlook

The cities already have set up very ambitious approaches for integrative energy planning. Most of the mentioned issues are part of the implementation plans. There is a wide range of issues (3-10 per city). Nevertheless, it was possible to cluster these issues into themes such as data, strategies or organisation. These clusters show the similarities in the different city approaches. Matching of some mentioned elements to themes was not always clear-cut. For instance, an element which is a tool could also provide basic data. The figure on the following page provides an overview of elements by cities and categories.

The importance of energy data and studies for implementation

Sufficient energy data and studies provide an important basis for all concepts, energy related activities and decisions. Therefore, most of the implementation plans point to the importance of providing an energy database (in some cases it should be integrated in a city's GIS system) and visualised results in e.g. an energy atlas. In some cases, it would also be possible to integrate the potential for refurbishment (e.g. Berlin). Vienna will develop a fundamental building database as input for subsequently developed energy data models. Paris has an ambitious approach for a 3D model which is integrating amongst others lifecycle issues such as material flows. It should be used as a tool for planning certain areas and for discussions with stakeholders. Furthermore, studies are an important basis for decisions which will also generate data. For instance, Zagreb wants to develop urban energy studies for urban projects as a basis for the guidelines and the integration in the urban development plan. Amsterdam is using different data as input for heating plans and will developing new ways to use data for the future strategy and plans. The studies can either be created for the whole city or separately for each urban development project. The following list includes all tools, studies and models that are being discussed or under development in each of the partner cities:

- Amsterdam: Energy Atlas, Calculation tool, Map heating sources, different energy studies for urban projects, tool
- Berlin: Energy Atlas, Refurbishment Map
- Vienna: Energy Atlas, Basic Energy Data Model, Basic Building Data Model
- Warsaw: E-Map, Adaptation of the assumptions (new data and scenarios)
- Paris: Paris 3D model integrating energy, energy studies for urban projects
- Stockholm: GIS based energy data
- Zagreb: Urban Energy Study

Strategic documents and guidelines for orientation

Most of the cities want to implement a vision or a strategy on energy (in addition to climate strategies). It should define objectives and provide an orientation for development of the energy supply using renewables and energy demand. All other instruments and actions should follow such vision. For instance, Zaanstad will develop an 'Environmental vision' and a 'Heating vision'. Amsterdam has already a 'Zero Gas Strategy' which is the basis for all further activities such as the 'Heating plan'. Vienna will develop an 'Energy Framework Strategy' which influences other instruments. Paris will develop an 'Energy Master Plan' based on the national 'Energy Transition Law' and a new 'Climate Action Plan'.

Furthermore, guidelines provide an orientation for the operative level. This could be helpful for urban planners and other experts in city administrations or for external stakeholders such as developers. As a first step, Zagreb is developing 'General energy planning guidelines' as an orientation for the city administration. Berlin wants to develop specific guidelines for areas as input for urban planners of districts.

The following list depicts all documents with a strategic focus or guidelines currently being discussed or under development in each of the partner cities:

- Amsterdam: Agenda Sustainable Amsterdam, Zero Gas Strategy and Study for Sustainable Heat
- Berlin: Urban Energy Planning Guidelines
- Stockholm: Energy strategies for urban projects
- Paris: PLU – Energy guidelines (thematic OAP)
- Vienna: Energy Framework Strategy
- Zaanstad: Environmental vision, Heating vision
- Zagreb: General energy planning guidelines

Adaptation of the organisational framework and integration of stakeholders

All cities intend to define clear responsibilities in their respective city administrations for integrative energy planning or build on existing ones. For instance Zagreb is interested in developing an administrative unit which can take over those responsibilities (possibly modelled after the already existing energy department in Vienna). If there is already an existing, responsible unit, then the tasks and resources might need to be redefined. In some cases, it is not a separate unit, but rather a permanent working group, committee or board as is being planned in Paris and Stockholm. In some cases, a new coordination institution/unit might be needed; e.g. Berlin is in the process of developing a new ‘Service Point for Energetic Neighbourhood Development’ which coordinates refurbishment activities. The following list includes all potential organisational changes in partner cities:

- Amsterdam: Program ‘City without gas’
- Berlin: Service Point for Energetic Neighbourhood Development
- Stockholm: City-wide energy group
- Paris: Energy Board/Committee
- Zagreb: Administrative unit for energy planning

Planning instruments for spatial coordination of the energy supply

The implementation plans of some cities focus on planning instruments which enable a spatial coordination of energy issues. Amsterdam recently has the possibility to integrate energy in the zoning plan and investigate this new opportunity. Amsterdam and Zaanstad are also preparing themselves for the new Environmental Plans which will be used from 2021. Nowadays, Amsterdam is using a separate instrument called the ‘Heating plan’ to define the heat energy supply for an area. Paris will define energy guidelines (OAP) as part of the ‘Land Use Plan’ (refer to strategic documents) and develop an ‘Energy Master Plan’. The latter will define the development of heating, cooling, gas and electricity grids. That will also include spatial aspects such as zones for densification and extension. Thus, it could be viewed as a planning instrument. Vienna is developing a ‘Thematic concept for integrative energy planning’ as part of the ‘Urban Development Plan’ (STEP 2025). This document provides an orientation and represents the basis for developing Energy zoning plans and/or an Energy Development Plan. It will provide the framework for a functioning interaction and cooperation between different departments as well as between the city and energy providers. The following list depicts spatial planning instruments for coordination of energy supply that are being discussed/under development in each of the partner cities:

- Amsterdam: Heating Plan, Extended zoning plan, Preparation of Environmental Plan
- Vienna: Thematic concept for integrative energy planning, Energy Zoning Plans, Energy Development Plan
- Paris: PLU – Energy guidelines (thematic OAP), Energy Master Plan
- Zaanstad: Preparation of Environmental Plan

Contracts as legal instruments

Aside from other already mentioned instruments such as strategies and plans the use of contracts which will include energy issues is foreseen in some implementation plans. This is the case in so-called voluntary 'urban contracts' in Amsterdam, Stockholm, Vienna, Warsaw and Zaanstad. Paris wants to use concession contracts with developers and land sale contracts to define energy requirements. All these kinds of contracts based on negotiations between the city and the developer, land owner or buyer. But in the end, it will be a binding legal instrument. That has a higher impact than Letters of Intent (LOI).

Tools and Monitoring

The definition of tools has a wide range; e.g. studies are also categorised as tools which generate basic data. This is also the case for 'Energy calculation tools and methods' used in Stockholm which helps to calculate the energy performance of a building in an early planning stage. Structural definitions of planning processes constitute yet another kind of tool. Such tools include the handrail tool Ledstången in Stockholm or the Plaberum in Zaanstad and Amsterdam. In both cases, the adaptation or relaunch of this definition should ensure that the coordination of energy issues between different departments as well as with developers and energy providers becomes more effective and institutionalised.

Finally, monitoring which can be seen as an important quality management tool is explicitly mentioned in the implementation plans of Paris, Stockholm and Zagreb. Nevertheless, it is an important issue in each city.

Outlook

Some of the mentioned elements have already been started and/or will be finished next year. In most of the cases, the implementation plans have a time horizon of about 5 years. Thus, the main issues are going to be dealt with short-term and mid-term. Nevertheless, long-term elements are also included. The implementation of some elements that were suggested will depend on the realisation of other elements. All the plans have to be viewed as living documents which will need continuous updates and negotiations.

All elements of the city implementation plans are depicted below – see figure 2.

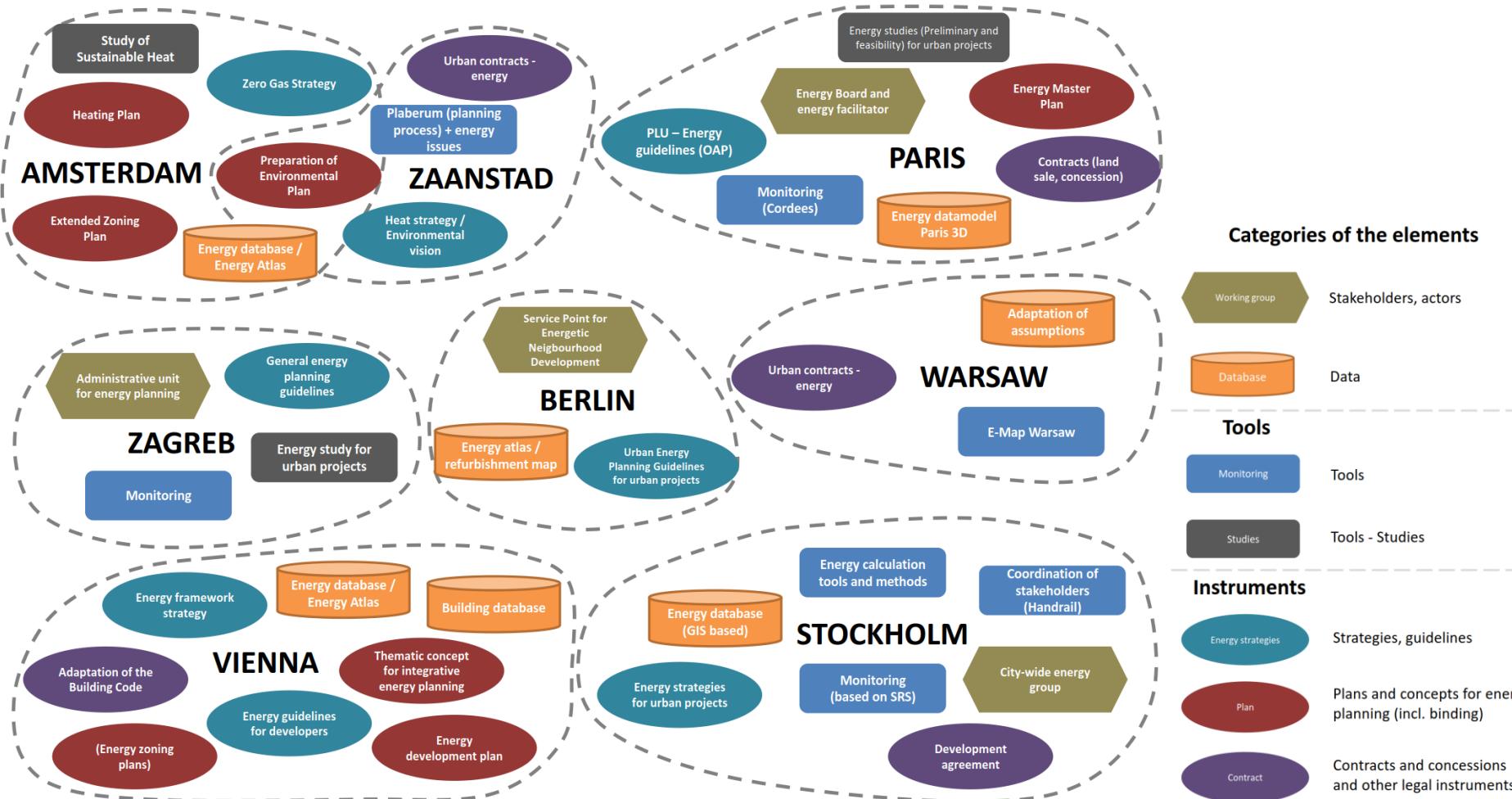
Elements of the implementation plans

Figure 1.2: Overview of the cities' implementation plans; Source: Hemis (MA 20 – Department for energy planning, City of Vienna)

2. Amsterdam

2.1. Framework and impact

In December 2016, the City Council Amsterdam adopted the strategy 'Towards a City without Natural Gas'. This describes the strategy of how the city can become gas-free. This means, among other things, that new buildings are no longer connected to the gas network, and that alternatives should be found for the heating of homes, the preparation of hot tap water and cooking. This strategy means to find a way for developing new sustainable heating systems in transformation areas.

In 2017 and 2018 a study will be developed for a sustainable, affordable and open heating system (or combination of systems) for the newly developed and transformation areas in Amsterdam. Some strategic decisions must be made about governmental influence or freedom and for collective or individual solutions. The study will deliver information what's needed in kind of organization, process, (legal) instruments, advice capacity and finance to implement these new heating systems in the city of Amsterdam. Finally the instrument: heating plan can be used to oblige a specific heating system in a specific area. The first experiences have been gained with this heating plan.

In the near future (2021) in the Netherlands the zoning plan and the heating plan will be integrated into one plan: the environmental plan. This new plan makes it possible to integrate sustainability subjects and not only spatial subjects. This year Amsterdam started to work and gain some experience with this new plan in one specific area and next year the idea is to expand this to more areas.

2.2. Implementation plan

Below a summary of the Amsterdam implementation plan.

Table 2.1: Implementation plan for Amsterdam

Element	Suggested timeframe
<i>Agenda Sustainable Amsterdam</i>	2015
<i>Strategy 'Towards a City without Natural Gas'</i>	2016 - 2017
<i>Study of Sustainable Heat in new area's</i>	2017 - 2018
<i>Heating plan</i>	2016 - 2020
<i>Extended zoning plan</i>	2017 – 2020
<i>Environmental Plan</i>	2021

2.3. Experience from testing new governance elements

During the scope of the project URBAN LEARNING, the first step is made to integrate energy planning in the city planning and decision process (PLABERUM). The City Council of Amsterdam formulated in December 2016 the ambition to develop new districts without natural gas. Now Amsterdam has to find new procedures and new ways of working together to implement this ambition.

3. Zaanstad

3.1. Framework and impact

National legislation currently makes Zaanstad work on an Environmental Vision that will later be turned into an Environmental Plan. This work should be done before 2021. Energy is an integrated part of this spatial plan for the city of Zaanstad, mainly focused on new developments.

Elements of the plan like a so-called Heating Vision provide a vision on heat supply for new developments as well as for existing buildings. In this plan the directions are given on how to become a city without using Natural Gas and Climate Neutral.

Many studies are now performed, e.g. *Zaanstad without Natural Gas*, as part of a bigger project: 'Noord-Holland (province): The next study is 'Energy transition strategy'. This study especially digs into the heat transition of existing building stock in the city as well as regional energy supply options.

3.2. Implementation plan

The implementation plan consists of both plans to integrate energy in the urban planning process (e.g. Omgevingsvisie and Plaberum) and plans to develop visions/scenario's for the energy supply of Zaanstad as a whole (existing and new buildings). This is all work in progress. Part of the (national) legal framework is still subject to change. Some short term instruments have been created to make it possible to anticipate on future policies and legislation.

Below a summary of the Zaanstad's implementation plan.

Table 3.1: Implementation plan for Zaanstad

Element	Decisions and actions	Optional: Responsibilities	Suggested timeframe
<i>Omgevingsvisie (Environmental vision, the basis of the new Environmental Plan)</i>	<i>The decision that energy policy is part of this has been made on a national level .On a local level, the City Council has to come up with a local vision/plan</i>		
	supply input	Program manager Omgevingswet with input from specialists	2018
	compare possible measures in their consequences	Program manager Omgevingswet with input from specialists	2018
<i>Warmtevisie (Heat vision)</i>	<i>Map how to heat Zaanstad</i>	Program manager Climate and Energy	2018

Plaberum	<i>The decision to add both 'energy' and 'participation' as topics in the Plaberum</i>		Ready
	Include new actions regarding energy in the Plaberum and develop extra input on this issues	Head of the department for Projectmanagement	Q4 2017

3.3. Experience from testing new governance elements

During the scope of the project URBAN LEARNING, energy issues have been integrated in so-called Letters of intent and in Urban contracts (Anterior Agreements). These new ways to increase energy and sustainability demands on building parties were first tested in projects lead by members of the LWG.

In February 2017 the City Council of Zaanstad formulated the ambition to only develop new districts without natural gas. This decision is a stimulus for integrating energy issues in new developments. In practice this means that sustainability counts for at least 30 % of the assessment in case of tenders. The EPC (Energy Performance Coefficient) in new building projects exceeds the national Building Act norms so far with up to 60 % (experience based on cases with tenders and Letters of intent and Urban contracts).

4. Berlin

4.1. Framework and impact

Service Point for Energetic Neighbourhood Development

One main focus of the work in Berlin is put on the transformation and refurbishment of the building stock. Main element is the required promotion of Energy Neighbourhood Concepts in selected areas, with potential for realisation of concrete energy actions. The neighbourhood concepts are considered as a central base to support the refurbishment of buildings and modernisation of energy supply in quarters in Berlin.

For this reason, 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 (like Building Regulation Plan) and processes to integrate energy on 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.

The establishment of a Service Point targets to support the implementation of the Berlin Energy and Climate Protection Program, which initially foresees the development of more than 20 Energy Neighbourhood Concepts and the implementation of suggested actions until 2030. The initiation of implementation oriented energy neighbourhood concepts through the establishment and support of a service point could therefore address up to 100.000 apartments (assumption that urban areas of around 5.000 apartments in average are addressed) in Berlin and significantly contribute towards an increased refurbishment rate in these areas.

Urban Energy Planning Guideline

The construction of new housing and urban quarters has not been a focus of urban development in Berlin in the past decade. Due to dynamic city growth in recent years the pressure to provide affordable and sufficient housing has increased significantly. For that reason, the City of Berlin has identified potential areas for new housing. Main focus is put on 11 main development areas to provide around 37.000 new dwellings and related infrastructure within the next years.

In order to strengthen the integration of energy into the urban development process of new housing, it is needed to provide guidance to urban planners on how to do so, taking into account Berlin specifics such as density, energy infrastructure and urban design.

For this reason an urban energy planning guideline is recommended to which urban planners in Berlin can refer to in planning processes. To draw first conclusions regarding an urban energy planning guideline specific experiences are planned to be derived from pilot projects as part of the implementation plan. For this reason, the implementation plan targets to accompany and support the planning process of concrete development projects in Berlin, which refer to three development projects in the North-Eastern part of Berlin, in the District of Pankow.

4.2. Implementation plan

Service Point for Energetic Neighbourhood Development

In Berlin work has been elaborated to pilot core elements of a “Service Point for Energetic Neighbourhood Development” as an improved governance process to support the 12 district authorities in Berlin to prepare and identify district quarters, which have high potential for refurbishment and related energy actions. The approach seeks to engage local stakeholders within respective quarters at an early stage (e.g. building owners, energy suppliers, businesses, associations).

A common workshop with urban planners from the Berlin districts has been carried out on 12. October 2016 to present and introduce the supporting service centre. One main topic was to identify at least one quarter which could be supported by the service centre to promote energetic actions in selected neighbourhoods.

Several districts have shown great interest and suggested different potential areas. After a first consultation process (via mail, phone and bilateral meetings) the testing in the quarter “Obstallee” in the district of Spandau has been agreed upon as main focus of work. Some other districts (e.g. Pankow, Treptow-Köpenick) were punctually supported.

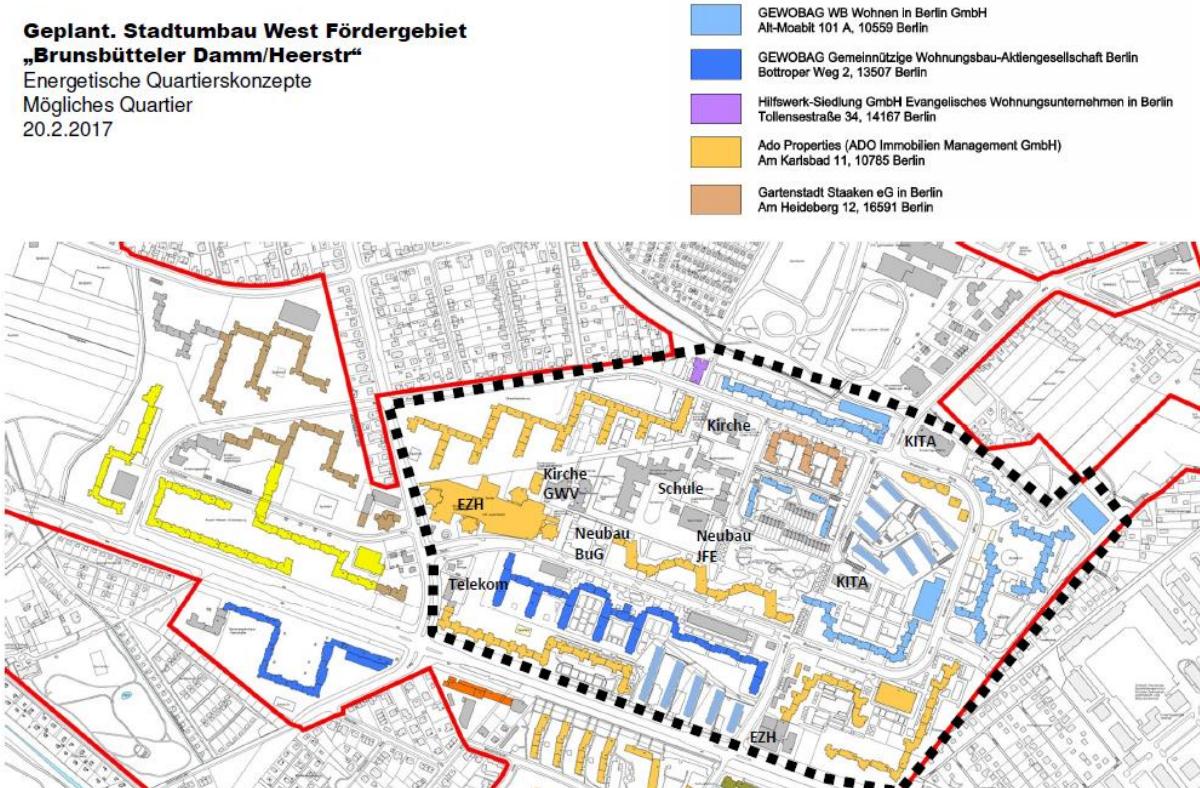


Figure 4.1: Map of the pilot neighbourhood “Obstallee”

The quarter “Obstallee” is part of the urban transformation zone “Brunsbütteler Damm/Heerstrasse” and has been the main pilot of the implementation plan from December 2016 until end of the project. The support has basically been provided according to the different (pre-competitive) support modules, as follows:

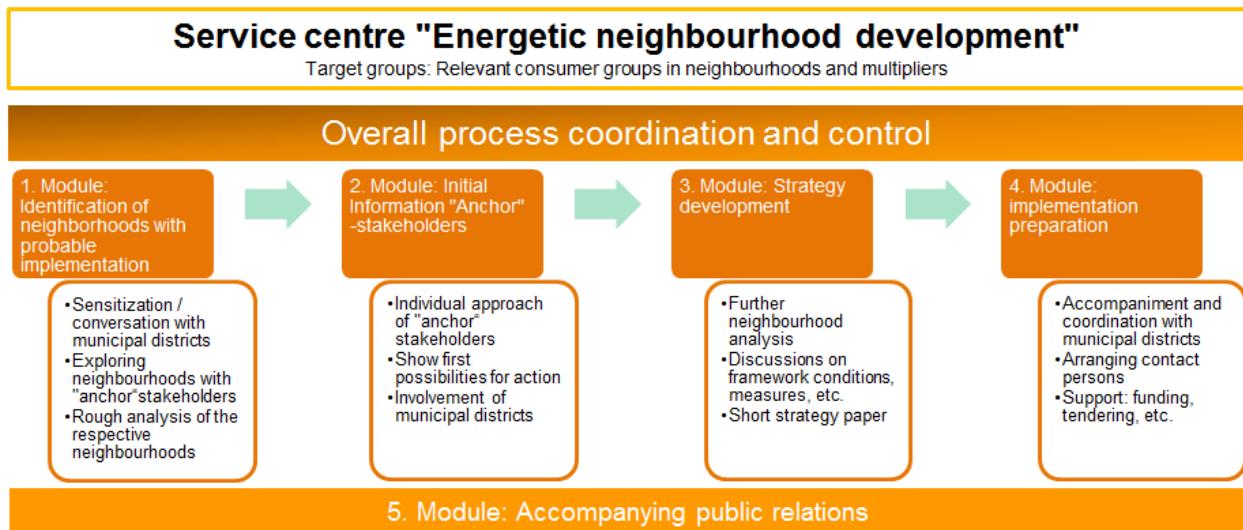


Figure 4.2: Overview "Service Point Energetic Neighbourhood Development"

The expected outcome of the piloting of the Service Point was to evaluate the need and success of actions in order to strategically decide upon the follow up after project completion.

Urban Energy Planning Guideline

In order to derive first conclusions for the development of an Urban Energy Planning Guideline for new housing, the implementation plan also focusses on the exchange with urban planners in charge. During the project the planning processes for three new housing development areas in the District of Pankow in the North-Eastern part of Berlin were investigated.

Initial exchange started in a meeting in October 2016 and led to a continuous exchange until end of the Urban Learning project. First recommendations have been derived from the exchange and consultations processes, which are among others summarized in following figures:

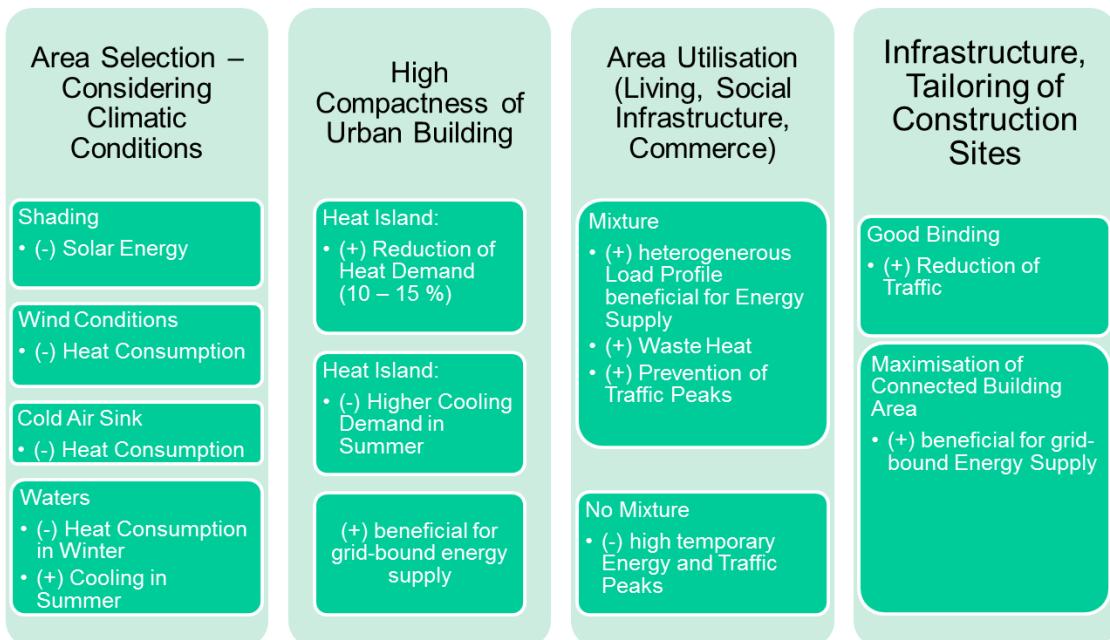


Figure 4.3: Field of Influence for Energy Supply

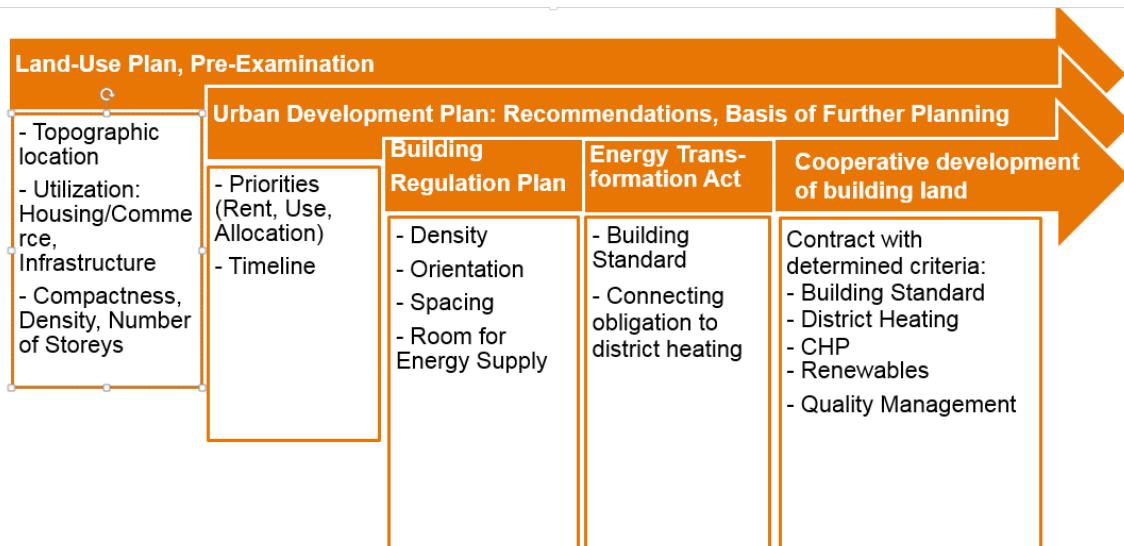


Figure 4.4: Urban Land-Use Planning – Energy aspects Berlin

4.3. Experience from testing new governance elements

Service Point for Energetic Neighbourhood Development

As outlined before the main focus of work in WP4 was put on the piloting of a Service point for Energetic Neighbourhood Development.

The support of the district Spandau and the quarter “Obstallee” has shown good results in terms of:

- Willingness of local stakeholders such as housing companies to support the process of a neighbourhood concept and the implementation of actions suggested such as new heating supply systems, mobility concept, energy efficient lighting of public space, refurbishment of selected building blocks etc.
- Willingness of the District of Spandau to establish a climate friendly district in Spandau as lighthouse for other districts
- combination and bundle of different funding schemes to support the implementation of energy actions as part of urban transformation processes
- development and submission of a proposal and application to develop the energy neighbourhood development concept in “Obstallee”

The District of Spandau and also other Berlin Districts considered the support as very helpful. The LWG-members representing the Senate Department for Urban Development and Housing and Senate Department for Environment, Transport and Climate Protection seek to establish a Service Point in the long-term. The integration of a Service Point has been included in the political decision to implement the Berlin Energy and Climate Protection Program.

Discussions will be continued to establish a Service Point (potentially for a period of 3 years from 2018).

Urban Energy Planning Guideline

The exchange with urban planners in charge for new housing development have shown that energy issues punctually have been addressed in on-going planning processes, but not to the full extent. The exchange and conclusions referring to the three development areas in the District of Pankow have shown that the capacity for comprehensive understanding of urban planning and energy planning needs to be strengthened more in the future. The results of developing recommendations for the three development areas has supported the capacity building process but needs to be advanced and also applied to the high number of other new development projects in Berlin.

The discussion to develop a guideline with general recommendations for urban development of different type and structure is on-going and expected to be continued after the completion of Urban Learning.

5. Paris

5.1. Framework and impact

Since 2004, the City of Paris is engaged in the fight against climate change by carrying out an initial assessment of the city's energy consumption and greenhouse gas emissions. It then adopted in 2007, unanimously, an ambitious Climate Action Plan with strong objectives. This plan was updated in 2012 and completed in 2015 with a climate change adaptation strategy.

Paris' ambition for the climate took on a new dimension at the 21st International Climate Conference (COP21) hosted by France in 2015. Illustrating the role of local governments in the fight against climate change, Paris brought together 1,000 local representatives from around the world. More recently, the City of Paris has confirmed its commitment to meet the climate challenge on the international scene with the election of the Mayor of Paris as C40 Chair.

Relying on these commitments, the City of Paris is now opening a new page of its climate-energy policies through the development of a new Climate Action Plan. This new document is the comprehensive vision of the most recent commitments made by the City of Paris for the climate, its support for the perspective drawn by the Paris Agreement and a vision shared with the Parisian community.

The ambition of the Climate Plan is to define the path that will make Paris a carbon-neutral city and 100% renewable energy by 2050, articulating targets for 2030 as well as acceleration actions to be undertaken by 2020 to meet the urgency of the ecological and energy transition. With 500 measures in several topics of action (buildings, transport, energy, food, waste, urbanism, governance, finance ...), the project of new Climate Action Plan has been adopted by Paris City Council on November 21st 2017.

5.2. Implementation plan

The implementation plan is a step-by-step description for reaching upgraded governance processes.

Strategy

The City sets out the planning guidelines for its territory through various framework documents, including the PLU, to which it must give special attention to the energy issues. The climate action plan makes it possible to reinforce these orientations within the framework of the definition of a 1.5°C city. These documents lay down the regulatory framework in which urban projects will develop. They ensure respect for the local context and the challenges of sustainable development.

Energy Master Plan

According to national regulation, Paris is working on creating an Energy Master Plan for its energy networks. The work is ongoing and will be done for 2019. Regarding Heating Energy Master Plan, the Parisian company for district heating submitted an application for a national call for projects on Energy Master Plan.

In addition, the Metropolis of Greater Paris has to manage its on Energy Master Plan; the schedule is not fixed yet.

Besides the Energy Master Plan, Paris is preparing the renewal of its concession contracts for the energy networks: heating (2024), cooling (2021) and gas (2019). This situation presents a good window of opportunity to enhance the role of energy networks to integrate energy in urban development projects.

Land Use Plan (PLU)

The Land Use Plan allows for the setting of obligations to ensure the reduction of greenhouse gas emissions and energy consumption and the production of local renewable energy at city scale.

The presentation report, which constitutes the territorial assessment, provides the key to understand the political issues raised by the sustainable planning plan (PADD). The PADD translates the city's climate policy, in particular the orientations set out in its climate plan for controlling CO₂ emissions and developing renewable energies. The regulation part details the rules applicable to constructions, in particular in terms of energy performance and integration of renewable energy production systems. Finally, the Programming Planning Guidelines (OAP) finally set the guidelines for energy efficiency at the level of a sector in urban renovation.

It is difficult to prescribe strong obligations in the regulation part since they can limit the construction to take place on the territory. The City of Paris has already incorporated an article 15 in the regulation part of its PLU which sets requirements for buildings in terms of reduction of energy requirements (national regulation -20%) and integration of renewable energy production systems. The limit of this exercise is the verification of compliance with rules laid down in the PLU, which must be carried out by the building permit instructor services. Support and even strengthening of services on this subject will be necessary in the future.

It is therefore easier to work on the planning directions (OAP – orientation d'aménagement et de programmation), that allow the urban development principles to be set at the level of a given sector. These measures may be written or graphic and may be opposed to any land use authorization. The modification of the regulatory context made it possible to create thematic OAPs which allow the setting of measures on all or part of the territory in relation to a given subject including energy. This generalized OAP on energy makes it possible to fix a consistency between the PLU and the climate action plan. It does not substitute for sector specific OAPs for which more detailed objectives can be defined.

Committee

Paris is working on creating its new Climate Action Plan to establish a vision of carbon neutral vision for 2050 and a comprehensive roadmap for 2030. The plan will be published on early 2018. The Climate Action Plan fixes the approaches of resilient and energy efficient eco-districts. During the preparation of the future plan, discussions took place on creating a dedicated committee to both monitor and control the implementation of Energy Master Plan, and to validate energy issues in urban planning projects. This "Energy Board" will be a major output from Urban Learning.

Criteria and Requirements

The project forecast makes it possible to spatially represent the needs of the operation. The studies carried specify the context of the urban project and enrich the reflections in order to define the aims to be set in the project. These studies define the general aims defined at the city level in an operational manner. These studies are carried out as soon as the number of dwellings, the area dedicated to shops and public facilities envisaged are known. Studies should seek to highlight:

- The optimization of energy needs and the strong synergies between the actors in the use of energy on the site.
- The effectiveness of the systems that will be implemented, whether centralized or individualized.
- The use of renewable energies to guarantee a carbon neutral energy supply.

A first "opportunity" study should provide information on the future energy needs of the area and on the various possible solutions on renewable energy for the future development project. This preliminary study will complete the definition of the project by influencing some choices of development such as density, urban organization, the reservation of land for the creation of collective heating plant, etc. It may also make it possible to dismiss some energy sources which will prove to be unsuitable for the area.

Subsequently, a second more detailed study, called "feasibility", will complete the "opportunity" study. It will aim to identify precisely the best energy scenarios of the area with techno-economic calculations and taking the most successful programming elements.

The study should assess the energy consumption of the site, and in an enlarged scope considering the large potential consumers around. Some scenarios of future energy requirements should be done considering different levels of energy performance of buildings (national regulation -10%, -20%, positive energy building) for the new but also for the renovation of existing buildings. The study should also identify the heritage constraints related to the site, in particular for the renovation and implementation of renewable energy plants. The relevance of district heating and district cooling network should be assessed considering an enlarged perimeter. The study should quantify the potential for renewable energy production and heat recovery on or near the site. Finally, the first sketches or ground plane could be optimized to improve passive solar contributions.

The issue of energy criteria and set of basis requirements for preliminary studies is ongoing in the context of Urban Learning Local Working Group and the elaboration of the new Climate Action Plan. A training session about energy and urban planning has taken place on 22 March with the different urban project leader from the City.

Master Plan / Development Plan

The planner must meet the commitments set out in the development concession contract. It must be ensured that the development plan does not increase the energy requirements of the project. Furthermore, a regulatory study on the renewable energy supply of the project must be carried out. It allows to know the proven potentials of the site and to provide robust energy supply scenarios such as the opportunity to connect to the urban cooling and heating networks.

In the same way that the program can impose constraints related to the location of public spaces, wastewater management, the destination of the ground floors of buildings, it can impose energy objectives.

The development plan combined with the preliminary studies form the basis for the specifications of the consultation for the developer if there is development concession contract. For projects where the city does not have control over land, its leeway is limited. However, the program details the will of the city on the concerned sector, which serves as basis for negotiations with operators upstream of the granting of the building permits.

Contract

1. Urban Development Contract

The feasibility studies allow preparing the necessary tasks to make the urban plots suitable for construction. The planning of the plots and the realization of the shared equipment are entrusted to the developer through the concession contract whereby the city transfers the project management competence to a developer. The project manager will be responsible for the design and implementation of the urban project: acquisition or control of land, servicing of the land, building of equipment and networks and marketing of lots. The Planning Act does not specifically provide for specific provisions for the integration of environmental objectives into urban development concessions.

The City of Paris outlines the energy objectives that have been defined in the Master plan in the design phase. These objectives will have to be transposed into selection criteria which will be indicated in the consultation and which will have to cover the 3 stages of the development operation:

- Conception: max energy consumption, renewable energy rate, connection to district heating
- Implementation : material reuse, waste and site management
- Life time: performance guarantees of system over time

2. Land Sales Contract

During the implementation phase, the promoters and the landlords commit themselves to respect the objectives fixed in the project for the development of each plot. The administrative document that allows to contract with an operator is the specification of land transfer (CCCT). As an annex to the act of sale of the land, the CCCT has a contractual scope. However, the non-respect of the obligations can in no case motivate the refusal of the building permit. At best, it may result in refusal to conclude the sale or result in contractual penalties.

In Paris, for each sale a receiver representing 4% of the amount of the sale is generated. The provisional sums will be retained in the event that the objectives set in the environmental specifications are not obtained in particular from the energy point of view.

Life Time Phase and Monitoring

1. Cordees

The concept of energy manager for urban planning project will be discussed and could be set in the future climate action plan. The City of Paris is currently managing a research project on energy manager for its eco-district Clichy-Batignolles thanks to a European call for projects related to smart city. With the CORDEES (CoResponsibility in District Energy Efficiency & Sustainability) project, the city experiment smart grids solutions and effective governance to reach ambitious energy performance targets.

2. Data about energy

Four major energy network operators, RTE, GRTGaz, Enedis and GRDF team up with the City of Paris, to launch an innovation event on energy issues last of June. Startups, developers, Data scientists and UX designers, join forces with experts in energy and territories to develop proposals on 4 challenges. One of these challenges was to explore the potential of the data. Energy planning, Spatial planning, fight against energy poverty, energy efficiency: how can territories rely on data and on various representations (dataviz, cartography, etc.) to address these issues? This competition has rewarded innovative solutions that could be implemented in the years to come. 2 startup companies were selected and will develop their prototype with the support of energy operators.

Data - PARIS 3D

Before 2020, the City of Paris will implement a geographic information system (GIS) in three dimensions as part of the "Paris 3D" approach. 3D GIS will facilitate the development of digital models of buildings and neighborhoods embedded in their urban environment. It will thus be the support of tools for consultation of urban planning projects. These tools will also accompany the next modification of the PLU and its application.

The city will study the feasibility of integration in 3D GIS, especially for urban development projects, of all the relevant data on the networks (energy, water) and material flows, as well as Building Information Modeling so that 3D GIS becomes a tool for energy and ecological transition. This study will aim to determine which of the most relevant tools can be backed by the "Paris 3D" approach to assess the environmental impacts of urban planning projects and facilitate participatory project design through 3D visualization and interaction with stakeholders, inhabitants and residents. It will also make it possible to define data sharing obligations, in particular through the BIM, which will make it possible to engage stakeholders on performance requirements. The data reported will relate to actual energy performance (taking into account usage and comfort), lifetime greenhouse gas emissions as well as other environmental impacts (air quality, acoustics, impacts of the materials used and the building site, water cycle, etc.) and will have to make it possible to engage the actors on numerical obligations.

5.4. Experience from testing new governance elements

Strategy

The city of Paris is preparing the elaboration of its Energy Master Plan for district heating and cooling. In the same time, the preparation for the legal renewal of its concession contract for energy distribution (heating, cooling, gas, electricity). The first studies for both procedures are ongoing and energy and climate issues are part of the disposals to be included in the documents.

Land Use Plan

The updating process of Land Use Plan resulted during summer 2016 in the adoption of a regulation incorporating new environmental disposals, in particular an article 15 related to energy efficiency. The City of Paris is working on the elaboration of a guideline in order to assist in the application of the regulation. This document is intended for both petitioners of applications for planning authorizations and for instructors in the examination of these applications and in their exchanges with the petitioners. The aim is to produce recommendations to comply with the Land Use Plan rules, and possibly to go further, in line with the City's objectives on energy efficiency.

The new climate action plan (2018) will reinforce the energy and climate disposals in the PLU. Especially, OAP on energy will be draft for the whole city combined with more detailed OAP on specific zones.

Governance

Paris intends to rethink its modes of governance of urban projects and has already launched several initiatives in this direction to better involve stakeholders in urban design. It is the case of different calls for projects “reinventer paris” or “reinventer la Seine”, which have received a very positive feedback from the actors of urbanism and urges us to show more openness and innovation in our way of understanding urban projects. So soon the urban project ‘St vincent de Paul’, which is a federative urban project with great ambitions such as a sustainable and innovative energy strategy, will test the solutions and tools that have been developed in the framework of urban learning.

As a first step, the City of Paris has launched an energy competition to address energy supply for the project just as the city does with architect to design buildings. It is an innovative way to involve energy companies in the early governance of the project. A dedicated workshop was organised on April 2017 to present the project context and key measures. The energy providers, district heating and cooling operators as well as start-up involved in innovative energy solutions had participated in order to gather in groups and propose innovative bundle of solutions to supply the project. The contributions were expected for June 2017 and the energy strategy for the project will be draft in November 2017 according to best solutions.

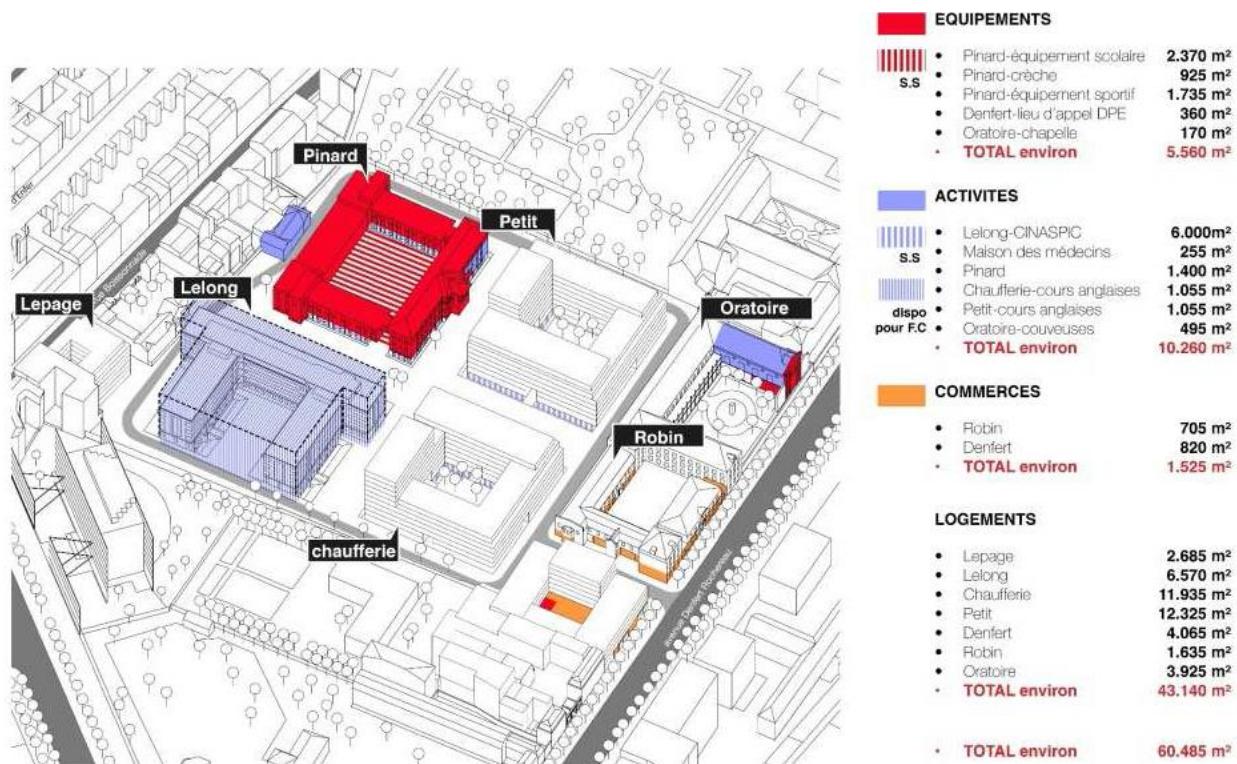


Figure 5.1: Project review Saint Vincent de Paul – Paris 75014

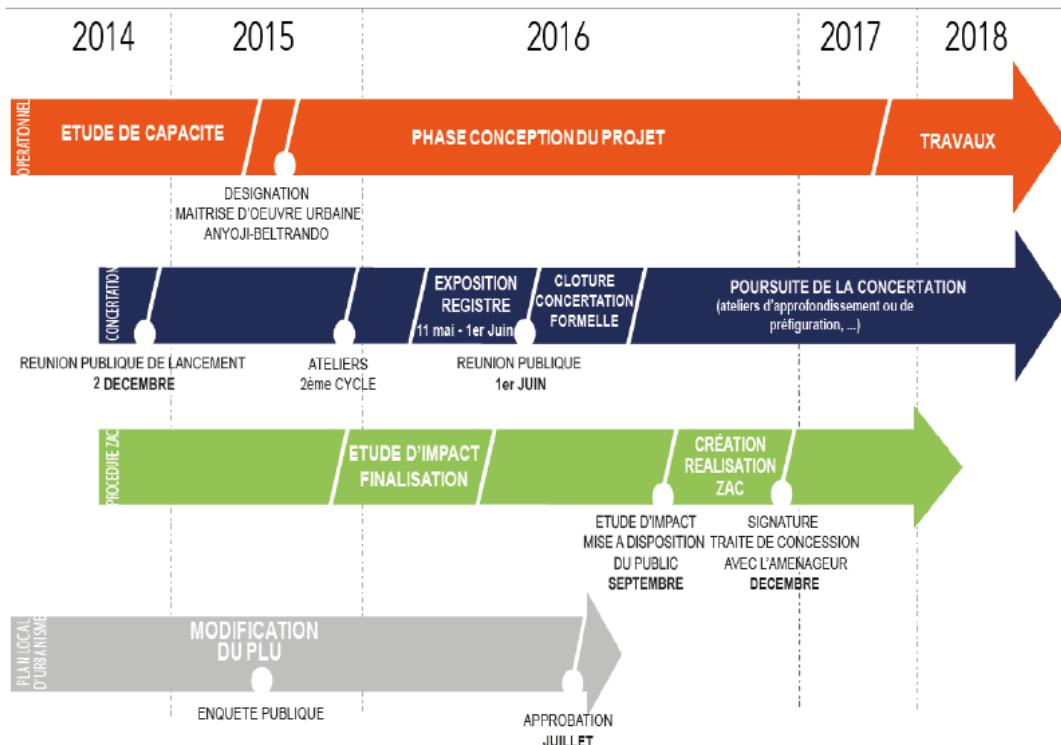


Figure 5.2: Project timeline Saint Vincent de Paul – Paris 75014

Monitoring

1. Cordees

The City of Paris aims to achieve a break through by creating a new energy ecosystem at Clichy Batignolles, a 54 hectare eco district under construction. With the CORDEES (CoResponsibility in District Energy Efficiency & Sustainability) project (2017-2020), the city experiment smart grids solutions and effective governance to reach ambitious energy performance targets. This project will build the first smart grid project in Paris. It is part of the Urban Innovative Actions program to identify and test new solutions for sustainable urban development in Europe. CORDEES propose to combine three main solutions in an integrated approach. An energy management platform will enable real-time monitoring and optimization of production and energy consumption. It will test a new form of governance introducing a principle of energy co-responsibility for all actors (owners, occupiers and users, building managers, network operators, community, urban developers, etc.). On March 24th, the Paris municipality and its stakeholders are entering the first step of the CoRDEES program. 50 professionals of 20 companies gathered to launch the project. Financial partners and the municipality presented the entire project to the associated partners: builders, property operators, investors, energy providers. A work methodology necessary to the fulfillment of the project was also shared with the partners. The success of this project depends on the active involvement of these associated partners.

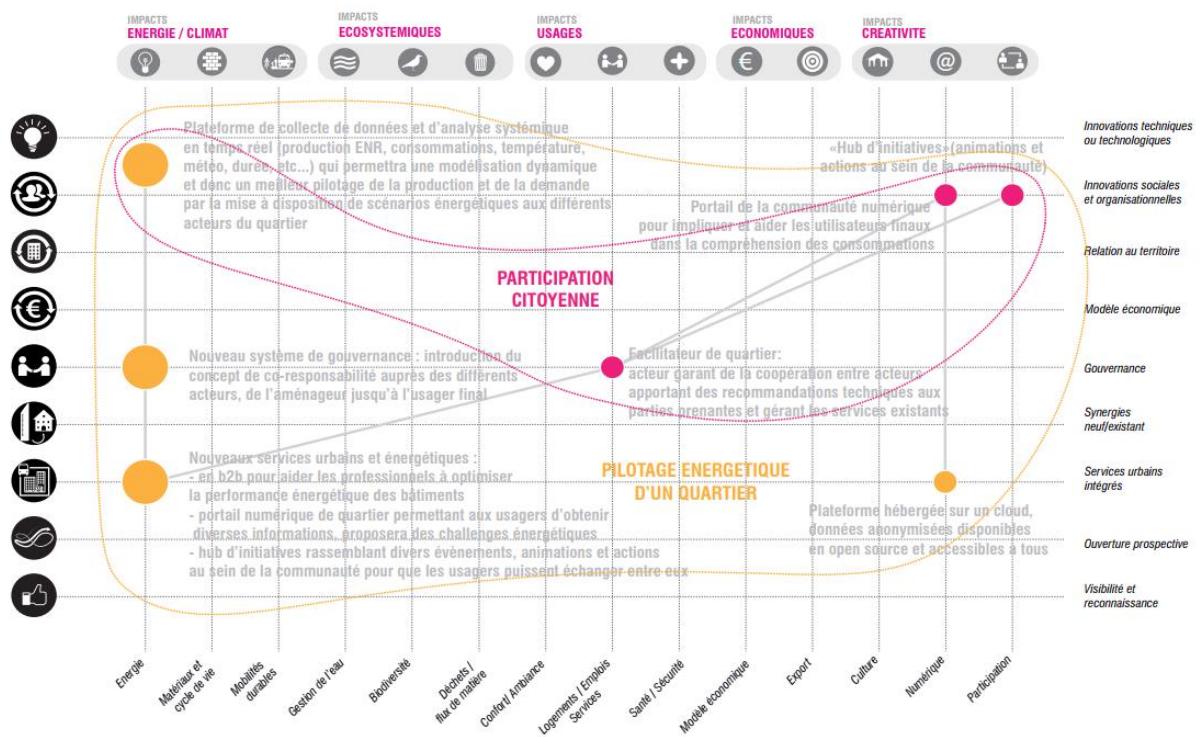


Figure 5.3: Principle scheme – Cordees project

2. Eiden

The city of Paris is also involved in an application to H2020 2018 framework, EIDEN (Enabling a sustainable behavioural change of private consumers towards a more flexible and efficient energy consumption). The project proposes to:

- Create and implement community-based engagement actions facilitating a behavioural change of private consumers towards a more flexible and efficient energy consumption, through:
- Develop community-based actions to engage consumers with energy efficiency solutions;
- Design and develop community-based engagement actions to activate sustainable behaviour of consumers;
- Deploy and validate the community-based engagement actions;
- Develop replication package to enable wider deployment and consumer adoption;

This could contribute to the specific challenge: "To facilitate the wider deployment and consumer adoption of existing ICT-based solutions, for energy efficiency and information on energy consumption and costs, with a focus on action and resulting in improved understanding of ICT interfaces and information depiction (including smart metering and related systems).

6. Stockholm

6.1. Framework and impact

The Urban Learning project has been running in the city of Stockholm on an administrative level, with discussions between administrations without much political involvement. The focus has been to get a common idea between the different stakeholders inside the administrative body of the city of Stockholm, and to come up with ideas for an improved process. This decision was taken due to the fact that change in a politically run organisation with many different administrations with separate budgets is a slow process that has to be run according to the existing structure for decision making. As a result of the Urban learning project a list of actions that has been agreed upon by the involved administrations as important steps for the integration of energy in to the planning process. This list has been presented to people in leading positions within the different administrations with the aim to make a prioritized short list for improvements to be presented as a common request to the political boards. The LWG has also managed to influence and improve some ongoing processes.

6.2. Implementation plan

The following table shows the implementation plan for the city of Stockholm.

Table 6.1: Implementation plan for the city of Stockholm

Element	Decisions and actions	Responsibilities	Suggested timeframe
GIS based energy relevant data - NEW	Installing hardware – new server facilities for pilot database.	> Decision by Planning administration	Done
	Collecting data/building a database	> Planning administration in collaboration with development administration, environmental administration external stakeholders	Short term
	<i>Creating Routines for data collection and storing</i>	> Planning administration in collaboration with development administration, environmental administration and external stakeholders	Mid-term
	<i>Implementation of the use of GIS energy data for development of energy strategys in the area planning phase.</i>	> Planning administration in collaboration with development administration, environmental administration and external stakeholders	Mid-term

Regional perspective - NEW	Increased collaboration on energy in a regional perspective (RUFS)	> Decision by county council	Short term
Energy strategy's for urban Projects - NEW	Testing of integrative planning procedures	> Decision by planning administration	Done
	Pilot workshop with the aim to develop energy strategy's	> Energy utilities and planning administrations Stockholm and important regional development zones	Done
	<i>Evaluation of process and further development of strategy's.</i>	Involved development projects	Mid-term
A city-wide energy group (energy focus group) - MODIFIED	Transferring the existing SRS model for energy focus group to cover a city-wide perspective	> Decision by Development administration and environmental administration	In process
	Involving relevant representatives from relevant stakeholders	> Process run by the internal members of the focus group on energy	Mid-term
Coordination of stakeholders (Handrail tool) - MODIFIED	Decision of Creating an energy handrail	> Decision by the planning administration together with the environmental administration and the development administration	Done
	Integrate the environmental administration.	The Handrail working group	Done
	Developing the handrail for energy together with the involved actors.	The Handrail working group + internal and external actors	Ongoing – Short term
	<i>Applying the handrail action plan to all involved actors processes</i>	Each actor together with the handrail working group	Mid-term

Methods and tools for calculation of energy - NEW	Finding the right tool to evaluate energy on building level in the early stages of the planning process, and evaluate if the energy consumption is within the city's requirement(55kwh/m2)	> Decision by Planning administration	Ongoing
	Evaluation of different tools on the market presentation on project results.	> Planning administration, environmental administration together with developers.	Short term
Energy demand in development agreement - MODIFIED	Stricter criteria's on energy demand for the whole city of Stockholm	> Decision by city council in the environmental program 2016-2019	Done
	Formulate criterias in a standard document to be included in the land sales contract in the city.	> Development department and the Energy focus group	Done
Monitoring of energy - MODIFIED	Expanding the SRS monitoring system to include projects in the whole city	> Decision by Development administration	Done
	Development of processes and programming	> Development department	Mid- term
			In use 2019

6.3. Experience from testing new governance elements

Energiledstången - Creating an energy handrail for the cityplanningprocess. The development of the handrail tool to concern energy has been a very interesting process so far, mapping all relevant action in today's procedure relevant to energy. The working group has compared the standard process for the city with the more developed city for the SRS project with the aim to derive important improvements for the citywide process. The work has given us a better overview of the current conditions and input from the urban learning project has been very important, connecting new elements to the existing framework.

Citywide energy group – Members of the SRS focus group for energy has been the basis for the group developing the new citywide criteria for energy demand in the development agreement. Discussions has been very interesting, involving energy professionals, planners, developers and staff from the development administration, ranging from how sharp the demand should be to meet the market, and how monitoring should be performed all along the process from the signing of the development agreement to the monitoring of the built environment.

Energy strategies for development projects – In the project Strukturplan Kista an energy strategy for the new development area is under development together with representatives from energy provider and ICT sides. The goal is to find a common idea about how energy shall be dealt with in the development area to reach the city's goals for a fossil fuel free and low energy neighbourhood in 2040.

7. Vienna

7.1. Framework and impact

Based on the analysis and ideas developed for upgrading governance processes with energy issues this document provides suggestions for the next steps towards integrative energy planning. Some of the following elements are just ideas, other ones under negotiation. This document doesn't provide a fully committed implementation plan and needs further discussions.

7.2. Implementation plan

The City of Vienna wants to provide a legal and institutional framework for integrative energy planning. Energy should be one core topic for the urban development process. The following table is describing some first steps, which will need further elaborations. The suggested responsibilities and the timeframe are in some cases not fixed yet.

Table 7.1: Implementation plan for Vienna – first steps towards integrative energy planning

Element	Decisions and actions	Suggested Responsibilities	Suggested timeframe
Adaptation of the Building Code (Planning Act) (recurrent)	<i>Currently ongoing negotiations</i>	City administration	short-term
	<i>Resolution of the new adaptation</i>	City Council	Beginning 2018
Energy Framework Strategy (ongoing)	<i>Preparation for resolution</i>	Advisory Board for the City Council	End 2017
	<i>Resolution</i>	City Council	2017/2018
Thematic concept for integrative energy planning (Fachkonzept Energieraumplanung) (ongoing)	<i>First draft already provided</i>	City administration	-
	<i>Elaborated draft for final statements</i>	City administration	End 2017
	<i>Final statements and ongoing negotiations</i>	City administration	Beginning 2018
	<i>Final concept</i>	City administration	Beginning 2018
	<i>Final review and possible adaptations</i>	City administration	Beginning 2018
	<i>Resolution of the concept</i>	City Council	Spring 2018
Basic building data model (starting)	<i>Decision for building data model is made</i>	City administration	Done
	<i>Gathering and providing data on one platform; defining procedure of data harmonization</i>	City administration	Beginning 2018
	<i>First attempts for combining datasets</i>	City administration	Beginning 2018

	<i>Strategy and decision for process of building data model</i>	City administration	Beginning 2018
	<i>Developing Building Data Model</i>	City administration	Mid-term
	<i>Providing this model for the administration and as open data on one platform</i>	City administration	Mid-term
	<i>Energy atlas – getting started</i>	City administration	Done
Energy atlas (starting)	<i>Developing energy atlas</i>	Contractor	11/2017 03/2018
	<i>Final Energy Atlas integrated in the Vienna online gis</i>	City administration	03/04-2018
	<i>Based on energy data and Thematic concept developing first draft</i>	City administration, energy provider	2018
Energy development concept (Energieentwicklungsplan) (idea)	<i>Negotiations</i>	City administration, energy provider, others	2018/19
	<i>Final plan</i>	City administration	2018/19
	<i>Resolution of the concept</i>	City Council	2019
Energy guidelines for developers (starting)	<i>Developing of the guidelines</i>	City administration / external contractor	End 2017
	<i>Presentation and dissemination of the guidelines</i>	City administration	Beginning 2018

The MA20 – Energy planning department is responsible for most of the suggested issues. Nevertheless, it need to be defined which departments and other stakeholders should be how involved.

Adaptation of the Building Code (Planning Act)

For many activities suggested in the approaches for integrative energy planning adaptations in the Vienna Building Code (which is also the Planning Act) are needed. Some important issues which are under negotiations are amongst others:

- Strengthening climate protection and efficient energy infrastructure planning as objectives for urban planning
- Defining the framework for developing an integrative energy plan (heating plan) to steer the grid-based infrastructure by zones (e.g. priority zones for district heating)
- Regulations to increase the mandatory amount of solar energy (20 %) for hot water in new residential buildings

Energy Framework Strategy

An advanced draft of the Energy Framework Strategy is already developed. It is already committed by many involved administrative groups/departments and other partners. The document is prepared for the City Council and will be adopted soon.

The Energy Framework Strategy will define the path and objectives of the Viennese energy policy until 2030. Amongst others integrative energy planning and the importance of scenarios and energy data are emphasized. This strategy is related to the Climate Action Programme and the Urban Development Plan (STEP 2025). It will give an orientation for further documents and helps to develop needed instruments, processes and tools.

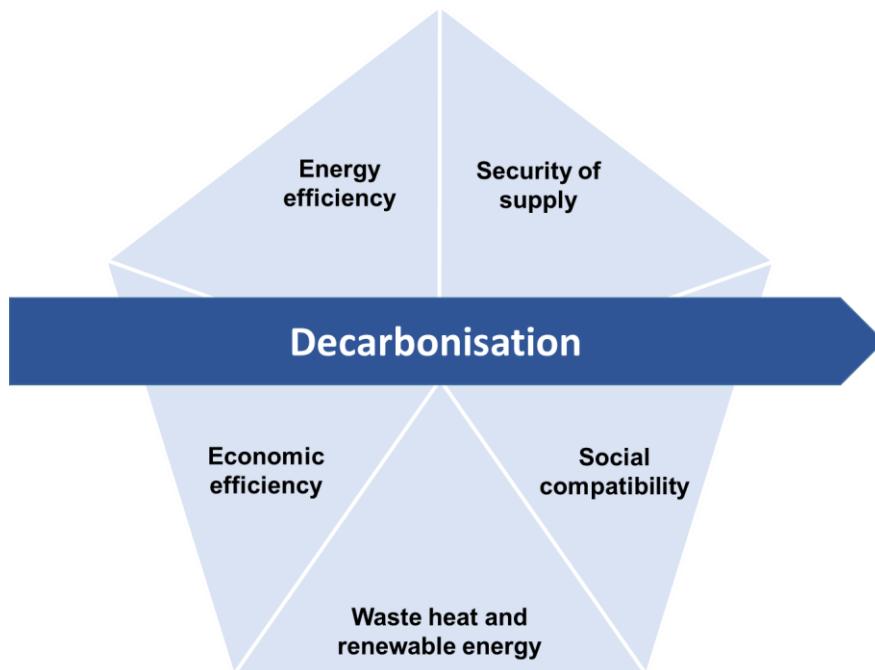


Figure 7.1: Five goals of the Viennese energy policy

Thematic concept for integrative energy planning

The thematic concept for integrative energy planning is part of the Urban Development Plan (STEP 2025). It describes the way how to integrate urban planning and energy planning and defines needed instruments, tools, data and decisions. It includes measures in different fields like superior activities, basic energy data model, instruments for implementation as well as monitoring. One important element is the description of the development of an energy development concept (see below).

A first draft was already developed according to the draft of the energy framework strategy. Some issues about the adaptation of the Building Code are under negotiation. The next draft will be provided in 2017 regarding the feedbacks to the first draft and results of ongoing discussions. It should be finalised in the beginning of 2018.

Basic building data model

The ongoing discussions about defining energy goals and scenarios, ensuring legal instruments amongst others show the necessity of well-founded basic data. Each energy data model needs sufficient data about the building stock and development areas. Therefore, the city of Vienna wants to provide a basis dataset on buildings. The first step is a clear ID and address for each building. Then, further information will be

supplemented like gross floor area, compactness, construction year and height for each building. Additionally, it will be tested which additional information are needed and could be linked (e.g. more detailed information on uses or kind of energy system). These activities are linked to the development of a new data platform for the city in the EU H2020 project SMARTER TOGETHER.

The activities for the building data model have already started. First results will be available in 2018. The final model will be expected for 2019. Nevertheless, further adaptations and integration of new information will be going on in the following years. It has to be decided if this building model will be sufficient for all other energy models or if additional efforts are needed.

Energy atlas

Based on the existing information of buildings an energy atlas will be developed. This atlas should show the energy demand, potentials of RES and potentials for refurbishments. New methods will be developed amongst others to combine different data (socio-economic data) or to assess the probability for investments on refurbishments. The results will be integrated in the Vienna Online GIS system. The provided model should be the basis for further energy data models and scenarios.

The development of the atlas has already started and will be finished in spring 2018. Parallel there are ongoing activities about developing an energy data model.

Energy development concept

The thematic concept for energy concept should be specified in an Energy Development Concept ('Energieentwicklungsplan'). It could concretise the goals and measures in different areas of the cities about district heating, gas supply, refurbishment activities and integration of waste heat and RES. It needs to be discussed and negotiated which issues are part of this concept as well as the legal character of the document. Therefore, a concrete timeframe couldn't be defined, but it is expected to develop such concept 1 or 2 years after the approval of the thematic concept.

Energy guidelines for developers

There are many different information and regulations about energy issues spread. For instance a lot of studies and approaches are available but they are not well known or in use. The City of Vienna will develop and provide an information package as guidelines for developers. This package will help to quickly find all important information as well as regulations for energy planning.

The development of the guidelines has started and will be finalised in spring 2018.

7.3. Experience from testing new governance elements

The testing of new elements centred in Vienna mainly around two topics:

1. Feasibility study for analysis of energy options ("Optionenstudie")
2. Data analysis for a quarter

In addition, also – because of the awareness raised with URBAN LEARNING – a 2-years pilot project was started in the field of mobility to ensure that alternatives to private cars are considered at the very early stage of planning new neighbourhoods.

1. Feasibility study for analysis of energy options ("Optionenstudie")

At the occasion of the urban development site "Donaufeld" (60ha, 6.000 dwellings) a feasibility study was commissioned to identify low-carbon alternatives to gas heating or district heating (as district heating did

not seem available at that time). The study as such was commissioned independently from the URBAN LEARNING project. However, the dialogue process, which was started during the elaboration of the study, was triggered by the project and followed the idea of exchanging and learning from each other at the early stage of planning.

This dialogue process involved the city departments for energy planning and housing as well as wohnfonds_wien - a non-profit organisation coordinating property developers, house owners, municipal departments and service centres of the municipality of Vienna – who will be in charge of organising the development competitions for the area. Also involved in the process was Wien Energie, the municipal energy supplier.

Intensive discussions on study parameters (assumptions for energy prices, costs for construction of grid, etc.) as well as discussions on who needs which information at what time in the planning process took place over a period of several months. The final study is available at (only in German) <https://www.wien.gv.at/stadtentwicklung/energie/pdf/energieversorgung-donaufeld.pdf>. The following figure shows one of six investigated solutions for the heating system of the area – local district heating network combined with heat pumps (ground water) and seasonal storage. All solutions were compared about CO₂ emissions, share of renewables, investment costs and life cycle costs.

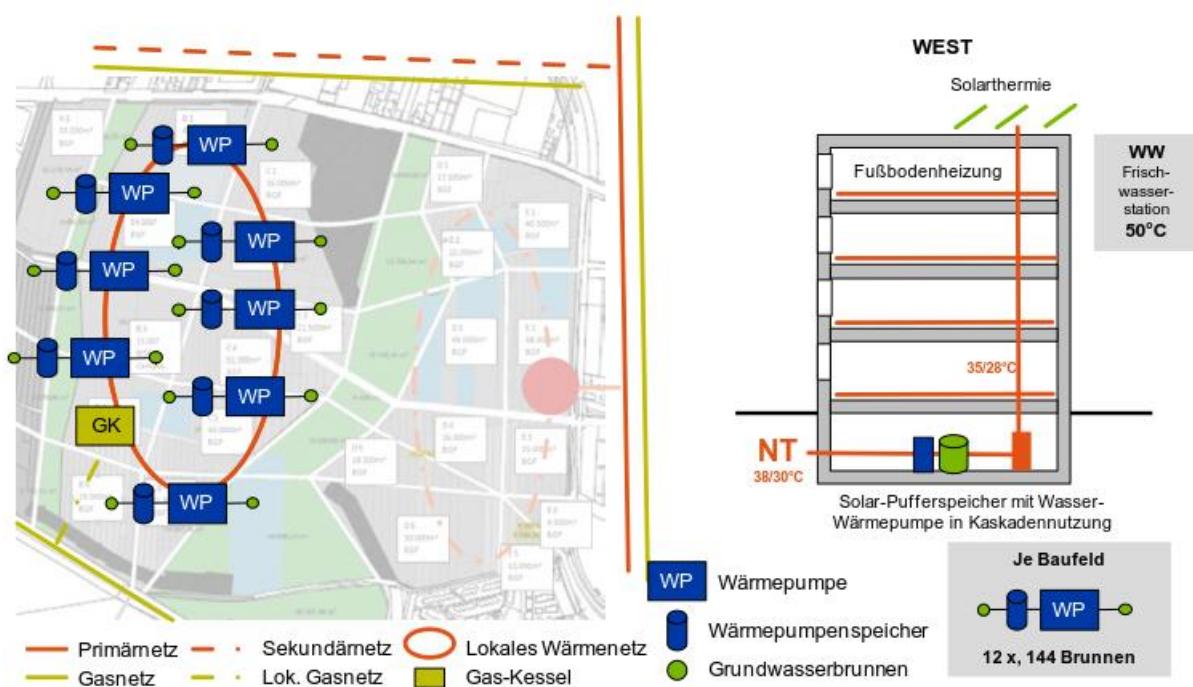


Figure 7.2: One of the investigated heating systems; Source: City of Vienna 'Energieversorgungsoptionen für das Stadtentwicklungsgebiet Donaufeld', 11/2016

Particularly the discussions about which information should be available from a future development in the early stage to make proposals for its optimal supply with energy were very valuable inputs for the URBAN LEARNING project to understand better the needs of the urban planners and of the energy supply planners.

The study as such has supply options that will be relevant for many more development areas in Vienna and similar feasibility studies – in combination with a dialogue process – have been proposed as new element for further developments of larger size. The results and insights of the study as well as the related process were an input for the thematic concept for integrative energy planning. But all activities around this thematic concept also could be seen as testing of a governance element, because the discussion and knowledge of URBAN LEARNING was a strong driver for developing this concept.

2. Data analysis for a quarter

Very soon during the URBAN LEARNING project the need for disaggregated energy data became evident: disaggregated data about current energy demand/consumption, local energy supply and existing infrastructure, expected development of inhabitants and energy demand etc.

However, with a clearer idea about this need it became also clear that improvements of the situation will require substantial investments into data collection, data cleaning etc. Also, that some identified needs and ideas should be tested first before being roll-out for the whole of Vienna. But even testing would have been too resource-intensive for the URBAN LEARNING project. But the successful application of another EU project – SMARTER TOGETHER, a smart city lighthouse project – offered in its implementation the possibility to test such a spatially differentiated energy analysis. The tested quarter was a part of Simmering, the 11th district of Vienna, an area of about 20.000 inhabitants.

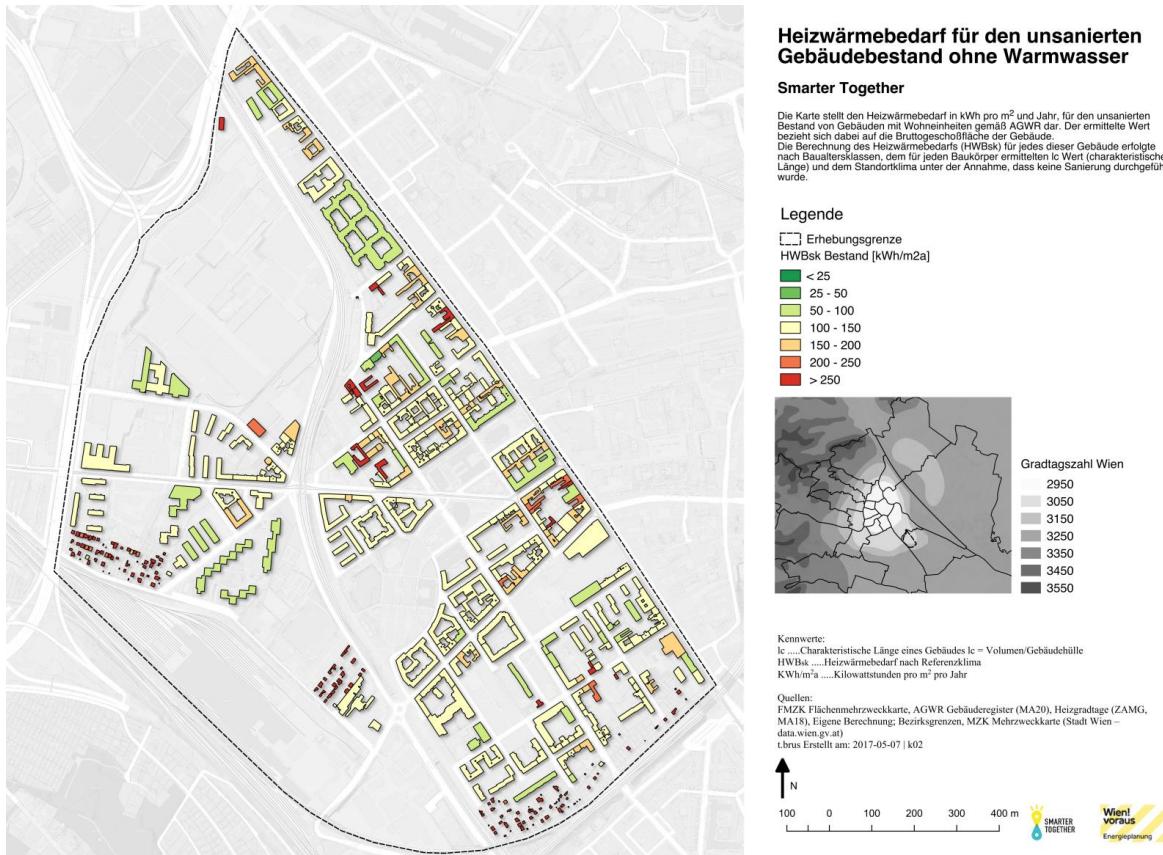


Figure 7.3: Energy analysis (here the energy demand on building level) in Simmering - EU project SMARTER TOGETHER

This testing included intensive discussion on the level of disaggregation needed, on quality of data, on data protection, etc. which altogether provided valuable inputs for URBAN LEARNING. In particular, these inputs were used to sharpen the proposals for next steps towards spatially disaggregated energy data (“energy atlas”, data platform, etc.) which are now included in Vienna’s implementation plan and for which first implementation steps were already undertaken.

8. Warsaw

8.1. Framework and impact

Assumptions

“Assumptions for plan of supply with heat, electricity and gas fuels for the City Warsaw” are basically a listing of all energy systems and forecasts of energy demand, which is addressed to energy companies, construction developers and the City of Warsaw and its units. This includes general city data, description of the city's energy systems, energy demand for base year 2014, demography, data bank on buildings, street lighting, etc.

Forecast of development of the city as in aspect of building/housing development includes:

- forecast for 2017 and 2020 on the basis of documented investment, approved plans, building permits, etc.
- forecast for 2025 and 2030 based on current trends,
- forecast for the year 2035 on the basis of the absorbency of the areas in the study of conditions and directions of development.

E-map of Warsaw

E-map is an advanced electronic map system that works similarly to the Atlas of Amsterdam. This service contains many different maps of Warsaw. Each set consists of multiple layers with the ability to switch on and off individual layers. Some current and planned map sets:

- Warsaw today - a complete set of information on spatial planning, transport, underground utilities, etc.
- Historical Warsaw - a set of maps describing the development of the city.
- Development plans - map of local spatial plans (in raster and vector format), including plans adopted and elaborated (i.e. during process of adoption).
- Geodesy - data on elements of underground, ground and aboveground infrastructure, conducted in numerical form and signs of geodetic surveys and geodesic works.
- Map of RES - map of sun and geothermal RES, coverage of district heating network.
- Map of monuments
- Map of urban real estate for sale and rent
- Bike paths map
- Map of elements connected with adaptation to climate change



Figure 8.1: E-map of Warsaw (source:<http://www.mapa.um.warszawa.pl/>)

Energy contracts

Within the “Project of Low-Carbon Area” Targówek Przemysłowy (Industrial Targówek – part of the Targówek district) the major RES source will be available in form of the expanded ZUSOK waste incineration plant. The project plans to create a city area, which features solutions on behalf of energy efficiency, natural environment and low GHG emissions in the field of city planning, energy networks, buildings construction, transport, waste management, and water and wastewater management. Both in this and other similar projects the City plans to use some kinds of energy contracts (using examples from Amsterdam, Vienna or Stockholm). One solution could be to integrate requirements concerning energy efficiency, RES installation or water savings (including use of rainwater/grey water) in land/property sale contracts between the city and the developer.

8.2. Implementation plan

Implementation of Assumptions

Further works on updating *the Assumptions* require a series of consultations and agreements executed sequentially. "The assumptions for plan of supply with heat, electricity and gas fuels for the City Warsaw" are to be adopted within a year from now (see schedule below) in a form of the resolution of the City Council, and consultations with offices and districts and energy companies as well are foreseen. The current pre-project review procedure is necessary to remove the obvious numerical mistakes that need to be recalculated, so that at the level of the formal agreement, there are as few amendments as possible due to the size of the document.



Figure 8.2: Implementation plan of Warsaw

Implementation of e-map

The Geodesy and Cadastre Department has provided REST (Representational State Transfer) and Simple Object Access Protocol (SOAP) services. With their help, it is possible to search and retrieve spatial data, covering primarily the area within the administrative boundaries of Warsaw.

At first only part of the map was made public. At present, e.g. the whole underground network is fully visible to the public and it concerns almost all data that is not some kind of secret/protected information.

The map of "Warsaw today" is updated daily, showing, for example, current difficulties in connection with road repairs. Using examples noticed and analyzed within our URBAN LEARNING work, we are working on adding new layers and making them visible to the public as much as possible (see listing below).

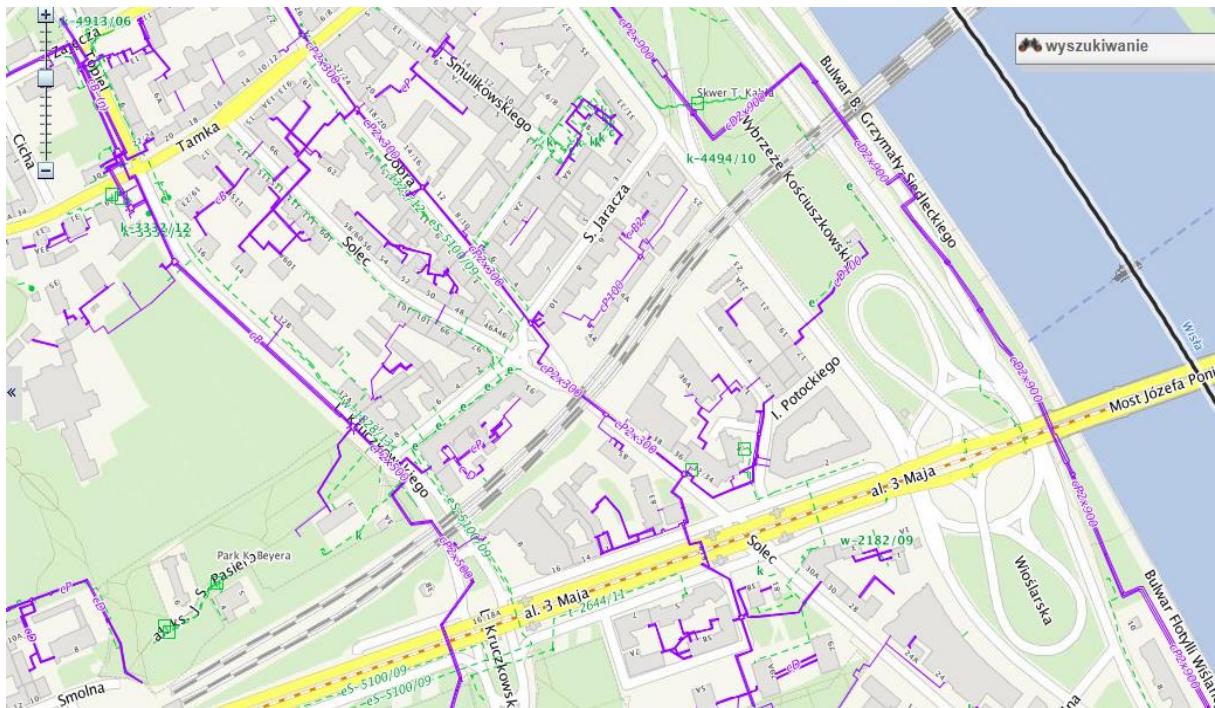


Figure 8.3: Fragment of e-map of Warsaw with district heating network

The e-map is constantly being expanded with new elements, such as currently work on:

- Map of elements connected with adaptation to climate change - a series of maps covering the surface temperature, air temperature, albedo value distribution, impermeable surface, green area, rainfall, etc.
- Energy map - a set of maps with the results of "Assumptions for plan of supply with heat, electricity and gas fuels for the City Warsaw" in all 261 energy areas. Most of the numbers from the Assumption's tables will be available online. Works on the introduction of an energy map are in progress.
- Map of charging points in Warsaw – preparatory work is under way to create a network of public charging stations for electric vehicles. The location of the charging stations will be shown on the map.

Implementation of energy contracts

Based on examples of Urban Learning partner cities, it is planned that the Targówek Industrial Project will also be in the form of an energy contract. Furthermore, the law provides the framework for urban contracts (even though we do not have special provisions about them: see §1a Building Code of Vienna). So the city could negotiate with the building developer, land-owner or investor and require financial contributions from the external contractor for public infrastructure and thereby exceed obligations. The most important requirements for energy efficiency are to be included in the local land plan as mandatory. These would, however, be minimum requirements that can and will be increased under the contract.

8.3. Experience from testing new governance elements

Experience of Assumptions

As part of the current works on updating *the Assumptions* there were developed partially a model for identification areas where the deficit will be in a particular type of energy when we introduce some specific data. This will allow taking preventive countermeasures in advance.

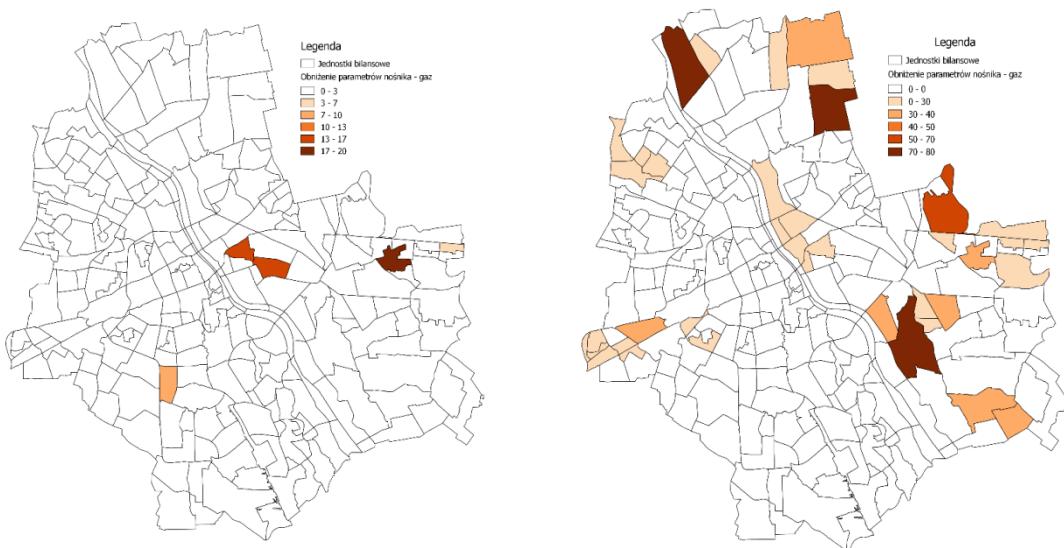


Figure 8.4: Energy deficits predicted by the forecast for the winter 2020 in normal/in extreme temperature (-31 °C)

A new element, which was not previously expected in the procedure of updating *the Assumptions* is the massive implementation of electric vehicles. The number and location of charging points must enter into Assumptions, which has not been applied so far. It is estimated that the number of electric vehicles in the city in a near future can reach 40.000. Warsaw can handle this if cars are loaded in the night valley. Mass-scale charging during the day can threaten functioning of the power system. During various URBAN LEARNING meetings we have discussed what are possible relevant solutions of this problem in other metropolises.

The next new element which should be analyzed is the need and identification of locations for local energy storages. This applies to local storage of both heat and electricity in the context of the use of energy from renewable sources. Proper management of energy storage can be a way to solve the problem of energy deficits in specific areas.

Experience of e-map

The e-map can not be the basis for creating official documents but may be used for preliminary design work. It provides access to a different set of information layers. The e-map service is constantly being expanded.

Experience of energy contracts

The Industrial Targówek project and a couple of similar projects are the initial planning stage so at the moment there are no implementation results. Currently it is checked what is the possibility of mandatory provisions in the local plan according to the applicable law and what it should be changed to implement such requirements. However, regardless of this analysis the relevant energy and sustainability-related requirements will be included in specific energy contracts, so we are already considering how such provisions shall be formulated to remain effective.

9. Zagreb

9.1. Framework and impact

Energy transition and energy planning are very complex issues that tackle many different fields of interest and different regulations. Whereas the main actor to define energy transition regulative framework is state administration there is possibility to influence urban planning procedure and emphasize energy planning issue.

Good understanding of planning process and its framework is crucial for improving a governance process. Governance is a key element to improve energy issues in urban planning process.

As a result of the analysis in the project URBAN LEARNING the current governance process has been reconsidered and the possible lacks and improvements have been identified as well. Those conclusions will be a good base for further improvement in the next years. The improvement could be in the form of suggestions to the City Assembly to adopt Guidelines for integrative energy planning and to initiate Pilot project of urban and energy study of refurbishment and retrofitting of existing neighbourhoods and other parts of the City.

9.2. Implementation plan

During the project we identified important issues of the current processes towards energy such as:

- Clear legal and political framework is needed
- Energy issues should be integrated early in the planning process – highest potential of influence
- Cooperative planning procedures and tender have high potentials to integrate energy issues
- Coordination between different kind of energy supply still missing
- Need for appropriate instruments to include energy zoning
- Good energy data basis is needed and has a high relevance

As a result of the analysis, we produced the blueprint of the process to clarify the step-by-step current governance process.

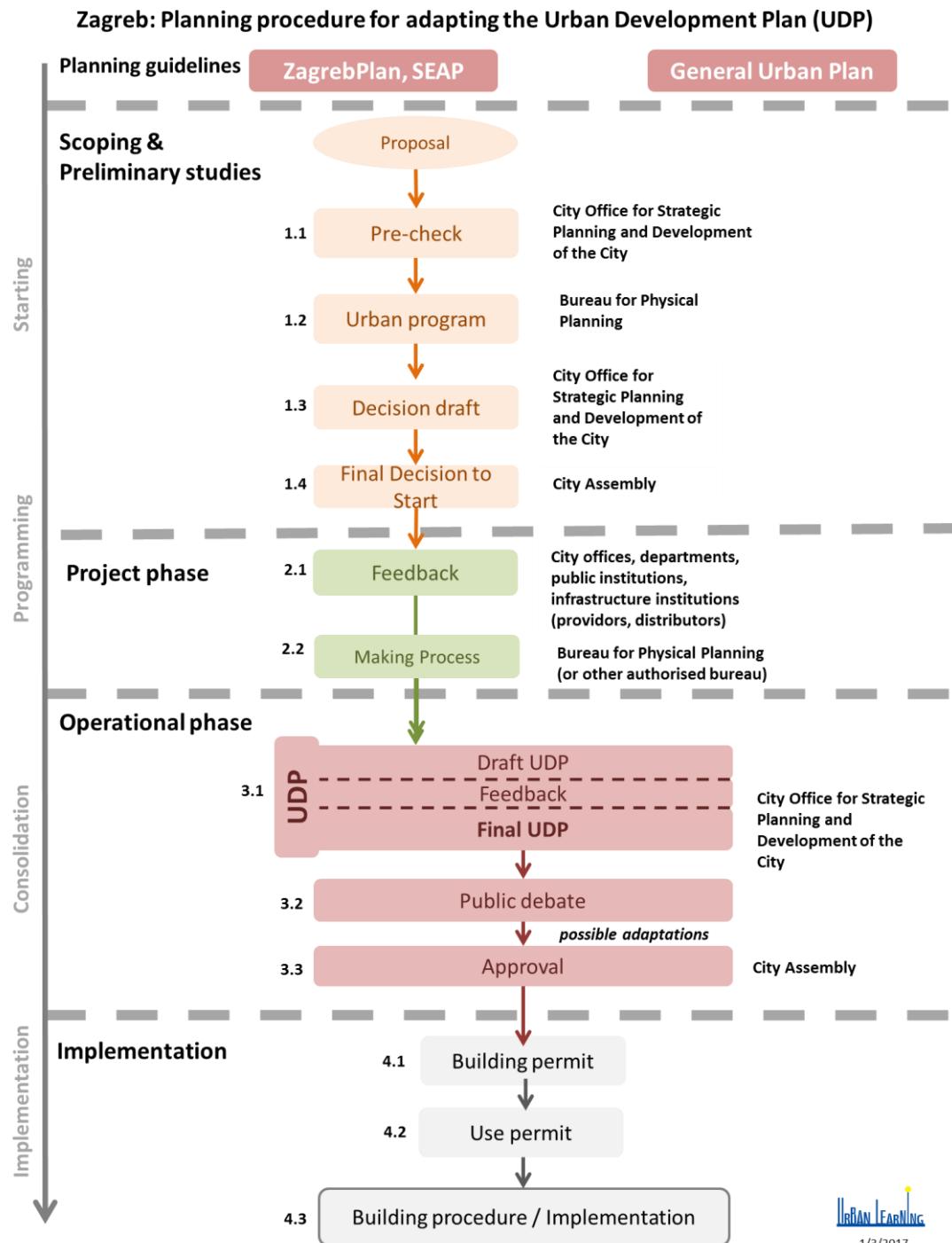


Figure 9.1: Current planning procedure

9.3. Proposal for testing new governance elements

After the analysis of the governance process we proposed some solutions for improvement (elements for improvement marked in red colour):

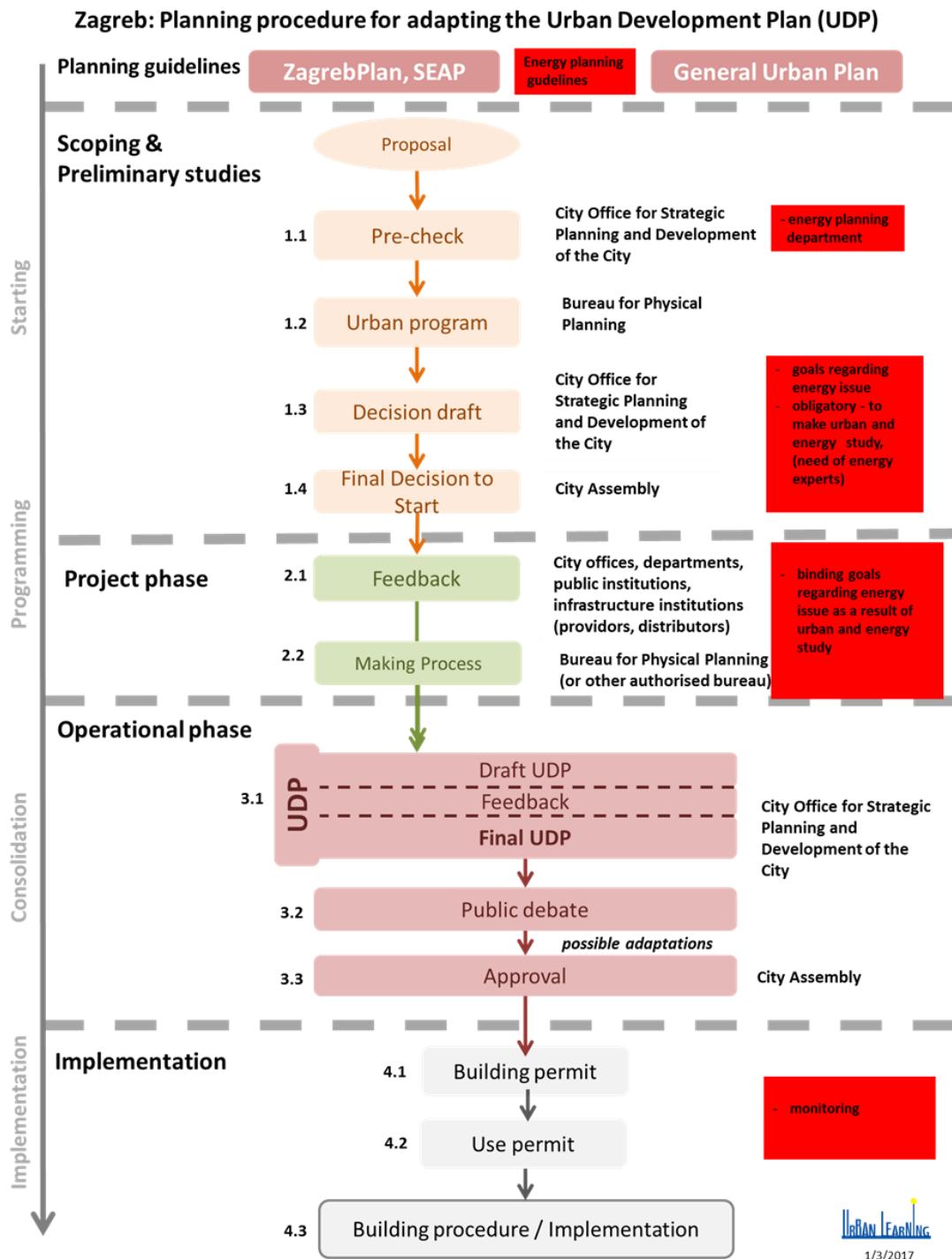


Figure 9.2 : Improved proposal for integrating energy in the planning process

Main goals for integrative energy planning guidelines are reducing use of fossil fuels, reducing CO2 emissions, reducing energy consumptions, increase energy efficiency, increase use of RES, refurbishment of existing urban fabric. Those goals need to be divided on at least two levels, strategic – long term and operational - short term (bridge the gap between energy strategic documents and action plans and urban planning documents). Guidelines should also define:

- Need of long term energy (overall) strategy;
- Need of establishing short term goals – transition, priorities;
- Need of establishing set of indicators (sustainability – connect with climate and environmental goals);
- Need of data collecting;
- Need of establishing energy planning and monitoring body or department;
- Need of legislation harmonisation on city and state level (energy, environment, urban planning, mobility, providers, distributors...).

Outputs of Urban and energy study of refurbishment and retrofitting of existing neighbourhoods and other parts of the City should be based on following analysis:

- analysis of pre-existing condition in the area: inhabitants, public space, building stock, GHG emissions, mobility, urban green etc.;
- Identification and mapping of specific type of users in the area – number of inhabitants, number of households, building typology (age, materials, systems),
- identify specific type of users in the area and benchmark energy demand and energy saving potential, analyse savings and set targeted benchmarks, set minimum binding and additional saving targets, provide info on RES use potential for specific uses, prepare mapping of energy demand intensity and energy saving potential intensity to define most appropriate areas to target activities.
- possibilities of developing the climate neutral part of the city and use of RES;
- possibilities of new technology and innovative solutions (grid-district heating and cooling or single solutions, dynamics etc.);