

# Energizing Zabrze

Energy planning in Sustainable Urban Development



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Lund, Sweden, June 2015

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Published in 2015 by IIIIEE, Lund University, P.O. Box 196, SE-221 00 LUND, Sweden. Tel: +46-46 222 02 00, Fax: +46-46 22202, e-mail: [iiiiee@iiiiee.lu.se](mailto:iiiiee@iiiiee.lu.se)

ISBN 978-91-87357-15-2

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# Acknowledgments

We would like to show our gratitude to all the people who made this project possible and gave us the unique opportunity to apply our abilities in “real world”.

First and foremost we would like to thank Małgorzata Mańka-Szulik, the Mayor of Zabrze, for inviting us to her city and believing in our capabilities and expertise regarding the energy planning process for the new city district, Nowe Miasto.

Special thanks go to Marcin Lesiak, Zbigniew Rau, Ewa Pawłowska, Marcin Bania, and our driver Andrzej Kleczka for making our stay in Zabrze worthwhile, effective and inspiring. Their hospitality, organisation and coordination of all the interviews, study visits, helping with translating, taking us to an old coal mine, keeping us well fed, and everything else has been truly amazing and extremely helpful. Dziękujemy bardzo!

In Zabrze we have been fortunate enough to meet with a number of key stakeholders for the Nowe Miasto project and would like to show our appreciation for their willingness to share their time and knowledge with us. In addition, we would also like to thank all our interviewees in Sweden for sharing their time and wisdom on energy planning and urban development in Skåne. This report is heavily indebted to the collected knowledge and experience we were able to access through the interviews, despite it not always being explicitly referenced.

Last but not least, a great thank you goes to Mikael Backman and Lars Hansson from the IIIIEE for the initiation of this project and the good collaboration and guidance throughout the project.

And finally, we also would like to thank all our fellow-EMPers who have been to Zabrze in former years and paved the way for this great collaboration between the city and the IIIIEE. Without your fantastic work this project would not have been possible for us.



# Executive Summary

The Polish city of Zabrze finds itself in an excellent place to speed up the process of constructing of Nowe Miasto, a new city district, and hopefully in extension of kick-starting a dynamic development of the city, the region and Poland. Zabrze has high ambitions of contributing to sustainable development, and sees that Nowe Miasto could be a showcase of how to achieve sustainable urban development in Poland. Ambitions are a great starting point - this report aims to sketch a roadmap of how to fulfill them.

The backdrop is that of an energy system highly dependent on coal, as well as a need to improve the image of Zabrze. According to the International Energy Agency, coal accounts for 55% of primary energy supply in Poland. This is not sustainable in neither an environmental, social, nor economic perspective. The burning of coal causes greenhouse gas (GHG) emissions contributing to escalate climate change, it causes hazardous air pollution that costs human life as well as carry an annual health care bill of €8.2 billion for Poland alone.

A new urban district is a possibility to try new solutions. This report focuses on the energy system of new urban development, and specifically on the process of how to plan it. Based on the numerous meetings and our research, we here present three main recommendations for Zabrze to consider.

## Establish a Clear Vision

Our first recommendation for Zabrze is to establish a clear vision of Nowe Miasto. It is noticeable that the seeds of one exist as several of the representatives of the municipality referred to plans and expressed their own visions regarding the district. It has not, however, been discussed and agreed upon, nor has it been written down. This makes the vision unclear and might result in that different internal stakeholders strive to achieve different objectives. The process of formulating a vision would engage the internal stakeholders within the municipality, draw on their competence to improve the vision and get them on the same page.

In addition, it would make the vision stronger, and the development steadfast. Several of our interviewees pointed to that while Zabrze knows in what direction it wants to go, they are accommodating to a potential interested developer. It is understandable that Zabrze wishes to be flexible towards potential developers, but if Zabrze does not have a clear vision of what it wants to achieve, there is a large risk of it disappearing in the discussions with potential developers. For those working with construction in general, and sustainable urban development in particular, it

comes as no surprise to hear that developers are often reluctant to try new innovative ideas. This is understandable from their horizon, but Zabrze must both dare to be steadfast in its ambitions, and know what they are.

## **Follow the Energy Planning Process**

Once a vision is established, our recommendation is for Zabrze to follow an energy process plan for how to implement an energy system. It is a complicated process that involves numerous actors, new technologies, changing behaviour as well as economic risks. We suggest Zabrze to follow a framework that United Nations Environmental Programme (UNEP) has developed, as it systematically and stepwise provides guidance on what to consider. It also prompts the municipality to initiate partnerships with key stakeholders, something that was seen as crucial for success in the Swedish examples. Zabrze has a good starting point here too, especially in relation to heating as the municipality own the company controlling the district heating network.

## **Attract Attention From Investors and Potential Citizens**

Lastly, in formulating a vision and working during the process with internal and external stakeholders, Zabrze also has a great potential to galvanize the interest of developers. The vision formulation can be used to energize their best ambassadors – their employees – to talk of the project and the city in general. This is a cheap measure that can change the mood and perception of a city fast, as Zabrze employs a few thousand people.

Moreover, when working with external partners to modify and implement the visions and plans for the area, these documents and ideas can be used to convince investors that this is a development which they do not want to forego. Developers will also identify the drivers that Zabrze already has, and the innovative will want to gain valuable know-how and experience to come ahead of its competitors, thus fostering a “race to the top”.

These recommendations are steps down a path that Zabrze already has started to walk down. The construction of Nowe Miasto is an excellent opportunity for Zabrze to kill several birds with one stone. A new modern city district improves the image of the city. It improves energy security as it could be a diversification away from coal. It can also have several other spin-off effects benefiting the citizens of Zabrze. Lastly, it should be seen as a natural development - Zabrze continues to shoulder its role as an energy provider for Poland, only that now it is not coal that it exports, but great examples and know-how of green energy systems. Aiming high and establishing a green energy system is a first important step in this direction.





# The Transition Must Start



It is becoming increasingly clear for humankind that we must start to seriously address climate change. It is no longer a question of “if we need to act” but rather “how we can act”. Without a willingness to change the mindset to become more proactive in sustainable solutions there is a risk that GHG emissions will keep rising – to a level which effects are uncertain for us humans and our environment.

In upcoming years, the energy demand of cities will increase due urbanisation and growing economies. This will put pressure on local authorities to work with sustainable urban development. Local authorities will also need to engage with climate change mitigation and adaptation. The good news is that change is happening.

Cities that work with action plans for implementing sustainable energy and climate solutions can reduce GHG emissions, improve the air quality, reduce traffic congestion, and get benefits from green growth. To work proactively with energy planning will allow cities to gradually transform their energy systems towards low-carbon and renewable sources. And most importantly, energy planning should strive towards improving the well-being of the citizens, as the people are the most valuable resource of a city.

Vision: Science village. Illustration: White  
Source: <http://www.lund.se>



# Introduction

## Zabrze

Zabrze is an ambitious city of some 170 000 inhabitants, located in southern Poland in the west of Katowice Urban Area that is home to some 2.7 million people. It is one of the founding members of the Silesian Metropolis, a cooperation organisation of the 14 cities in the area. The Katowice Urban Area forms part of the Upper Silesian Metropolitan Area which with 5.3 million inhabitants, is the most populous area in Poland. [1]

The region of Upper Silesia has a long history of coal mining and holds a large share of Poland's hard coal resources. It stands for the lion's share of Poland's current production as some 25 out of 27 operating hard coal mines are situated there. However, while current hard coal production levels are just below 80 million tonnes per year (Mt/year), it is projected to decrease to around 30 Mt/year in 2030.

The extracted coal is used for electricity generation, as well as fuel for burners in individual homes. [2]

Zabrze used to be an industrial powerhouse. As coal was abundant, making generation of energy easy, large scale industries developed along-side the cheap energy. Those days are partly gone. Eleven out of twelve coal mines have closed down, and parts of the old steel works have been turned into a shopping mall. The population has been steadily declining for a decade and a half, and the city is more often seen as stagnated rather than modern. In many ways, Zabrze is in the situation where the Swedish city of Malmö was in the early 1990s.



## Malmö - From Post-Industrial Slump to Hip Knowledge-City

Malmö is Sweden's third largest city, situated at the southern edge of Scania, facing the Danish capital Copenhagen across the Öresund Sound. Malmö's development features a journey from a post-industrial city in decline to a "knowledge-city" focused on people and networks. In the beginning of the 1990s, Malmö's population was decreasing fast, and the city's finances were in a bad shape. However, through a series of decisions, the development was turned around. Key decisions include the introduction of a national "local government equalisation system" where Malmö became a significant receiver of funds, as well as a continued focus on culture and leisure in the municipality. A series of physical investments are, however, often hailed as the most decisive factors. These are the construction of the Öresund Bridge to Copenhagen, the establishment of Malmö University as well as the construction of Bo01 and Västra Hamnen. Bo01 was a housing exhibition held 2001. It means Living01, referring to that it was held in 2001, and one aim was to show that Malmö was a good and exciting place to live. Today, only some 20 years later, Malmö is seen as a dynamic, innovative city with a booming population and being the destination of large scale private and public investments. [3]



*The existing plan for Nowe Miasto.*

*The red represents commercial areas, purple for industry and brown greyish colour represents residential areas.*



It is in this context that Zabrze has a vision of contributing to sustainable development. By emphasising unique solutions that are built upon cooperation between government, business and civil society, Zabrze aims to create a city that is a role model for sustainable development. One integral component of this goal is the plan for Nowe Miasto - the New City. It is a new city district that strives both towards sustainability, and to contribute to changing the perception of Zabrze from a post-industrial city in decline to an upcoming city at the forefront of urban development. It is planned to be located on 250 hectares of agricultural land, 7 km north of the city centre. The location will help to join two residential areas, Rokitnica and Grzybowice, and a developing special economic zone where investors are exempted from certain taxes and receive more favourable conditions to develop their businesses. With the plans for a new city district, Nowe Miasto, Zabrze has an opportunity to advance sustainable urban development and generate synergies for the region. [4]

## Our Task

As a part of the collaboration between the cities of Zabrze and Lund, as well as the Swedish-Polish Energy Platform, and the International Institute for Industrial Environmental Economics (IIIEE), our group was invited by Mayor Małgorzata Mańka-Szulik to give input to the energy planning of the Nowe Miasto. Our group was the sixth in line of groups from IIIEE, and in 2014, the group gave advice on the overall

sustainability aspects of the Nowe Miasto project in the report “Smart Zabrze – Building on a Mine of Opportunities”. The report introduced the framework of value based planning and a number of smart solutions in the area of energy, transportation, building design, water and waste, etc. for Nowe Miasto. The main recommendations of the report were to

- Preserve and enhance the area’s value: Create a green network
- Become the region’s sustainability forerunner: Build a smart pilot community
- Build to existing potential: Foster the transition to sustainability in the old city [5].

These recommendations have helped shape the plan for Nowe Miasto. As of 2015, it is on a conceptual stage and the municipality is searching for developers interested in constructing the district. The possible design and solutions to be realised are hence open for discussion.

Energy planning is one important forum for that discussion. It is a process that ought to happen continuously: in the early stages of the planning of a neighbourhood, via strategic technical decisions of what ambition level the system should have to nitty gritty technical details in the final parts. After meetings with key actors in energy planning of new city districts in Helsingborg, Lund and Malmö in Sweden, and their counterparts in Zabrze, the main recommendations of this report concerns the early stages of energy planning - the process to initiate planning. We deem this as most appropriate given Zabrze’s current position. If our recommendations would involve specific technical solutions, it might short-circuit the process that is essential for leadership, vision, collaboration to develop. Thus, the technical solutions presented in this report serve as inspiration rather than recommendations. To build on the mine of opportunities, we hope that our input can energize the process of making Nowe Miasto a reality.

## Outline

First, we start with giving some important background information on the main external drivers for Zabrze and essentially the Nowe Miasto project and why now is the right time to proceed. Second, we introduce the Energy Planning Process framework from United Nations Environment Programme and ICLEI. Third, we bring up a number of learnings regarding the process of energy planning from the cases of H+ in Helsingborg, Brunnshög in Lund, Hyllie and Västra Hamnen, both in Malmö. All four cases are developments of new city districts with high ambitions for the energy systems: smart electricity and transportation solutions, plus-energy areas, energy self-sufficiency with 100% local renewable energy. Hence, this section focuses on the key learnings of these showcases that we think are useful for the energy planning process in Nowe Miasto Zabrze. Last, we conclude with some final remarks and give an outlook of potential positive spin-off effects from the Nowe Miasto project for the city of Zabrze.



# Push and Pull Factors for Sustainable Urban Development

According to the International Energy Agency (IEA), coal accounts for 55% of the primary energy supply in Poland, and 92% of electricity generation. A big challenge for Poland is therefore to decarbonize the heat and electricity production, improve the energy efficiency and diversify the primary energy mix to enhance energy security. However, the IEA also emphasises that more needs to be done to put Poland on a truly low-carbon pathway. [6]

## Leadership on Climate Change Mitigation comes From Municipal Leaders

Although all significant decision about energy targets and emission requirements are taken on an international and national level, the municipal leaders have to face the challenge within adaptation and mitigation. As said by former Dr. Noel Brown, former Director of the North American region at UNEP: “Although it was national governments that signed the Climate Change Convention, the real global leadership for reducing carbon emissions and energy conservation is coming from municipal leaders.” Municipalities have the ideas and strength to start the process of change. [7]



While international and national policymakers are usually rather slow in taking bold decisions or introducing new regulations, municipal leaders are more proactive and show the way forward. Municipalities in general have many drivers both pushing and pulling sustainable urban development. This is particular true for Zabrze. Push factors are drivers, such as EU Directives or national regulations, that Zabrze has to follow. Pull factors are drivers that represent additional opportunities for Zabrze to pursue sustainable urban development. We have identified six drivers that are presented below:

## Push Factors

- Upcoming EU regulations

## Pull Factors

- First mover advantages of becoming a green showcase
- Numerous funding options available
- Opportunity of learning from the mistakes of others
- Opportunity of improving the local air quality
- Fostering local economic development

## Upcoming EU Regulations

There are several significant regulations on EU level that will come into force shortly and thus push the development in both Poland and Zabrze. According to the 2010 European Energy Performance of Buildings Directive (Directive 2010/31), all new buildings must be nearly-zero energy buildings by 2020; public buildings need to be so by 2018 [8]. According to the



European Commission, nearly-zero energy buildings have a very high energy performance and use energy mainly from renewable sources. Furthermore, EU Member States need to set up national action plans on how to improve the building's energy efficiency and implement energy performance standards for essential building elements, such as ventilation, walls and roofs [9].

Another EU legislation that will influence the energy system in Poland is the EU Air Quality Directive (2008/50/EC) which regulates the maximum levels of air pollution allowed [10], and the European Union Emissions Trading Scheme (EU ETS) that puts a price on carbon dioxide emissions for around 13 000 industrial and energy plants. In the upcoming years, the share of auctioning of emissions allowances of the EU ETS will increase and Poland will be fully integrated into the system, which is expected to influence the price of emissions allowances and thus increase the costs for fossil fuel intensive energy generation.

However, regulations can also act as pull factors, as in the case with the Renewable Energy Act (RES) in Poland adopted in February 2015, favouring distributed micro- and small-scale generation of electricity and introducing feed-in tariffs [11]. Derived from the overall EU targets for the share of renewable energy sources by 2020, Poland has a national target of 15% renewables to be met by 2020. Thus, the RES Act will contribute to achieve that target and will change the situation on the Polish renewable energy market, at least for micro- and small-scale renewable energy installations, as it sends a clear signal to the market through financial incentives and decreases uncertainty for homeowners and investors. Moreover, it helps to increase the diversification of the energy mix and reduces the dependency on fossil fuels and therefore enhances Poland's energy security. With such installations of renewable energy micro-systems, individual energy consumers also become energy producers at the same time (so-called "prosumers"). Being a prosumer is regarded as a solution extending the sphere of freedom, which can be interesting opportunity for the future inhabitants of Nowe Miasto, Zabrze.

## The Renewable Energy Act

Feed-in tariffs (FiT) for the micro-installations will be introduced, i.e. PLN 0.75/kWh for solar PV panels up to 3 kW, and PLN 0.65/kWh for solar PV installations between 3-10 kW.

## First-mover Advantage of Becoming a Green Showcase

Turning to pull factors, a crucial factor for Zabrze is that if it wishes to utilise the development of Nowe Miasto as a means to attract investors and people, the city should grasp this opportunity soon. By acting quickly, Zabrze can gain a first-mover advantage in becoming a unique green showcase. This is why a sustainable and innovative energy system for Nowe Miasto is a significant aspect when Zabrze aims to be a frontrunner in environmental sustainability in a Silesian and also Polish context. But if it becomes just one of many, the uniqueness factor disappears.



## Numerous Funding Options Available

There are considerable funding opportunities available for Zabrze. During the period of 2014-2020, Poland is the largest recipient of funds from the European Structural and Cohesion Funds and will receive €77.6 billion. Prioritised areas for funding are projects that

- promote a shift to a low-carbon economy,
- foster sustainable transportation, and
- enhance environmental and resource efficiency.

Low carbon economy investments can include investments in renewable energy, energy efficiency in buildings, smart grids, sustainable urban transportation, etc. The benefits from investments in the low-carbon economy include decreased energy imports, diversifying of energy sources, tackle energy poverty, cut GHG emissions, create jobs and support small and medium sized enterprises (SME). National and regional authorities are responsible for the Cohesion Policy Programmes for 2014-2020.

### Focus Areas of EU Cohesion Policy 2014-2020

According to the EU Partnership Agreement for Poland 2014-2020, environment and resource efficiency is a priority area. The Structural Investment Funds should be used to reduce primary energy consumption and increase the share of renewable energy. This fund will provide around 1/3 of the investments needed to reach the Polish renewable energy target of 15% in 2020. According to the Partnership Agreement with Poland, 23% of the funds available in the Regional Development and in the Cohesion Funds will be devoted for transition to a low-carbon economy and 5% of the Regional Fund will be devoted to sustainable urban development. Financial instruments used should encourage public private partnerships. [12]

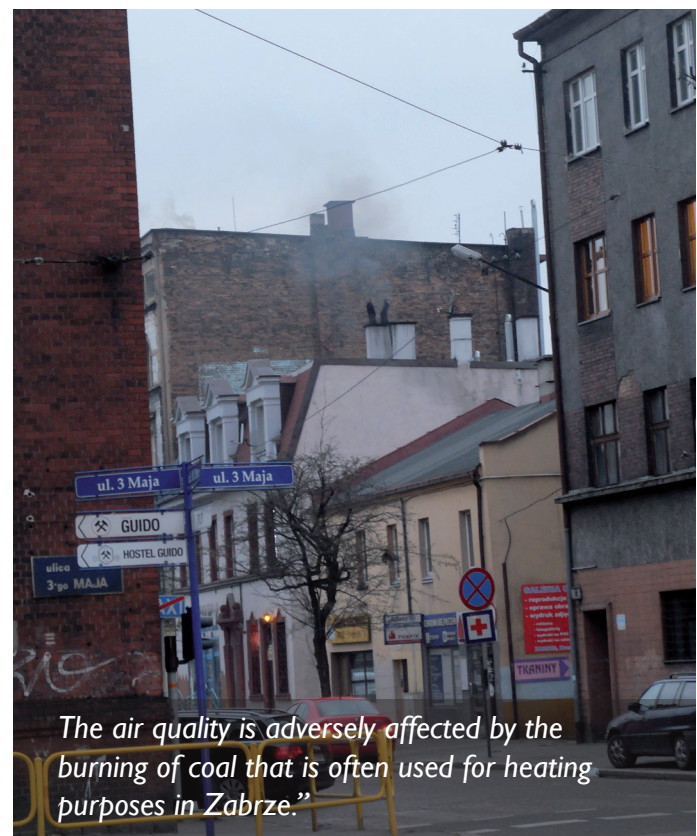
Although there can be economic benefits in the medium- and long-term with sustainable city development, the initial investments can be large and difficult to overcome. The actors involved are therefore often in need of additional external funding to cover the extra costs involved, and make the area cost-neutral compared to regular urban development. Västra Hamnen in Malmö received around €21 million in national funding for 65 environmental actions in the project, and in total around €50 million was spent on those environmental actions [13]. If Zabrze aims to promote a low-carbon development with Nowe Miasto based on energy efficient buildings and an energy and transportation system based on green, renewable sources, there should be considerable funding opportunities for the project as it fits well with the objectives and criteria set up with the EU Cohesion Policy for the upcoming years.

## Opportunity of Learning From the Mistakes of Others

Zabrze has a great opportunity as it can learn from previous mistakes that other cities have made when constructing new districts with similar objectives and intentions. The case studies from Sweden (see chapter 5) highlight some good and instructive examples and if Zabrze takes these lessons to heart, it can leapfrog ahead with innovative and sustainable solutions and without repeating mistakes of others.

## Opportunity of Improving the Local Air Quality

Improving local air quality, as stipulated by the EU Directive, can also be considered as a pull factor. According to the NGO Health and Environment Alliance, the annual health costs caused by coal pollution in Poland is estimated to €8.2 billion. Optimising existing energy systems, e.g. by using cleaner fuels and installing flue gas filters, or the transition to renewable energy sources can contribute to better air quality in the city, which decreases health costs as less people become ill [14]. Better air quality also increases the attractiveness of the city for potential residents.



## Fostering Local Economic Development

Another pull factor is the need of economic development in the local area to reverse the trend of a decreasing population in Zabrze [15], which places an increasing strain on the city’s finances to maintain existing infrastructure and services. Building a new city district could, together with other measures, kick-start economic development and help to attract new residents [16]. Zabrze and Upper Silesia have a long history as an energy provider through coal mines and coal power plants and with the transition to a low-carbon economy based on renewables and other clean and innovative energy solutions, Zabrze and the region can keep their leading role the energy sector. Leadership in the low-carbon energy transition could bring new partnerships and investors, create new jobs and enhance the economic development of the area. The Nowe Miasto project offers a great opportunity to invest in the new energy future.



# Vision for Nowe Miasto. Value-based Urban Planning

A vision can in general terms be described as “an idea or picture in your imagination” or “the ability to think about or plan the future with great imagination and intelligence” [17]. Therefore it is crucial to define and write down a clear and strong vision from the very start of the project, possibly together with potential project stakeholders. Why is this so important? The reasons are manifold but may not be apparent from the start.

*“A city is not gauged by its lengths and width, but by the broadness of its vision and the height of its dreams.”*

- Herb Caen, journalist from the United States

First of all, it is the core of what the entire project is all about and includes the larger purpose of why and in what way the project is envisioned once it is implemented. Moreover, once it has been specified by the project leader involved from the start, a bold and distinct vision helps to communicate and advertise the project

to the public, potential investors, developers and other stakeholders. This is not only true for carrying out the project to the broad public but also facilitates internal project-related processes and communication as everyone involved can refer to the common vision and in this way fosters that everyone talks the same language.

Overall, the vision acts as powerful common denominator that will pull the project in the intended direction, but only if it is ambitious and borne by strong leadership.

*“Leadership is the capacity to translate vision into reality.”*

- Warren Bennis, Author and organisational consultant from the United States



First and foremost, this requires that the visionary commitments and strategies go beyond solely good practices, standards, laws and regulations, but aim higher and truly strive to become a showcase project for Zabrze, the Silesian region and even Poland. Or as Trevor Graham (2013, p.75), Head of Sustainable Communities and Lifestyle at the Environment Department of the City of Malmö, point out the fact of leadership and being a frontrunner: “While councils and business across Europe sat hunched over plans, strategies and studies of optimal ways to design, build and transform without daring to take the first step, Malmö was rolling up its sleeves”. Thus, strong leadership with courage and no fear of taking some risks is also part of this process in order to live up to bold visions and ideas. [18]



At this point, it should also be highlighted that the process of defining a clear and bold vision is one that is not exclusive but rather inclusive together with the everyone involved in the project. Examples from Malmö (see box) have shown that such a process can result in a highly successful outcome with motivated and passionate actors who engage in the project and feel that they are part of it. This in turn, eases the interaction with other stakeholders, such as investors and developers, and may help to motivate, aspire and even spur “a race to the top”. Once those actors realize the collective potential, the final result will most likely be greater than the sum of the individual parts and will increase the overall value for everyone, as it was the case in the Västra Hamnen project in Malmö. Furthermore, the interaction with all possible stakeholders, including investors, developers and also the city’s citizens, helps to create and develop a project along the established visionary ideas that is accepted and promoted by everyone in the public.



## “Engagement for Malmö” Programme

The aim of the programme was to involve all employees of the City of Malmö to contribute with progressive ideas towards a collective vision and goal for the Västra Hamnen project in Malmö. Thus, most of the people working at the municipality were trained and educated about the project and then were encouraged to actively participate in the project with visionary inputs and carrying it out to the broader public. This common understanding of the project ensured that everyone talked the same language, meaning everyone in the programme shared the same vision and aimed towards the same goals. This also emphasized to a stronger cultural engagement and without leaving someone aside, all employees could actively engage and participate in the project. [19]

## Model for Value-based Urban Development

The value based urban planning programme has been developed in collaboration by the City of Malmö and the developer and landowner Peab Sverige AB during later stages of the implementation of the Västra Hamnen project in Malmö in 2011. As the name suggests it is all about values in a particular city area, rather than the physical structure. Derived from the the core and vision of the project, a “value plan” is developed in which specific values, for example quality and sustainability, are selected and prioritised. In this way the value plan allows a more flexible content, and can be changed or adjusted over time if needed. Derived from and linked to those values, strategies are developed that follow and complement those values in a more specific way, but still keeps enough flexibility for an open dialogue with all possible stakeholders during the implementation of the whole project and around the defined vision and values. Therefore, this approach enables a continuous urban development process with constant feedback among the different actors. [20]

*Value-based Urban Planning Framework, as used for the Varvsstaden part of Malmö’s Västra Hamnen project*







# The Energy Planning Process

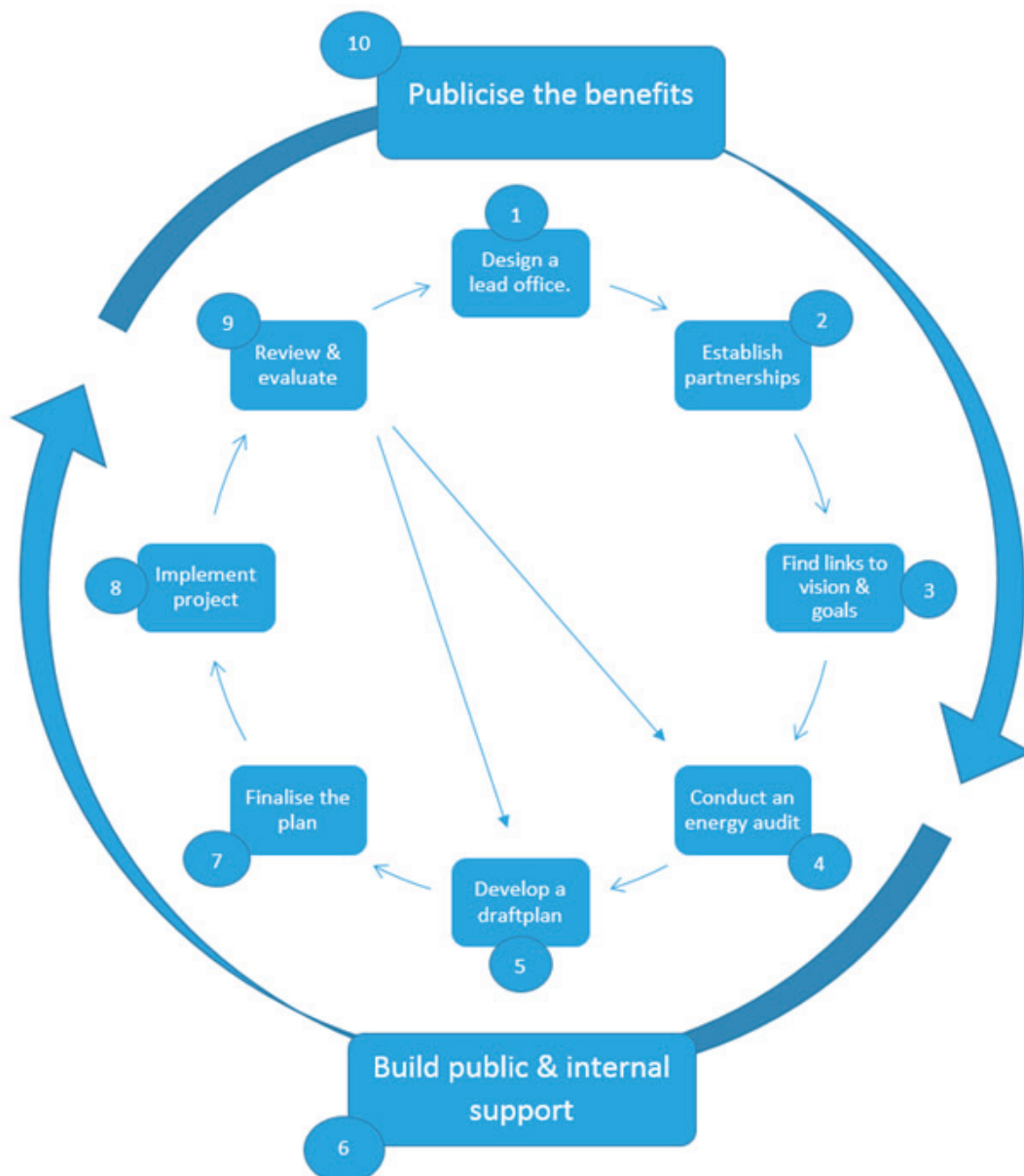
This chapter introduces a step-wise framework of how to initiate, develop and manage the planning process of an energy system in a city. Amongst other frameworks for energy planning, the United Nations Environment Programme (UNEP), Local Governments for Sustainability (ICLEI), and UN Habitat have developed a framework for the process of energy planning in urban development in “Sustainable Urban Energy Planning: A handbook for cities and towns in developing countries” (2009). While Poland is not considered to be a “developing country”, the framework presented is useful in a Polish context as well. The handbook provides urban developers on national and local level with tools, information, and models useful for sustainable urban development planning. [21]

Overall, two important points need to be made. First, the chances of success are much higher by focusing on developing sustainable solutions for energy in an early stage of a project. Second, planning an energy system is an effort of collaboration and a common understanding of each step in the energy planning process is crucial.

*“Energy planning should come in an early stage, as early as possible!”*

– Rickard Bengtsson, Energy project Manager for Brunnshög, Krafringen [22]

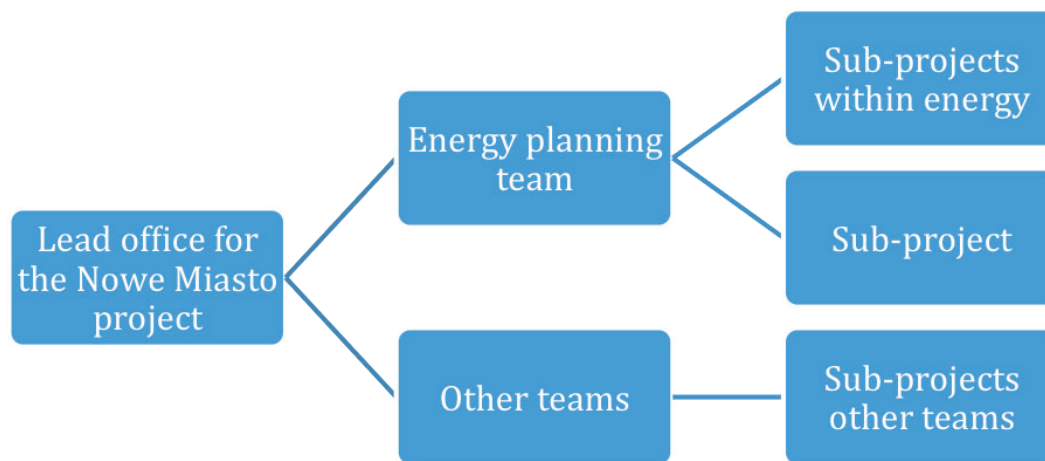
The energy plan process contains 10 key steps that should be followed stepwise. However, step 6 and 10 should be a continuous work throughout the whole process, as both aims to involve and build up support from the citizens in the energy plans. Each step will be described in this chapter.



*Framework of the city's energy plan process*

## Design a Lead Office and Find Champions

Appoint a lead office - a new or existing office within the municipality to oversee the project. As the energy planning process involves many of the city's departments and other market actors, the lead office's responsibility is to build up a commitment among the involved parties. The lead office should take the city's vision and inspire other actors to work towards it, which might involve slight changes of the vision to make sure that everyone is on the same page. As the lead office is important for the success of a project, it should be located where the chances are high to receive sufficient support. This is further highlighted by the people involved in the case studies in Sweden (see chapter 5). The lead office can appoint project teams in different areas, which in their turn can start sub-projects.



*Organisational structure for the energy planning process*

Another first important step is to identify “champions”. Champions are important leaders with power and committed to the task - for the energy planning process among politicians and civil servants within the city department. Politicians provide the political will and support, and lead the way of where to go, while coalitions of civil servants can bring departments together instead of just working toward their own goals. Both types of champions are important in terms of changing the existing mind-set within the municipality which is necessary for creating innovative thinking and open up for new business models.

## Establish Partnerships

The next step is to find partners that can provide the necessary resources and expertise needed to reach the vision. Differentiation is important - who should do what and to what degree should it be based on the resources and the expertise that the different partners have. An important point to consider is whether it is possible to get external funding in order to increase the attractiveness of the



project for potential partners. One way is to establish partnerships with local utilities and sign a contract about the vision and collaboration for the project. This has been done successfully in sustainable urban development projects in Lund, Helsingborg and Malmö.

In Zabrze, there are several actors who could be potential partners in the Nowe Miasto project. Large actors such as Tauron Polska Energia S.A. on the electricity and grid market, Zabrze Enterprise for Thermal Energetics (ZPEC) and Fortum Cooperation on the district heating market could be potential partners. It is important to get such partners onboard as they own and manage vital parts of the energy system. Other potential partners include local companies dealing with water and waste.

## Find the ‘Hooks’ in the Vision, Goals, and Policies of the City

The energy project’s vision and goals needs to be coherent with the city’s and the nation’s overall goals. This will ensure the relevance of the project and make it easier to secure eventual resources that can be used to reach these goals.

The correspondence between the visions can then be used as “hooks” and should later be translated into strategies to address how the energy project can reach its goals through its implementation. There are three important steps to identify the right hooks for the development:

1. the city’s long- and short-term objectives for the future,
2. the country’s relevant energy policies, and
3. the links between globally energy agenda and the country’s or region’s agenda.

Through material search, collection of data, participation in different projects and engaging public participation, the urban developers are able to identify issues in the city which needs to be taken into account during the energy planning process.

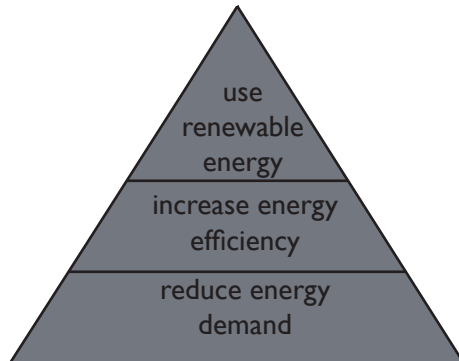
## **Conducting an Energy and GHG Emissions Audit**

After establishing a base for the project it is time to collect information about the city’s energy demand and supply. It is usually known as an energy audit process.

An energy audit process will help the city planners to identify where in the new district there will be a demand for energy use and from which sources there will be GHG emissions. Moreover, an auditing process helps to identify unsustainable trends of current markets and social conditions, as well as which partners could support the change of these markets and conditions.

There are various ways of conducting an energy audit process. One way of looking into the energy system for the new city district is by looking at scenarios for the energy balance, and taking a demand-led approach. In the energy balance, there is a supply and a demand side. On the demand side, there is a need for electricity, heating/cooling, and mobility. On the supply side there is traditionally a centralised system with heat and power production based on fossil fuels, and fuels to transportation sector from fossil fuels. With a demand-led approach, inefficiencies can be reduced. There are oftentimes big inefficiencies in the system due to heat losses in electricity generation, unless Combined Heat and Power (CHP) is used. With a demand-led approach, an energy system can be modelled based on the demand rather than the supply.

Some principles for the energy audit/modelling process is to consider key principles for sustainable energy systems. First, find ways to reduce the energy demand, by strict building codes, nearly-zero energy buildings and access to alternative modes of transportation, etc. Second, ensure ways to increase the efficiency, and third use renewable energy sources for the remaining energy demand.



### Priorities for an Energy System

When designing an energy system from scratch, it is important to keep in mind some key principles: reduce energy demand where it is possible, increase the energy efficiency, and rely on renewable energy sources.

The energy balance needs to be modeled based on quantitative data on demand and potential sources of supply. Based on data various scenarios for the energy balance can be developed and used for the decision making process.

## Analyse Your Information and Develop a Draft Plan

At this step in the energy planning process it is time to analyse the results from the energy auditing process and develop a plan together with the stakeholders. The draft plan should rank the issues accordingly to the priorities of the city and thereafter develop the draft plan of what needs to be done in order to reach the sustainable energy goals for the city. The draft plan should be based on realistic goals that are reachable as well as addressing the targets that can yield most benefits both for the city and for the environment.

To facilitate this process, there are software programmes that can be used. Among these tools are LEAP – Long-range energy alternatives planning system (developed by the Stockholm Environment Institute) [23], and HEAT – Harmonised emissions analysis tool (developed by ICLEI to help local governments account for GHG emissions, common air pollutants and volatile organic compounds) [24].



To support local authorities, the EU and the Covenant of Mayors have also developed guidelines for “How to develop a Sustainable Energy Action Plan (SEAP)” [25,26]. SEAP gives general guidelines of how to develop a plan and can be used as process support together with the UNEP, ICLEI, UN Habitat framework.

## **Build Public and Internal Support**

Building external and internal support is an ongoing process that needs to happen continuously. Project implementation cannot start before internal and external actors support the project, as this would likely cause the project to fail. It is essential to make sure that political leaders, civil servants, other stakeholders and the public have access to the same information and are well-informed about the plans. Changing how people live and act in the city is a long-term process and key actors in the city must continuously be informed and educated on the changes.

UNEP, ICLEI and UN Habitat suggest two important steps to take when interacting with stakeholders. First, it is important to identify the stakeholders, establish personal relationships and make sure that there is commitment from people within those organisations. This is to prevent that a partnership agreements does not become just a piece of paper, but rather an active cooperation. Furthermore, it is important to support the stakeholders to prevent that they get overwhelmed by the workload. The second step is to interact with the stakeholders. In order to obtain effective results it can be beneficial to identify and appoint task groups who then provide the range of expertise accordingly to what they are capable to manage. Here it is important to involve other public organisations such as schools, universities etc. and work with media to make the work visible and capture people’s attention.

## **Finalise the Plan**

There will be many potential actions to choose from within the development of a new city district. In this step, it is time to decide which to prioritize. After having discussed various scenarios and actions, it is time to decide what can be implemented in the short and long term in order to attain the overall vision of the project.

## **Implement and Finance the Plan**

Eventually, it all comes down to implement the plan. However, before reaching this step many barriers might have appeared, which is a reason for why the process plan should be structured and agreed in an early stage. Before the actual implementation process it is time to identify how and by whom these projects should be made. A responsible actor for each sub-project should be appointed and the responsibilities in each projects should be made clear. In order to implement the plans, UNEP,



ICLEI and UN Habitat suggest to be practical, focus on projects with the greatest impacts, and allocate financial resources accordingly.

## Monitor and Evaluate the Plan

As the plans are carried out, they also need to be evaluated on a regular basis. For short-term projects, this means to perform an evaluation every two to three years, and each five years for long-term projects. The evaluations should include measurements of the projects targets and the results so far, identify problems, correct the project's action plans and adjust plans for future challenges. Including an evaluation process in each project will help to improve the overall process of the project and to decide whether changes are necessary as well as if the project is beneficial or not.

## Publicise and Communicate the Benefits

Communicating with citizens is similar to step six in that it needs to be carried out throughout the whole energy planning process. Citizens and involved actors need to be informed of what the energy plan for the new district means, and also feel proud about it. A sense of proudness can reinforce an urban transformation as the image of the city as a whole will also change. In order to do this, the citizen need to feel trust in the project, and know how they will benefit. Reaching out through media and meet the curiosity and questions from the public will help facilitate the success of communicating the benefits of the project.





# Good Examples From Sweden

There are many possibilities to create a more sustainable energy system when building a new city district from scratch. Existing technologies to meet the needs for electricity, heating/cooling and mobility are advanced and the room for innovative solution is big. When building a new city district, it is an opportunity to develop the energy system of the future, create local job opportunities, and encourage sustainable lifestyles.

Up until this point, the report has emphasised the importance of how to organise actors and the energy planning process. Now, the attention will be turned to a few case studies in Sweden. Two of the cases Brunnshög in Lund and Hyllie are still in developing and planning phase, while the case of Västra Hamnen in Malmö is already

an established project. All city developments in Skåne region of Sweden have high ambitions for energy systems.

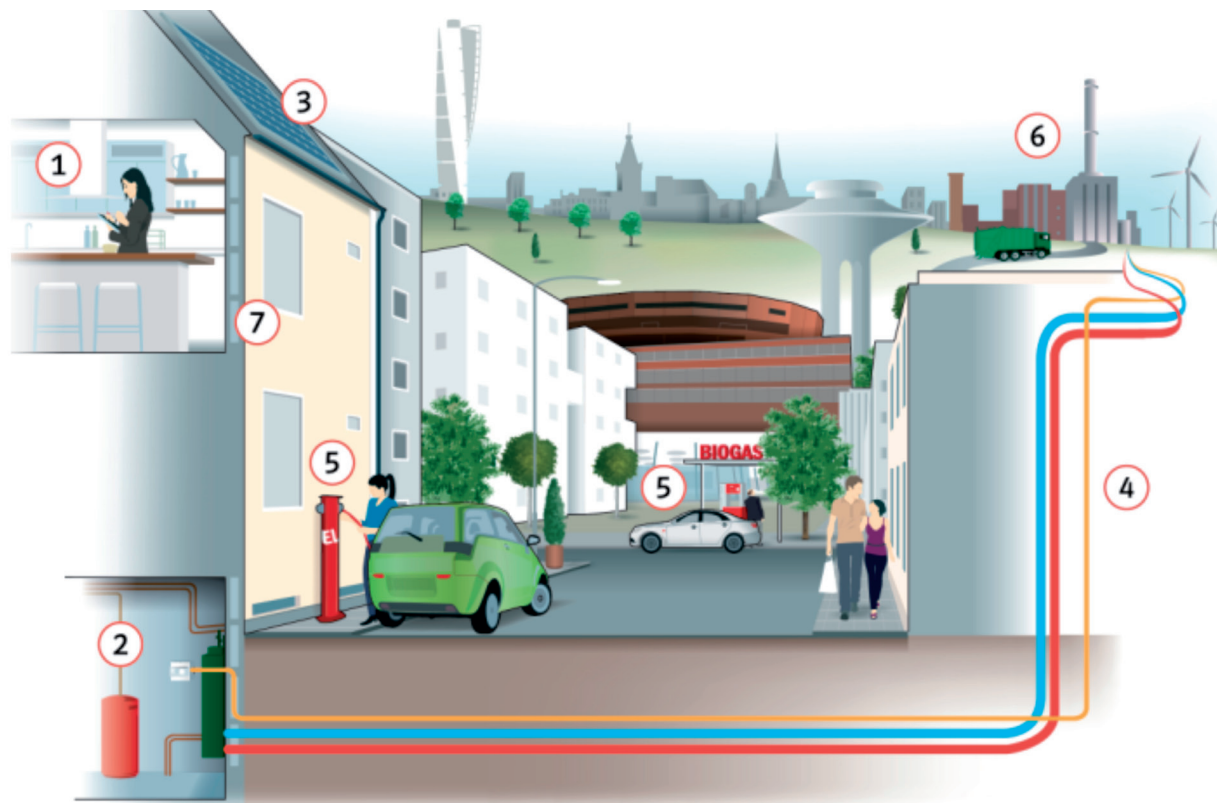
## Developing a Smart Grid in Hyllie Malmö

Hyllie is a greenfield area where 9000 apartments and 9000 office workplaces will be built until 2030. The vision for the area is for Hyllie to become the most climate smart city district in the Öresund region and an international role model for sustainable city development. As a part of the development, a collaboration was started in 2010 between the city of Malmö, E.ON and the water supply and wastewater treatment company VA SYD. The vision for the collaboration was outlined in a “Climate contract for Hyllie”, signed by the parties in February 2011. The energy system of Hyllie should be 100% renewable or recycled energy by 2020. [27]

Hyllie serves as a testbed for development, demonstration and implementation of new smart solutions. These includes of a small-scale smart grid for the local energy utility E.ON to get new insights and real-life experience on the interaction and management of a smart grid. Such test projects can be seen as real world examples of new solutions as well as innovative business models for utilities like E.ON to be better prepared in the future to upscale smart grid networks and better control and monitor them. As a part of the development, E.ON and Siemens has agreed on a collaboration to develop the energy smart infrastructure. The Smart Grids project for a sustainable energy system in Hyllie has received €5.2 million of external funding from the Swedish Energy Agency between 2012-2014, and stakeholders involved are E.ON, City of Malmö, in partnership with developers and other companies involved in the project. [28]

*“What is unique about Hyllie is that we will build functionality into the system that makes it possible to optimize a whole city district from an energy perspective. A bit sloppily expressed the lines between customer and supplier will to a certain degree be erased through the energy being routable both ways”.*

*-Mattias Örtenvik, Head of Sustainable City, E.ON Nordic. [29]*



*Smart grid solutions in Hyllie*

Source: Berne, Peder (2013). *Smart city Malmö - Sustainable Neighbourhood Hyllie: concept, strategy and innovation.* <http://www.smartgrids.ch>

- ① Customer control of heat and electricity consumption
- ② Smart home and Smart building solutions
- ③ Distributed generation – electricity and heat
- ④ Smart grid solutions – DH and electricity
- ⑤ Sustainable mobility solutions – gas and e-mobility
- ⑥ CO<sub>2</sub> and resource efficient energy supply
- ⑦ Distributed energy storage



## What is a Smart Grid?

*Smart grids* is an electricity system that monitor energy flows and respond dynamically to changes in supply and demand. Individual households and buildings can install what is called a smart meters and track their electricity consumption. *Smart meters* provide real time information to electricity consumers and suppliers through monitoring and tracking consumer patterns and energy flows. Therefore, smart meters are an essential part of any smart grid because they allow consumers and suppliers to respond and adapt to fluctuations of electricity over time. It helps consumers to use the electricity at time periods when prices are lower instead of peak times, so smart meters help to save money for consumer while at the same time balance and manage the electricity grids. The fluctuating supply of renewables can be forecasted by grid operators and they can, together with the information of smart meters from energy consumers, better plan the integration of such renewable energy sources and balance supply and demand. [31]

*“Smart electricity grids offer a variety of benefits, such as the better and safer integration of intermittent renewable energy sources through demand response, control and monitoring, or leaving greater flexibility and control to consumers in actively participating in the electricity market”.* [30]

Learnings from developing a smart grid system in Hyllie shows that collaboration between the municipality and utilities can be constructive and become a driver of innovation. The stakeholders involved in the development of a smart grid in Hyllie complement each other, and through setting up a common vision in the Climate contract for Hyllie, the actors can work together towards a common goal of 100% renewable or recycled energy. Also, the project allows for the actors to develop smart energy systems of the future and contribute with new innovative solutions.

## EU's Plans to Roll Out Smart Meters on a Large Scale

The EU plans to replace 80% of electricity meters with smart meters until 2020 wherever possible and cost-effective, as it is estimated that this alone could help to cut GHG emission by approx. 9% and reduce household energy consumption to the same extent. Concerning data security, consumer's personal data on electricity consumption is protected under

EU law and the European Commission has specifically set out rules and guidelines how such data from smart meters can be used and who can access it under which circumstances to secure consumer's data privacy.



## Smart Heating Solutions in Västra Hamnen Malmö and Brunnshög Lund

Västra Hamnen in Malmö has a number of feasible solutions for district heating and local renewable energy. Västra Hamnen has an energy system based on 100% local renewable energy for heating and electricity, and low energy housing. The base in the electricity production is a local 2 MW windmill, and 120 m<sup>2</sup> solar PV producing equivalent of 6 MWh. For heating, the area gets around 85% of the heat from heat pumps that use heat from aquifers and from the sea. 1400 m<sup>2</sup> solar collectors that heats water, which is fed into district heating network, meet the remaining 15% of heat demand. Excess heat from the systems in the Västra Hamnen is fed into the city's district-heating grid. [32; 33]

Learning from Västra Hamnen's heating solutions is firstly to have clear leadership in the beginning of the energy plan process and to have a vision of a 100% renewable energy system. Secondly, to provide cost-neutrality option in terms of enhance sustainable solutions. For instance, the construction companies in Västra Hamnen that implemented local renewable energy to their construction were compensated for the additional costs from EU and national funding. If the constructors were not offered a cost-neutral solutions such requirements would become impossible. Further, it was important to have a dialogue with the construction companies and develop a quality programme for the builders.

## Energy Use in Buildings

According to the International Energy Agency, buildings represent 32% of total final energy consumption. In Poland, heat and hot water accounts for 57% and 25% of energy consumption of residential buildings, and 52% and 9% respectively in public buildings. The energy performance of buildings and heating systems are therefore of major importance when designing a new city district. [34; 35; 36]



Vision: Brunnsjön. Illustration: Atkins.  
Source: <http://www.lund.se>

Brunnsjön is a new city district in Lund, that is planned in connection with the opening of the world-leading research facilities Max IV and the European Spallation Source (ESS). Brunnsjön, covering an area of 225 hectares, will host 40 000 residents and workers when completed in 2050. In Brunnsjön, solutions for smart energy systems will be implemented, along with large scale capture and utilization of waste heat. ESS will need 250 GWh/year for its activities (mainly electricity) and most of this will become waste heat, around 190 GWh. ESS took an early strategic decision to not use cooling towers, but instead to let the surrounding city use this heat. Through a close dialogue with Kraftringen, a public utility company owned to 90% by Lund Municipality, strategies of how to utilize this heat were developed. The waste heat will be supplied into the district heating system operated by Kraftringen. The entire local district heating system, that includes the neighbour towns as well, has a current need around 1 000 GWh/year.

Energy needs in the residential area of Brunnsjön will be around 12 GWh/year. The vision is therefore that from 2020 Brunnsjön is a “power plant”. As a part of the project, Kraftringen has developed a collaboration with the construction company Skanska to develop heat storage facility - an initial idea was to store it in a bedrock 10-15 km away from Lund. Initial reports point to that it seems too expensive, but the idea is not discarded yet. [37]



Vision: Kunskapsparken. Illustration: Mandaworks  
Source: <http://www.lund.se>

Learnings from the case of Brunnsög shows the potential of having a public energy utility company, which can become a proactive partner in the work towards sustainability. Kraftringen is owned by four municipalities and has a vision to develop the future's energy system. The ownership structure allows the municipalities to appoint the board and in this way ensure that the vision of the company goes hand in hand with the municipality. A good collaboration is what allows for win-win situations where the new city district reaches its goals and the companies gain knowledge and experience with innovative solutions. Kraftringen also collaborates with researchers at Lund University to develop the smart solutions for Brunnsög. Finally, energy performance of the buildings is a crucial component of designing a sustainable heating system. In this process, a good dialogue with developers is important.



Vision: Solbjer. Illustration: Anna Klara Lundberg  
Source: <http://www.lund.se>

## Mobility in Brunshög Lund

The City of Lund's aim is that mobility needs in Brunshög should be at most 1/3 by private car and at least 2/3 by public transportation, biking or walking. As the current distribution is 55-60% in favour of car, a considerable change has to be achieved. Besides environmental reasons, such an aim is also favoured due to decreased costs and required space for the development of road infrastructure. This allows for a denser district, which is generally seen as more attractive. The most important strategic action for Brunshög is to ensure that a high quality public transport option is established from the very start. Therefore, the municipality of Lund aims to build a tram line from the centre of Lund to Brunshög. The goal is that the tram line should be ready by



2020 – the same year as the ESS building is planned to be ready. This makes it possible for the new residents and users of the district to get into the habit of using public transport from the start. Moving to a new place allows for establishing new habits of mobility. Having the public transportation in place from the start can also drive investments to the area, as good accessibility is an important factor for investors. [38]

## Residential Carpools and Parking Garages

A project that Brunnsög are working on is to change the habits of using the car for the new district. By working with concrete measures they want to provide good accessibility with car as well as with other modes of transport. This requires down-prioritising infrastructure for cars. One measure is to introduce residential car pools, which means that the car pool will be available to all residents and included in the rent.

Another measure is to create parking garages placed at some distance from residential houses and offices. Changing the availability of parking space increases the perceived costs of car using simply as it is further to walk, and thus increases the attractiveness of public transport. The possibility that these measures are seen as acceptable are dependent on accessibility to good public transport and other means of mobility. [39]

These measures does not make housing more expensive. The City of Malmö has calculated how much different types of parking solutions affect the costs of construction and found that building larger parking garages instead of underground garages for each building lowers the share of parking costs of construction from 12% to 4%, and combined with carpools, the share decrease to around 3%. [40]

Learnings from Brunnsög show the importance of including mobility in energy planning. For a new city district to be truly sustainable, mobility needs to be included. This has several reasons. First, transport is a big challenge for a low-carbon development. Second, mobility patterns are shaped to a large degree by the structure of a city, and therefore mobility considerations should be included from the start.

Another learning from Brunnsög is that good infrastructure for bicyclists and pedestrians cannot be limited to only the new district, instead the whole city need to provide the same options. For instance, the commuter will not choose to bike if the rest of the city feels unsafe compared to the new district. Hence, Lund uses



Vision: New avenue. Illustration: Kontoret  
Source: <http://www.lund.se>

the construction of the new city district as a driver of investments and upgrades of the physical infrastructure even beyond the area. To involve citizens in the process, the city of Lund has started the Brunshög dialogue, where inhabitants of Lund can get information about the project and express their opinions through a series of public meetings.

*“An advanced city is not a place where the poor move about in cars, rather it’s where even the rich use public transportation”*

- Enrique Peñalosa, Former Mayor of Bogota, Colombia, 2011



# Potential Spin-off Effects and Outlook

The project of Nowe Miasto has the potential to become the vitamin injection that Zabrze hopes it will be if the city develops and stays true to their visionary ambitions. It could attract investors and people to Zabrze, and allow the city to convert itself into a leader of sustainable transitions to low-carbon and resource efficient societies with improved living standards. Nowe Miasto could also generate synergies for the entire city of Zabrze – some examples are summarized below.

Within the area of mobility, investments in innovative solutions such as better public transportation, bike lanes, bike-sharing options, and carpools in and to Nowe Miasto, can have positive spin-off effects for all the citizens of Zabrze. It requires investments that will improve the mobility throughout the city and can also create interest among citizens to use new modes of transportation in the longer run.

Another positive spin-off effect of the Nowe Miasto project can be new partnerships and collaboration with key stakeholders and sustainable cities all over the world. Many cities are striving to build sustainable city districts and have formed numerous networks to learn from one another. One example is ICLEI - Local Governments for Sustainability. Other than the experience exchange and learning aspects, these partnerships can bring increased exposure through visits by international and national delegations that want to learn from the case of Zabrze.

This could lead to increased attractiveness for investors and new citizens, as well as an increased sense of pride among the residents of Zabrze. It is also important for Zabrze to remember the larger regional context. While the surrounding cities of Bytom, Gliwice and Katowice might seem as competitors at times, it is the Upper Silesian Metropolitan agglomeration as a whole that competes with urban areas of Warszawa, Kraków or the three cities of Gdańsk, Gdynia and Sopot up north. The regional cooperation that Madam Mayor currently chairs is a great example of a step in the right direction. Zabrze should continue on this path and use the Nowe Miasto project as a catalyst for more regional cooperation.

Improved capacity in the municipality to work with sustainable urban transformation in collaboration with key stakeholders, can create improved practices of green public procurement. The city of Zabrze has a unique opportunity to support sustainable heat and electricity production through its public procurement of electricity, and ownership of the local Zabrze Enterprise for Thermal Energetics (ZPEC). With the development of Nowe Miasto and finding sustainable heating solutions, ZPEC can be a key stakeholder. Moreover, with the development of a new CHP plant by Fortum in Zabrze, there is a golden opportunity for the municipality to demand sustainable production of heat and electricity from biomass and municipal solid waste (MSW) instead of coal. With heat generated from biomass and waste, the green profile of Nowe Miasto and Zabrze could improve. The new CHP of Fortum has the technical capabilities to be among the few CHP plants fuelled only with biomass and MSW in Poland (as of 2015 there is one CHP plant fuelled with biomass in Poland, located in Białystok). [41; 42]

If Zabrze continues to develop its visionary plan for Nowe Miasto and manages to implement it, the new city district could become the game-changer the municipality is searching for. However, Zabrze should not just strive to follow in the footsteps of cities such as Malmö which has transformed and reinvented itself as an attractive post-industrial city; it should learn from its mistakes and leapfrog ahead. Crucially then is that while for example Västra Hamnen was important for Malmö's transformation as a whole it was only one part of the transformation [43]. Many other changes have together fuelled the transformation that is still ongoing. Zabrze has already embarked on a journey where Nowe Miasto is just the first stop on a long but energizing voyage.

## Meet the Project Team



From left to right:  
Moa Forstorp, Sandro Benz, Paula Makuch, Danica Caganic, Per Wretlind

### **Moa Forstorp**

is from Sweden and has a background in International Relations and Sustainable Development from Stockholm and Lund University. She has previously worked in the Swedish and European Parliament, and for the Swedish Energy Agency.

### **Paula Makuch**

is from Poland and holds an Engineering degree in Environmental Protection and Management and a Master's degree in Environmental Protection Technologies, both from Gdańsk University of Technology.

### **Danica Caganic**

is from Sweden with an academic background in Retail Management from Lund University and she has worked in the retail sector.

### **Sandro Benz**

is from Switzerland and holds a Bachelor's degree in Economics and Business Administration from the University of Zurich. He has previous experience in environmental consulting and strong interest in the field of energy systems and renewable energy.

### **Per Wretlind**

is from Sweden and holds a Bachelor's degree in International Business and Politics from Copenhagen Business School and a Master's degree in Economic Growth, Innovation and Spatial Dynamics from Lund University. He has experience from politics in Malmö and Skåne, and worked with national and international NGOs.

# Thank You!

We would like to show our great appreciation to all our interviewees that took some of their limited time to share their valuable knowledge and experiences with us. Thanks to all of them, on whose inputs and expertise this study builds upon and without which this report would not have been possible. Of course, it is the author's responsibility for interpreting and presenting their views.

We would like to express our gratitude to:

Andreas Kertes, Head of Strategic Business Development, Öresundskraft

Czesław Chłudziński, senior administrative specialist, Tauron Dystrybucja S.A.

Grzegorz Kotyczka, Head of Connection Unit, Tauron Dystrybucja S.A.

Grzegorz Syrek, Head of Planning and Development Department, Tauron Dystrybucja S.A.

Janusz Famulicki, Head of the Ecology Department, City of Zabrze

Jens Gille, Environmental Coordinator for H+, City of Helsingborg

Jozef Neterowicz, Counsellor (Business Promotion), Embassy of Sweden in Warsaw

Karolina Thel, Ministry of Infrastructure and Development, Department of Spatial Policy, Poland

Katarzyna Dzióba, Deputy Mayor, City of Zabrze

Kerstin Rubenson, Climate Strategist for Hyllie, City of Malmö

Krystyna Kurowska, Mayor's advisor, City of Zabrze

Krzysztof Piziak, coordinator of the system movement, Tauron Dystrybucja S.A.

Nora Smedby, PhD Candidate, International Institute for Industrial Environmental Economics (IIIEE)

Lesław Złotorowicz, President, Zabrze Enterprise for Thermal Energetics (ZPEC)

Paulina Radecka, Ministry of Infrastructure and Development, Department of Spatial Policy, Poland

Rafał Kobos, Head of Investors' Issues Office, City of Zabrze

Walenty Biedulski, Mayor's advisor, City of Zabrze

Wojciech Wichary, CEO, Wichary Technic Sp. z o. o.

Zenon Rodak, Head of the Urban Planning Office, City of Zabrze

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