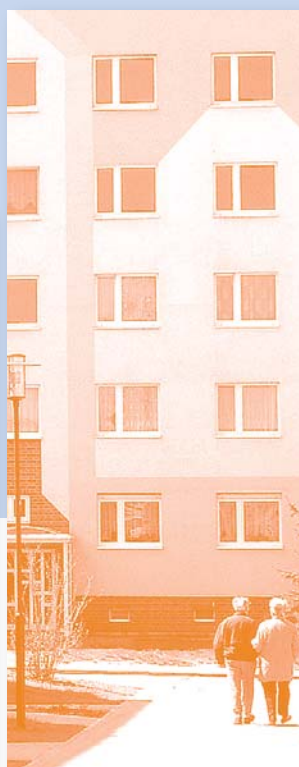


Sustainable Neighbourhoods

Approaches to Improve the Energy Efficiency of Residential Areas

Interim Brochure of the INTERREG IV B Project Urb.Energy



Part-financed by the European Union (European Regional Development Fund and European Neighbourhood and Partnership Instrument).

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1. Introduction

By taking a closer look at urban space with the majority of people living in urban areas with high energy consumption, it becomes clear that two main aspects 'energy' and 'urban settlements' can not be considered independently. Households in particular need more than one fourth of the final energy consumption. Hereby heating takes e.g. in Germany up to 70% of households energy consumption. Energy efficiency measures in the context of energetic refurbishment offer possibilities to reduce heat energy consumption e.g. by insulation of roofs and walls. Developed in the last years, new urban renewal concepts use an integrated approach and work on an upgrading based on a neighbourhood level. Integrated concepts consider all aspects of urban development and urban renewal and aim for increased quality of residential neighbourhood, increased energy efficiency and decreased energy consumption. Thus, in integrated urban development concepts energy efficient refurbishment of individual buildings is widened to energy efficiency in an urban context. By pooling the tasks and goals in a concept, the action taken is coordinated and control is simplified.

The development of integrated concepts for six sample neighbourhoods is one of the main aims of the Urb.Energy project. The gained experiences es-

pecially regarding integrated approaches and energy efficiency will be presented within the project and in the produced materials in order to promote more energy efficiency in the Baltic Sea Region. Even though the different neighbourhoods have certain concordances – the majority of them are residential areas and predominately characterized by the typical multi-apartment buildings of the soviet time – each area has to deal with the specific situation on the spot and to develop its own approaches for the general target of the project: A more efficient use of energy and an enhancement of the overall living quality in the neighbourhoods.

On the following pages this brochure provides you with general information about the Urb.Energy project. Insights of the EU energy policies reflect the project work in a European perspective. Shown experiences in Brandenburg, Germany illustrate different approaches to deal with integrated urban development and energy efficiency. A description of the Urb.Energy target areas and their specific challenges, potentials and perspectives for an integrated upgrading follows. Finally the conclusions summarize interim results and findings and give first recommendations for overcoming existing barriers.

2. The Project Urb.Energy

2.1 Background

Due to climate change and limited energy resources, improved energy efficiency in buildings, increased use of renewables and energy saving settlement structures gain importance.

The European housing stock is one major contributor to energy waste and CO₂ emissions. At the same time the refurbishment rate especially in the new EU member states is extremely low and mainly concentrates on particular urgent “standard measures”. However, the quality of life and the contentedness of the residents do not only depend on technical standards but are more and more influenced by the quality, design and the usability of the spaces outside of one’s home. The attractiveness and future-orientation of the entire urban quarter is becoming a crucial aspect that needs to be considered. Hence, energy efficient rehabilitation measures on the housing stock should be combined with the renewal and further development of the energy supply infrastructure (making increasing use of renewable energy sources) and the improvement of the quality of the residential environment of the whole urban quarters. The actions to be implemented must be embedded in integrated urban development concepts which are to be developed by involving residents and the relevant stakeholders in a continuous participation process.

2.2 Project Idea

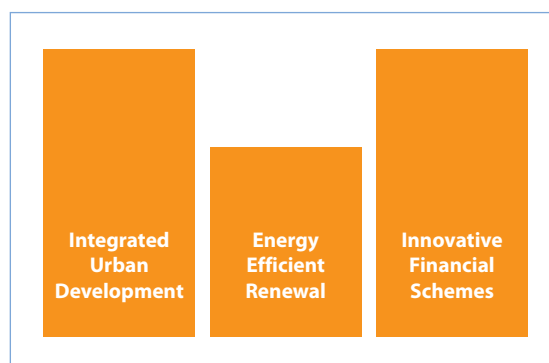
Urb.Energy focuses on the elaboration and partly implementation of transferable integrated urban concepts and strategies for the sustainable and fu-

ture-oriented energy rehabilitation of residential areas in the Baltic Sea Region (BSR).

By this, Urb.Energy not only responds to Territorial Agenda of the EU and the Leipzig Charter for Sustainable European Cities emphasising sustainable urban development strategies as a prerequisite for attractive and competitive European cities as well as to current energy and climate EU policies but also to the fact, that from 2007 on, EU structural funds can be used to finance measures in housing within integrated urban development concepts.

2.3 Objectives

Urb.Energy builds upon the results of the BSR Interreg III B project BEEN – strategies to promote the energy efficient refurbishment of the prefabricated housing stock – and combines the approach of integrated urban development with the increase of energy efficiency of the building stock, the modernisation of the energy supply infrastructure, the revaluation of the residential environment and the identification of innovative financing instruments.



Objectives of the project Urb.Energy

2.4 Thematic Issues

Urb.Energy works on three complementary and interlinked overall thematic issues:

- **Integrated Urban Development – Improvement of Residential Quarters**

Strategic focus: Enhance the application of integrated development approaches for urban renewal as important conceptual basis to increase the energy performance of urban quarters. Integrated urban development approaches realise

- a) important synergies between the fields of action energy efficient refurbishment of buildings and modernisation of energy supply infrastructure;
- b) revaluation of residential environment and improvement of the social and economic infrastructure and
- c) motivating owners and residents to realise investments.



Residential environment improvement in Guben, Germany

- **Energy Efficient Rehabilitation – Improvement of Buildings and Energy Supply Infrastructure**

Strategic focus: Conception and partly realisation of energy efficient refurbishment (EER) for buildings including the renewal of the supply infrastructure in the urban target areas. The conceptions, measures to be implemented consist of an optimised complex package of re-

furbishment measures, new conceptions for district heat supply (incl. renewable energy sources) and include the participation, involvement of the concerned stakeholders (energy providers, municipality, owners, housing companies etc.).



Residential energy efficiency measures in Šiauliai, Lithuania

- **Setting up Financial Instruments – Improved Affordability of Investments**

Strategic focus: Improvement of the mechanism for providing financial means for integrated urban rehabilitation measures. Based on the analysis of the existing funding possibilities, appropriate funding instruments will be developed that lead to an improved affordability of investments in EER of residential buildings and integrated urban development measures. Special attention will be paid to EU structural funds and revolving funds.



Financial Instruments for urban renewal and energy efficiency

Source: chocolat01/PIXELIO

2.5 Financial Support

Urb.Energy is funded by the Baltic Sea Region (BSR) Programme 2007–2013 and national co-financing from the project partners. The BSR Programme 2007–2013 is an EU Structural Funds programme for transnational cooperation under the European Territorial Co-operation objective. The programme aims to make the Baltic Sea Region an attractive place to invest, work and live in. The BSR Programme is divided into four priorities. Urb.Energy is allocated to priority 4, which aims at the “Promotion of Attractive and Competitive Cities and Regions”.



Source: Lilo Kapp/PIXELIO

3. The Energy Efficient Modernization of the Housing Stock in the Context of the European Energy Policies

The European Union has to find answers for their crucial challenges in the field of energy: Safety of energy supply, stable energy prices and climate change.

Therefore the European Council adopted the European Energy and Climate objectives 'EU 20-20-20' in 2007:

- reducing CO₂ gas emissions by 20%,
- reaching a share of 20% of renewable energy and
- to increase energy efficiency by 20% until the year 2020.

This presents a core aim within the new Post Lisbon Strategy Europe 2020 which builds the framework for European policies until 2020.

The building stock accounts for around 40 % of the EU's total final energy use, of which two thirds are consumed in the residential sector. Therefore, buildings offer the largest single potential for energy efficiency.

The EU has responded to this fact with various regulations and initiatives where building infra-

structures, urban and regional structures play an important role, not only within the European energy policy but also within research and regional policy. Inter alia to mention are here the recasted Energy Performance of Buildings Directive (EPBD), the strategy 'Energy 2020' and the 'Energy Efficiency Plan 2011'.



3.1 Tackling European Energy Challenges on a Local Level

Beside the European strategies and regulations also questions on financing and exchange of experiences and knowledge are of major importance. The most important initiatives and instruments are

- JESSICA (e.g. revolving integrated urban development funds, co-financed by the European Regional Development Fund),



- CONCERTO (energy efficiency and use of renewable energies within the built urban context, co-financed by the framework program),



- the Covenant of Mayors (development of strategic energy action plans in cities)



- ELENA (European Local Energy Assistance, co-funded by the Intelligent Energy Europe Program within the Competitiveness and Innovation Program),
- Smart Cities and Communities Initiative (for more sustainable and efficient cities rely on the organisational framework of the EU's Strategic Energy Technology (SET)-Plan within the 7th framework research program).

Against the background of the economic crisis since 2009 in all member states the European Regional Development Fund (ERDF) can be used for energy efficiency and renewable energy investments in housing with an available amount of up to 4% of the total ERDF allocation.

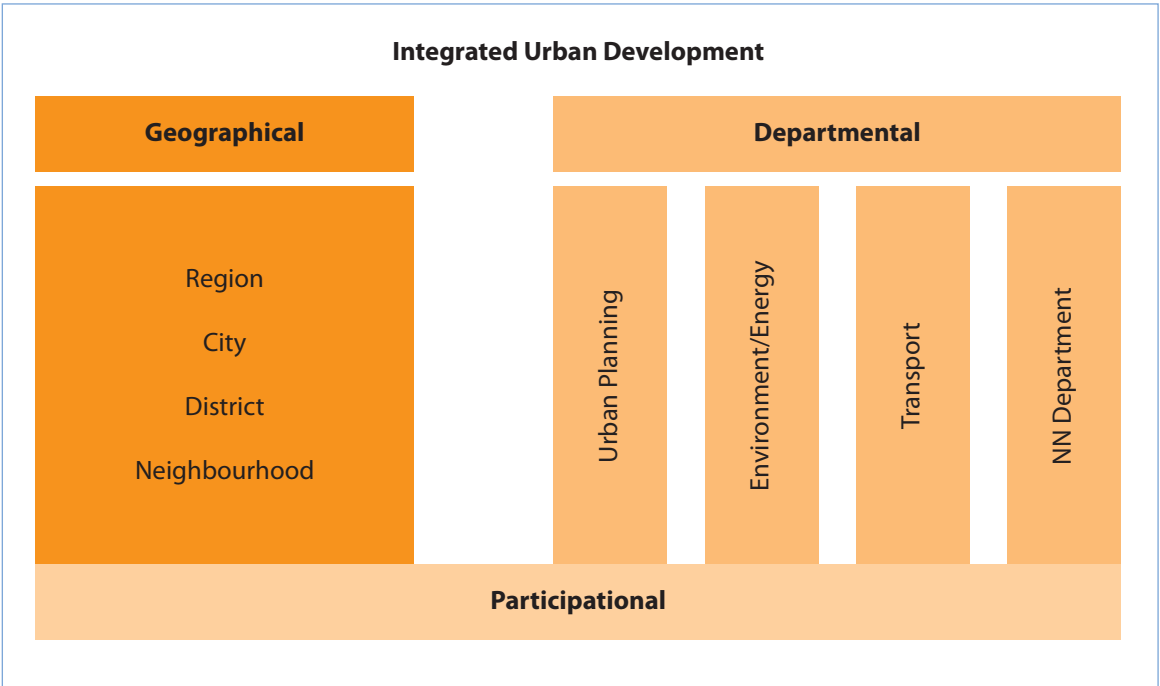
To reach the European Energy and Climate objectives further efforts regarding efficient use of energy supply systems and energy efficient refurbishment of the existing housing stock are necessary especially in the new Member States. To implement the European objectives different fields of activity have to be taken into account: building infrastructures, urban and regional structures. Thereby it is important not only to develop smart technologies and to implement single actions such as the renovation of single house components but to bring together these components within an integrated territorial approach that brings together different stakeholders such as architects, urban and regional planners, housing companies, energy suppliers and political responsible persons on local and regional level.

In the Leipzig Charta on sustainable European Cities the member states' ministers responsible for urban development declared 2007 that energy efficiency of buildings must be improved, both existing but also new buildings. The renovation of housing stock can have an important impact on energy efficiency and the improvement of resident's quality of life. To realize energy savings – and to introduce more renewable resources – the local level is one of the most crucial fields of activity.

4. Integrated Urban Development Approaches with Focus on Energy in the Land Brandenburg

The Land Brandenburg, represented by the Ministry of Infrastructure and Agriculture (MIL) as a project partner in Urb.Energy, can draw upon extensive experience on the way to an integrated urban development. In the 20 years after the fall of 1989, all towns went through comprehensive transformation and development processes. Since then

city development strategies and instruments have experienced a continuous development, which can serve as inspiration, particularly for midsize and smaller cities in Eastern Europe. Experience in implementing integrated approaches and in energy appreciation of neighbourhoods are processed and incorporated into the Urb.Energy project.



Three dimensions of integrated urban development

Source: based on EBP

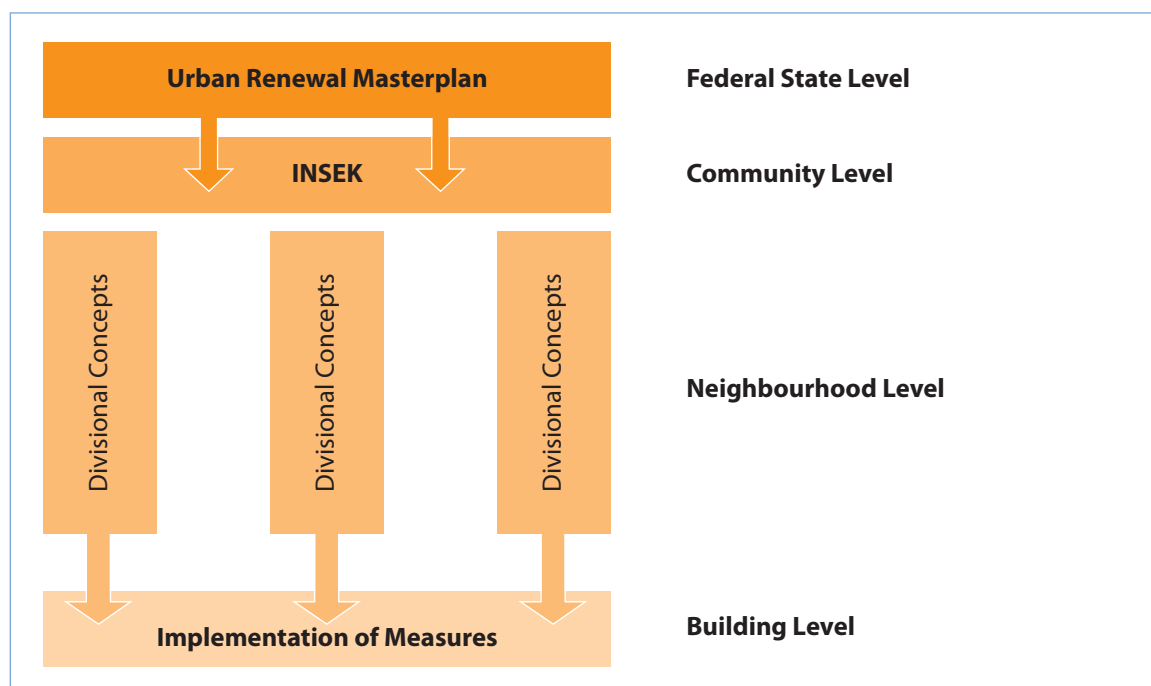
4.1 Overall Strategy

The Land Brandenburg with its 2.5 Mio inhabitants is situated in the east of Germany and covers a region of about 30.000 km². The federal state faces three main challenges as there are the continuing economic fragility, the restricted financial room for manoeuvre in the communities (and the federal state) and the consequences of the demographic change. In result a high complexity of task occurred with an enormous amount of parallel strategies and many complex funding schemes which led to the development of a new urban development strategy for the Land Brandenburg. This combines the spatial, departmental and participatory dimensions using a holistic integrated approach.

The Urban Renewal Masterplan of the Land of Brandenburg is a main aspect of the strategy which includes a funding policy for urban development and housing on the basis of Integrated Urban Development Concepts (IUDCs), also called INSEK. An IUDC bundles all relevant strategies of urban development of a city or community as a communal

“framework strategy”. It provides the basis for financial and organisational support for cities in line with their circumstances. The single processes of the IUDCs are implemented in individual sub-city divisions. Therefore several integrated divisional concepts either on a structural/ geographical or on a functional basis are part or developed from the IUDC for parts of a city. They are derived on the basis of comprehensive analysis of existing conditions and they serve to intensify action and project planning at a smaller geographical level.

To obtain a broad spectrum of commitment and participation among the people on relevant issues and future urban development matters the Federal State is using a top-down as well as a bottom-up-participatory approach with guidelines and statements of objectives from the politicians and administration and also ideas, proposals and projects from the citizens. Additional an urban renewal monitoring system is used to analyse the urban renewal process on a city-wide, divisional and event building level to monitor and manage a predictive and preventive urban development policy.



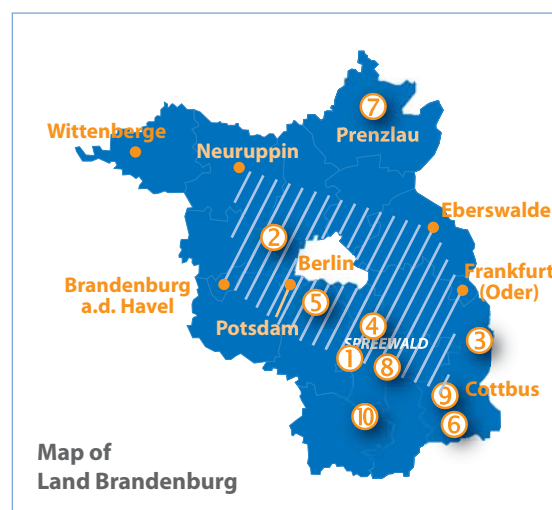
Implementation of integrated urban development in the Land Brandenburg

Source: based on EBP

4.2 Land Brandenburg Example Cities

For the Urb.Energy project ten examples of Brandenburg were selected to show how to assist and how to foster the new development strategy. All of them – as a prerequisite for the project – concentrate on issues of energy efficiency and the use of renewable energy in an urban context and use new methodical approaches to energy efficient urban renewal. A large variety of thematic issues is shown as there are projects working on the rehabilitation of valuable old houses like in the city of Prenzlau or on the modernisation of social infrastructure for individual needs like in the city of Spremberg. On the neighbourhood level works the creation of a school campus in the city of Finsterwalde or the model refurbishment as part of the district energy concept in Luckenwalde. A city-wide strategy is followed by the development of an integrated energetic concept

in the city of Lübbenau/Spreewald. Moreover the network BraNEK connects similar departments of different cities by fostering the exchange of energy related knowledge and experience and therefore acts on a national and regional level.



No.	Region/Municipality	Project	Spatial Reference	Method. Approach
①	Region Spreewald-Triangle	Regional energy concept	National/ Regional	Top-Down
②	Land Brandenburg (Neuruppin, Eberswalde, Frankfurt (Oder), Cottbus, Luckenwalde, Jüterbog, Brandenburg a. d. Havel)	BraNEK – Network for energy efficiency and climate change prevention	National/ Regional	Top-Down
③	Guben	Integrated energy strategy	City	Top-Down
④	Lübbenau/Spreewald	Lübbenaubücke – Municipal energy concept	City/ Neighbourhood	Top-Down/ Bottom-Up
⑤	Luckenwalde	Model refurbishment as part of district energy concept	Neighbour- hood/Building	Bottom-Up
⑥	Spremberg	Energy efficient renovation of an educational and leisure centre	Complex of buildings	Bottom-Up
⑦	Prenzlau	Energy efficient renovation of heritage protected housing	Complex of buildings	Bottom-Up
⑧	Vetschau/Spreewald	Energy efficient renovation and conversion of heritage protected school building	Building	Bottom-Up
⑨	Cottbus	High energy efficient renovation of school building	Building	Bottom-Up
⑩	Finsterwalde	High energy efficient renovation of sports building	Building	Bottom-Up

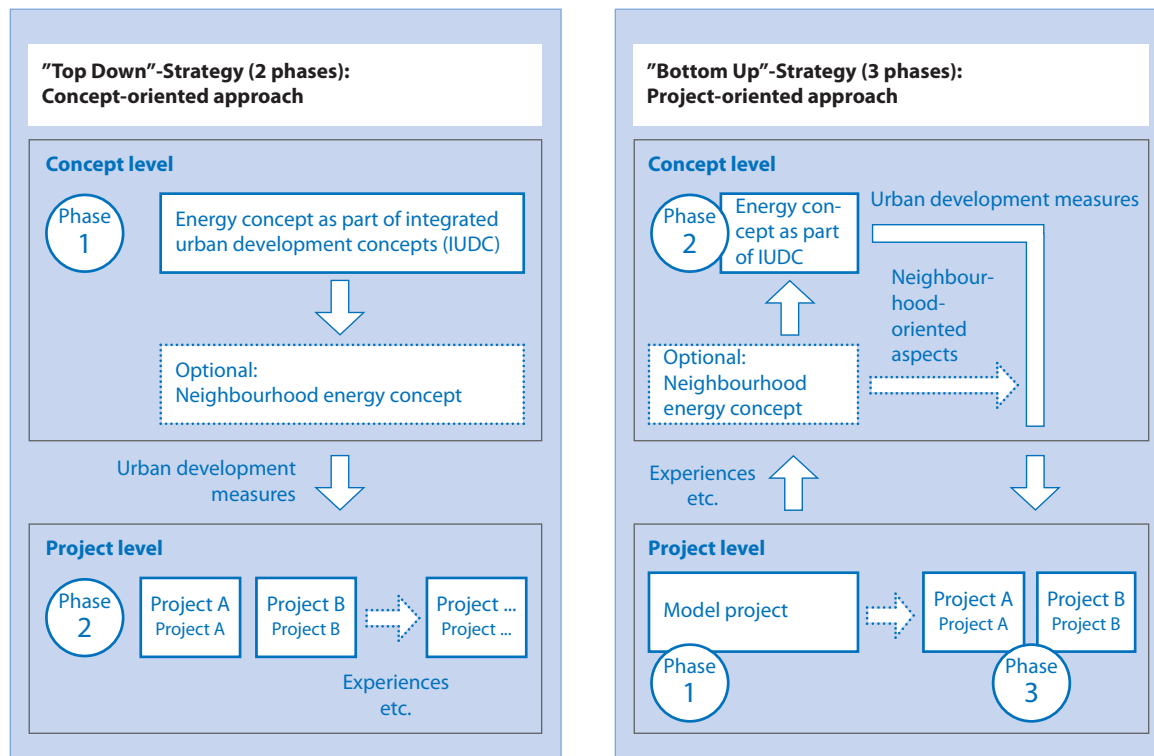
Examples of energy efficient refurbishment in the Land of Brandenburg

4.3 Methodological Approaches to Energy Efficient Urban Renewal

The projects of the Land Brandenburg used two approaches to develop concepts for energy efficient development. The Region Spreewald-Triangle or 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 as framework concept in a first phase. On 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 realizing several projects. Hereby generated new experiences in terms of ways of implementation, stakeholders or financing give usable help on following projects.

A three-phase Bottom-Up-Strategy is used by the cities Luckenwalde and Finsterwalde. This project-oriented approach starts on the project 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 or the economy of projects, are used in the second phase on 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 for implementation urban development measures derived from the conceptual level and experiences of the project level as well are working on the realization of different integrated and energy efficient projects.

In all example cities the energy efficient concepts are an instrumental step for identifying and evaluating the potential and possible threats that are occurring on the urban and neighbourhood level with respect to minimising the use of primary energy and implementing alternative energy sources.

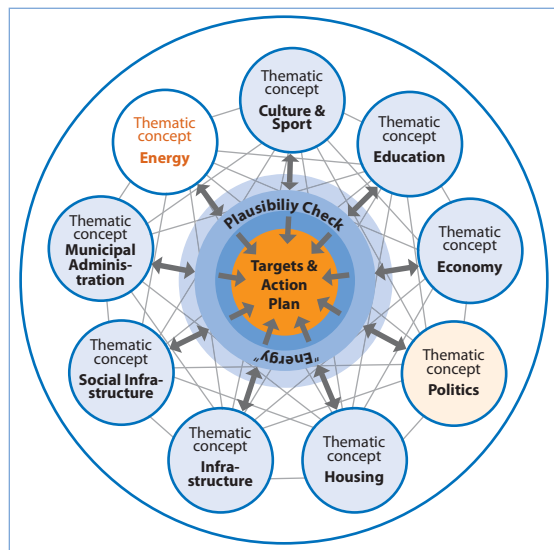


"Top Down" and "Bottom Up" approaches for integrated urban development

Source: based on BMVBS/BTU Cottbus

4.4 Plausibility-Check Energy

Within the development process of IUDCs it became clear that there was a need for a special instrument, assessing the work ability of measures towards energy efficiency. Thus the instrument “Plausibility-Check Energy” was designed for an energetic optimised IUDC. The check provides knowledge on the expected energy demand in typical settlement structures with their typical building typologies. An optional fine check evaluates the energy demand and efficiency in detail. Thus an evaluation of whether measures are physically and economically making sense in relation the costs implied is allowed. The “Plausibility-Check Energy” works well on neighbourhood level and can be aggregated towards higher urban levels because a high amount of precision and judgement of the feasibility of measures is allowed.



Interplay of the plausibility check Energy

Source: based on BTU Cottbus

4.5 Further Experiences

Other experiences of the Land Brandenburg projects concern social aspects, funding and supply systems. The sustainable implementation of energy efficiency in urban development is a social process as well for which the project Lübbenaubücke in Lübbenau/Spreewald represents example experiences. The implementation in long term policy as well as the acceptance among all stakeholders including administration, companies and inhabitants is a precondition for success and therefore for more energy efficiency.

The example of the refurbishment of the community centre in Vetschau/Spreewald shows that the combination of funding with minimum energy-saving requirements raises the proportion of energy related measures in projects. Furthermore the project of the city Prenzlau illustrated the need of combinations of funding options for high energy efficiency refurbishment where a combination of granting and minimum energy-saving requirements was used to increase the energy efficiency standard.

Beyond the energy efficiency at building level, the creation of efficient energy supply systems gives potentials for more energy efficiency. In the future more emphasis is needed for an integrated development regarding issues of energy generation, energy distribution and energy consumption at various geographic levels.

Experiences in incorporation of individual initiatives into general strategies for city-wide and regional considerations by interlinking aspects are made in the regional energy concept of the Spreewald-Triangle. Advantages result in economically sound, ecologically justifiable and socially compatible strategies.

5. The Target Areas of Urb.Energy

For six target areas in Piaseczno (Poland), Siauliai (Lithuania), Jelgava and Riga-Jugla (Latvia), Rakvere (Estonia) and Lida (Belarus) are Urban Development Concepts (IUDC) elaborated within the project Urb.Energy. While the target areas consist mainly of soviet prefabricated buildings, the size of neighbourhood differs and brings in very different working levels, concepts and approaches. The target area in Rakvere is based on one street concerning around 800 inhabitants. Other target areas in Piaseczno, Siauliai, Jelgava and Riga-Jugla are medium-sized neighbourhoods with 10.000 to 27.000 inhabitants. Finally the target area in Lida consists of around 98.000 inhabitants.

SWOT-Analyses for each target area are starting points in Urb.Energy. They show the different characteristics and point out weaknesses and potentials regarding building and energy structure, inhabitant structure or energy efficiency. Based on these findings specific and coordinated approaches are developed within the IUDC for every neighbourhood.

The preparation of German experiences with energy efficient refurbishment (EER) in IUDCs gives a central input to the project partners. Therefore two different neighbourhoods show their progress and results that had undergone energy efficient refurbishment based in IUDC in recent years. Both of them are situated in Berlin. Similar to most of the target areas the neighbourhood "Frankfurter Allee Süd" consists of typical industrial prefabricated housing estates. The second area "Kaskelkiez" is a typical old building neighbourhood with smaller buildings and diverse building structures. The de-

velopment of both quarters regarding urban development and energy efficiency consists of important knowledge which enables target areas to develop IUDCs including EER.



Urb.Energy participating project partners

Target Area Piaseczno

Poland

General information:

Piaseczno is with about 67,000 inhabitants a middle-sized municipality, located in the centre of Poland and in the direct neighbourhood of the southern part of Warsaw. It is the seat of the county authorities.

Current situation in the Target Area:

Due to the vicinity to Warsaw the neighbourhood is a typical sub-urban residential area characterized by middle sized apartment buildings and a high number of open green spaces between the buildings. A significant share of the residents used to work in a nearby factory but due to the reduction of labour force a relatively high number of inhabitants was laid-off. This cause to some extends social tensions. Despite the fact that the Target Area is located in a rapidly developing district of Piaseczno, the development pressure on the neighbourhood itself is rather low and therefore the emphasis on future activities lays on the stabilization and enhancement of residential environment.

Apart of four re-furbished building, the energy performance of the existing building stock is rather poor with an urgent need for improvement. The entire Neighbourhood is connected to a central heating system that sup-



Location of the target area

Key figures:

Size	8.26 ha
Number of inhabitants	2,079
Number of buildings	26 apartment buildings
Period of construction	1961–1974
Owner structure	30% housing cooperative 70% individual owners
Current annual energy consumption of multi-apartment buildings *	229.7 kWh/m ²

* Average annual final energy demand of a typical not modernized building (Space heating + hot water preparation)

plies the area with heating energy. However, the warm water supply is organized by apartment-related individual boilers and the project targets on the development of new integrated solutions regarding a combined heat, warm water and energy production.

Major challenges regarding the urban structure of the neighbourhood is the improvement of the quality of the open spaces in terms of social use and security. Due to the strong rise of the private car ownership, in comparison to the construction period, there is a need to develop appropriate solutions for the internal traffic and parking solutions. The residents are showing their strong commitment to take over responsibility for the green areas in between the buildings by self-organized gardening activities.

The municipal administration considers the development of the integrated development concepts within the frame of the project as driving force to engage both, local owners and the municipality to initiate working, communication and decision patterns for the overall de-

velopment and in particular for the enhancement of the energy efficiency of the neighbourhood.

Perspectives:

On behalf of the city of Piaseczno the Polish National Conservation Agency (NAPE) develops an integrated concept for the energy efficient upgrading of the neighbourhood.

Parallel to the energy related topics, the concept takes in account as well the aspects for a general improvement of the residential environment in the neighbourhood and will come up with a prioritized package of measures for a general accompanying upgrading of the area. The concept becomes, after the approval by the city council, a local bylaw.

Based on the integrated concept the city implements the prioritized package of measures for the public space. To enable the self-organized enhancement of the buildings in the neighbourhood, the concept includes as well detailed proposals for the technical upgrading of the 26 buildings in the quarter as well as financial supporting resources for the owner associations and housing cooperative respectively. In the frame of the project work all buildings are the subject to an energy audit in order to provide to the owner a solid basis for tailor-made further refurbishment activities in respect to the special conditions in the neighbourhood.

The focus of the enhancement of energy efficiency is on one hand the modernization of the building shells and on the other hand the development of more adequate solutions for the up to now apartment-related warm water supply. Due to the specific conditions of the district heating system (seasonal heat production only and difficult property rights) the emphasis of the possible solution approaches lies on decentralized building-related co-generation devices.

Based on a survey among the residents of the neighbourhood the focus of the upgrading activities of the residential environment is on the improvement the amenity value in front of the local supermarket and the enhancement of the green areas in between the buildings.



Target Area Rakvere – Seminari Street

Estonia

General information:

The city of Rakvere is situated in north Estonia and the administrative, economical and cultural centre of the Lääne-Viru County. According to the Estonian settlement system Rakvere is considered as one of the so called old county centres and with about 17,000 inhabitants the 7th largest City in Estonia. The city has joined the Covenant of Mayors as first city in Estonia and wants to become the leading city in energy saving in Estonia.

Current situation in the Target Area:

Seminari Street was founded in 1920ies as a part of a general extension of the historic city. Today the street is bordered by houses originating from different times as well as different architectural styles and sizes. One can see wooden and stone houses from prewar era as well as typical apartment houses from Soviet time. Single-storied houses are rowed up with five-storied panel colossuses.

The multi-apartment buildings bordering the street are the dominating structure in the area. The thermal conditions and the appearance of the apartment buildings do not correspond to contemporary needs or expectations and more and more attention is paid on the reconstruction of the façades of those buildings.

The population has been quite stable in Rakvere over the last years, although there is a tendency to move from the areas with a high density – like the target area – to single-family house areas. In order to encourage a more compact and energy efficient settlement structure, it is of public interest to enhance the living quality in the existing building stock and to improve the overall quality of urban environment in the target area. In compliance with the Master Plan and the Sustainable Energy Action Plan of Rakvere city government the overall upgrading of inner-city areas shall inhibit diffused urbanization and contribute hence to a sustainable settlement structure.

Key figures:

Size	80 ha
Number of inhabitants	800
Number of buildings	18 apartment buildings
Period of construction	1960–1989
Owner structure	97% individual owners 2% institutional (rental) ownerships 1% cooperatives
Current annual energy consumption of multi-apartment buildings*	170–180 kWh/m ²

* Average annual final energy demand of a typical not modernized building (Space heating + hot water preparation)

Despite the poor condition of the buildings, residents are rather hesitating towards refurbishing activities. This is due to the fact that the majority of the residents have a very limited financial capacity and little access to information about support possibilities. Therefore, the major challenge of the project lays on the development of proposals for tailor-made solutions for the upgrading of the building stock by the owner associations.

Perspectives:

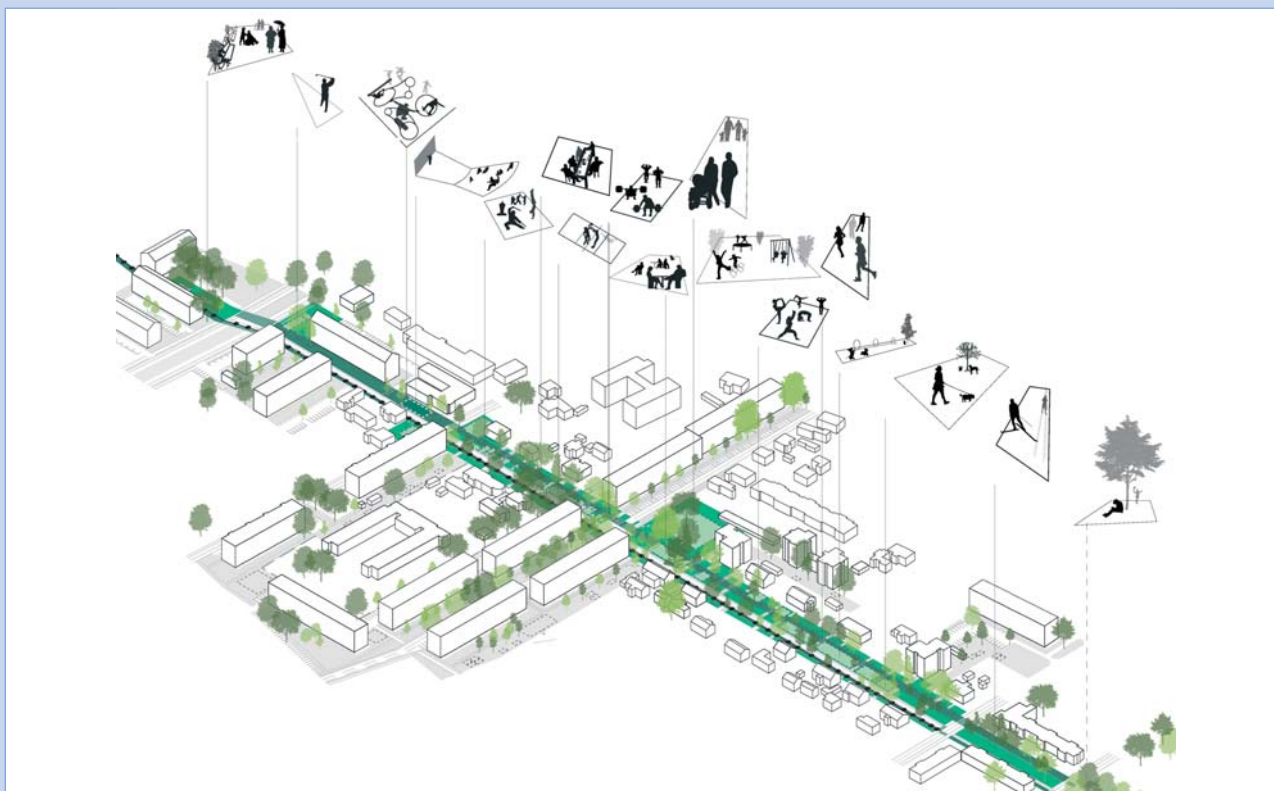
The goal of the project is energy saving, enhancing the more efficient use of the public space and connecting the central part of the city with the town's green corridor. Also, more attention should be paid on the importance of shaping the living environment and development of good design examples for increased energy efficiency.

In the target area a step-by-step approach is applied. In the first stage, a public idea competition is carried out in

order to get the best solution to develop Seminari Street to a linear park and to get ideas for the renovation of the façades of the houses surrounding the area. Both, architectural as well as landscape architectural aspects are combined in the idea competition. The City Government of Rakvere expects architectural solutions for renewing the façades of the typical Soviet-style apartment houses and landscape architectural solutions for re-designing Seminari Street in order to alter it to an attractive urban landscape and connecting corridor between the heart of the city and city forest in the south. The goal is to get an integral solution where both elements of the task are solved in a mutually complementing manner: forming a united and integral urban environment. The next step of the project is the preparation of specific renovation projects that are carried out on the basis of the attained idea solution in cooperation with the house owner associations of the area.

Those building projects are the basis for future renovation works on apartment houses in order to make the

houses energy efficient and adding to the more attractive urban environment. The intention of Rakvere's City Government is, by investing in the compiling of the building project documentation, to inspire the different individual owners of the housing associations to take up the actual renovation works.



Contribution the architectural competition at Seminari Street

Target Area Lida (Grodno Oblast)

Belarus

General information:

The Housing Department of Grodno Oblast Executive Committee (administration of the Province Grodno) is responsible for the majority of the existing housing stock in the entire Province of Grodno. The Executive Committee selected the city of Lida as a Target Area within the project Urb.Energy. In Lida an integrated development concept will be developed that covers the entire area of the core city. As a preparatory step, three sample buildings (that are representative for the housing stock in Lida) will be analysed and refurbished.

Lida is the fourteenth largest city in Belarus, situated 110 km east of Grodno.

Current situation in the Target Area:

The city of Lida is a very old city with roots back to the 13th century. However, the city suffered serious damages during WW II and nowadays the city is predominantly characterized by multi-apartment buildings from the soviet era. The major part of the Target Area is connected to the central heating system.

Recently, large renovation activities has been carried out in order to upgrade the public spaces in the city centre and to improve the general conditions of the buildings.

However, still a major part of the housing stock in the city lacks sufficient insulation. Regarding the district heating system there is an urgent need to install individual meters as well as to modernize generation plants and networks.

Currently the major energy resource is gas and local energy sources (like fire wood, peat and sawdust). There is the intention to increase the share of cogeneration (3–4% at the moment) but currently there are no special financial programmes available to support the extension. At the present time there are no renewable energy

Key figures:

Number of inhabitants in Lida	98,000
Number of buildings in Lida	6,250
Owner structure	Type 1: Sovetskaya, 43: constructed 1979; 5 stories, 40 flats Type 2: Tavlaya, 35: constructed 1980, 9 stories, 60 flats Type 3: Mitskevicha, 24: constructed 1972, 5 stories, 5 flats
Current annual energy consumption of multi-apartment buildings*	237.7 kWh/m ²

* Average annual final energy demand of a typical not modernized building (Space heating + hot water preparation)

sources in use in Lida. This is due in particular to the lack of experiences and certain scepticism about the efficiency of renewable sources.

The buildings 43 Sovetskaya St (type 1), 35 Tavlaya St. (type 2) and 24 Mitskevicha St. (type 3) are typical buildings in Lida. The type 1 is a brick building, meanwhile type 2 and 3 are concrete slab buildings. Together there are 535 buildings in Lida of the same typology.

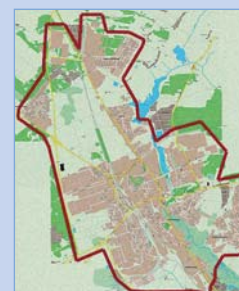
Currently they have a very poor overall energy performance, insufficient internal heating systems and they are not embedded into an overall energy concept of the surrounding neighbourhood.

Perspectives:

For the sample buildings the project partner develops and implements a comprehensive refurbishment concept. The so gained experiences are an important part of the awareness rising activities to promote the enhancement of energy efficiency of the existing building stock.

Parallel the Executive Committee elaborates – supported by an consultant – an integrated urban development concept for the city of Lida that consider in an integrated way approaches to refurbish the housing stock, to promote the use of local and renewable energy resources as

well as the modernization of the district heat supply system. The concept addresses as well the possibilities to activate financial support for the modernization and to enhance the living environment around the buildings.



Lida city centre



Sovetskaya street 43



Mitskevicha street 24



Target Area Jelgava

Latvia

General information:

Jelgava is located in the central part of Latvia, the largest city of Zemgale planning region and, according to territory and population, ranks fourth among the cities in Latvia. Leading industries in Jelgava are food processing, textiles production, metal-working, machinery building and wood-working industries. Most of the active businesses in Jelgava are engaged with trade.

Current situation in the Target Area:

The target area is situated in the city centre of Jelgava and is a mixed type residential and business buildings area. It consist beside shops and public buildings a number of multi-storey residential buildings.

After World War II 90% of buildings in Jelgava were destroyed. The reconstruction started in the central part of the target area in the late 1940ies to the 60ies with mostly individual planned buildings in the common Soviet-style of this time. In the 1970–80ies the area was completed with standardized multi-storey apartment buildings. Also located in the target area are some important cultural historic heritage sites as like the museum Academia Petrina and the Tower of St. Trinity Church. Great part of the territory is under protection as historical site of national importance.



Key figures:

Size	170 ha
Number of inhabitants	20,630
Number of buildings	220 apartment buildings; Public buildings and shops
Period of construction	1948–1989
Owner structure	94% individual owners
Current annual energy consumption of multi-apartment buildings*	188 kWh/m ²

* Average annual final energy demand of a typical not modernized building (Space heating + hot water preparation)

With around 20,630 inhabitants approximately one third of the total population of Jelgava is living in the target area. The neighbourhood is well connected to the public transport network and contains retail, public services and cultural institution. Furthermore the area is well equipped with public and green spaces as well as with educational and health institutions.

The major part of the area is connected to the central heating system. The former pipeline-system from the Soviet period was mostly replaced and two co-generating power stations provide heat and feed-in into the electric power grid. Both power stations were re-developed to a modern standard of cogeneration on the basis of natural gas with the option in both systems for a future instalment of biomass as the basis of energy production.

The technical conditions of the main structures of buildings in the neighbourhood are relatively good. On own initiative of the residents especially windows were re-

Aerial view of the target area

placed to avoid heat losses. However, insulation and the internal utilities remain rather poor.

As the main challenge for the further development of the neighbourhood the municipality identified the energy related modernization of the building stock and the enhancement of the living environment.

Perspectives:

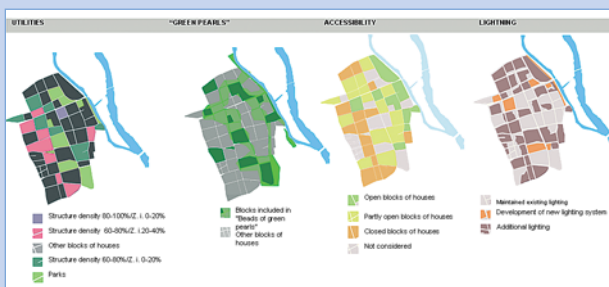
With the integrated urban development concept (IUDC) the city government of Jelgava develops a comprehensive for the enhancement of the neighbourhood. The major emphasis of the upgrading activities lays on the rise of the energy efficiency of the multi-storey residential buildings within the area.

Parallel, approaches are developed to improve the amenity values of the yards of the multi-storey buildings, the development of modern recreation areas and play grounds as well as the modernization of parking lots and access roads.

After the approval of the IUDC by the city council, prioritized activities will be integrated into the municipal Investment Plan.

The city supports the refurbishment of the buildings by providing sample energy audits to for the most common building types to the owner associations.

To promote the idea of energy efficiency, the municipality provides trainings for house managers and organize regular information activities for flat owners and general public.



Target Area Riga-Jugla

Latvia

General information:

Riga is a modern city with 712,000 inhabitants and an area of 304 km². The target area is situated in the Jugla neighbourhood on the eastern outskirts of the city.

Current situation in the Target Area:

Jugla is part of the Vidzeme district, since the year 2010 – centre district and the second largest neighbourhood throughout Riga. It is divided from the planning perspective in five smaller units with very different characters.

The main development as residential area began in the 1960s when multi-apartment blocks were built in the area. Today, there are major housing estates and one-family house areas, but predominately the neighbourhood is characterized by the Soviet-era high-rise (mainly 5-storey) residential buildings constructed in the 1960s and 70s.

In contrast to the overall development in Riga, where the number of inhabitants is decreasing, the number of inhabitants in Jugla is very stable with slight increase in last few years. Since the neighbourhood itself offers only a little number of employment possibilities, the majority of the residents are commuters or retired persons.

Even though Jugla is predominately a residential area, elements of a centre can be found along the main arterial road and there are sub-centres situated across the entire area for the provision with convenience goods. The location at the eastern edge of the city and close to forests and lakes offers a high potential for recreation and leisure.

The entire area is covered by a central heating system. Like in most parts of Riga the local heating company “Rīgas Siltums” is maintaining the central heating network and provides heat mainly to high-rise apartment housing estates and all kinds of public as well as service

Key figures:

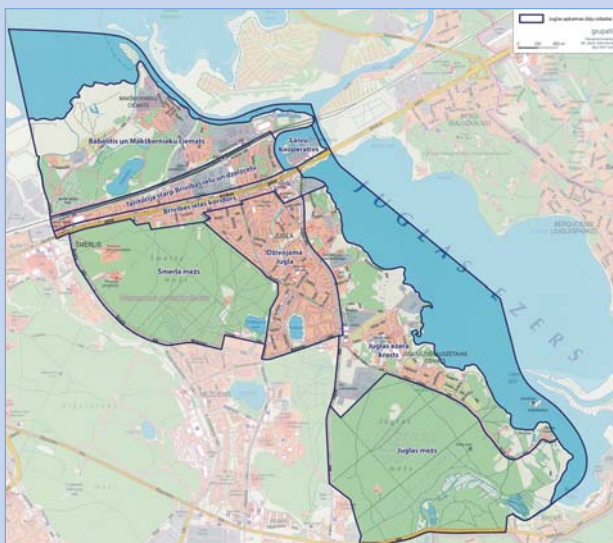
Size	1,400 ha
Number of inhabitants	27,000
Number of buildings	182 apartment buildings; Public buildings and shops
Period of construction	Till 1950: 8% 1951–1960: 12% 1961–1970: 67% After 1979: 13%
Owner structure	Almost 100% individual owners
Current annual energy consumption of multi-apartment buildings*	207 kWh/m ²

* Average annual final energy demand of a typical not modernized building (Space heating + hot water preparation)

buildings. Individual homes – and to some extent – new residential apartment projects use often autonomous heating on a gas or solid fuel basis.

The heating pipeline network is relatively old but it is partially replaced with prefabricated pipes and is still undergoing the renovation process which stabilizes the average technical condition of the heating grid in Jugla.





In particular the Soviet-era multi-apartment buildings, like many other places in Riga and Latvia, are facing large heat losses and a poor internal infrastructure. Installation of energy efficiency measures together with overall renovation and refurbishment of the buildings is the main challenge for future in this field. Energy price increase together with physical poor condition of the buildings will be the catalysts for renovation and refurbishment works.

Major challenges in Jugla are to initiate a refurbishment process of the buildings in the context of a very heterogeneous owner structure and to find solutions for the reduced working load of the two existing central heating plants that supply heat to the neighbourhood. Parallel the share of renewable energy sources (currently 2% in Riga) should be fostered. From the urban planning perspective major challenges are the inner accessibility on foot, by bicycle and public transport as well as the parking situation and the insufficient street lightening. Due to the uniform construction style the neighbourhood lacks a visual identity.

As a prerequisite to start an upgrading process it is very important to identify and communicate financial possibilities for complex approaches, to involve the public and to clarify legal issues about property questions.



Perspectives:

The city of Riga prepares an integrated concept for Jugla for the overall upgrading of the neighbourhood. It addresses local planning issues, architectonic solutions and possibilities to enhance the energy efficiency of the entire area. The public is involved during the entire preparation process.

Since the majority of the apartments in Jugla are owned by individual owners the success of a development concept depends on the activation of them. It is important to enable individual owners by influencing unfavourable framework conditions and providing information. Therefore, the possibility to establish a special municipal building renovation company as well as a municipal revolving fund is assessed.

To provide better information to the end-user, a special internet portal for online monitoring informs about indoor climate and consumption parameters of renovated and not renovated buildings.



Target Areas Šiauliai

Lithuania

General information:

Šiauliai is the fourth largest city in Lithuania with 130,000 inhabitants and covers an area of 81.13 km². Within the project the city administration develops integrated urban development concepts for two target areas.

Current situation in the Target Area:

Both target areas, Lieporiai as well as Miglovaros, are predominately characterized by the standardized multi-storey apartment buildings from the soviet time. Meanwhile Lieporiai is a typical major-housing estate with neighbourhood related schools, park area and shops for the local supply, the target area Miglovaros is a smaller pure residential area.

The two target areas were selected on one hand because they are very typical regarding their structure and the experiences in the target areas can be used as samples for further municipal activities regarding the develop of approaches for the modernization of the “soviet planning legacy” in the city. On the other hand there are active communities and NGOs in the target area that could be a favourable factor to promote the modernization process in the area.

The residents of both target areas started with own activities to enhance the energy efficiency of the buildings. However, these activities vary widely in terms of quality and complexity and are mainly focused on apartment-related measures. Activities that require a general structural change or activities of the entire house owner community are rarely applied. For this reason the general refurbishment rate is still very low – as in the entire municipality of Šiauliai – and there is the urgent need to prepare integrated concepts for a holistic overall upgrading of the two neighbourhoods that take into account a common design and an integrated approach. Those concepts are the precondition for the implementation of National Programme of Refurbishment of multi-storey buildings.

Key figures AREA 1 – Lieporiai

Size	91 ha
Number of inhabitants	11,500
Number of buildings	106 apartment buildings; Public buildings and shops
Period of construction	1968–1982
Owner structure	97% individual private owners 3% institutional (rental) ownership
Current annual energy consumption of multi-apartment buildings*	95–170 kWh/m ²

* Average annual final energy demand of a typical not modernized building (Space heating + hot water preparation)



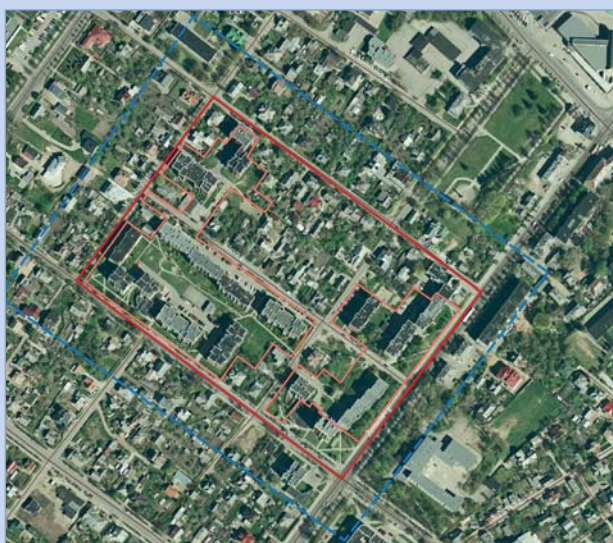
Target Area 1 – Lieporiai

Key figures AREA 2 – Miglovaros

Size	6,1 ha
Number of inhabitants	998
Number of buildings	18 apartment buildings; 18 single family-homes
Period of construction	1960–1989
Owner structure	98% individual private owners 32% institutional (rental) ownership

Both areas are connected to the central heating system of the city. However, the heating grids are in poor condition and there are high energy losses up to 40%. Due to the losses the price for district heating is very high. Residents as well as the energy supply company are very reluctant about the introduction of renewable energy sources.

A major challenge of the upgrading activities in both neighbourhoods is to enable the different house owner communities to start with own coordinated refurbishment activities. For this reason it is necessary to provide adapted technical and financial solutions.



Target Area 2 – Miglovaros

Perspectives:

The major objective of the project in Šiauliai is to assure the sustainable and integrated development of the two target areas. For this reason the city supports on one hand the thermo-modernization of the building stock and of the energy supply system. On the other hand it carries out accompanying measures to improve the living environment of the two target areas.

Both activities are coordinated in a holistic way in the two neighbourhood related integrated urban development concepts (IUDC). The IUDC becomes a binding document (approved by the city council) that has to be considered at all public and private construction and renovation activities.

As a precondition for further upgrading activities as well land property issues are addressed within the project. Solutions are developed to clarify the property rights of the related area in the surrounding of the buildings which has not been so far part of the land titles of the apartment owners.

Special focus of the enhancement of the living environment is the quality of the public space, playing grounds and the Lieporiai park. Additional the supply with public transport, parking space, infrastructure for disabled persons is improved and the cycleway network is extended.

To encourage the enhancement of the energy efficiency the city provides owners with information about financing possibilities and adequate technical approaches for the specific situation in the different building types. For this reason the city organises energy saving days and meetings with the heads of the housing communities.



Case Study Berlin (Frankfurter Allee Süd/Kaskelkiez)

Germany

General information:

The area “Frankfurter Allee Süd and Kaskelkiez” is located at the Eastern inner city periphery in the district of “Lichtenberg”. With a number of 260,000 inhabitants Lichtenberg is the seventh biggest of the 12 districts in Berlin.

Since the early 1990ies integrated urban development planning is being executed in the two neighbourhoods. Although the improvement of energy efficiency of buildings and supply infrastructure was not the major focus of the activities from the beginning, both areas have been comprehensively modernized step by step during the last 20 years.

The Case Study Berlin documents integrated urban development approaches and solutions to implement EU energy/climate measures and elaborates a critical evaluation on retrospective measures and plans for the two very different residential areas.

Situation in the areas before modernization:

The neighbourhood Frankfurter Allee Süd is a large housing estate with prefabricated buildings and a predominantly residential use. Very typical for the urban structure of the neighbourhood are the large green spaces between the buildings. The area is well connected to public transport and in the north it borders on one of the main arterial roads in Berlin. With about 5 km distance to the Eastern City centre of Berlin, the neighbourhood is located at the periphery of the inner city.

In 1992 Frankfurter Allee Süd was characterized by a relatively balanced social structure. The area was lacking facilities for youth and elderly and had a high deficit in design of public green space and squares.

The neighbourhood possessed a district heating system that covered the entire area but had an urgent need for modernization. The building stock had a poor energy

Key figures AREA 1 – Frankfurter Allee Süd

Size	44.5 ha
Number of inhabitants	11,000
Number of buildings	22 prefabricated multi-apartment buildings 37 others (church, schools, etc.)
Period of construction	1970–1974
Owner structure	66% owned by one building association (rental ownership) 34% owned by cooperatives Almost 100% tenants
Annual energy consumption of multi-apartment buildings 1991 ^{*1)}	190 kWh/m ² (range 160–340)
Annual energy consumption of multi-apartment buildings 2010 ^{*2)}	87 kWh/m ² (range 84–220)

^{*1)} Average annual final energy demand of sample buildings before modernization (Space heating + hot water preparation)

^{*2)} Average annual final energy demand of sample buildings after modernization (Space heating + hot water preparation)



Key figures AREA 2 – Kaskelkiez

Size	21.7 ha
Number of inhabitants	2,500
Number of buildings	284 traditional european urban fabric Predominately attached 4–5 storey brick buildings
Period of construction	1872–1918
Owner structure	Today: 15% building asso- ciation 85% private owners, 'fragmented ownership' (in 1992 about 50% indi- vidual ownership, 50% of the buildings were under public control due to unsettled property rights)
Annual energy consump- tion of multi-apartment buildings 1991 ^{*1)}	340 kWh/m ²
Annual energy consump- tion of multi-apartment buildings 2010 ^{*2)}	200 kWh/m ² (range 60–360 kWh/m ² depend on the refurbish- ment status)

*1) Average annual final energy demand of sample buildings before modernization (Space heating + hot water preparation)

*2) Average annual final energy demand of sample buildings after modernization (Space heating + hot water preparation)

performance with defects in the façade as well as in the technical equipment.

Kaskelkiez is located south of Frankfurter Allee Süd, separated by railway tracks. The neighbourhood has a traditional European urban fabric, composed of a scheme of roads and blocks. The blocks are predominantly built up with attached 4-5-storey buildings. In World War II the area was marginally destroyed and for this reason the neighbourhood is rich of historic buildings. Kaskelkiez is an area with mixed use, but still holds a large proportion of residential buildings.

In 1992 the area was characterized by a relatively high unemployment rate (19%) and about 15% of the households had an income below the official minimum living wage. Furthermore, there was an unclear ownership situation and a lack of infrastructure facilities. Only few green areas existed and public space as well as the yards were lacking amenity values.

Most of the buildings in the neighbourhood suffered very desolate structural and poor energy conditions. About 76% of the households were using coal-burning stoves.

Integrated planning activities

Urban development of the case study area has been steered in several planning processes throughout the last 20 years. The integrated aspect of energy efficiency had been followed imminently in the 1990ies but was fostered strongly and explicitly only since the past years.



Frankfurter-Allee-Süd



Kaskelkiez

In the first planning phase (1990–1995) basics for development and first integrated concepts were set up. After having concentrated on constructional qualities and measures in the first years after the fall of the Berlin wall, one started to include social issues more intensively into the urban development planning processes during the second planning phase (1995–2000). The third planning phase (2000–2005) is characterized by integrated concepts reacting to population decrease. Only since the forth planning phase (2005–2010) energy efficiency explicitly becomes an important issue.

Since 2002 the public sector conducts energy-efficient refurbishment of the social infrastructure and from 2005 onwards specific superior energy-efficient measures are conducted by housing societies on residential buildings. Measures for the energy-efficient improvement of buildings and supply infrastructure by public and private owners now are an integral part of the activities.

Various stakeholders (mainly housing societies, municipal and private supply companies) and residents were involved in legally binding and legally non-binding planning processes. In Kaskelkiez the residents were involved through an institutionalised residents' board (Betroffenenvvertretung) between 1993 and 2008, when the neighbourhood was formally designated as redevelopment area.

In addition to that several social, labour market-oriented and educational measures had been realized on the

neighbourhood level, such as the "Climate Office Lichtenberg" ("Lichtenberger Klimabüro"), project "energy consultants" (Energieberater) or the opening of a sample "show-flat" by the housing association HOWOGE to demonstrate possibilities for energy saving.

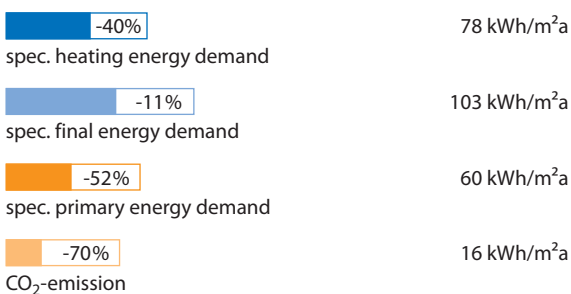
Balance of the achievements until today:

During the last 20 years numerous different measures have been implemented to improve energy efficiency and the living conditions in the two neighbourhoods. In both areas it was possible to halve the total primary energy consumption between 1992 and 2010.

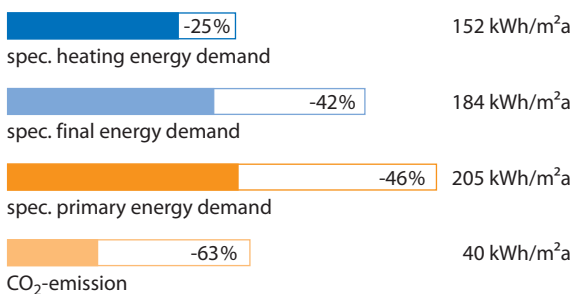
Selected measures in Frankfurter Allee Süd:

- Refurbishment of 100% of the residential buildings, including insulation of façade and ceilings, replacement of windows and the modernization of the supply equipment
- Partial renovation of schools and kindergartens
- Construction of a new neighbourhood centre
- Reconstruction of a multi-storey building as Europe's biggest low-energy building, which is now equipped with a combined heat and power unit.
- Renovation and maintenance of the district heating system
- Reorganization of traffic routeing, traffic calming measures, rearrangement of parking lots as well as the improvement of path network
- Reorganization of the allocation of public and private

Frankfurter-Allee-Süd



Kaskelkiez



Surface-related energy parameters 2010 and reduction in comparison to 1992

green, greening of the main streets and construction of a new green corridor in the neighbourhood

- Realization of several awareness rising, educational, social and labour market-oriented projects
- Establishing of good cooperation between housing associations and public authorities
- A municipal housing company (HOWOGE) was founded and buildings and land properties were transferred to the company. The juridical constitution of the existing housing company was changed.

Selected measures in Kaskelkiez:

- The existing residential buildings were returned to the former owners (restitution)
- Modernization of more than 60% of the residential buildings and construction of 323 new flats
- Replacement of existing stove heating by decentralized heat generators. For cost reasons at later stage the connection to the central heating system of the neighbouring district was not carried out.
- Installation of several solar heating systems, photovoltaic or biomass furnaces
- Establishing of a new neighbourhood centre
- Extension of the kindergarten supply, refurbishment of a school building
- Stepwise increase of the number of shops, cafés, arts and crafts enterprises
- Reorganization of traffic routeing, traffic calming measures and rearrangement of parking lots
- Redesign of all existing and construction of additional green spaces and playgrounds
- Organization and implementation of an intensive communication process during the entire modernisation process by formal committees, informal meetings and publications



Low-energy building

6. Conclusions – Key Elements and Obstacles of Integrated Approaches for Energy Efficient Urban Renewal

An integrated approach of urban development has the potential to transform sophisticated, technical modernisation measures of individual buildings into an overall rehabilitation strategy of urban neighbourhoods with a sustainable supply infrastructure. Thereby the combination of energy efficiency measures with neighbourhood upgrading measures offers multiple enhancements on different levels.

Based on the national but especially transnational experiences, integrated approaches of urban development are suitable instruments to activate energy efficiency potentials in urban areas and implement upgrading measures. Based on this Integrated Urban Development Concepts (IUDC) with energy efficiency measures follow holistic approaches with manifold fields of action in buildings, green space, public space, mobility, technical infrastructure, energy supply and also behaviour change and mobilisation of inhabitants. For a suitable implementation a strong basis of the legal, administrative, actor-related and financial frame is needed in order to set up an IUDC. Legal stability, administrative capacity, well-proved participation models, financial funds and awareness raising are further important key elements. Finally upon following aspects actions should be taken to successfully elaborate an IUDC:

1. Analysis of the current situation,
2. Securing the management and integrated, cross-sectoral approach,
3. Organisation of the participative process,
4. Development of a target and implementation oriented action plan and
5. Securing the political and financial support.

However, it is clear that integrated concepts for energetic urban renewal alone will not be sufficient to solve the retrofit dilemma. Experiences show that there are different fields to work on for overcoming existing barriers:

- Integrated urban development approaches need to be integrated into the planning process at city level, but also in national urban policy and planning law with a focus on energy issue.
- Comprehensive and differentiated analyses of the energy standards and the saving potentials of the building stock interlinked with the most suitable energy supply systems are needed. These are prerequisites to identify and realize suitable refurbishment measures and also measures to adapt the energy supply.
- The ownership structures in housing areas needs to be regarded and corresponding difficulties need to be coped with. Especially in the new member states these structures require adjustments in e.g. energy efficient measures

or financing possibilities. Findings of the project UrbEnergy show importance of homeowners' association support in e.g. the clarification of their legal status or property rights. The affordability of energy efficient refurbishment remains to be the core question for homeowners.

- Suitable and long-term financing schemes are essential to e.g. support integrated urban planning processes as well as refurbishment measures on buildings. Here variable financing instruments need to be available, giving support by long-term revolving loan programs and addressing diverse parts and bodies of the integrated process. Occasionally grants can serve as incentive for investments of sole owners.
- Communication strategies between governments, property owners, housing companies and tenant's initiatives as well as residents in

general are to be developed, financed and maintained.

- Continuity is a relevant factor, therefore not only financing of investments has to be established but human support and mentoring is important.
- Capacities of local governments need to be enhanced to initiate and coordinate a lasting refurbishment process, e.g. by setting up special rehabilitation units within the city administration or specialised (external) agencies.

Awareness raising and information campaigns as well as technical support (e.g. by a local agency) are crucial instruments and need to be used to inform residents on potentials and benefits of integrated and energy efficient measures. To change consumption patterns and behaviours needs investment in human resources is needed.

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