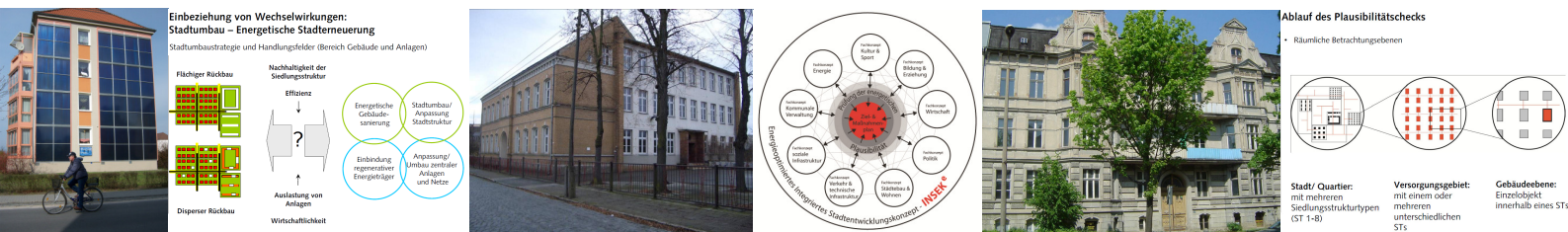


## WP 3 Urban Development



# Analysis on realized integrated urban development concepts in Brandenburg

## Energy efficiency in integrated urban development - perspectives

July 2011

**Author: Ministry for Infrastructure and Agriculture of the Federal State of Brandenburg)**

Compiled by the Urb.Energy working group which consists of the following companies:

Ernst Basler + Partner GmbH

B.B.S.M. Brandenburgische Beratungsgesellschaft für

Stadterneuerung und Modernisierung mbH

UrbanPlus, Droste&Partner



# Table of Contents

- Introduction..... 1**
- Urb.Energy in the context of European energy policy ..... 2**
  - European climate protection policy .....2
  - Urb.Energy .....2
- Energy-policy conditions at state and federal state levels ..... 3**
  - Energy-policy conditions at state level .....3
  - Energy policy of the Federal State of Brandenburg .....3
- Integrated urban development and climate protection in Brandenburg..... 4**
  - National Urban Development Policy.....5
  - ExWoSt research field of “Energetic Urban Renewal” .....5
  - Methodical approaches in energetic urban development - Top-Down and Bottom-Up .....6
- “Energy in the city” report..... 6**
  - Recommendations for homogeneous urban districts.....6
  - Recommendations for heterogeneous urban districts .....7
  - Overarching recommendations for action .....7
- Recommendations for action and lessons learned from activities and projects in the Federal State of Brandenburg ..... 8**
  - Urban and settlement structure .....8
  - Energy and climate protection concepts .....8
  - District concepts .....9
  - Private and institutional residential buildings ..... 11
  - Energy generation and supply ..... 12
  - Public relations and advisory services ..... 13
  - Organisation and financing ..... 13
- Recommendations for action for project partners from Brandenburg’s perspective ... 14**
  - Lessons learned from good practice approaches that can help in the development of appropriate strategic approaches ..... 14
  - Recommendations on measures that should be implemented in the short term ..... 15



## Salutation



Energy policy and climate protection are increasingly perceived as essential components of urban development. The European Union sent out important signals to this effect with its European Sustainable Development Strategy in 2001.

Important milestones at national level in Germany were marked by the establishment of the Integrated Energy and Climate Programme of the German government of 2007 and the “energy turnaround” with the accelerated withdrawal from nuclear power.

The Federal State of Brandenburg has been committed to increasing energy efficiency since the formulation of its first Energy Concept as far back as 1996. In the context of Energy Strategy 2010 of 2002 and Energy Strategy 2020, which is currently being developed, the objectives and measures adopted and implemented in the context of global climate change have been continued and formulated in more ambitious terms.

The energy-related refurbishment of the building stock, increasing the proportion of renewable energy sources used not only in electricity production, but also in the generation of heating and hot water, the development and implementation of energy-related development concepts at neighbourhood level, the reduction in fuel consumption by vehicles and the development and use of alternative drive technologies, e. g. electro-mobility, are topics that affect urban development directly and are being pursued with commitment by

the Brandenburg Ministry for Infrastructure and Agriculture.

We need strong partners in this process. Many cities and municipalities acknowledge their responsibilities, initiate and support local activities and projects, instigate planning processes and adopt coordination tasks in the context of the implementation of such measures. They satisfy their model function with pilot and model projects, provide information, clarify and support or accelerate authorisation and participation processes.

The housing sector is also a reliable pillar of energy and climate policy. Large sections of the housing stock have already undergone energy upgrading and further measures to increase energy efficiency in buildings will follow.

The Federal State of Brandenburg is contributing to the necessary “energy turnaround” through the implementation of individual initiatives, the provision of funding and the improvement of other framework conditions.

The problems surrounding the scarcity of resources and climate change can ultimately only be solved at international level. The exchange of experience and solutions within the European Union and shared reflection on obstacles and success factors can make an important contribution to the development of a successful energy and climate strategy on a European scale. The UrbEnergy project relies on cooperation with its partners in the Baltic Sea region to achieve this and is focusing its attention on a highly relevant topic.



Jörg Vogelsänger

Minister for Infrastructure and Agriculture of  
the Federal State of Brandenburg

## Introduction

Over the past two decades, comprehensive measures to increase energy efficiency have been carried out on the building stock in the Federal State of Brandenburg. In view of the increasing significance of energy and climate policy and the growing awareness of the complexity of the action required in these areas, the focus of attention in urban development is increasingly extending beyond the level of individual buildings to the sustainable development of neighbourhoods, the use of renewable energy sources and implementation of intelligent distribution structures. The link between urban development and energy efficiency is becoming increasingly clear and the integration of these topics, which were previously considered from a sectoral perspective, is acknowledged as essential.

In the EU's eastern accession states, and particularly in the Baltic states, comparable projects have only been carried out on a considerably lower scale so far, and less than 10 % of the post-War housing stock there have been upgraded.

The main causes of the varying development of the cities and housing are due to the prevailing socio-economic conditions. The transformation in Brandenburg was boosted by the options available for state promotion and private investment opportunities in a comparatively wealthy country. In addition, it was possible to buffer the consequences of the transformation through the adoption of the laws and economic system of the Federal Republic of Germany, the transfer of information and experience bolstered by the shared linguistic area and the comprehensive social transfer. The early decisions made in relation to the structure of the housing sector were also highly significant. Whereas in Brandenburg, housing was taken over by municipal and private housing companies and comprehensive cooperative stocks were retained, the housing in the CEE states underwent a rapid process of individual privatisation.

Against the background of the varying conditions in the participating states, the Urb.Energy INTERREG project aims to promote the exchange of information and experience on energy efficiency in integrated urban and

district development, in particularly with Central and Eastern European (CEE) States.

The Federal State of Brandenburg has already been committed to the exchange of information and experience on the sustainable development of settlements built using industrialised construction systems with its eastern neighbours since the 1990s. Becoming involved in Urb.Energy as a project partner involved a conscious paradigm shift for the Federal State of Brandenburg as compared with previous cross-border cooperative projects. Whereas previous cooperative ventures were usually focused on individual pilot projects, the Urb.Energy project adopts such ventures and integrates them into general strategies for neighbourhoods or - in the case of smaller cities - the entire city.

This brochure summarises the main findings of Report II "Energy Efficiency in Integrated Urban Development - Perspectives". As a complement to Report I and Brochure I "Energy Efficiency in Integrated Urban Development - Interim Report", it presents, in particular, the insights gained in the Federal State of Brandenburg in this area and extrapolates concrete recommendations for action and strategy approaches for energy-efficient and climate-friendly urban development.

The recommendations for action are based on current experience gained in two project areas of the Ministry for Infrastructure and Agriculture (MIL) of the Federal State of Brandenburg, i.e. the National Urban Development Policy (NSP) and the ExWoSt pilot project on energetic urban renewal. Recommendations from the report "Energy in the City", which was commissioned by the MIL, are also evaluated.

Finally, those strategy and action recommendations are highlighted, which are of particular interest to the Urb.Energy project partners and which enable the identification of possible applications under other socio-economic conditions.

## Urb.Energy in the context of European energy policy

### European climate protection policy

European climate protection policy is integrated into the EU's sustainability strategy which was adopted in 2001. One of its seven central challenges is called "Climate Change and Clean Energy". The focus here is on the protection of the climate through the reduction of greenhouse gas emissions.

The European cities assume a key role in this process. High proportions of gross national product are generated in the cities which are also centres of knowledge and innovation. 80 % of EU citizens live in cities and around 75 % of European greenhouse gas emissions are produced there. With the Leipzig Charter on Sustainable European Cities, the ministers from the EU Member States with responsibility for urban development in 2007 supported the European strategy on sustainable development and highlighted the importance of sustainable integrated urban development policy in this context.

One of the main focuses of attention here is the buildings and transport sector, and the corresponding objectives include the acceleration of refurbishment measures, the energy-labelling of buildings and the promotion of environmentally-friendly urban mobility.

### Urb.Energy

The European cooperation project Urb.Energy aims to promote sustainable energy-related urban development strategies in residential areas in the Baltic Sea region. It combines the integrated urban development approach, as adopted in the Federal State of Brandenburg and other places in the past decade, with different aspects of municipal policy with a view to increasing energy efficiency and municipal activities in the area of climate protection.

Fifteen partners from Germany, Poland, Lithuania, Latvia, Estonia and Belarus have joined forces in the implementation of the Urb.Energy project. As key actors, they represent the relevant national activities for energy-efficient settlement structures. As part of



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three work packages (Integrated Urban Development, Energy-efficient Building Refurbishment and Financial Instruments), existing approaches in the individual countries and target areas are being analysed and transferable integrated urban development strategies are being presented.

The following cities are located in the target areas: **Rakvere (Estonia), Riga Jugla (Latvia), Jelgava (Latvia), Siauliai (Lithuania), Piaseczno (Poland) and Lida (Belarus).**



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The focus in the "Urban Development" work package is on the application of integrated urban development approaches with a view to increasing the energy efficiency of urban districts and neighbourhoods. Particular emphasis is placed on the action areas of **energy-efficient building refurbishment** and the **modernisation of energy supply infrastructure**, the **upgrading of the residential environment** and the **improvement of the social and economic infrastructure** as well as the **participation of property owners and residents**.

The Urb.Energy partners view as a challenge the replacement of a planning culture that was predominantly characterised by sectoral planning and centralistic traditions with **actor and network-oriented strategies**, which incorporate and strategically exploit local potential.



## Energy-policy conditions at state and federal state levels

### Energy-policy conditions at state level

Based on the 29 measures of the Meseberg Programme, the Federal German government passed the Integrated Energy and Climate Programme (IEKP) in 2007. This programme applies the European decisions on an integrated European climate and energy policy and the associated European objectives at national level and implements them through a concrete programme of measures. The stated aim of the programme is to:

- reduce greenhouse gas emissions by 40 % of 1990 levels,
- increase the share of electricity generation accounted for by renewables to at least 25-30 %,
- increase the share of heat generation accounted for by renewables to at least 14 %,
- increase the share of electricity production accounted for by the cogeneration of heat and power to 25 %

by 2020.

### Energy policy of the Federal State of Brandenburg

As far back as 1996, the Federal State of Brandenburg acknowledged the challenges of climate protection and energy with its “Energy Concept for the Federal State of Brandenburg”. The scope for action in the area of energy policy was further expanded by the adoption of “Energy Strategy 2010” in 2002 and “Securing the Future - Developing Brandenburg as an Energy State” in 2006.



The international and national energy and climate policy objectives are currently being further developed in “Energy Strategy 2020”, which was passed in 2008, and in the “Catalogue of Measures for Climate Protection and the Adaptation to the Consequences of Climate Change”. The focus here is on the provision of a secure and economically viable energy supply in the long term and the reduction of CO<sub>2</sub> emissions. Brandenburg is pursuing here the triple objective of security of supply, competitiveness and environmental and climate compatibility. The quantitative strategic aims of “Energy Strategy 2020” up to 2020 are:

- reduction of final energy consumption by 13 % (as compared with 2004, i.e. an average of 1 % per year);
- increase in the proportion of primary energy consumption accounted for by renewables to 20 % (in particular solar energy, biomass and wind power); and
- 40 % reduction in CO<sub>2</sub> emissions by 2020, as compared with 1990 levels, and a further 35 % by 2030 (to be achieved through greater energy efficiency, carbon capture and storage (CCS) with brown coal conversion).

For the implementation of the energy strategy, Brandenburg is banking, in particular, on communication with all actor groups, on the provision of information and consultation, the creation of incentives, on networking and the exchange of experience.

The Brandenburg Ministry for Infrastructure and Agriculture’s (MIL) policy is based on these guidelines and focuses, in particular, on how sustainable contributions to the implementation of the federal state’s energy strategy can be made in the context of urban development, the improvement of the energy quality of the building stock and the reduction of greenhouse gas emissions in transport.

A new section has been specifically created in the urban development department of the MIL which concentrates, in particular, on the energy orientation of urban development policy in addition to issues concerning architectural culture and construction technology.

## Integrated urban development and climate protection in Brandenburg

The political upheaval of 1989 resulted in fundamental social and economic changes in the Federal State of Brandenburg which continue to have an impact on urban development and housing to the present day. Neglected old inner-city housing stock had to be upgraded, the residential areas built using industrialised construction methods had to be adapted to the demands of a changing society and new buildings needed to be erected to meet the quantitative and qualitative accumulated demand.



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Whereas energy efficiency was initially more of a consequence of the measures necessary to curb energy costs, climate change and the associated challenges, in particular for the increasing of energy efficiency and also for the use of renewable energy sources, have increasingly shifted to the focus of an integrated regional development based on climate protection.

Due to the transition situation in Brandenburg's cities, up to the year 2000, urban and district development was initially largely sectoral and reactive in nature. The main focus of attention was on the development of "cities worth living in" through comprehensive modernisation and refurbishment of the building and infrastructure stock with a view to achieving equal living conditions throughout the Federal Republic of Germany as stipulated in the German Constitution.

Following the completion of the extensive refurbishment of the building stock and comprehensive construction of new housing, urban



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development planning from 2000 to 2005 was characterised by a response to demographic change. The significant reduction in the housing stock combined with the corresponding adaptation of the infrastructure necessitated a shift in strategy from the level of the building to the level of the neighbourhood. During this phase, the urban actors in the Federal State of Brandenburg developed an awareness of the scarcity of conventional energy resources, increasing energy costs, dependency on global developments and greater environmental responsibility.

Due to the growing complexity of the tasks involved, since 2005, urban development has increasingly been understood as an interdepartmental cross-sectional task. In the Federal State of Brandenburg, the instrument of Integrated Urban Development Concepts (IUDCs) became established as a basis for all sectoral planning, for larger projects and for the promotion of urban development using public funding.



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The Federal State of Brandenburg has since gained extensive experience in relation to the linking of urban development, energy and climate policy, in particular through the pilot projects carried out as part of the National Urban Development Policy, through the federal authority's model projects in the research area of energetic urban renewal, carried out under the auspices of the programme Experimental Housing and Urban Development (Ex-WoSt) and the report 'Energy in the city' published by Brandenburg.



## National Urban Development Policy

With the National Urban Development Policy (NSP), the Federal German government supports cities and regions through model projects which aim to strengthen and secure the economic competitiveness of German cities and regions.

In addition to civil society, the social city, economic development, architectural culture and regionalisation, climate protection and energy is one of the NSP's six urban development action fields. The Federal State of Brandenburg is involved with the project [Brandenburg Urban Network on Energy Efficiency and Climate Protection \(BraNEK\)](#) and the project [Spreevalddreieck Regional Energy Concept](#).



## ExWoSt research field of “Energetic Urban Renewal”

The Brandenburg cities of [Cottbus](#), [Finsterwalde](#), [Guben](#), [Lübbenau/Spreewald](#), [Luckenwalde](#), [Prenzlau](#), [Spremberg](#) and [Vetschau/Spreewald](#) are participants in the model project on energetic urban renewal.

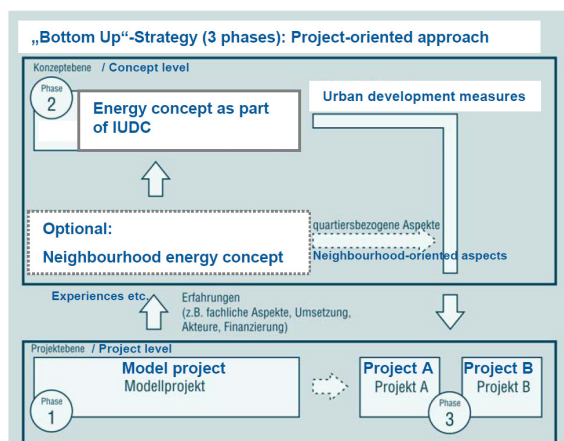
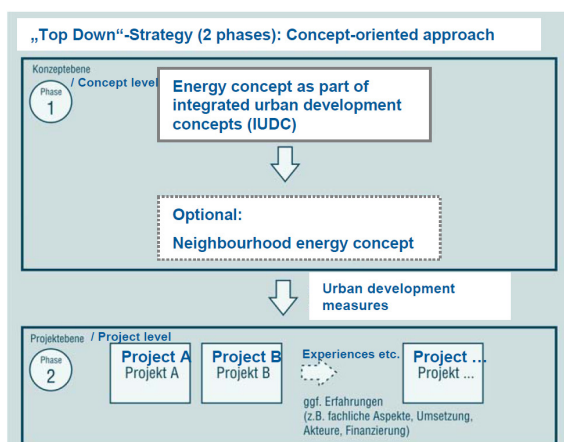
The aim of the ExWoSt research area of “Energetic Urban renewal” is to design the urban development processes and measures that are being implemented in the context of the Urban Redevelopment East programme more energy-efficiently and sustainably. Different concepts, paths and projects are being tested to this end.



Programme	Federal State/Region/ Municipality	Project	Spatial Reference	Method. Approach
NSP	Brandenburg (Brandenburg a. d. Havel, Cottbus, Eberswalde, Frankfurt (Oder), Jüterbog, Luckenwalde, Neuruppin)	Brandenburg Urban Network on Energy Efficiency and Climate Protection (BraNEK)	statewide/ inter-municipal	Top-Down
NSP	Region Spreevalddreieck (Calau, Lübbenau/S., Vetschau/S.)	Spreevalddreieck Regional Energy Concept	regional/ inter-municipal	Top-Down
ExWoSt	Cottbus	Energy-saving School	local	Bottom-Up
ExWoSt	Finsterwalde	School and Sport campus	local	Bottom-Up
ExWoSt	Guben	Integrated Energy Strategy 2020	local	Top-Down
ExWoSt	Lübbenau/Spreewald	Lübbenaubrücke/ Energy Masterplan	local	Top-Down/ Bottom-Up
ExWoSt	Luckenwalde	Energetic Neighbourhood Concept for the Nuthe/Burg Neighbourhood	local	Bottom-Up
ExWoSt	Prenzlau	Renovation of the Residential Buildings 25, 27 and 29 Schwedter Straße	local	Bottom-Up
ExWoSt	Spremberg	Gartenstraße Education and Leisure Center	local	Bottom-Up
ExWoSt	Vetschau/Spreewald	Community Centre with Energy!	local	Bottom-Up

## Methodical approaches in energetic urban development - Top-Down and Bottom-Up

The projects of the Federal State of Brandenburg used two approaches to develop concepts for energy-efficient development. The Spree-wald-Triangle Region and the city of Guben followed a Top-Down strategy which is a concept-oriented approach concentrating on the development of an energy concept as part of an IUDC framework concept in a first phase.



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At this level of municipal government, strategic plans may include neighbourhood energy concepts as well. In a second phase, urban development measures implement the ideas of the concept level through realising several projects. New experiences generated hereby in terms of ways of implementation, stakeholders or financing give usable help on the following projects.

A three-phase Bottom-Up strategy is used by the cities Luckenwalde and Finsterwalde. This project-oriented approach starts at the pro-



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ject level with individual projects of excellence that are carried out in the municipality. The experiences gained here, e.g. organisation and relations of stakeholders, exploiting experiences, technical solutions and the economy of projects, are used in the second phase at the concept level for the development of an energy concept as part of an IUDC. Here, as an intermediate step, neighbourhood energy concepts may be developed as well. In a third phase of implementation, urban development measures derived from the conceptual level and experiences of the project level as well contribute towards the realisation of different integrated and energy-efficient projects.

### “Energy in the city” report

The “Energy in the city” report was prepared in 2010 and examines current discussions on energy and climate policy and also identifies potential technical and legal challenges. The report uses this knowledge basis to produce recommendations for action to be taken to produce an urban development policy that is more focused on the energy and climate policy goals of the Federal State of Brandenburg and thus on the goals of the German Federal government and the EU. The report differentiates between recommendations at district level, which are further divided into homogeneous and heterogeneous structures, and overarching recommendations.

### Recommendations for homogeneous urban districts

Buildings located in homogeneous districts (large housing developments) in Brandenburg’s towns and cities have mostly already been refurbished and therefore have good levels of energy efficiency. Above all, there is potential to make savings within the heating networks and by implementing low-cost measures in buildings such as optimising heating systems.

**Recommendations for homogeneous districts**

- **Optimise district heating networks**  
A range of potential options for optimisation should be examined within the context of energetic district concepts. These include replacing fossil fuels with renewable sources of energy, increasing efficiency by using cogeneration systems and minimising heat loss by rehabilitating or reducing the distribution network.
- **Evaluate the efficiency of the heating network**  
The inefficiency of the existing system can be counteracted by expanding the network and connecting new areas to the system. If the existing supply system is no longer cost-efficient, a standalone system should also be considered.
- **Use renewable energy sources**  
Public utility companies and energy providers should consider switching from using fossil fuels to integrating decentralised solutions (e.g. solar thermal energy, biomass cogeneration units, photovoltaics, etc.) into the existing network.

**Recommendations for heterogeneous districts**

- **Establish a set of criteria for centralised or decentralised heating networks which can form the basis of district energy efficiency concepts**  
Decentralised systems are an advantage if heat requirements are expected to sink in the future (as a result of energy-efficient renovation and falling population figures), or if there are large distribution distances between Energy Clusters (EC).
- **Use “add-on measures” as a substitute for energy efficiency measures that cannot be implemented in listed/architecturally significant buildings**  
Energy efficiency can be achieved by using compensation measures such as switching to renewable sources of energy (e.g. solar thermal energy, photovoltaics, geothermal energy, etc.) or energy-efficient solutions (e.g. industrial waste heat, cogeneration plants, etc).
- **Form energy clusters at district level**  
By forming and classifying related urban clusters, it is possible to develop concrete recommendations for action without having to examine each house individually, which can be costly.

**Recommendations for heterogeneous urban districts**

In contrast to homogeneous urban districts, heterogeneous urban districts (areas with old buildings) are characterised by very diverse ownership structures and building energy profiles.

**Overarching recommendations for action**

In relation to overarching recommendations for action, the report highlights three thematic areas in which action is required state-wide. These are...

**Overarching recommendations for action**

- **Establish and update municipal energy concepts**
- **Develop district energy efficiency concepts**
- **Conclude climate protection agreements with the local housing association**
- **Distribute relevant information about energy efficiency and renewable energy sources**
- **Support pilot and demonstration projects relating to energy efficiency and renewable energy**
- **Introduce a quality management system (European Energy Award®)**
- **Implement low-cost measures within the building sector**
- **Focus on quality assurance within the construction industry**
- **Appoint municipal energy managers**

## Recommendations for action and lessons learned from activities and projects in the Federal State of Brandenburg

The main conclusion that can be drawn from an analysis of all the projects implemented within the framework of ExWoSt and the National Urban Development Policy is that it is essential to interlink all sectoral approaches and involve all stakeholders at an early stage and to maintain this link. This applies to activities at city, district and also building level, focusing in particular on districts.

With regard to the stakeholders and strategic direction, the main focus is on urban planning and municipal property, housing management and energy supply. A wide range of instruments is available to implement the strategies, from the analytical and conceptual level to multiple small-scale investment measures to advisory services.

In many cases, municipalities do not need to address new issues, but can draw on existing urban development approaches that have been brought to the fore as a result of the challenges posed by climate protection and energy efficiency.

### Urban and settlement structure

Some of the key aspects of energy-efficient urban structure include compact settlement structures with a focus on inner urban development, multi-use options, short distances and minimising the extent of coverage by impervious surfaces. In recent years, the majority of Brandenburg's towns and cities have produced Integrated Urban Development Concepts that prioritise the development of city centres. This guiding principle affects a number of urban development areas.

In relation to mobility, compact settlement structures involve short distances that prevent or reduce traffic and provide good conditions for the most environmentally-friendly forms of transport, i.e. walking and cycling.

As far as energy policy is concerned, compact cities facilitate the development of modern,

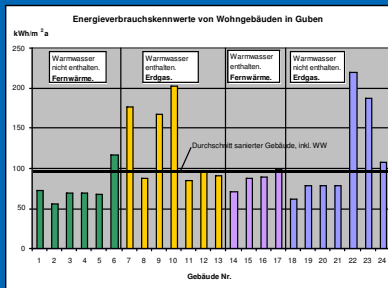
effective district and local heating systems that are highly efficient, cost-effective with regards to investment and consumption, and particularly environmentally friendly as far as emissions are concerned. Settlement structure also has an impact on energy efficiency at building level. Compact designs that are closer together require much less heat than structures that are spread out, e.g. separate detached houses.

When building new developments - preferably on fallow land in the city centre - municipalities can (within the context of urban land-use planning) stipulate the maximum energy and heat requirements, and insist on a compact design and the use of renewables. In this way, they can actively drive efforts to attain a high level of energy efficiency.

### Energy and climate protection concepts

Increasing numbers of towns and cities in Brandenburg are drafting energy and climate protection concepts, which build on the relevant Integrated Urban Development Concepts and provide a more in-depth technical contribution. They are normally applied to urban zones; however it can be useful to expand them to cover urban and suburban regions as well. The energy and climate protection concepts examine both existing and potential areas of action at local level and also break overarching energy policy and climate protection objectives down so that they can be realised on a small scale. The focus is on developing specific strategies that take the local situation into account. As many energy efficiency and climate-related decisions are made by stakeholders at local level, municipal concepts are particularly relevant for the implementation of European and national climate objectives.

Example:  
GUBEN - INTEGRATED ENERGY STRATEGY  
2020



© EBP

The town of Guben produced an integrated energy strategy in 2009 within the framework of the ExWoSt research on energy-efficient urban renewal.

Guben is in the east of the Federal State of Brandenburg and has lost roughly 40 % of its population since 1990. The town is actively tackling the challenges posed by the urban redevelopment process in relation to energy efficiency and the provision of public utilities and has drawn up solutions that focus on the town's future spatial and demographic development.

District heating consumption has declined by 75 % since 1990 and heat loss within the grids is high. Action needs to be taken urgently.

Within the framework of the energy strategy, the municipality examined and evaluated different approaches for restructuring energy provision. It was concluded that the development of local heating systems for various types of residential building would provide the greatest potential to make savings at the lowest cost. The local provider is currently examining different types of heating system and how to adapt the network to support them.

The aim is to integrate renewable energy sources into the supply system in order to increase energy efficiency and ensure that areas with prefabricated buildings remain an attractive location to live and work.

## District concepts

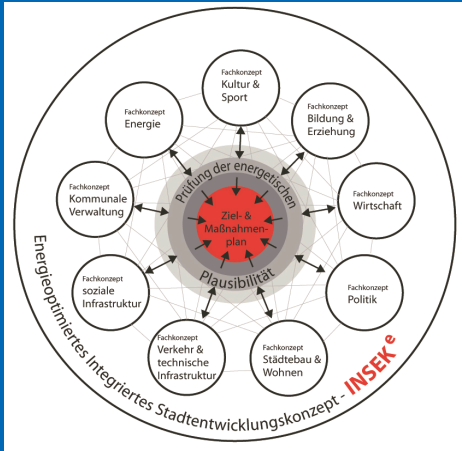
Energy and climate protection concepts are implemented mainly at district or neighbourhood level. Although these concepts define the city-wide goals and areas of action, the role of district energy efficiency concepts is to develop and coordinate step-by-step processes with local stakeholders that focus on buildings and measures. The municipalities are responsible for drawing up these concepts, and the main planning partners are the property owners (e.g. housing associations) and utility companies, particularly heating supply companies.

District concepts should also form the basis of implementation-oriented pilot and demonstration projects. Strategies must take account of the individual situation and they are strongly influenced by the structure of the given area. The report "Energy in the city" asserts that heterogeneous districts require a fundamentally different strategy to homogeneous districts. Wherever possible, the aim should be to form "energy clusters" among districts with similar characteristics in relation to utilities provision, socio-spatial organisation and urban development, especially in heterogeneous districts with old buildings.

The Brandenburg University of Technology (BTU) Cottbus developed an **energy plausibility check** to assess energy efficiency in districts and neighbourhoods. This procedure was used for the first time in 2011 within the context of the NSP project "Spreewald-dreieck Regional Energy Concept". It helps municipalities to identify areas where action is needed, to bring urban development and energy-efficiency objectives in line with each other and to provide solutions for energy-efficient urban renewal. Within the framework of urban development funding programmes in Brandenburg, energy plausibility checks will be a requirement for all measures at district level in the future.



## ENERGY PLAUSIBILITY CHECKS



The **plausibility check** is a two-stage process for verifying current and potential future energy supply systems for their energy-related plausibility. It shows the influence of settlement structure type, building density, settlement area size, building typology and building upgrade status on the energy balance of a neighbourhood or supply area.

The **general check** provides an overview of suitable energy supply systems in different settlement structures with different building types and upgrade statuses. It indicates the typical energy requirements of buildings in characteristic settlement structures and acts as a basis for the comparison of estimates for the energy consumption of settlement areas in individual neighbourhoods. The general check also indicates which energy supply system is worthwhile for which level of energy requirement in a particular

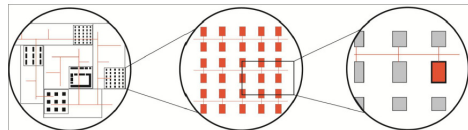
settlement type with the associated building types at different levels of upgrading.

The **detailed check** provides a basis for the concrete energy-related consideration of an area. It is a tool for the estimated calculation of the useful energy requirement of neighbourhoods/supply areas before and after appropriate refurbishment measures to the building stock. In addition, the energy efficiency of the supply systems can also be verified using the detailed check.

The basis of the plausibility check is the definition of “energy-relevant settlement types of local settlement structures” and a “German building typology”. The system underlying the energy plausibility check can be applied to other countries and situations; however, the settlement and building typologies must be adapted to the relevant structures and climatic conditions.

### Ablauf des Plausibilitätschecks

- Räumliche Betrachtungsebenen



**Stadt/ Quartier:** mit mehreren Siedlungsstrukturtypen (ST 1-8)

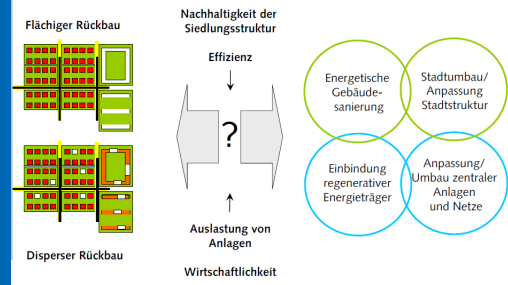
**Versorgungsgebiet:** mit einem oder mehreren unterschiedlichen STs

**Gebäudeebene:** Einzelobjekt innerhalb eines STs

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### Einbeziehung von Wechselwirkungen: Stadtumbau – Energetische Stadterneuerung

Stadtumbaustrategie und Handlungsfelder (Bereich Gebäude und Anlagen)



## Public buildings

There is considerable potential to increase efficiency and conserve energy in public buildings, partly as a result of the limited extent of renovation. The energy-efficient renewal of public buildings (e.g. municipal buildings) is exceptionally important for the implementation of energy and climate protection concepts. This is due to their role in setting a good example for citizens, busi-

nesses and other urban development stakeholders. Since municipal administrations are directly involved, opportunities for implementing measures are comparatively good, even if many cities and communities currently have too little revenue and high debts.

The measures recommended include introducing energy management procedures in order to identify and exploit any potential to make savings, implement energy-efficient renovations and use renewable energy sources.

Additional technical and structural measures can be applied to heating systems or - within the context of negotiated municipal agreements - setting down mandatory energy standards for measures relating to new buildings and renovations.

Example:  
**VETSCHAU/SPREEWALD - A COMMUNITY CENTRE WITH ENERGY!**



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As a result of demographic change, the secondary school in the old town area of the small town of Vetschau/Spreewald had to be closed. Since the listed building was worth preserving, the town administration developed a new concept for using the building on the basis of a feasibility study. It proposed bringing together various facilities that were housed in different locations across the town in order to provide a single facility that could be used by people of all ages.

The concept was implemented under the auspices of ExWoSt research into energy-efficient urban renewal. It was possible to fulfil the functional, heritage protection and energy-efficiency objectives in equal measure through the innovative solutions put forward as part of a competition to realise the project. As a result of installing a geothermal system with a water pump and a heat recovery ventilation system and also implementing several other measures, it was possible to achieve a very favourable primary energy requirement without affecting the building's structural qualities. The community centre is a good example of how energy efficiency and heritage protection can be brought together and how unused property can be adapted to strengthen the function of the old town.

Since public buildings play a role in setting a good example, they make particularly good test subjects for pilot and demonstration projects. At the same time, training measures and incentive systems should help to influence the behaviour of those using the buildings. Public marketing campaigns about the activities should raise awareness and pass on experiences and success stories.

### Private and institutional residential buildings

There is also considerable potential to conserve energy and increase efficiency in both private and institutional residential buildings. The municipal and cooperative housing associations in Brandenburg have already achieved a high level of renovation. However, given demographic changes and economic limitations in relation to the housing associations' current debt obligations and also given the tenants' restricted financial capacity, it is not sensible to carry out extensive energy-related renovations to the entire housing stock of these associations.

Based on the Integrated Urban Development Concepts and basic analysis of the existing state of a given building, several municipalities in Brandenburg and the housing associations agree amongst themselves where it is both useful and possible to carry out extensive renovation.

For the remaining properties, the stakeholders consider various options such as converting the heating system to run on renewable energy in the medium term, or using cogeneration systems and carrying out cyclical maintenance work, or implementing low-cost measures. These measures normally have a particularly favourable cost-benefit ratio and can be applied across the board in both renovated and unrenovated properties.

The outcomes of this coordination with institutional property owners and housing associations should be recorded in agreements on climate protection and energy-efficiency targets and regularly assessed and updated as part of the monitoring process.

### LOW-COST MEASURES

Within the context of the ALFA<sup>®</sup> project (Allianz für Anlageneffizienz - Alliance for investment efficiency), which was initiated by the Berlin-Brandenburg Association of Housing Companies (BBU), a concept was developed for achieving relevant energy-efficient use at a very low cost.

The bundle of measures focuses on buildings with central heating and involves - depending on actual requirements - altering the heating curve and other installation parameters, adjusting the connected load of the heating system to reflect actual requirements, carrying out hydraulic balancing, presetting the thermostat valve, installing highly efficient pumps, automatic circulation valves and a system for regulating the central heating that is easy to programme and uses remote monitoring as well as improving the insulation of valves and lines. A competent examination and analysis of the existing systems and implementing high quality measures are key requirements for success.

The cost of implementing these measures is within the region of EUR 5.00 - 7.00/m<sup>2</sup>. In the pilot project, heating energy consumption was reduced by 6 % - 20 %. In contrast, comprehensive energy efficiency renovation carried out at a cost of around EUR 700.00 - 1,000/m<sup>2</sup> reduced heating energy consumption by roughly 50 % - 70 %.

## Energy generation and supply

There is further potential to conserve energy and increase efficiency in the area of **energy generation and supply**. In Brandenburg, the consumption of heat energy - in comparison to the consumption of electricity - has decreased over the past 20 years. The reasons for this include increased energy prices, better options for regulating and managing heating systems, building renovation projects and declining population figures in some parts of the state.

This decrease in demand has a serious impact on the existing supply network, particularly in relation to district heating. The suppliers need to undertake the important task of assessing the efficiency of existing networks and reducing excess capacity, which has a

detrimental effect on environmental sustainability and economic viability. This involves reducing the capacity of the plants or integrating new supply areas. In this context, rethinking heating facilities and networks is the option that is easiest to implement and realistic.

They also need to decide whether district heating is still a sensible option given the lower levels of consumption and the reduced size of some of the supply areas or whether constructing local heating or standalone systems might be a more beneficial alternative. The adaption process provides a good opportunity to integrate **renewable sources of energy** into the network or to switch to using other sustainable, low-emission technologies for generating power (e.g. cogeneration).

Another way to support the use of renewables at local level is by producing a register of surface areas. For solar plants, this means systematically gathering and presenting information on suitable rooftops or less valuable land where solar farms could be installed without damaging food production. For larger installations, such as solar or wind farms, coordination at regional level is essential.

When expanding renewable energy, municipalities should find ways to involve as much of the population as possible in order to increase acceptance of the installations. This can include - in coordination with the relevant investors - investment companies such as community funds and public parks. Bio-energy villages also provide an opportunity to raise awareness of the issue of renewable energy and involve new stakeholders.

In order to set a good example, municipalities should focus on climate protection when choosing ways to provide electricity and heat for their own properties.



Example:  
**PRENZLAW - CONVERTING THE DISTRICT HEATING NETWORK TO USE RENEWABLE ENERGY SOURCES**



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Five different-sized residential areas in Prenzlau are supplied by district heating networks. Based on a city-centre district heating concept, which is financed by the EU's EFRE fund, the city has decided to further expand its role as a pioneer in the use of renewable energy sources.

The concept aims to provide more than 80 % of the city's future heating requirements through the use of renewable sources of energy, particularly biogas and gas from sewage plants. In order to ensure that the plants are able to function continuously, some of the heat produced during the summer months will be stored underground. In the winter months, when the amount of heat produced is insufficient, this stored heat can be used. This means that only a small amount of the peak load will need to be derived from natural gas.

This concept, which is already being implemented, has resulted in very low CO<sub>2</sub> emissions during district heat generation and a favourable primary energy factor.

The impacts of this concept can be seen in a number of projects, for example the energy-efficient renovation of 25/27/29 Schwedter Straße (an ExWoSt project). Since the buildings have been connected to the district heating system, the primary energy requirements following renovation are very low, even exemplary, in spite of the restrictions faced because the buildings are listed.

## Public relations and advisory services

Raising awareness and making information available are key areas of action for municipal

energy and climate protection policy. In order to foster participation, this involves, in addition to providing information on and encouraging involvement in planning and concepts, sharing details on concrete measures and explaining the effects that have been achieved.

The involvement of institutions such as schools and nurseries should be actively supported. The public, businesses and representatives of the housing market should systematically receive information about energy-efficient construction/renovation in order to motivate them to contribute to energy efficiency and climate protection.

## Organisation and financing

Brandenburg's cities and communities are the driving force behind efforts to increase energy efficiency and implement an integrated urban development concept. Their organisational and administrative structures are increasingly focusing on realising these tasks.

In some cases, **energy/climate protection managers**, or administrative teams, are appointed to carry out these responsibilities. This makes it possible to provide continuity through the process and to guarantee competency. In many cases, **external experts** are also needed, particularly for short-term projects, e.g. drafting planning concepts or implementing pilot projects. Larger cities in particular in Brandenburg are engaging in inter-municipal exchange of experiences and participating in networks that focus on energy issues.

Since climate protection costs money, securing **financial resources** is a key prerequisite for the success of municipal climate policy. The EU, the Federal Government of Germany and the Federal State of Brandenburg are increasingly focusing on energy issues in their funding programmes and as a result there are a range of opportunities to source funding for climate protection projects. Acquiring funding has now also become one of the main municipal tasks associated with energy and climate protection policy.



## Recommendations for action for project partners from Brandenburg's perspective

The Federal State of Brandenburg can look back on a wide range of experiences over the past two decades. On the one hand, these reflect the state's journey from reactive urban planning to sustainable, integrated urban development; and, on the other hand, they gradually take into account the challenges posed to towns and cities by climate change, especially the need to increase energy efficiency. Project partners can actively draw on the experiences gained from the numerous approaches developed based on the lessons learned in Brandenburg. In this way, they can take good practices on board and also avoid mistakes. However, this does not mean that they have to adopt models and recommendations exactly as they are. Given the differentiated conditions, it is clear that the aim is more to sound out strategic approaches together and then adapt them to local situations. The focus is on strengthening bottom-up approaches within the local context while at the same time emphasising the importance of competence-based top-down strategies, developing cooperative structures and drawing up step-by-step strategies. It should also be noted that the technological knowledge transfer process at building level is relatively problem-free and has been up and running for some time, while there are still major shortcomings in the process to share innovations concerning energy generation and smart grids.

### Lessons learned from good practice approaches that can help in the development of appropriate strategic approaches

Below are some suggestions based on the lessons learned in Brandenburg that offer partners ideas for their own projects:

#### 1. Instruments

- **Integrated concepts represent governance approaches**  
... and provide an opportunity to change planning culture, which makes it possible to establish a balance between bottom-up and top-down strategies
- **Network structures as a general model for action**  
... enable stakeholders with different interests to come together at a level of action that focuses on issues and tasks, creating a balance between the various groups
- **Round tables**  
... help to establish dialogue between the various stakeholders and those who are "affected" and make it possible to build trust and develop routines for solid discussions
- **Integrated energy/climate protection concepts**  
... are an essential component of integrated urban development and can provide inspiration to implement individual measures and small-scale energy/standalone solutions
- **District energy concepts**  
... enhance municipal urban development, energy and climate protection concepts and should be developed jointly with stakeholders from the housing and utility industries and focus in particular on implementation
- **Energy plausibility checks**  
... are a process to assess current and potential future energy supply systems and are intended to provide a basis for making strategic decisions within the context of energy-efficient urban development (cf. page 10)
- **Municipal energy management**  
... aims to reduce energy consumption in public buildings in particular
- **Quality management**  
... ensures that results are continuously evaluated and increases the prospect of being able to identify and, if necessary, adapt to any changes in good time



## 2. Measures at building level

- **Complex renovation measures**  
... implemented in order to achieve a standard of excellence are only worthwhile if long-term demand for the housing and the economic viability of the investment can be guaranteed
- **Agreements between municipalities and property owners**  
... help the parties to form a basic consensus on the energy-efficient renovation of buildings and districts and make it possible to initiate the implementation process more quickly
- **Differentiated methods of generating and distributing power**  
... have proved successful in facilitating technical and economic optimisation, increasing the acceptance of solutions and making it possible to take new innovations on board
- **Low-cost measures**  
... often lead to an effective increase in efficiency, have a favourable cost-benefit ratio and, for the most part, can also be implemented if economic and legal conditions are unstable (cf. page 12)
- **Using renewable sources of energy**  
... can help to considerably reduce greenhouse gas emissions, even in existing buildings and those where restrictions apply because the property is classed as architecturally significant

## 3. Organisation and training

- **Municipalities as initiators of energy efficiency**  
... have the appropriate resources and capacity to establish favourable conditions for the development and implementation of energy concepts
- **Pilot projects and knowledge transfer**  
... should be promoted at state, regional and municipal level in order to facilitate innovation and share experiences
- **Information and training**  
... are success factors, particularly within administrations, and can be supported by establishing networks as learning forums or encouraging temporary staff exchange programmes

## 4. Financing

- **Revolving funds**  
... are a cost-effective and reliable way to fund measures, even if the development of the public spending is unstable
- **Means-tested grants**  
... are an essential funding component for the foreseeable future given the financial situation in and demographic composition of Brandenburg and Urb.Energy's target regions
- **A combination of financing instruments**  
... consisting of revolving funds and grants is, in many cases, a suitable way to develop the capacity of stakeholders to take action

### Recommendations on measures that should be implemented in the short term

Given current social and economic conditions, it is not possible to implement solutions that seek to attain a standard of excellence, although this is desirable, on a large scale, either in the Federal State of Brandenburg or in Central and Eastern Europe. Step-by-step approaches, on the other hand, which form an integrated part of a comprehensive strategy, enable actors to achieve large savings in relation to energy consumption, reduce harmful emissions and sustainably increase the quality of districts and housing at little cost.

Some of the recommended approaches that have been used in Brandenburg are district concepts developed jointly with local stakeholders, energy plausibility checks and low-cost measures for buildings. These instruments and measures are cost-effective and could also be used in Central and Eastern European countries, taking into consideration the limited financial resources available and local legal conditions (particularly the individual privatisation of property). Funding programmes (if possible a combination of grants and revolving funds) are essential to help overcome difficulties and opposition.

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#### Ministry for Infrastructure und Agriculture of the Federal State of Brandenburg (MIL)

Department 22: Construction, Energy,  
Building Culture and Urban Culture  
Peter Busch

Henning-von-Tresckow-Straße 2-8  
14467 Potsdam

Germany

Telephone: +(49) 331 - 866 8200

Fax: +(49) 331866 8368

E-mail: Peter.Busch@mil.brandenburg.de

<http://www.mil.brandenburg.de>

### Authors:

ARGE Urb.Energy consisting of the following  
companies:

#### Ernst Basler + Partner GmbH

Tuchmacherstraße 47

14482 Potsdam, Germany

Telephone: +(49) 331 - 74 75 90

E-mail: info@ebp.de

Stephan Kathke, Kathrin Senner,  
Tobias Schmeja

#### B.B.S.M. Brandenburgische Beratungsgesellschaft für Stadterneuerung und Modernisierung mbH

Behlertstraße 3a Haus B

14467 Potsdam, Germany

Telephone: +(49) 331 - 28 99 70

E-mail: UrbEnergy@bbsm-brandenburg.de

Wolfgang Wüntsche, Rainer Blank,  
Alexandra Valentin

#### UrbanPlus, Droste&Partner

Geusenstrasse 2

10317 Berlin, Germany

Telephone: +(49) 30 3221154

E-mail: Droste@urban-plus.eu

Christiane Droste, Thomas Knorr-Siedow

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