

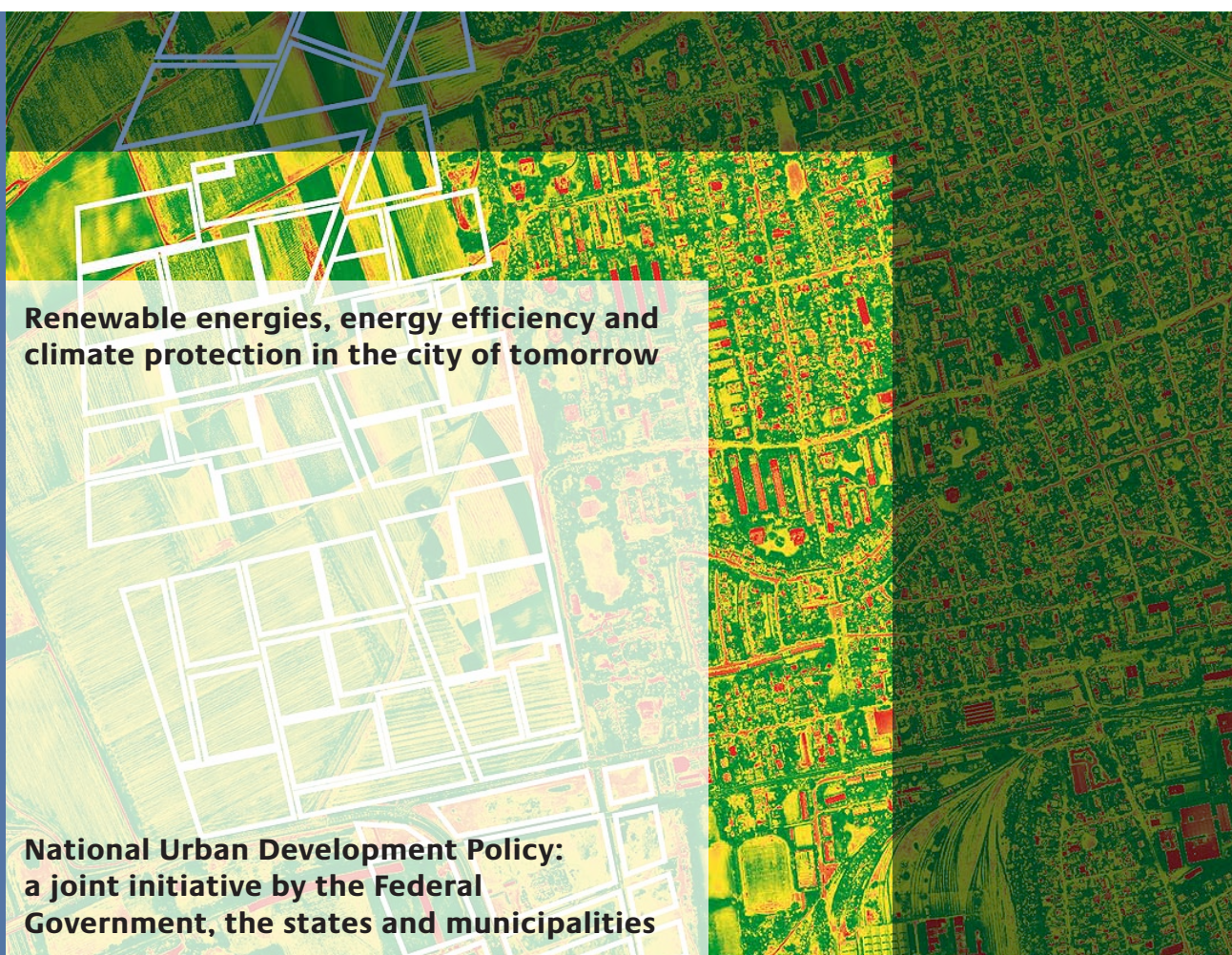


Bundesministerium
für Verkehr, Bau
und Stadtentwicklung



NATIONALE
STADT
ENTWICKLUNGS
POLITIK

stadt:pilot special



**Renewable energies, energy efficiency and
climate protection in the city of tomorrow**

**National Urban Development Policy:
a joint initiative by the Federal
Government, the states and municipalities**

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This stadt:pilot special was first published in German in October 2011. The English translations therefore depict the research status of summer 2011. Due to the novelty of the topic and its specific involvement in Germany, some ideas and terms have been approximately paraphrased. More detailed explanations can be found in the glossary on page 41.

Preface

Dear Readers,



In the summer of 2011, we resolved to embark on an accelerated transition to a sustainable energy supply within a broad social consensus. This path undoubtedly represents a vast effort that can only succeed if we work together.

Progressive urbanisation combined with growing energy needs is confronting urban development policy with immense challenges.

What is needed above all are measures aimed at increasing energy efficiency. This is not only necessary in Germany and the member states of the European Union, but also on a global basis. Innovative approaches are essential. Examples from Germany, such as the Efficiency House Plus, integrated energy concepts on the neighbourhood and citywide level, along with inter-municipal cooperation for safeguarding energy supplies, are now attracting international attention.

The results of the model and demonstration projects of the 'Experimental Housing and Urban Development' programme and 'National Urban Development Policy' presented in this stadt:pilot special strikingly show that the areas of urban development, building culture and architectural conservation contain considerable potential for increasing energy efficiency and climate protection. We are determined to enhance these areas of potential as quickly and effectively as we can.

Taken together, transport and buildings are responsible for around seventy percent of energy consumption and forty percent of CO₂ emissions. Approaches for tackling the issue of energy efficiency are also varied. Broad cooperation by a large number of actors is essential: the states and municipalities are just as called upon as the business and science communities as well as civil groups.

When it comes to the field of urban development, we are particularly concerned with supporting both public and private actors on projects and processes for energy-efficient and climate-friendly urban development. The CO₂ building rehabilitation programme and the recently launched KfW programme for 'Urban Energy-Efficient Rehabilitation' that we are offering represent targeted instruments.

Information and recommendations for their practical implementation have been assembled in this magazine. I hope you will find its content informative and I wish the 'Urban Energies' congress participants an interesting exchange of ideas.

A handwritten signature in black ink, which appears to read 'Peter Ramsauer'. The signature is fluid and cursive.

Dr Peter Ramsauer MdB
Federal Minister of Transport, Building
and Urban Development

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Editorial

In just a short period of time, energy and climate protection have become central issues of integrated urban development. Much is new. Solutions have to be tested and skills must be developed in countless locations. This makes it all the more important to discuss new approaches with the responsible actors on a broad basis.

This *stadt:pilot* special assembles the elaborated results of discussions that were held at the Federal Ministry of Transport, Building and Urban Development within the framework of a transfer workshop entitled 'Renewable Energies and Energy Efficiency in the City of Tomorrow' on 21 June 2011. This workshop brought together more than sixty stakeholders from the fields of municipal politics, administration and urban planning in charge of the model projects in the National Urban Development Policy and the demonstration projects of the ExWoSt field of research on 'energy-efficient urban renewal'. This was the first time that such a compilation of experiences from different programmes has been attempted.

All participants clearly acknowledged that energy efficiency and renewable energies are two central future tasks of municipal development. Three aspects that are relevant to different areas of urban development particularly stood out in this framework: cooperation, integrated approaches and the neighbourhood level as a field of action. These factors represent a 'common thread' running through the different articles in this issue. The central principle of energy and climate protection in urban development needs to be much more vigorously detached from a sector-based, technical viewpoint and instead be embedded in an integrated, comprehensive spatial strategy. This automatically results in new constellations of actors and calls for a cooperative approach. Alongside the evaluation of technical feasibility, communication and participation need to be promoted as central tasks more than ever before.

In this issue, nine main results are developed under the heading 'energy topic' and are underpinned by commentaries, interviews, portraits and reports. This *stadt:pilot* special, which appeared in German in October 2011, is intended to support municipalities as they make their way towards energy-efficient urban development. We hope this English translation will help to make these results part of an international discussion.

We hope you enjoy reading this issue.

Making strategic decisions: now!

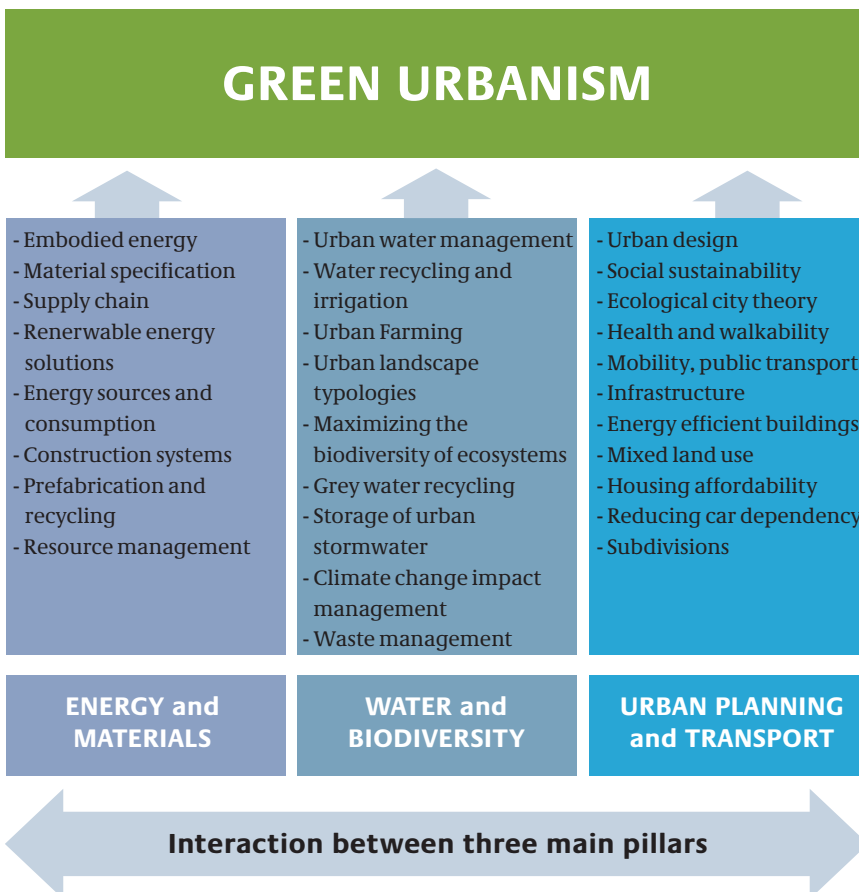
by Steffen Lehmann

Against the backdrop of the environmental crisis, demographic and structural transformation, globally increasing social disparities and rising energy prices, we currently find ourselves at a turning point in our civilisation. One thing is already very clear today: the success with which we master these challenges at this turning point will be decided in cities all over the world. For those working in professions dealing with urban and architectural planning, this means working in an increasingly holistic and sustainable manner. When it comes to reducing energy and resource consumption, integrated urban development focused on energy and climate will assume a key role in conjunction with political action.

It is essential to think through the concept of ‘the city’ one step further. By doing so, we will be providing cities with new tasks and fields of action. The challenges resulting from this process are part of what I call the post-industrial condition. Today we are facing shrinking cities with insufficient development alongside cities containing sections of rapid growth. To tackle these challenges, we will require comprehensive strategies for dealing with demographic and structural changes in the future. The need to continue developing our existing cities on a sustainable basis arises from this post-industrial condition. This need for action provides us with a marvellous opportunity, namely that of further developing central cities that are often in need of renewal.

Germany: a focus on building stock renewal

Action is needed in cities everywhere. While the context may differ in Australia and Oceania, Asia, America and Europe, the question of what a climate and energy-efficient city should look like is posing itself everywhere. In Asia, rapid growth and urbanisation processes are taking centre stage. In the USA, the focus is on strategies to combat and reverse unsustainable urban sprawl. In Germany, people are mainly concerned with the energy-efficient redevelopment of existing building stock and the optimisation of material flows. As in many other European countries, our cities are already built. The rate of new construction is at around one percent. Important climate protection and energy efficiency steps have already been undertaken in Germany. The Federal Government has formulated ambitious climate protection objectives. Possible approaches have been tested and developed at many locations. As these approaches unfold, great value is being placed on public discussions and participatory processes. This approach is not yet sufficiently widespread in Asia, but should also be attempted there in an effort to meet these challenges. With not only this in mind, it would appear advisable to undertake a global quest for common approaches and strategies for integrated urban development and also to learn from one another.



‘Green urbanism’: principles for the city of tomorrow

What is ‘green urbanism’? It means developing a concept for the city based on the resource-protecting management of energy, land, water and mobility. Its long-term goal is zero emissions. The principles of green urbanism have given rise to strategic elements that have equal relevance in both growing and shrinking, new and

‘Green urbanism’ focuses on the careful management of resources. In this way, habitats can be protected and emissions can be reduced. Source: Steffen Lehmann



Whether Shanghai or Wanzleben: climate and structural changes demand new global approaches.

1. Integrated urban development – a catalyst of climate protection

Solutions for a climate-protecting future are being developed in the cities. There is widespread recognition that we need a profound transformation of the way we develop, build and manage our cities. For example, renewable energy-generation and distribution are being considered and discussed on many levels. The results of this process need to be evaluated and examined in relation to the resulting settlement patterns, future-compatible infrastructures and adaptable building typologies. We have begun connecting concepts for sustainable urban development, innovative design processes and strategies with the reality of limited resources. It is clear that cities remain the places with the highest energy consumption, yet the size advantages of cities also provide us with an opportunity to make energy sources more cost-effective. Architecture and urban development, particularly in Germany, are viewed by many as drivers of energy and social transformation with the goal of creating better and healthier neighbourhoods. It is clear that profound changes must occur to our urban settlements within the coming decade. Cities should look different in 2020 than they do today.

2. Using local sources of renewable energy for emission-free cities (Zero-Emission Cities)

This principle examines the issue of how energy can be generated and made available on an emission-free basis and in the most efficient way possible. The decentralised, local availability of renewable energy sources should be the primary selection criterion when it comes to deciding on energy production. It is necessary to transform our energy and transportation systems in such a way that they can be supplied from local renewable energy sources – by fifty percent at least. The energy mix should also consider the costs and availability of technologies. Electricity production and on-site energy storage should be conducted and distributed via a 'smart grid'. In a Zero-Emission City, neighbourhoods are transformed from energy consumers into energy producers: they become local power stations for renewable energies and harness solar photovoltaic technology, solar heat, wind energy (on and off-shore), biomass, geothermal energy, energy

from mini-hydro plants and other technologies. Some of the most promising approaches can be found in photovoltaic systems integrated into buildings, in urban wind turbines, in microsystems for combined heat and electricity production (combined heat and power, or CHP) as well as solar cooling and solar hot water systems. A further important aspect here is the zero-waste concept, which entails a halt to material wastage. Here, waste materials are regarded as a valuable resource.

3. Adapting political leadership and urban management

Good urban policies and administration are extremely important if we want to continue sustainable building stock development in our neighbourhoods. Without political support, no changes will take place. The actors in integrated urban development require support from administrators and politicians in order to implement their ideas, concepts and approaches. Political leaders are thus being called upon to act quickly and create the parameters for implementation. It is essential to 'pick up' local actors and inspire them to get involved. In order to make this happen, we need to prescribe a strategic direction and promote it accordingly with sustainability management and government leadership, integrate it with corresponding internal structures, and then link everything together. The activation of the citizenry plays a central role here. Cities are constructs that should be developed out of collective responsibility. Empowering citizens and allowing them to take active part in the further development of their neighbourhoods is one of the hallmarks of a democracy. A city that is managed and built holistically, that implements changes harmoniously and shares its decisions and responsibility with an activated population is on the road to sustainable development. When the needs of the community are balanced with the demands of urban development, design solutions can be achieved that keep the needs of the people squarely in view while encouraging local citizens and key actors to get involved. Some of the important milestones on this path include anchoring the energy-based renewal of our cities more strongly in public consciousness, improving public participation in planning and political decision-making processes, developing political backing for integrated action plans, introducing best practice methods

for urban governing and developing renewable energies through incentives, subsidies and tax breaks while simultaneously discontinuing subsidies for fossil fuels. Furthermore, it is essential to promote integrated urban land-use planning and to implement a system of evaluation and certification for urban development concepts in regard to their sustainability.

4. Preserving and integrating cultural heritage and identity

Preserving (architectural-) cultural heritage and maintaining an identity developed over time are important aspects that must be taken into consideration when it comes to developing cities in accordance with energy conservation principles. The challenge lies in maintaining the character of a city or region and strengthening it through development strategies oriented towards the desires of the population. That is why it is the duty of urban administrations to weigh up the preservation of their town's heritage against its further development into a sustainable energy and climate-compatible city while avoiding interchangeable designs that render all cities alike in their appearance.

5. Upgrading and reconcentrating existing neighbourhoods

One important goal lies in making cities attractive as habitats for diverse and lively population groups. At the same time, a city's ecological footprint needs to be reduced by creating autonomous, energy-efficient neighbourhoods. Increased density and mixed use, improved local public transportation and the enhanced integration of transportation and land-use planning can represent an important step in this process. At the same time, typologies permitting flexible inner-city living and working, the upgrading of public space, the activation of empty spaces as well as the constructive redevelopment of existing buildings represent important steps along the path to a sustainable city.

6. Using new technologies

While my focus so far has been on the city as a whole, I would now like to say a few words about the potential of individual buildings. Thanks to passive house standards and the use of renewable energies, we can now build structures that produce more energy than they consume. It is therefore important to retrofit our entire building stock on an energy-efficient basis along the lines of green urbanism. This also means adapting energy supply structures. For example, what are currently hard-to-renovate Wilhelmine-era and half-timbered houses and neighbourhoods can be supplied in a coordinated fashion by renewable energies, ideally through CHP. This can achieve a considerable reduction in the energy consumption of existing buildings. All buildings and building complexes should be oriented towards innovative best practice methods for passive building standards. Energy

efficiency should gain in importance in a number of ways – through effective thermal insulation, high-energy efficiency standards and the use of intelligent measurement technologies ('smart metering'). However, programmes merely aimed at promoting energy efficiency do not go far enough. Only all too often do we discover afterwards that savings arising from increased efficiency are swallowed up by energy consumption elsewhere. Thus, earnestly conceived climate protection initiatives require making coal and gas power generation stations more efficient and, over the long term, replacing them with stations using renewable energies. At the same time, it is essential to erect buildings that are adaptable, meaning that they can be developed for different uses and thus have a longer lifespan. Since technical systems and tools have a shorter lifespan, they should only be utilised sparingly.

7. Advancing knowledge and skills

The redevelopment of our cities on an energy-efficient basis and the new tasks this entails demand an expansion of skills on the professional and political levels. It is essential to spread technical expertise and develop competencies. These include both intense exchanges of experience and expanded research. New research centres for sustainable urban development and best practice examples should be developed as tools to evaluate the ecological performance of cities and to research new ways of improving their efficiency. Universities can assume an important role as think tanks for the energy-efficient transformation of cities. This also means redefining the training of architects, urban planners and landscape architects. It is also important to anchor the energy-efficient redesign of our cities in the minds of the population, since the energy transition will ultimately be founded on changes in the attitudes and lifestyles of all citizens. That is why it is also important to offer citizens sufficient access to educational and vocational training opportunities. As a centre for such educational institutions as libraries, museums and galleries, the city is predestined for this role.

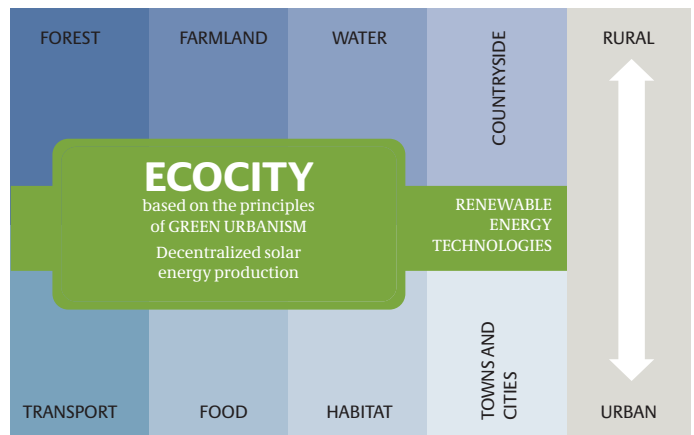
15 holistic principles of green urbanism

- Understanding the climate within the local context
 - Using local renewable energy sources for the Zero-Emission City
 - The Zero-Waste City: using waste as a resource
 - Using water sustainably
 - Preserving landscapes, gardens and urban biodiversity
 - Promoting sustainable transportation and good public spaces
- Achieving energy savings through the use of local and sustainable materials
 - Upgrading existing neighbourhoods
 - Using new technologies and building systems for green buildings and neighbourhoods
 - Joining together to think about the quality of life, healthy neighbourhoods and mixed uses
 - Using local foods and short supply chains
- Maintaining and integrating local heritage and identity
 - Adapting political leadership and urban management
 - Advancing knowledge and skills development and encouraging innovation
 - Accelerating strategies for cities in developing countries

existing cities. At issue is always the promotion of socially and ecologically sustainable boroughs and neighbourhoods. I have developed a total of fifteen principles for the sustainable city of tomorrow (see above). They are listed here in a set of keywords and are detailed in my book 'The Principles of Urbanism'. I would like to pick up on a few of them against the backdrop of the 'Renewable Energies and Energy Efficiency in the City of Tomorrow' transfer workshop and present them in greater detail (see blue-shaded box).

The situation in Germany

Germany in particular offers an opportunity to make cities energy-sustainable for the future and to develop them in a climate-compatible manner. Model solutions here can set international standards. Because the demographic and structural-economic conditions are so complex, the administrative procedures are so multifaceted and the legal, ecological and environmental standards are so high, solutions made in Germany are particularly valuable on the international level. In addition, there is a growing consensus regarding the need for integrated urban development in Germany, and the central instrument of participation, which, in my opinion, is a key tool for the success of sustainable processes, has been tested in many ways and has undergone considerable development. The transfer workshop also shows that best practice experiences as well as experimental approaches have been correspondingly



The 'ecological city' largely supplies itself through the use of renewable energies. Source: Steffen Lehmann

evaluated and the knowledge gained has been thought through, yielding further considerations on climate and energy-compatible urban development. Some of the central principles of green urbanism are coming into play here. From the standpoint of a German looking back on our cities from faraway Australia, I can only encourage the municipal actors, the planners and scholars to actively continue down this path. When others around the world join in and we jointly assume responsibility for our future, this will give rise to a justified hope that we can succeed in dealing with climate change and in redesigning our cities on an energy-efficient basis.



Prof Dr-Ing Steffen Lehmann

is an architect and the director of Sustainable Design and Behaviour Research Centre at the University of South Australia in Adelaide. He has held a chair in sustainable architecture and urban development since 2002. His work includes among other things research on rapid urbanisation processes in Asian cities. This essay is based on his book 'The Principles of Green Urbanism' (Earthscan, London, 2010). His new book 'Designing for Zero Waste' (Routledge, London, 2012) takes a close look at the concept of the urban metabolism. For more information, go to www.slabb.com.au

The role of cities in energy-efficient urban renewal

The energy transition is taking place in the cities

The objectives laid out in the energy concept of the Federal Government have been clearly cited. By 2020 the aim is to reduce heating needs by 20% and by 2050 to reduce primary energy needs by 80%. The key sector in this monumental task is the existing building stock. This means that the municipalities will be playing a central role in managing this energy transition. However, this role varies greatly when it comes to the details. Roland Bornemann (city of Stuttgart), Gerhard Borstell and Gerd Wetzig (both from the city of Tangerhütte) talked about this issue with *stadt:pilot special*.

stadt:pilot special: Why are the cities so important in developing the climate-friendly and energy-efficient ‘city of tomorrow’?



Roland Bornemann: Due to the German federal structures, local municipalities are closer to the citizens than are Federal and state governments. The built city is visible

to the citizens as a field of municipal activity. That is why the cities have a role model function, for example when it comes to the energy-efficient renovation of buildings. Moreover, the municipalities can create incentives, for example through energy saving programmes. All of this is helpful. Finally, they can determine planning regulations. The new legal instruments will hopefully permit improved procedures for energy-efficient retrofitting.

Gerd Wetzig: I would like to add something to that: the city can act on a broad level and possesses powerful instruments, such as integrated urban development concepts (INSEK). As in the case of Tangerhütte, it can expand these with energy efficiency components.

Gerhard Borstell: In addition, cities can work on a conceptually interdisciplinary level in order to draw upon their enormous potential for energy efficiency.

stadt:pilot special: What do you mean by that?

Borstell: The city can be divided into individual areas so that they can be studied for their energy-saving potential with professional planning assistance. These findings can then be used to derive concrete projects. Conversely, one can also approach the issue from the bottom up, that is to say, starting from an individual project and moving up to the overall urban level. Both approaches have advantages and disadvantages. Particularly in small municipalities in the eastern German states, cooperation between cities and building societies is critical for success. Just think of those residential areas built in the 1960s and 1970s, which were frequently very large in relation to the city as a whole.

stadt:pilot special: Does this make it easier for small towns to meet energy efficiency goals?

Borstell: That is certainly the case. But one should not underestimate such funding instruments as the model projects in the Experimental Housing and Urban Development (ExWoSt) research field. Many projects can be pushed ahead in this way and a whole range of new knowledge has been gained.

Wetzig: Let me give you an example: over a long period of time we were unable to adapt the basic prices in the district heating contracts to the decommissioning process in our housing stock because the heating supplier was not willing to discuss it. This only changed because of the public discussion triggered by the model project. Then, together with our adviser, we worked out a contract which provided for the gradual transition from a centralised to a decentralised heating supply for the housing stock. We managed to save one third of our costs and could pass these savings directly on to our tenants.

stadt:pilot special: Are demographic and economic parameters a catalyst for energy-efficient urban renewal?

Bornemann: Not necessarily. Sustainability goals and the related investments for larger projects are hardly a foregone conclusion in municipalities that are engaging in budget consolidation. Positive political line-ups are needed there too.

Borstell: The housing market is a central factor for us. In the early 1990s we had an enormous renovation backlog in our housing stock, which was then redeveloped wholesale on a scattershot basis. In the late 1990s we finally woke up and recognised that we were facing massive migrations and vacancies. Thanks to integrated urban renewal concepts, we then managed to avoid further misguided investments. However, we now actually have a surplus of residential buildings that have been refurbished on an energy-efficiency basis.

Bornemann: The situation looks different in a prosperous area like Stuttgart. We are experiencing enormous real estate pressure. This means that existing unrenovated flats with an immense consumption of twenty to twenty-five litres of petroleum per square metre per year are easy to rent at all times. The mechanisms vary greatly across Germany.

stadt:pilot special: How do the municipalities deal with the enormous growth in expert knowledge regarding energy and climate issues? Are they equipped to handle it?

Bornemann: One advantage the large municipalities enjoy is that their administrations show greater technical diversity. They have more professional staff available to deal with demanding technical sustainability issues than the smaller municipalities.

Wetzig: That is correct. A small town cannot afford these staff levels on a sustainable basis.

Borstell: One central lesson is that small municipalities in particular cannot do without professional knowledge. The assumption that one can do everything by oneself because that isn't supposed to cost so much is false. Sure, expert knowledge costs money, but the costs are well invested, particularly when it comes to renewable energies, energy efficiency and climate protection. Knowledge transfer is a key to successful municipal action.

Bornemann: Thanks to improved tools and research programmes, many municipalities have more exact energy balance sheets at their disposal. The largest end user of energy in Stuttgart is still industry, followed by private households, transport, commercial operations, trade and services. The energy flows are now better recognisable on a sector-to-sector basis – measures can be established on this basis. The share of renewable energies amounts to just around five percent – so there is still a lot to do.

stadt:pilot special: What can be improved?

Bornemann: Energy-efficient urban renewal should be given the highest possible priority in the administrative hierarchy, such as creating a staff position for sustainability in the mayor's office. High policy preferences can continually push this cross-cutting issue to the foreground in conjunction with various other issues, such as transport. The certification of neighbourhoods and cities is interesting. It offers us the opportunity of observing a broad spectrum and balancing it within the system. Environmental performance can be rendered comparable on the basis of various indicators (CO₂, water consumption, land acquisition etc.). By the way, when it comes to the individual item of building energy consumption, the large German cities come off quite well.

stadt:pilot special: Energy efficiency and climate protection are important Federal goals. Do the municipalities also have their own direct interests?

Borstell: What are own interests? It is certainly in a municipality's own interest to have more money available to it in the end. Thanks to the energy-efficient refurbishment of public buildings in Tangerhütte, we managed to lower heating costs from around 30,000 to around 10,000 euros. This convinces the public.

Bornemann: Ultimately, the municipalities have a great interest in remaining competitive with cities of similar size and economic power while simultaneously reaching a similar green level. Sustainability is no luxury article, because even municipalities with low per capita gross domestic products can create outstanding environmental projects.



Gerhard Borstell and Gerd Wetzig touring the energy-efficient refurbishment of a school in Tangerhütte.

stadt:pilot special: What sort of support from the state and Federal level would be desirable for energy-efficient urban development?

Borstell: It is important to have good contacts with the ministries and the state administrative agency. But you also need a local partner who can keep setting up projects with you. For us, this was the town's building society, which also successfully lobbied for subsidies.

Bornemann: The ExWoSt field of research and the National Urban Development Policy are helpful programmes. But when tough financial decisions are pending in the municipal council, there is certainly a danger that good concepts will end up vanishing into somebody's desk drawer. That is why it would be ideal if we could provide the programmes with an anchor effect. By that I mean that the concept phase should be linked to the financing or partial financing of the implementation. Allow me to make a final comment: in a Europe-wide comparison of metropolises, the large German cities, tightly grouped as they were, did very well. In the study this is attributed among other things to the comparatively strong role of the Federal Government, that is to say the Federal Ministry for Transport, Building and Urban Development, in programme development, basic preparation and norm-setting! According to the study, the impact of the Federal Government's activities on the municipal level was also significant.

Roland Bornemann has been active in the redevelopment department of the Office for Urban Planning and Urban Renewal in Stuttgart since 2000, a function in which he has been particularly involved with sustainability and energy-efficient construction.

Gerhard Borstell was city manager of Tangerhütte until 1994 and then served as the city's mayor until 2010. He is a long-standing member of the district council of the District of Stendal.

Gerd Wetzig has been general manager of the Tangerhütte Municipal Building Society since 1994. He previously worked among other positions as the branch manager of the Magdeburg Building Society.

Energy topic

Urban development concepts and guiding principles

Climate protection and energy efficiency are long-term tasks of urban development. These diverse issues demand a coordinated overall strategy as well as a great deal of communication. Integrated urban development concepts (INSEK) and guiding principles are long-standing instruments that can be adapted accordingly. However, impulses aimed at integrating energy efficiency aspects have so far come less from administrators and politicians than from energy companies and incentive projects. It is frequently individual actors who get the ball rolling with situation-based projects. But when it comes to actively shaping development on the citywide level, there is still a shortage of strategies and concepts for energy and climate protection policy in many places.



Integrated and optimised: energy efficiency goals can particularly be reached when they are integrated into a comprehensive concept (INSEK or INSEK^e). Energetic guiding principles provide important impulses for this. A plausibility check conceived by the ExWoSt research assistance and presented in the 'Action Guidelines for Energy-Efficient Urban Renewal' allows one to estimate a neighbourhood's energy consumption in advance. Source: BTU Cottbus

The integrated concept – a centre of long-term energy-efficient urban development

Updating INSEK to INSEK^e or developing an energy and/or climate concept should be the medium-term goal of municipal urban development. Sustainability and a holistic perspective are high on the list – precisely to avoid slanting the discussion toward the energy issue. Municipal responsibilities have to be clarified, and a determination has to be made as to whether the district and region are both working in parallel on similar concepts. As far as the actual concept development is concerned, it is essential to strive for an interdisciplinary approach rather than a purely sector-based one. Existing experiences should be pooled and skills should be created and expanded on both the

planning and political levels. In order to avoid errors, it makes sense to call in outside experts. The seemingly high initial investment this entails saves a great deal of money and time in the medium term.

Deriving guiding principles and guidelines from an integrated concept

This is particularly effective when the citywide conceptualisation and implementation of model and flagship projects go hand in hand. A guiding principle is helpful here, particularly when it comes to communicating local energy goals to politicians, administrators and citizens and also 'catching' the actors. The guiding principle should be derived from an integrated citywide concept and be developed in common by the administration and the

citizens. Then it is important to formulate guidelines and safeguard them with flagship projects. These should be selected with caution: a failed flagship project will not only shake the credibility of the guiding principle but that of energy-efficient urban renewal as a whole.

Actively involving actors at the 'grass roots level'

Local actors are the key to energy-efficient urban renewal. It is essential to profit from their knowledge and implement their suggestions on the basis of practical examples. Since individual projects have the potential to kick off comprehensive plans, they should be promoted by impulses from above. But municipal administrations should also actively support the 'doers' of projects from below.

We asked **Bernd Poloski**, Mayor of the Hanseatic City of Havelberg (Saxony-Anhalt)

The existing INSEK was continued as INSEK^e within the framework of the ExWoSt research field. This was based on the resolutions and directives of the Altmark regional planning community. Furthermore, there was an additional accompanying study on the available natural raw material potential in the region from the Mitteltelebe biosphere reserve administration. Not least, INSEK^e oriented itself towards the guidelines of the state development plan as well as the general urban land-use plan of the Hanseatic City of Havelberg.

Is there already a self-commitment resolution for INSEK^e on the part of the municipality?

Yes, the city council of the Hanseatic City of Havelberg approved a corresponding resolution at its meeting on 5 May 2011.

Do you feel it is having a positive effect on the implementation of measures?

We are still in the preliminary phase. But there is no doubt that all actors are displaying earnest efforts to make the recommendations of the INSEK^e into the basis of their further planning.

What role are the public utilities assuming?

A central one! The public utilities are a one hundred percent city-owned enterprise and naturally were the actual motor of the development process. Their business field encompasses all supply categories, and they have remarkable technical expertise at their disposal – the basis for very intensive cooperation.



From INSEK to INSEK^e: six central topic areas for Havelberg

- Energy and CO₂ balance sheet of the Hanseatic City of Havelberg
- Developing scenarios for different heating supply and generation options
- Identifying the optimisation potential of different building types for Havelberg
- Presenting the parameters for building efficiency improvement
- Consequences for the operating and maintenance costs of the Havelberg public utility heating supply
- Suggestions and recommendations for the actors involved

Commentary

Neighbourhood-based approaches are important

When looking at energy-efficient urban renewal it is becoming increasingly clear that the effective implementation of climate protection goals can only succeed on the basis of integrated urban renewal and urban development concepts that develop and implement solutions that are suitable and adapted to the respective location using a neighbourhood-based approach. Such energy generation concepts as neighbourhood-based production and use of different energy sources (wind, sun, geothermal etc.) and energy distribution (neighbourhood-based storage and distribution of energy in consideration of the specific needs of different user groups) only begin developing their effectiveness at this level and can also take into account and preserve an area's unique architectural and cultural character.



Ricarda Jill Ruland has been a research associate in the department of 'Baukultur and Urban Architectural Heritage Conservation' at the Federal Institute for Research on Building, Urban Affairs and Spatial Development (BBSR) in the Federal Office for Building and Regional Planning (BBR) since 2003. There she is project director for accompanying research on urban historic preservation, the investment programme for national UNESCO World Heritage Sites along with further related research projects, including the energy-efficient redevelopment of historic neighbourhoods.

Time windows for designing the city of tomorrow

Time horizon I

How long does it take to initiate and implement a project or general strategy for energy-efficient urban renewal? The pilot projects and model projects can provide us with some preliminary indicators.

The **average processing time for citywide plans** (top-down approach) from the beginning of the analysis to the presentation of a draft, in months: **12**

Duration of the **clarification phase** preceding the plan, during which financing is prepared, a partner is found to develop it and corresponding resolutions are brought about in the municipal parliaments, in months: **6 to 12**

This does not take into consideration the period required for the final clarification of financing issues.

The time that passes from the **completion of the plan** to its **approval** by the municipal parliament, which is necessary to implement it (in consideration of possible setbacks in the parliament), in months: **6 to 8**

The time periods required in the model cities varied greatly. This was due less to the plans themselves than to external influences, e.g. the new composition of the city parliament following elections.

Resulting period of time that can be used as a guidepost for the **preparation, processing and voting** on an energy concept in **political bodies**, in months: **24**

Since a range of influences can delay this process, tight supervision by the initiators is extremely important.

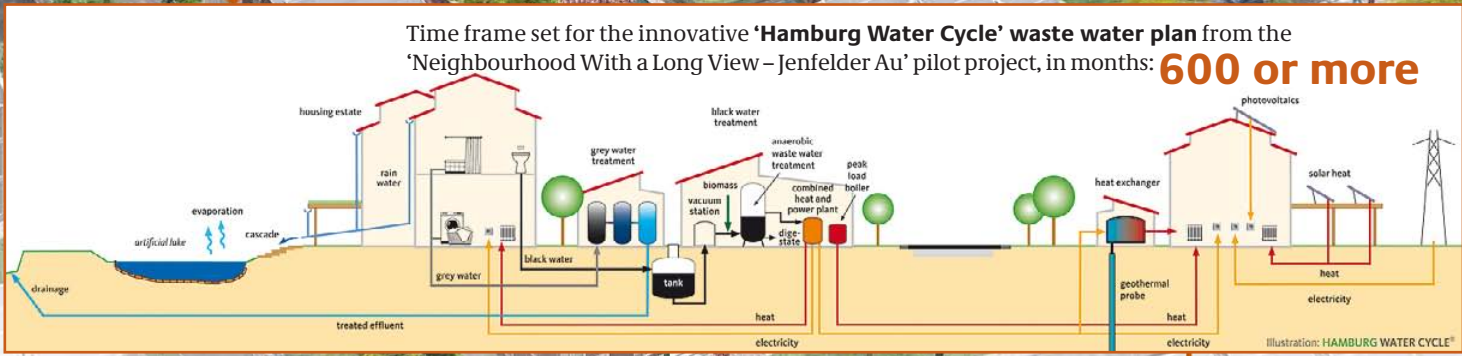
Realistic period of time for the implementation of individual energy-efficient refurbishment projects developed with a **project-oriented bottom-up approach**, in months: **36 or more**

Duration intended for the implementation of a multi-stage **planning procedure** with workshops for the future users to discuss the building plans and a subsequent competition, in months: **6 or more**

This duration is based on a comparison of model projects in Cottbus, Prenzlau and Vetschau, which conducted a planning procedure, with the city of Finsterwalde, which refrained from doing so.

Further reasons for the clearly longer periods for bottom-up procedures in relation to the citywide approach are the novelty and individuality of the projects, which results from their specific size, their architectural implementation and technical facilities. The adoption of new solutions and technologies, e.g. a high-performance thermal heat pump in the Vetschau community centre, requires a certain amount of time for additional studies and communication. This also includes the time needed for the preparation of feasibility studies aimed at limiting investment risks. These periods become shorter as the processes become more routine. That is why projects with high transferability should be favoured in this way.

The average time needed for **applications and approval regarding available support funds** from EU, Federal and state programmes for the financing of bottom-up projects, in months: **6 to 9**



In this infrastructure project, different waste water types are collected separately and then put to new uses. In the future, toilet waste can be used to produce biogas, which in turn can produce heat and electricity for the new Jenfelder Au district. Despite the long period of time and the large investments, the actors are already convinced by the long-term value of the infrastructure project today.

Visible in the background: the Jenfelder Au district in Hamburg as it could one day look.

Four cities, three times, four approaches

Time horizon II

Time plays a role in energy-efficient urban renewal in many places. When it comes to the energy-efficient optimisation of buildings and entire architectural ensembles, it is essential to take their period character and the developed urban identity into consideration. But the future also plays a role: engineering solutions and materials should last as long as possible – a time aspect of sustainability that is often underestimated. Interactions such as this are being intensively studied in the pilot project of the national urban development policy 'Cityscape and Energy' at the German Institute for Civic Art at TU Dortmund.

There is no doubt that reducing energy consumption in built cities is one of the greatest challenges facing the Federal Government's energy goals. This is why it is particularly important that they are not bundled in the energy-efficient city paradigm – like the car-friendly city of the post-war era – thus absorbing all other aspects of integrated urban development. Many current solutions are solely focused on the energy-efficient optimisation of individual buildings, and thus on construction and building services. In the process, we lose sight of such architectural and urban planning connections in built cities as the spatial location of a building within or in relation to the city and the surrounding density. As a result of this one-sided observation, existing,

identity-creating cityscapes clearly lose value when the material basis and structure of streets always follow the same guidelines. Thus, the model project links energy-relevant issues with urban and architectural parameters.

Developing and testing integrated approaches

Solutions are developed for existing settlement structures in cooperation with various building societies where current structures dictate the approaches to be taken. The context, construction period and also the individuality of each estate are examined as they interact with the city as a whole. Through the development of the qualities of architecture, the urban space and energy efficiency demands,

new approaches are developed for a broader view and evaluation of existing urban structures. The urban dimension is concerned not only with the maintenance and preservation of the existing structure. Instead, the point is to improve existing architectural situations on an energetic, organisational and urban design basis using sustainable construction materials demonstrating a favourable energy balance over the long term in regard to manufacture, maintenance and disposal. This can only occur from an integrated perspective. Four urban districts, which were built in different eras in Frankfurt am Main, Lübeck, Mülheim on the Ruhr and Berlin, have been examined so far. Further studies for other construction periods and urban situations are to follow.



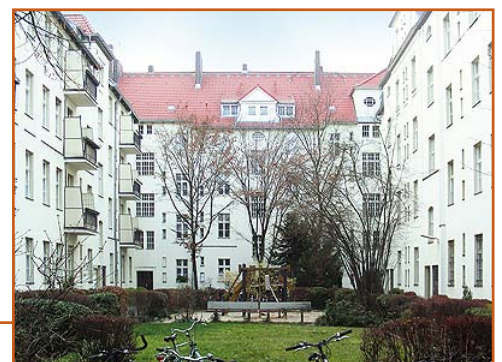
Lübeck, central city: district from the Middle Ages

Frankfurt, Riederwald estate: urban district from the 1920s



Mülheim on the Ruhr, Salierstrasse estate: urban district from the 1920s

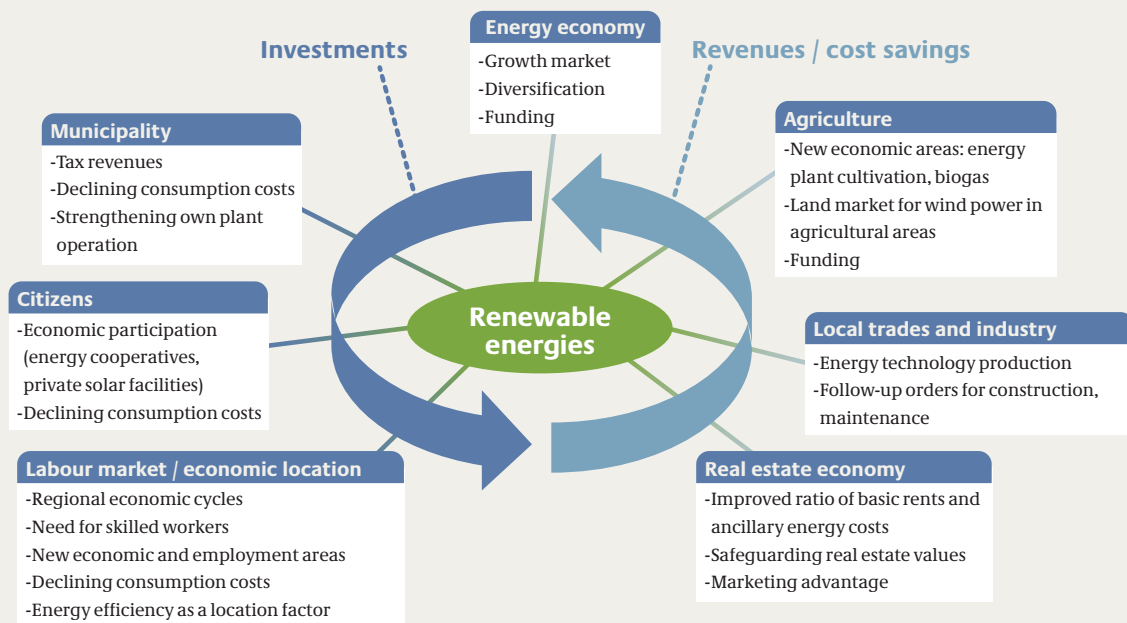
Berlin, Alttempelhof: urban district from the Wilhelmine period



Energy topic

Cost-effectiveness, value creation and incentives

There is no question that climate-friendly and energy-efficient urban development requires high investments and costs a great deal of money. That is why cost-effectiveness and value creation aspects can become weighty arguments in municipal and public discussions. The possibilities provided by value creation in particular have scarcely been recognised. And yet, investments can bring about both indirect effects (e. g. maintenance and material supplies from municipal enterprises) and induced value creation impacts (e. g. profits and wages spent within the community). When it comes to raising awareness among politicians, administrators and citizens, it is essential to regard the cost-effectiveness of what today appears to be a high investment in relation to long-term value creation aspects.



Energy-efficient urban development measures are worthwhile – especially when they are viewed over the long term. Source: Urbanizers

The question of whether energy-saving measures save money is also a central one for all communities. The double-entry book-keeping of municipal budgets plays a not inconsiderable role here. Thanks to this technique, many municipalities are now in a position to identify cost-saving aspects. It looks very different when it comes to the question of when such measures will pay off. For many local politicians, short-term visible results are an important argument. Owners and investors want to make good on their cost benefits as quickly as possible, too. Municipal utilities are a different matter. When it comes to infrastructure renewal, they think in terms of decades. They test measures today that they hope will pay off in thirty or more years.

Don't just go with what you've already tried

In a new field such as the energy transition, it is necessary to try out a variety of approaches. Their cost effectiveness often only reveals itself after implementation, and ideas for improvement are easier to develop in conjunction with concrete projects. If we

invest solely in 'spectacular' and previously tested projects, we can wind up in a long-term blind alley. In order to create a balance, the different approaches should be coordinated into a city-wide plan (INSEK, climate or energy plan). The cost-effectiveness of energy-efficient redevelopment can, for example, be brought about in connection with a trans-generational residential project in order to achieve 'multiple goal effects'.

Economic incentives raise awareness of energy issues

Economic incentives contribute greatly to building awareness. This applies to many central actors of energy-efficient urban renewal. For example, municipal companies can better recognise their savings potential using a municipal CO₂ profit-sharing agreement. If reference points are fallen short of, the company receives money. If they are continually surpassed, they receive less money in the future. However, the measure assumes the presence of a consolidated municipal budget. Revolving funds

are a further incentive. The savings achieved in this way can be used to refinance the fund. When it comes to implementing the measure, a limited liability corporation can be founded together with entrepreneurs, owners, the municipality and energy providers as shareholders. The fund can also be used to finance a climate protection officer or project manager ('driver') to

coordinate neighbourhood-based measures. Linking companies in commercial districts with the property owners of neighbouring residential areas, e. g. in regard to the heating supply, increases value creation and/or cost savings for both sides. Tax breaks designed on a suitably cooperative basis could also be an incentive for companies.

Commentary

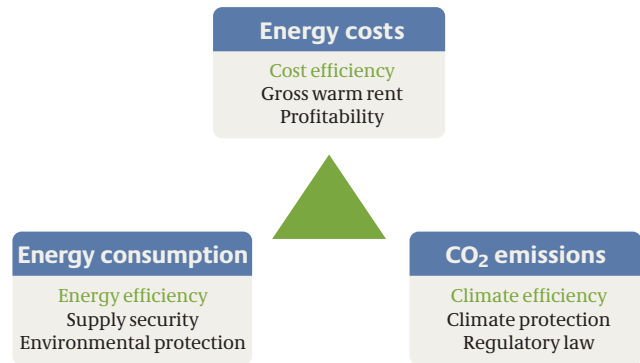
The housing industry at the crossroads of will, ability and coercion

Housing entrepreneurs want to offer their tenants attractive and affordable living space. Integrated and balanced approaches are necessary to achieve resource protection and energy efficiency. Alongside a multi-dimensional approach for technical solutions – weighing up measures to be undertaken on the building shell, the use of engineering technology, utilising renewable energies and finding neighbourhood supply solutions – socially acceptable implementation and thus also economical implementation play a decisive role. While these dimensions should be considered within the framework of a portfolio and a district-wide development, political guidelines for energy efficiency are linked to a few technical parameters, such as primary energy needs, the share of renewable energies and transmission heat loss. The more demanding these technical indicators, the smaller the range of action which remains

for a balanced approach, since more and more needs to be done from a technical point of view. This leads to situations where these processes can no longer be



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Residential housing industry goal triangle: when it comes to energy efficiency measures, technological, social and economic factors mesh.
Source: Ingrid Vogler

sufficiently financed. For example, problems arise with respect to low-income tenants, particularly when communities with difficult budgetary situations attempt to reduce burdens related to assuming tenants' residential expenses. Their ability to pay their rent in turn influences the building owners' economic viability. The measures are only economical when their costs can be refinanced through corresponding rental income.

Somebody has to take the reins



In the Zero Emission Park pilot project, Veronika Wolf brought local entrepreneurs together for discussion and exchange.

Promoting energy goals is one thing. Implementing them is another. Merely the conception and development of a project-based network of actors are time-consuming and require long-term dedication. This is hardly manageable in day-to-day business. What is needed is a qualified management team to coordinate, moderate and advise the process. The 'Zero Emission Park' project was joined by an additional task: reducing the negative ecological, economic and social side effects of an industrial park to zero over the long term. Only through active communication between entrepreneurs and other actors was energy able to be saved. Commuters shifted from cars to local public transportation and bicycles, employers set up bicycle parking lots and shower facilities and the local transportation companies adjusted their schedules to shift-changing times. The conclusion of the project coincided with the end of the process management, and thus of a large portion of the public involvement. Long-term financing and the legal safeguarding of management are becoming central to this and other projects.

Legal foundations and what they are good for

Laws set the framework for the implementation of energy goals. Various legislation from environmental, economic and building law is concerned with energy-efficiency issues. Due to the rapidly changing framework conditions, many of these laws are regularly adapted in their detailed regulations. This overview presents some particularly important laws dealing with planning and building.

§ **Federal Building Code (BauGB):** The Federal Building Code is the central legal instrument for the control of urban development. Since 30 July 2011 the ‘Law on the Promotion of Climate Protection in the Development of Towns and Communities’, which was approved by the Bundestag as an amendment to the Federal Building Code, went into force. This new version is the first to cite climate protection and climate adaptation as explicit goals of urban development (Article 1 Section 5 BauGB). Different individual regulations will regulate energy-efficient, climate-friendly urban development in the future. This includes:

- Expanded display options for climate protection and renewable energies in the preparatory land-use plan (FNP) in Section 5 BauGB and in the legally binding land-use plan (B-Plan) in Section 9 BauGB
- Expanded regulation options regarding energy in the urban development contract (Section 11 BauGB)
- A strengthening of climate protection and renewable energy issues in the weighing up process of German land-use planning (Section 1a BauGB)
- ‘Climate-based urban restructuring’ in the Special Urban Planning Legislation for the avoidance or elimination of urban planning function losses in the non-fulfilment of demands for climate protection and climate adaptation (Section 171 a BauGB)
- Special regulations on the admissibility of measures for energy savings and efficiency in building redevelopment in the new Section 248 BauGB.

§ **Energy Industry Act (EnWG):** The Energy Industry Act particularly regulates the tasks of suppliers and grid operators, as well as of producers and public actors in the energy business. Although the German electricity market is privately organised and has been liberalised, the EnWG provides numerous public means of exerting influence to secure this component of infrastructure services. The EnWG was altered by law as of 26 January 2012.

§ **Renewable Energy Sources Act (EEG):** The Renewable Energy Sources Act contains various elements designed to contribute to the increased share of renewable energies in electricity generation. The goal set out in Section 1 paragraph 2 EEG, namely to increase this share “to at least 30 percent by the year 2020 and to continue increasing it thereafter”, lays out the framework for the overall political strategy. The most important pillars supporting the implementation of these goals are the obligations that have been placed on the grid operators to link the production facilities for renewable energies to the power networks, the obligation to prioritise the feeding of these energies and the supported feed-in remuneration that has been set according to energy type.

§ **Renewable Energies Heat Act (EEWärmeG):** The Renewable Energies Heat Act is aimed at increasing the share of renewable energies in the heating of buildings. Substitute energy saving measures can compensate for these regulations under certain conditions. An additional important regulation concerns the possibility of mandatory linkups for all properties in neighbourhoods with existing district heating grids in order to increase the load factor of this energy-efficient infrastructure.

§ **Energy Saving Act (EnEG)/Energy Saving Ordinance (EnEV):** Both laws regulate the minimum standards for the consumption of operating energy in many buildings. These requirements create a powerful impetus both for energy-efficient modernisation of existing buildings and new, energy-efficient construction.

§ **Combined Heat and Power Act (KWKG 2002):** The Combined Heat and Power Act also has an incentive effect on energy-efficient urban development due to its promotion of modernisation and new plants, as well as compulsory linkups for facilities generating combined electricity and heating energy.

Funding instruments and who can benefit from them

The incentive to invest in energy efficiency and renewable energies is undoubtedly enhanced by means of funding programmes and instruments. How far this spectrum reaches already becomes clear through this selection. Project-related packages can be tied up using targeted links.

- € **Market incentive programmes to promote renewable energies as well as renewable energies in the heat economy:** These programmes support the installation and utilisation of new energy technology in various building types. Privately, publicly and commercially active owners and tenants can make use of these programmes, which are supervised by the Federal Office of Economics and Export Control (BAfA).

- € **KfW programme on 'urban energy-efficient rehabilitation / energy-efficient supply for neighbourhoods':** With its energy concept, the Federal Government has approved the condition of a funding programme for 'energy-efficient urban rehabilitation'. This is intended to cover the path from building to neighbourhood in consideration of architectural-cultural qualities. The programme is designed to initiate comprehensive measures for the energy-efficiency of buildings and infrastructure, particularly in older inner-city neighbourhoods. The intention is to include not only the municipalities, but also the commercial housing industry and individual private owners. Within the framework of this programme, subsidies for integrated neighbourhood concepts and redevelopment managers are available for energy-efficient urban rehabilitation.

- € **KfW funding programmes for energy-efficient construction and refurbishment within the framework of the CO₂ building rehabilitation programme:** The programmes entail the promotion of newly established energy-efficient residential buildings, the retrofitting of existing residential building stock into KfW efficiency buildings as well as individual measures. Funding occurs via a low-interest credit or, alternatively, in the form of an investment subsidy for retrofitting. In 2012, particularly attractive funding conditions were introduced for historical monuments and other especially preservation-worthy structures. The programmes are particularly aimed at private owners as well as housing companies and owner associations.

- € **KfW programmes for 'energy-efficient refurbishment – municipalities' and 'social investment programme – energy-efficient building refurbishment' within the framework of the CO₂ building rehabilitation programme and 'energy-efficient city lighting':** These programmes fund the comprehensive energy-efficient redevelopment of individual measures as well as buildings related to municipal and social infrastructure via low-interest credits. The programmes are aimed at both municipalities and non-profit or church-based sponsors. Moreover, it offers financing for investments in the sustainable improvement of energy-efficient public city lighting.

- € **Renewable Energy Sources Act (EEG):** This law regulates not only prioritised supplies of renewable energies, but also the promotion of electricity generated from renewable sources via feed-in remuneration. It is thus of great significance for all operators of production facilities for renewable energies.

- € **Combined Heat and Power Act (KWKG 2002):** The Combined Heat and Power Act is directed at the operators of energy-generating facilities. It funds the establishment of infrastructures for the efficient, simultaneous utilisation and feed-in of heat and electricity and subsidises the electricity generated in these facilities.

- € **Urban Development Promotion Programme:** The Urban Development Promotion Programme funded by the Federal Government and the federal states does not explicitly provide energy-efficient or climate-friendly subsidies, but rather instruments for integrated, sustainable urban development. The amendment to the Federal Building Code (BauGB) in July 2011 further strengthens energy-efficient and climate-friendly urban restructuring in Section 171 a BauGB. Entire neighbourhoods in participating municipalities represent the reference areas. Urban development programmes support public and private measures.

- € **Funding for climate protection projects:** An entire range of funding opportunities for all groups of actors is assembled beneath the umbrella of the Climate Initiative of the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU). Among other possibilities, the funding of climate protection concepts and management is of particular interest to municipalities.

Energy topic

Urban development promotion

The urban development promotion programme is one of the most important driving forces for urban development processes. It is well suited for introducing and institutionalising overarching urban development goals. It has shown success over and over again since its introduction in 1971, for example in regard to cautious urban renewal, social urban development and the management of structural change and the consequences of urban shrinkage. Why should this not also be possible for the energy-efficient and climate-friendly city?

District infrastructure and network reconstruction in a neighbourhood as a task for the urban development promotion programme

The neighbourhood focus is a special characteristic of the urban development promotion programme. It is thus particularly well suited for the energy-efficient development of entire urban districts. In many places it is already evident that the great potential in energy-efficient restructuring derive from cross-property measures and a focus on neighbourhoods, not from individual buildings. The urban development promotion programme in particular allows for the implementation of individual projects within the context of overarching development goals for the entire assisted area. The demand that “neighbourhoods not be made efficient by packing up buildings but rather through networks and infrastructure” provides the basic orientation for an energy-efficient urban renewal concept that clearly goes beyond individual property refurbishment and façade insulation. Such a neighbourhood renovation project only takes full effect through the linking of different individual measures, ranging from energy-saving network infrastructure all the way to façade insulation. All of this can be bundled with neighbourhood-based urban development funding. It is clear that strategies aimed at the networked supply of existing areas (e. g. waste heat and combined heat and power) and the development of new local and district heating networks are not manageable with building-based instruments. Thus future tasks for the urban development promotion programme cannot just be based on the support for the so-called uneconomical costs of individual architectural measures but also on the expansion of supply networks and pipe systems in addition to tasks such as the upgrading of the residential environment and public spaces.

Designing not just neighbourhoods but also processes

Like other complex neighbourhood developments, energy-efficient urban renewal also requires an especially high degree of coordination and cooperation before the actual energy-saving construction measures can be defined or implemented. This entails the quality of the urban development promotion programme developed over years of practice. It is not merely urban

development funding, but also procedural funding. Pre-investment and investment-supporting measures such as the preparation of an integrated planning concept, management, communication, participation and financial organisation allow for a coordinated neighbourhood effort instead of an isolated case of ‘projectitis’, which can easily lead to poorly-coordinated and misguided investments. The programme-specific procedural regulations and the special urban planning legislation provide a set of instruments allowing for both experimental and more strongly intervening and regulatory approaches. Procedures such as assigning the redevelopment of energy grids to fiduciary enterprises according to section 158 of the Federal Building Code, the establishment of special funds for energy-saving public utility infrastructure and the joint public-private financing of energy efficiency measures by means of a contingency fund are all conceivable here.

Integrated action? That’s standard procedure in the urban development promotion programme!

Most instruments in the ‘funding jungle’ have one thing in common: they are targeted and earmarked. The flip side of this is that they only rarely form part of an integrated approach. The urban development promotion programme is different. It is consciously oriented towards multi-dimensional effects and integrated development targets. In this way, urban development funding can pick up on synergies while also taking greater consideration of potential conflict areas, e. g. design and social sustainability. Resource and financial bundling also succeed better with holistic approaches than with highly specialised measures. When it comes to an energy-efficient retrofit conducted for economic reasons, urban development funding can also guarantee minimum planning-cultural standards such as participation and the weighing of interests. The key to integrated action is integrated neighbourhood-based development concepts, which are also prescribed by the Federal Building Code for most assisted areas. Renewable energies and climate protection would integrate well into the basic instruments of Preliminary Examination and Integrated Action and/or Development concepts (IHK, IEK), not only as marginal elements but also as an obligatory core component. However, this requires qualified processing in cooperation with experts.



Urban development funds in use: with its project 'Energy City Baumholder 2020', Baumholder places energy at the centre of its urban development concept.

An example for this could be the linkage of retail concepts and integrated action concepts in the 'Active City and District Centres' funding programme. In this way, energy-optimised integrated urban renewal concepts (INSEK^e) in the 'Energy-Efficient Urban Renewal' ExWoSt research field were developed and applied. When measuring energy-efficiency, it is important to observe not only final energy consumption but also the overall energy balance sheet as well as the neighbourhood's CO₂ balance sheet. When updating the concepts, it is important to demand that energy-saving goals be subsequently included within existing structures. The goal must be to regard energy efficiency approaches not as special measures but rather as climate protection mainstreaming on an integrated and comprehensive basis.

Urban climate restructuring in the amendment of the Special Urban Planning Legislation

According to the new version of Section 171 a Paragraph 2 of the Federal Building Code (BauGB) – introduced by the law to promote climate protection in the development of cities and communities of 22 July 2011 (BGBl. I Nr. 39 of 29 July 2011, p. 1,509) – “when

the general requirements of climate protection and climate adaptation are not fulfilled”, this represents an urban functional loss, which can justify the implementation of an urban restructuring measure. The law states with absolute clarity that these tasks demand comprehensive, neighbourhood-based intervention. The claim that property-based approaches are not sufficient in regard to climate-friendly urban renewal is concretised here in terms of planning legislation. The use of funding and legal instruments that were previously used in complex problem situations characterised by structural transformation and the housing industry thus takes on a new qualitative objective. The special urban planning legislation is now well established in instrumental and programmatic terms. It will be interesting to observe whether the municipalities will pick up on this offer and whether a solid financial basis for these potential areas of activity of the urban development promotion programme can be found. The contrast between municipal conditions and conditions in the metropolis, with large financial, staff and professional resources on the one hand and relatively weakly positioned small towns on the other, must be taken into consideration during the implementation process.

Commentary

Shaping the future of cities together

Linking urban development policy with the topics of renewable energies, climate protection and energy efficiency had already been an important concern for the Federal Ministry of Transport, Building and Urban Development before the energy policy resolutions of the Federal Government in 2010/11. Urban development policy is focused on the long term and must face new challenges. As far as my field of activity within the ministry is concerned, I find it particularly exciting that the threads linking the two urban development megatrends together converge here. We are linking the urban development programmes for Urban Restructuring in East and West Germany from the urban development promotion programme, which serve to manage the demographic and economic change, with research fields from the Experimental Housing and Urban Development programme (ExWoSt), which serve partly to save energy and protect the climate, but also partly to adapt cities to climate change. In both cases, the focus is on the fact that shrinking and adjustment processes are often difficult, but they also offer opportunities to achieve a new urban quality. We wish to actively and effectively support the municipalities in this process.



Manfred Hilgen is the director of Department SW 23 – Urban Restructuring in East and West Germany – in the Federal Ministry for Transport, Building and Urban Development.

Energy-efficient urban redevelopment from a legal perspective It's complicated...

The implementation of pilot and demonstration projects is decisively influenced by legal frameworks. New laws strengthen the municipalities as they undertake measures to ensure climate-friendly urban development. *stadt:pilot* special spoke with legal scholar Monika Böhm regarding which legal instruments and approaches are suitable and when, how property owners can be involved and where further clarification is needed.

stadt:pilot special: What possibilities does building law provide in order for it to become an effective instrument for the achievement of climate protection goals and in helping to bring about an energy transition?



Monika Böhm: Building law undoubtedly plays a central role. However, we must differentiate between new construction and redevelopment of the existing building stock. Demands are made on new construction in special laws, e. g. regarding how insulation should occur and what energy values must be

achieved. The Federal Building Code allows municipalities to set standards within the framework of urban land-use planning, e. g. for the utilisation of such renewable energies as solar energy in the construction of new buildings. With the inclusion of climate protection in the amendment to the Federal Building Code, there are now further opportunities, which, if only on a point-by-point basis, have an influence on the urban development funding law. The municipalities' freedom of action has been expanded. But aside from the fact that many municipalities are not currently making use of this freedom, the setting of standards is often not sufficient when it comes to renovating existing buildings.

stadt:pilot special: Why?

Böhm: Because every owner has rights!

stadt:pilot special: Involving owners here is showing itself to be difficult in many fields of urban development. Where are the legal challenges?

Böhm: If a building has been built in accordance with the law, the owners enjoy rights of continuance. In principle, they have no obligation to change anything. Single-family homes and other properties do not represent an immediate danger, unlike chemical factories or nuclear power stations. To what extent climate protection justifies interventions in the rights of continuance in regard to residential buildings has yet to be clarified.

stadt:pilot special: Are there any legal possibilities for the energetic retrofitting of existing buildings?

Böhm: Indirectly, if a building is to be redeveloped, or if an addition is planned. In both cases, similar energy-efficiency regulations can be demanded as would be for a new construction.

stadt:pilot special: In your opinion, where are the main areas of potential in the current laws for the energy transition? I can think of urban land-use planning, building approvals, special urban planning legislation and the federal states' building regulations.

Böhm: Let's take the federal states' building regulations. Some states have passed regulations according to which an energy-efficient system is to be selected for heating facilities in the case of redevelopment or renovation. Such concrete steps are needed in order to expand the municipalities' freedom of action. Hamburg, North Rhine-Westphalia and Baden-Württemberg provide examples of how one could approach this.

stadt:pilot special: What about the other points?

Böhm: Unfortunately, it's complicated. We are dealing with a complex interaction of regulations and competencies. EU regulations and Federal legislation must be observed. The states must in turn issue authorisations...

stadt:pilot special: ...on the basis of which all municipalities of the respective state can approach local regulations.

Böhm: Right! The states must prepare the corresponding authorisations to allow the municipalities to issue statutes. In Marburg, a controversial and much-discussed solar statute was issued. There was a corresponding authorisation in the Hessian building regulation. The Administrative Court in Giessen ruled that the statute conformed to the law in principle. Just one or two special cases still had to be adopted in the statute, which the city of Marburg then proceeded to do. The solar statute prescribed various options, for example for climate-protecting heating systems, from among which a real estate owner should then choose. Then there was a sudden change of course. The authorisation was cancelled again in the Hessian building regulation, and thus also the basis for such statutes. The Marburg statute was abrogated.

stadt:pilot special: Was that related to the heated discussion in the press? Terms like 'eco-dictatorship' and 'solar coercion' dominated the debate.



When it comes to energy-efficient retrofit, owners' rights in particular must be taken into consideration. Shown here: these buildings on the market square of the historic centre of Weissenfels have been restored in accordance with heritage conservation and energy-efficiency principles.

Böhm: I'd like to look at it from a legal point of view. The background was that the solar statute would have meant an intervention in the freedom and property of many real estate owners and of persons who wished to become real estate owners. The statute provided a legal basis for such an approach.

stadt:pilot special: How about the special urban planning legislation? Are there also possibilities to determine corresponding areas?

Böhm: Only up to a point. Here too, specific authorisations are needed if one wants to regulate climate protection or energy efficiency for existing buildings.

stadt:pilot special: When it comes to a new field of this kind, doesn't this also require a willingness to experiment?

Böhm: As a matter of fact, it does. But municipalities want clear regulations, not experiments. And justifiably so. In administrative terms, this provides for a clear approach, and in local political terms, this means that a measure's chances for success increase, which is ultimately of central importance when it comes to securing the acceptance of the citizens. If a municipality's initiative fails in court after a long legal suit, this has a negative impact on all energy-efficient retrofit projects.

stadt:pilot special: From a legal perspective, how far can one go on the municipal level towards implementing climate protection, energy-efficiency and the use of renewable energies?

Böhm: As a lawyer, I can only answer that question up to a certain point. Alongside the vertical interplay of competencies, laws, authorisations and statutes, professional planning expertise is required. We are an auxiliary science in this field. For example, it is

only possible to assess the commensurability of energy-efficiency measures to be imposed on owners or tenants on the basis of expert knowledge. But this means the legal frame of action can adjust itself in one direction or the other.

stadt:pilot special: What about the cooperation between experts and lawyers?

Böhm: The legal evaluation in particular is predicated on differentiated model calculations. In my opinion, one possibility would be to have model and demonstration projects, such as the one in Munich-Freiham, supervised by lawyers. Among other things, this project's deep geo-thermal heating plant could provide interesting information regarding the sensitive issue of an obligatory hook-up to the district heating grid, and/or how this could be achieved on a voluntary basis, without resorting to legal measures.

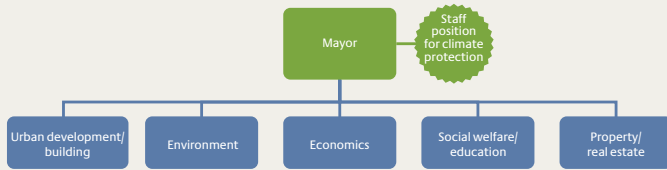
stadt:pilot special: What does the legal situation here look like at the moment?

Böhm: The municipal codes entail the possibility of requiring obligatory hook-ups and use for municipal facilities. However, climate protection usually isn't expressly mentioned as a justification. But now it is clearly stipulated in Section 16 Renewable Energies Heat Act (EEWärmeG) that municipal competencies can also be "made use of for the purposes of climate and resource protection". But there is another hurdle in regard to the heating systems in use. When there is a functioning system in place, it is very difficult to require owners to install a new one. It is different when the heating system has to be replaced anyway. In this case, an energy-efficient district heating grid can be considered.

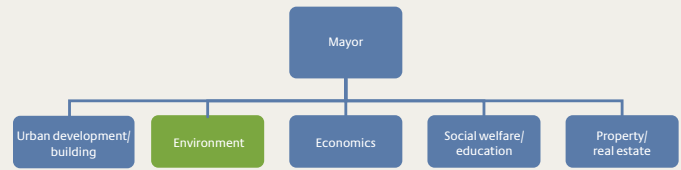
stadt:pilot special: Is there an alternative?

Böhm: When it comes to making people more willing to adjust, I believe incentive systems can be helpful, for example existing KfW measures. Good examples and consulting measures as well as an objective public discussion would be further aspects. The fact is that legal regulations alone, without financial support or tax incentives, will not be enough.

Prof Dr Monika Böhm has been working at the Chair of State and Administrative Law at the Philipps University in Marburg since 2000. She has been a public prosecutor at the Hessian State Court since 2009. She has become known for her numerous publications and lectures, including presentations on environmental, planning and building law. She is a cooperation partner with the Demonstration Project for Energy-Efficient Urban Renewal in Marburg on the Lahn.



Central coordination office



Sectoral responsibility of one specialised department

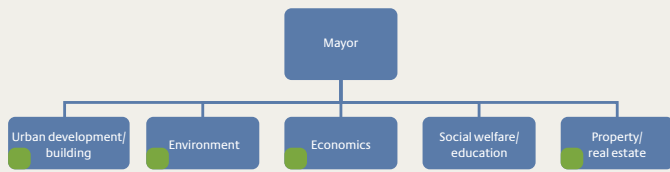
Energy topic Administration

Eleven persons work at the building authority in the small Brandenburg city of Jüterbog. Their tasks extend from green space maintenance to the administration of public buildings, and stretch all the way to the conversion of former military bases and land-use planning. Figuring out just how a small town administration is supposed to maintain the necessary professional competency for such a complex topic as climate protection is a difficult task for Maud Decker, who is responsible for urban planning at the Jüterbog building authority. That is why she is happy to have the opportunity to join together with colleagues from six other towns in the 'Brandenburg Network for Energy and Climate-Efficient Urban Development' (BraNEK) and develop ideas on the subject of how municipal administrations can shoulder this frequently novel topic. What at first glance looks like a small town problem is equally symptomatic of much larger cities as well. There is no clear responsibility for these future issues, even though nearly all departments are involved in them in some way. The decentralised organisation scarcely allows for targeted energy-efficient and climate-based urban development. It usually occurs by chance when, for example, a childcare facility needs to be renovated on an energy-efficient basis. It clearly makes sense to assign it to a specific department. This department is frequently

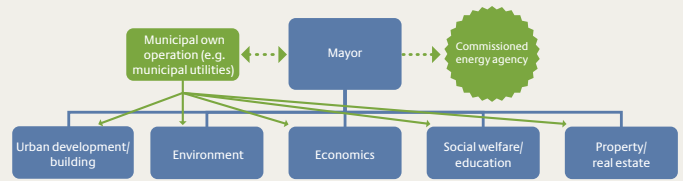
the building administration. When there is a strong energy focus, it can also be the business development agency or, when the climate is at issue, the environmental protection office. The benefit here is clear responsibilities. However, cross-cutting issues become almost inevitably lopsided when they are assigned one-sidedly. This reduces acceptance and cooperation from other areas. Somewhat larger towns, like Cottbus, which is also a member of BraNEK, have a department of urban development, which at least entails an overarching strategic level. "Lots of things that are a bit more complex and go beyond individual buildings end up on our table!" is how Thomas Kramer, group director for urban development, sums the situation up. With its well-rehearsed integrated approach, urban development is actually a 'natural partner' for climate protection and the energy transition. But specialised qualifications have to be established there as well. What are the alternatives? One example is interdisciplinary working groups. They help prevent a department-focused one-sidedness while also demanding a high degree of coordination. Moreover, somebody has to hold the working group together and actively continue developing its tasks. A staff position is frequently set up alongside the mayor to maintain a neutral position above specialised interests while maintaining an influential status.

Organising climate protection in administrations

- 1 Plan for long periods of time: build up long-term planning for organisational structures.
- 2 Interdepartmental cooperation: urban planning/building, economic development, property and the environment are directly affected.
- 3 Train administration for further qualifications: professional knowledge must be acquired for new tasks.
- 4 Ensure political support: administration requires backing for unpopular tasks.
- 5 Include external expertise: administration does not need to cover everything but should centrally coordinate the process.
- 6 Allow for increased costs: new tasks require additional funds that can pay off later.



Distributed responsibilities



Authorities outside of the administration

The topic of energy can be anchored in various sections of the administration. This organigram shows examples of possible approaches. Source: Urbanizers

Another model involves transferring responsibility and support to actors with a connection to the city. These can be municipal energy suppliers, who often function as process motors. Qualified service providers can also work towards the inside, in the administration, and towards the outside, on the local public stage. The risk here is that municipal administrators, citizens and politicians could assume a role that is too passive of a role and neglect developing their own competencies. It is essential for both models to cooperate in an overarching manner and for the municipalities to actively manage their own development. This also includes ensuring that the specialised administrators can build upon the necessary backing from municipal politicians and administrative heads. An effective municipal control of climate protection demands not only additional planning but also restrictions on building projects or obligations, such

as the mandatory link-up to efficient energy supply systems via statute – none of which are particularly popular procedures in municipal politics. This leeway can hardly be taken advantage of without political support. Thomas Lenz, who recently assumed responsibility for climate protection in the BraNEK member city of Brandenburg on the Havel, has another idea. He suggests that we regard the topic much more strongly in terms of services of general interest. In this way, activities would be upgraded from voluntary to compulsory tasks and be anchored in the municipalities alongside other public services such as civil engineering and public order. He is aware that the municipalities would have to shoulder more tasks. And yet, there is no alternative to tightening up the municipalities for these future tasks by supplying them with the proper equipment as well as the necessary qualifications and competencies.

Commentary

Integrated approaches for the future tasks of energy and climate protection

In Ludwigsburg, the impulse to anchor the issues of renewable energies and climate protection more closely in the administration emerged from the updated urban development plan (SEK) and is the basis for administrative action through the Energy Master Plan control element. The SEK was developed starting in 2004 in a dialogue between the citizens, politicians and administrators within the framework of the future conferences on the basis of the so-called questions to the future, for which answers need to be prepared already today in order to be prepared for such future challenges as scarce resources and climate change. Eleven topic areas were defined from among these results, including energy. The strategic goals are anchored in the master plan and are coordinated and networked as holistically as possible by the Sustainable Urban Development department. Control occurs through the Energy management board. The new position of climate protection manager is being created out of activities within the framework of the climate-neutral community initiative. The city places great value on integrated approaches to its future development. The Europe and Energy team in the Sustainable Urban Development department works closely with universities and research institutes. For example, the general energy concept in Ludwigsburg was developed in close cooperation with competent partners among politicians, the business community and the citizenry. Participation in various funding programmes generated important support. When we look at the existing general energy concept, the utilisation of resources for this future project was more than worthwhile. It showed that the issues of energy and climate protection should not be viewed on a situational and isolated basis, but

should instead be pooled by networking activities and actors. By the involvement of the citizenry and local public figures it is possible to incorporate different viewpoints and ideas – an important basis for a broader consensus and greater acceptance. An administrative system should be installed through the development of an advanced vision of the future. This system should guarantee a transparent pursuit of goals and provide feedback to the citizens on where the city stands in achieving its goals.



Albert Geiger directs the Department of Sustainable Urban Development and is responsible for the citizens' information office on building in the City of Ludwigsburg.

From municipality to municipality: 17 steps for successfully implementing climate protection, energy efficiency and the use of renewable energy

1 From individual objects to an overall strategy

Individual individual buildings and sites frequently provide the impetus for energy topics. In order to make full use of energy efficiency potential, the focus should quickly be directed at the development of an overall strategy, e. g. in the form of a climate or energy concept.

2 Integrated Urban Development Concepts (INSEK) as a basis

The updating of INSEK to INSEK^e including energy aspects is a good opportunity to conceive climate and energy goals and prepare their implementation.

3 Including cost-effectiveness and value creation as arguments

The linkage of cost-effectiveness and value creation effects with aspects of integrated energy-efficient urban renewal can make a project more convincing.

4 Energy and climate protection require cross-cutting skills

Energy-efficient urban development requires new competencies that often have to be developed on the political, administrative, professional and technical level. Pooling them is essential in order to make more effective use of cross-cutting savings.

5 Energetic guiding principles provide orientation

Guiding principles along with guidelines and flagship projects provide help in jointly implementing municipal energy goals and in building a consensus. In the best case, the guiding principle should be developed on the basis of a citywide energy or climate concept. With the help of attendant monitoring, guidelines and flagship projects can be continually adapted.

6 Focus on the neighbourhood level

The greatest areas of potential are seen in energy-efficient redevelopment are seen in cross-property measures and on the neighbourhood level. Particular value should be attached to linking property refurbishment with the development of local and district heating grids based on renewable energies.

7 Integrated approaches in administrations

Energy efficiency and climate protection should become a cross-cutting issue for the city administration. Building and urban planning departments along with cross-divisional staff positions can assume important coordination tasks.

8 Balancing climate protection in its overall effects

The value of climate protection measures can only be judged when such aspects as resource consumption, technology, acceptance and intrinsic value are considered. Interdisciplinary work styles are a central component.

9 Legal instruments allow for confident action

A prompt and continuous adjustment of legal instruments to overarching goals and to the use of new technical solutions provides clear frameworks for energy-efficient redevelopment.

10 Supporting municipalities with new tasks

Energy-efficient redevelopment provides municipalities with specific demands regarding control, consultation and communication. Particularly small communities with low staffing levels should bring in outside professional support.

11 Communication increases acceptance for energy-efficient urban renewal

Early communication of the complex interactions of climate protection and energy policy can increase the acceptance of the actors involved and of the population. Long-term cost-effectiveness and value creation perspectives are easier to realise this way.

12 Those responsible moderate and coordinate processes

Processes succeed particularly well when a coordinating person includes different actors in a network. Such a project manager or driver can develop concepts and keep the ball rolling.

13 Involving actors at the 'grassroots'

Local actors are the key to sustainable energy-efficient urban renewal. Municipal administrators and politicians can profit from their knowledge.

14 A recognisable political will promotes acceptance

Projects and measures can only be successful when politicians and administrators convincingly stand behind them. Practical key projects help to 'pick up' decision-makers and the population.

15 Observe the architectural-cultural dimension of energy-efficient urban renewal

Energy-efficient urban renewal is linked to architectural-cultural processes. Administrations should promote cultural and social aspects by developing architectural-cultural energy awareness.

16 Keep an eye on design while redeveloping

The promotion of energy-efficient redevelopment should correspond with technical necessity and an eye for design. The development of design guidelines is not only important for listed buildings, but also for housing estates and buildings located outside of historic central cities.

17 Targeted funding of holistic concepts

Strongly coordinated funding programmes can make a considerable contribution to the development of integrated approaches to energy-efficient urban renewal. The funding should also be made dependent on preparatory and neighbourhood-based urban development concepts.

Energy topic

Top-down or bottom-up

Two fundamentally different approaches are available for energy-efficient urban renewal: top-down and bottom-up. Which approach is better largely depends on whether a municipality has already developed the necessary skills to deal with the issue. It is also possible to work with both approaches at the same time.

Top-down – from general plan to project

The top-down or concept-oriented approach corresponds to ‘classic’ municipal planning practice. Systematic approaches and comprehensive development are especially possible here. In the case of energy-efficient urban renewal, the starting point is the identification of existing savings potential linked with the formulation of municipal savings objectives. Both are used to develop an energy-efficient and usually citywide plan. This plan is then used to derive

energy-efficient neighbourhood concepts with corresponding projects. Municipal administrative structures are essential for its success. It can be helpful to arrange for an energy officer or a person responsible for directly addressing and involving central actors. This is not (yet) the case in many municipalities – after playing virtually no role in the past twenty years, integrated energy concepts have only begun to gain significance on the citywide level in municipal planning practice in recent times.

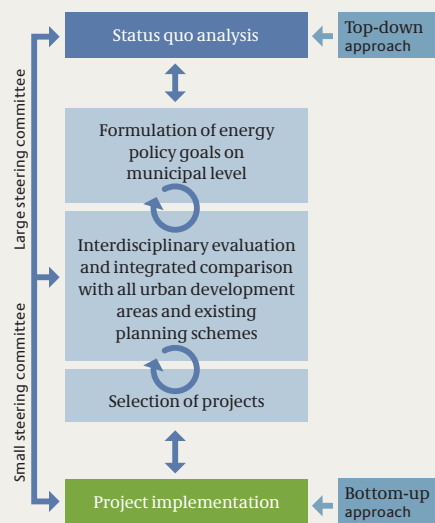
Top-down – from gravel patch to model neighbourhood

If anyone had taken a look behind St. Mary’s Church in Weißenfels five years ago, he or she would have seen a giant patch of gravel surrounded by an intact city centre. The reason for this remarkable urban desert was that most buildings on Marienstrasse were torn down shortly before the fall of communism in order to erect new structures on the site. But nothing came of these plans. Some additional buildings fell into disrepair and had to be demolished later on. There was considerable discussion regarding what should be done with the area, but almost nothing happened for nearly fifteen years. The situation in Weißenfels is typical for many towns: extensive valuable building stock in need of elaborate redevelopment, a relatively low demand for residential space due to a declining population, and hesitant investors. The people in Weißenfels regarded this situation as a challenge. Taking a comprehensive, city-wide perspective, they analysed the conditions and potential for future development. Fundamental issues of demography, energy supply and transport were discussed. This analysis led to a general strategy with energy-efficient renewal at its core. It soon became clear that Weißenfels could only face the future if it placed energy savings and renewable energies at

the centre of its planning. Then, last year, the city approved the ‘Technical Energy Concept’ as part of the ‘2020 Urban Development Concept’. This plan provides Weißenfels with criteria on what direction the energy-efficient redevelopment process should take – e. g. which renewable energy sources make sense where and what needs will have to be met in the future. The concept also provides concrete solutions for individual projects – including the ‘problem zone’ on Marienstrasse. Here, Weißenfels has since demonstrated in exemplary fashion how new energy-efficient inner-city construction can look: seven row houses have been built according to passive house standards along with a senior care centre. The building style fits into the developed cityscape. When it came to implementation, the focus on seniors also provided the necessary security in regard to the demographic trend. The still undeveloped areas were transformed into temporary green spaces – until new construction can occur there as well. The technical concept has shown investors that the city is serious about redevelopment, leading to further constructive discussions. The concept also showed something else about the old city: an energy-efficient heating supply can balance out the energy-efficiency deficits that historic buildings retain as long as one does not wish to intervene too much in their preservation-worthy structural fabric. No wonder that energy-efficient model redevelopment projects are also being planned.



Seven passive houses in the old city of Weißenfels



Bottom-up – from project to general plan

If the conditions are not in place, e. g. in the administration, then a project-focused bottom-up approach can make sense. It should be mainly used for demonstration projects with the highest possible imitation effects. It is important to have a good understanding of constructive measures in order to actually achieve the desired effects. Using experiences from the project, the municipality can develop new skills and/or strengthen existing ones. Both can be used for developing an energy-efficient neighbourhood plan or comprehensive plan. A network of actors gradually develops alongside. It is beneficial for municipal persuasion efforts if the projects can become ‘visible’ to everyone relatively soon.

Both are possible: top-down and bottom-up approaches.
Source: BTU Cottbus

Bottom-up – from school redevelopment to climate protection plan

The city of Spremberg is almost entirely surrounded by active, partially discontinued and also freshly planned areas for the Lusatian lignite strip-mining industry. Despite this fact – or perhaps because of it – there is a desire here to set the stage for a green and renewable energy future. There is little practical experience here with renewable energies and energy efficiency in urban development. That is why the town took the necessary redevelopment of a former school as an educational and leisure centre as an opportunity to learn for itself what is important, what is possible, and what pays off when it comes to energy-efficient renovation. Using this concrete learning and demonstration object, they tested energy supply scenarios, technical possibilities and savings potentials. In the process, they raised awareness for this topic among both politicians and citizens. For one thing was clear from the beginning: if the town hoped to inspire imitators, it would have to provide a positive example and both vividly and credibly show its citizens the benefits and technical details. In these new buildings, particularly young people can see how energy – and money – can be saved and how renewable energies can be utilised right in the centre of town.



The three buildings required individual solutions. During the redevelopment of the boarding school, a decision was made to leave up the façade insulation from the 1990s, even though it falls far short of present-day efficiency standards. Instead, they insulated the building’s ‘floors’ and ‘lids’ – i. e. the cellar and storey slabs. The gymnasium was gutted and equipped with a new low temperature heating system fed by a heat pump. The Association House (Haus der Vereine) showed that the greatest energy savings potential could be achieved by an own link to the district heating grid. A so-called BUS system ‘intelligently’ controls the heating and lighting. For example, the heating is reduced whenever windows are opened. Although the actual energy needs of the buildings, which were put into operation in 2010, are still being assessed, people are already anticipating an enormous reduction in ancillary costs. These renovation projects got the ball rolling. Important actors were convinced that this was the right path to take. The town has now decided to advance the citywide expansion of photovoltaic facilities. In the energy-efficient urban redevelopment working group, representatives from the administration, political and business communities are consulting with one another on how to save energy and reduce operating expenses. And in an effort to retain the positive mood that has arisen in the city due to these successes over the long term, the city is working on a climate protection plan. A citywide schedule is to be developed by the end of 2011. This instrument is all the more important due to the fact that local commercial tax revenues from the nearby lignite-fuelled power station have declined drastically due to the Federal Government’s energy transition policy.

A visible symbol of energy-efficient redevelopment: the inner-city educational and leisure centre in Spremberg.

Perspectives for the energy transition in the cities

The time to act is now!

Linking practical knowledge with a cautious look into the future was the topic of a discussion that stadt:pilot special conducted with János Brenner, BMVBS, Lars Porsche, BBSR and Peter Busch, Ministry for Infrastructure and Agriculture (MIL) of the state of Brandenburg. A further point concerned how existing instruments for the implementation of the energy transition are to take effect and where the framework should perhaps be changed. This was linked to the question of what needs to be done now. Alongside the issue of how to manage growing levels of technology and make better provisions for mobility, a previously neglected field is gaining in importance: the energetic retrofit of single-family homes everywhere in Germany.

stadt:pilot special: Setting aside the model projects of the National Urban Development Policy and the ExWoSt demonstration projects, which urban development topics related to climate protection and energy efficiency stand out in particular?

Peter Busch: I would first like to point out that the issues were formulated in both programmes before Fukushima and the introduction of the energy transition (Energiewende) and have now reached the actors and municipalities.

János Brenner: For me, two different conceptual approaches stand out. In Saxony-Anhalt a more comprehensive concept (top-down) has been selected that partially operates using a neighbourhood-focused approach. In Brandenburg a path was selected that went more from an individual project towards a comprehensive approach for the whole city (bottom-up).

stadt:pilot special: Was it a coincidence that the states have chosen such different strategies?

Brenner: No, the states chose the focus. However, each of the two states contains examples of the opposite approach.

Busch: The municipalities and actors in Brandenburg were generally well prepared for both paths. When renovating the existing building stock, we implemented rough energy-efficiency check-ups long before energy performance certificates were introduced nationwide. Integrated urban development concepts were already initiated in the field of urban restructuring during the last legislature period.

stadt:pilot special: Mr Porsche, you have an overview of both the model projects of the National Urban Development Policy and the demonstration projects from the ExWoSt field of research. What connects the two?

Lars Porsche: In my view there are three aspects. In both the model projects and the demonstration projects we can see a new focus on existing construction in many places. Germany's cities are already built. The new construction rate is low. Nevertheless, new construction projects in building gaps or on brownfields and former military sites are important. In many model and demonstration projects the connection between buildings, neighbourhoods and the city level has been analysed for the

energy efficiency issue. In the end, basically all projects emphasise the inclusion of actors, and they have often created novel constellations. Energy-efficiency issues are no longer the sole task of the municipal utilities or an energy provider. They affect private homeowners just as much as building companies, urban administrations, private businesses and civil society actors. It is also interesting that previously neglected urban areas such as industrial districts have come into focus.

stadt:pilot special: Let's step back a little further.

What will the 'energy efficient and climate-friendly city of tomorrow' look like?

Busch: We shall see that the transport flows will be of a different type and will be organised differently. For example, bicycling and car sharing will grow in importance. We may hear of new things, such as electric cars that are already equipped with artificial sound so as to make them audible to pedestrians and bicyclists. When it comes to energy-efficient redevelopment, intelligent solutions will be found that preserve the cityscape-formative character of historic buildings while being efficiently connected to an energy system through combined heat and power. The problem will then be eliminated through intelligent network solutions. Urban dwellers will also experience a city where all



Mobility in focus: transport-optimised measures have the greatest potential for energy savings in the city of Zeitz.

energy and climate issues are included in all areas of life. New opportunities to cooperate with those responsible for the energy and housing industries as well as with the actors in the town halls will produce positive changes.

Brenner: Three points are becoming visible. First, the energy-efficient city will be compact, and will be linked to keywords like ‘restricting suburbanisation’ and the ‘city of short distances’. But compact doesn’t mean ‘too dense’. The ExWoSt field of research on energy-efficient urban renewal is closely connected with the urban development programme Urban Restructuring in East Germany. One partial goal of this programme is the gaining of urban development qualities, e. g. through the creation of more green spaces or block clearance. If one thinks of this in connection with climate adaptation, this naturally also entails sufficient green space modulation to prevent urban heat islands. The second point picks up on what Mr Busch is saying. The energy-efficient city focuses on sustainable mobility, i.e. pedestrian and bicycle traffic, local public transport and electro-mobility. Third – and I regard this as particularly important – the utilisation of information and communication technology for process optimisation must not be allowed to take on an uncontrolled life of its own in the energy-efficient city. From a municipal point of view, it is essential to utilise technology intelligently in agreement with democratic consensus. Democratic legitimacy must not be coldly shunted aside by technology.

stadt:pilot special: Would that be the next step towards thinking more complexly about this and including more issues, such as mobility and new information technology?

Porsche: Looking to the future, we will become more interested than before in finding acceptable solutions for the introduction of renewable energies, such as solar panels, in central cities. This is an architectural-cultural issue, which, like the hitherto poorly integrated topic of mobility – and I agree with Mr Busch and Mr Brenner on this point – must be discussed more intensely than it has been so far with users, providers and grid operators. We will attempt this in the ExWoSt study on ‘Requirements for energy-efficient and climate-friendly neighbourhoods’. Taken as a whole, the overall view still falls short.

stadt:pilot special: Mr Busch, against the backdrop of what we know about these projects and what we desire for the future, what must be done now on the state level for energy-efficient renewal?

Busch: We will support the municipalities in the development of neighbourhood plans. It is gratifying that the Federal Government is making the results of the ExWoSt fields of research on the topic of energy-efficient urban renewal available. This provides a good foundation for the topic of energy-efficient redevelopment. Moreover, energy as well as urban and building culture will be introduced even more specifically in our directives on urban



Havelberg in Saxony-Anhalt: the central district heating system was converted into a biogas facility with two block-type heat and power stations. Woodchip heating plants were erected at individual locations, e. g. to supply a Bundeswehr (German Federal Armed Forces) barracks.

development funding. In addition, we are currently negotiating climate pacts with the housing industry, which are to be presented and implemented this year. In the process, we will encourage the housing companies to participate in neighbourhood concepts within the framework of energy-efficient urban renewal. Moreover, we are giving intense thought to how we can take influence on the development of the EFRE Fund in regard to climate protection and sustainable urban redevelopment.

stadt:pilot special: Mr Brenner, Mr Porsche, what advice would you give the municipalities from the point of view of the Federal Ministry of Transport, Building and Urban Development (BMVBS) and the Federal Institute for Research on Building, Urban Affairs and Spatial Development (BBSR)?

Brenner: Whoever seriously pursues urban development needs a lot of stamina. This is a frequent experience. In regard to Urban Restructuring in East Germany, for example, after a long process we managed to fine-tune the programme in such a way that it is no longer financing the demolition of historically valuable building stock. This has been the result of long-term, continuous debate. The energy efficiency approach has been similar. Integrated urban development concepts (INSEK) make a lot of sense. But when it comes to issues related to the energy-efficient city, they are often still too abstract. Energy-efficiency topics must be expanded. For this we have come up with the charming term INSEK^e, meaning an energy-amplified INSEK. Here’s another point: we would like to see compact infrastructure networks. But as shrinkage processes continue, smaller, neighbourhood-based solutions such as local heating supplies with combined heat and power units will be in demand.

Porsche: The time to act is now! Despite many programmes and initiatives, on a nationwide comparison many towns have not actively adopted the topic of energy in their agendas or urban development policies. Some model cities in the ExWoSt field

of research showed that costs may be reduced by a conceptual approach including buildings, infrastructure, consumption structures, etc. This is hardly an insignificant aspect for most cities, since towns compete with one another, and not only in regard to the frequently discussed creative types. The energy-efficient and ecological quality of the urban environment counts. At the same time, an energy-efficient upgrading must be acceptable to the residents from an economic point of view. The topics of energy and climate have made urban development considerably more complex. The INSEK^e developed in the ExWoSt field of research helps set priorities and creates agreement on measures. In this way, building societies, cities and the energy business can find better common solutions.

Busch: I can only agree regarding the significance of expanding INSEK to an INSEK^e – in my opinion, it will happen. But I would like to contradict Mr Porsche on one point regarding the case of Brandenburg: studies show that, building on their INSEKs, many municipalities there have already embarked on this course.

Porsche: That may be. However, aside from some state initiatives and big cities like Hamburg, Stuttgart and Munich, these topics are not present in many places, or else the will is there but there is insufficient implementation. In addition, if we want to reach the Federal Republic's energy efficiency and climate protection goals, we must pay much more attention to private buildings (residential structures, production sites, offices...) in order to create the corresponding synergy effects. There continues to be high potential here. But we at least have to see them on the neighbourhood level with their chances and restrictions. Moreover, energy infrastructure is not focused on individual buildings or individual neighbourhoods. The point is really to take a comprehensive citywide perspective that includes weighing up buildings, neighbourhoods and the entire city, along with corresponding infrastructures such as energy and mobility.

stadt:pilot special: The urban restructuring you have frequently mentioned is gaining an additional energy-efficient and climate-focused foundation with the amendment to the Federal Building Code. Is this combination of the original housing business approach with the energy-efficiency focus also a model for municipalities in other federal states that are not suffering from vacancies?

Brenner: It at least represents an offer by the legislators to the municipalities to act. I see the great benefit of this amendment in the way the municipalities are being presented with an instrument kit to which they can help themselves. We have deliberately used our reference city in the West, Marburg on the Lahn, a 'stable' town with a relatively young population, as a counterpoint to the often structurally weak towns in Brandenburg and Saxony-Anhalt. We have determined that in Marburg too, both



Marburg was a reference city in the ExWoSt field of research on energy-efficient urban renewal. Despite other framework conditions (limited aging, economically stable), many aspects that were tested in the municipalities of Brandenburg and Saxony-Anhalt were successfully transferred to Marburg. These included the development of an energy-efficient neighbourhood concept with ambitious energy-saving goals. The city made use of this success and is now developing a parallel, integrated citywide climate protection concept.

citywide and neighbourhood approaches are justified. In Marburg the attitude is to act in a quasi-preventive way, i.e. before problems that demand urban restructuring measures can arise in the first place.

stadt:pilot special: Let me ask this differently: in your opinion, which area of urban development needs the most work when it comes to reaching these goals? Can the BMVBS provide support?

Brenner: I see approaches for further development in the area of neighbourhood development. In our field of research the two observation planes of the overall city and the individual property have crystallised. But we need another intermediary level between them, namely that of the neighbourhood. Mr Porsche has pointed to the new 'energy neighbourhood' ExWoSt field of research for energy-efficient neighbourhood renewal.

Busch: In practice, the draft law for the strengthening of climate-friendly development in towns and communities, which the



Prof Dr János Brenner has been serving as deputy department head for Urban Restructuring in the Federal Ministry of Transport, Building and Urban Development (BMVBS) since 2007. Among other areas, his work focuses on the urban development programmes Urban Restructuring in East and West Germany, the supervision of the ExWoSt fields of research on Urban Improvement Districts, energy-efficient urban renewal and urban climate change strategies, as well as consulting activity in Hungary in the field of urban development.

Federal Government has presented within the framework of the energy transition (Energiewende), can be of great help. The new law is designed to promote climate-optimised urban development that preserves architectural-cultural townscapes and landscapes. Planning law already allows for more (island) solutions that go beyond individual properties and are neighbourhood-based.

stadt:pilot special: The tenor of the workshop was that we are dealing with a cross-cutting issue that demands much more strongly integrated, cooperative behaviour on the part of local actors. Can experiences from other areas of urban development or spatial planning be utilised here?

Brenner: Networking is certainly the order of the day. This applies just as much in a horizontal direction – i.e. between actors and departments, or between municipalities – as in a vertical direction – i.e. between the Federal Government, the states and the communities. We are currently attempting to link the energy issue with the KIQ (cooperation in the neighbourhood) field of research. We are trying to link the idea of activating individual owners with the idea of energy-efficient urban renewal.

Busch: There is a fundamental difference between the working methods of the municipalities vis-à-vis those of the Federal Government or states. The municipalities are bundled in their own tasks. When it comes to the Federal Government and the States, however, we are facing a departmental principle with individual responsibilities. These interdisciplinary paths are thus hard to travel. For example, two years ago, on the Federal level, there were several ministries that advertised grants for energy and climate concepts in parallel. But top-down is not always a panacea. Things can also develop from below in a neighbourhood, which, after starting in a municipality, should then be picked up on other levels.

stadt:pilot special: How can we strengthen inter-municipal cooperation?

Porsche: We have researched this issue on various levels. The relevant levels stretch from the state to the region to the municipality, and finally encompass neighbourhoods and individual owners. This raises many previously unanswered questions. This is actually a matter of adapting the counter-flow principle which is used in spatial planning. But it's not only individual municipalities or planning regions that are getting into the act, but also aggregations that are difficult to grasp in terms of administrative boundaries. Legal questions and responsibilities play a considerable role.

The main thing is how to cooperate in such a way as to allow the most efficient and space-compatible solution to develop.

stadt:pilot special: In regard to design options, the instrument kit basically has three compartments: legal regulations, financial incentives and conviction via communication – we have already discussed them all. In your assessment, where is the greatest potential for ensuring the necessary local cooperation?

Brenner: I believe the greatest potential lies in the blend of instruments. The Federal Building Code amendment represents an important, state-of-the-art instrument for us. One finding from the field of research was that there are many possibilities even without a lot of money as long as there are good conceptual approaches. My municipal representatives have repeatedly confirmed this to me. Particularly in small municipalities without a corresponding administrative apparatus, investing in procedures, knowledge transfer and communication can bring enormous results. The results from the ExWoSt field of research, by which the support by the research assistance was almost exclusively financed, clearly confirm this.

Porsche: In my opinion, communication takes centre stage. When people react to the issue with understanding it becomes easier to activate the corresponding actors. Technical solutions can be found, but achieving acceptance is a huge challenge when it comes to implementing the energy transition. The added value it brings has to be made clear. In the energy field, this usually means energy prices. Financial incentives, e. g. via the Renewable Energy Sources Act (EEG), can help to bring renewable energies onto the market more quickly, and subsidies also help financially weaker municipalities to devote themselves to the issue. The will is usually there.

Busch: For me it is actually more interesting to discover where previous instruments haven't been effective. We are having only limited success in reaching the owners of single and two-family houses on the edges of the cities with our Federal and state subsidies. But they are often badly positioned on nearly all energy-efficiency balance sheets. We need solutions for these areas too. If we do nothing, the buildings will become virtually impossible to use, rent or sell in the near future due to rising operating expenses. Intensified by demographic trends, these structures represent future vacancy and demolition objects. Here, too we should adopt additional neighbourhood concepts on the Federal and state levels.



Peter Busch was departmental director of Section 2, Urban Development and Housing, in the Ministry for Infrastructure and Agriculture (MIL) of the State of Brandenburg until 2012. There his focus was on building and urban culture, structural engineering, energy policy and climate protection.



Lars Porsche is project director in Department I 5, Transport and the Environment, in the Federal Institute for Research on Building, Urban Affairs and Spatial Development (BBSR) in the Federal Office for Building and Regional Planning (BBR). His work focuses on energy and spatial development, regenerative energies, integrated local and regional energy concepts, cultural landscape development as well as urban climate protection and climate adaptation.

Energy topic

Sustainability

Whenever energy-efficient urban development comes to dominate the public stage, other aspects of integrated urban development can easily fall by the wayside. However, successful, in other words sustainable energy-efficient urban development must be conceived as a cross-cutting issue. It is essential to recognise potential conflicts of interest where they touch on social, economic and ecological issues and to develop them constructively from shifting perspectives.



Foresight pays off: a sustainably successful energy-efficient urban development plan keeps an equally steady eye on economic, ecological and social aspects.

Challenge: combining cost-effectiveness with social sustainability

When the costs are largely passed on to tenants, energy-efficient optimisation quickly generates a negative image among the population. In structurally underdeveloped regions this kind of refinancing is scarcely feasible, even from the real estate industry's point of view. There, it is more important to develop consumption behaviour using low investment or advisory measures. It can also be beneficial to bring about cost reductions using bundled demand power when energetic retrofit is implemented, e. g. by a local owners association.

Location advantages and disparities

An energy-efficient showpiece can open up a market niche among a demanding public – if there is one in the first place. In this way, energy efficiency can become a local advantage. However, a socially balanced energy-efficient urban development scheme should be oriented towards the possibilities available to average local households. But for owners as well, cost efficiency and the financial viability of an adaptation to higher energy efficiency standards may have a selective socio-economic effect, namely when the municipality sets excessively high goals. When energy-efficient renewal becomes the 'exclusive' element of a higher living and building standard, socially disadvantaged neighbourhoods can additionally become energetically disadvantaged neighbourhoods as well.

People often underestimate the power of personal stubbornness and idealistic motives which, once they are present, are then no longer accessible to rational and economic arguments.

Energy efficiency, climate protection and ecology are not the same thing

First impressions can fool you – a blanket equation of climate protection and renewable energies with ecological qualities is deceptive. In the urban context, it is evident that well-intended individual measures for the use of renewable energies and CO₂ reduction in a neighbourhood or citywide overview can even have unfavourable effects. Impact interactions should also be considered in dealing with sustainable energy-efficient urban development.

Conflict avoidance through genuine sustainability

Further societal and cultural interests, such as the preservation of developed landscape and architectural structures, are also part of this. A strategy that is sustainable in the sense of energy-efficient urban development seeks a balance between overall ecological assessment, economic and social feasibility, and architectural-cultural acceptance. The 'sustainability triangle' of economics, ecology and social issues is also significant when it comes to energy-efficient urban development.

Energy topic Acceptance

Energy efficiency and the utilisation of more renewable energies are transforming our world. Everyone agrees on this. But what does it mean for the individual – whether as an owner, a tenant, a seller or supplier, or as a simple citizen of a town? It's easy to give an abstract “Yes!” to climate protection and the energy transition. But if the effects touch on a group's immediate living and working environment, people will take a closer look. What does it really mean to have a solar plant, a block-type heating plant or a biogas facility next door? When a town makes energy into an issue, popular acceptance is essential. Good communication becomes the key. Otherwise, well-intended efforts can quickly fail if people regard them as a restriction on their personal freedom.

Open planning procedures, participation and argumentation

Creating acceptance for more energy efficiency and renewable energies in the city of tomorrow is above all a communications issue. What is needed is to develop open planning and decision-making procedures and to ‘take along’ all the affected parties. Particularly when it comes to the still novel energy issue with its many unknowns, it is advisable to conduct participation procedures in order to achieve a balance of interests and to discover synergies. The opportunities and possibilities for projects must, of course, be communicated from different perspectives. It is particularly effective to link arguments connecting climate protection goals with potential for new value creation and the perspective of long-term declining energy costs for consumers.

Municipal politics: good will isn't enough

A local politician who wants to achieve energy goals must do more than display good will. Visibly committing oneself to the realisation of projects is essential for gaining acceptance. Particularly at the beginning it is important to concentrate on demonstration projects, to indicate the priorities of administrators and

politicians, and to generate a high potential for imitation by others. Integrated project and conceptual approaches additionally help in bundling interdisciplinary skills and making connections to comprehensive urban development strategies visible. This can lead to a constructive contribution to generating more acceptance in the public sphere, the administration and the political arena at the same time.

Changing concern into a positive force

Public acceptance significantly depends on how strongly individuals are affected by concrete projects. Many model and demonstration projects have shown this. Thus acceptance for ‘abstract’ climate protection strategies is high. However, this acceptance quickly declines when it comes to measures undertaken within a person's immediate surroundings. However, direct concern can be shifted in a positive direction. One example could be taking part in a participation procedure. That is why participation aspects should be anchored more strongly in such formal instruments as approval procedures or regional and land-use plans, which are more vital for energy-efficient urban development than has been the case so far.



An energy-efficient multi-family house in Gräfenhainichen.

What is a Charette procedure?

For Thomas Ludwig, director of the building authority in the city of Gräfenhainichen, the solution is clear: “A local participation process that not only includes actors and citizens but also convinces people. I think we will continue to use this extremely clear, open participation procedure for future projects.” For Gräfenhainichen, Charette has become a kind of synonym for successful municipal urban development. The impetus came from the town's participation in the ‘Stadtumbau Ost’ competition in 2002. At that time, the procedure was used to identify approaches for urban development that were then developed further with the knowledge that citizens and actors stood

behind them. This ultimately led to the ‘Gräfenhainichen – city with new energy’ model. Initial measures, including the energy-efficient redevelopment of large housing estates, could thus be successfully approached.

Energy-efficient urban development in Munich

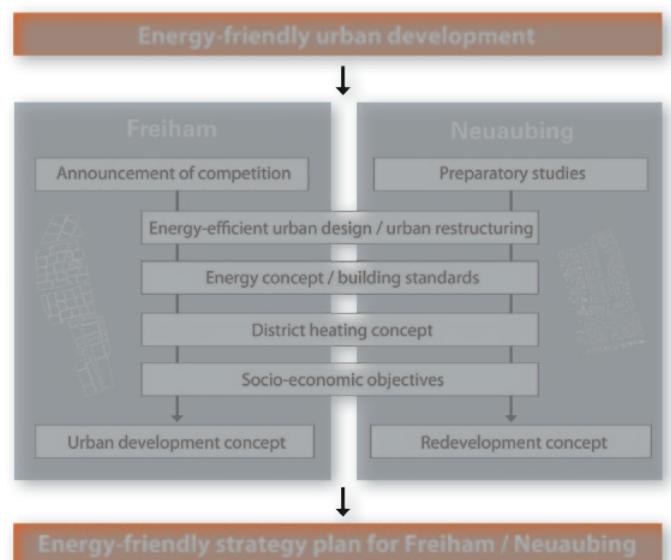
Bringing existing and new buildings forward together

by Ursula Eicker, Heiko Huppenberger and Detlef Kurth

On the western edge of the Bavarian capital, one of Germany's largest urban expansion schemes is being planned in the form of the new district of Freiham. Over the next thirty years, a district will take shape offering living space for 20,000 persons and setting high energy-efficiency standards. Freiham is being built entirely in the tradition of the compact European city and the nearby district of Neuaubing will also profit from the development. In this way, the project combines energy-efficient new construction and building stock development in an exemplary manner. Just how energy-efficiency concerns are being integrated in both the planning of Freiham and the development of Neuaubing can be seen in a joint research project by the state capital of Munich, the HFT Stuttgart (University of Applied Sciences) and the Stadtwerke München GmbH (municipal utilities) under the title 'Energy-Efficient Urban Development – Opportunities for the Existing Building Stock Through Innovative, Energy-Efficient Development Areas'. This project is to result in integrated 'energy master plans' in conjunction with land-use plans and redevelopment concepts, thus linking urban development, energy-efficiency and socio-economic goals.

Efficient Freiham

The core of the energy-efficiency plan for the heating supply of both the existing and new districts is the use of regenerative thermal heat (deep geothermics). A new heating station will be erected in the course of Freiham's development. The 80°C to 90°C degree water will feed thermal energy into the urban district heating grid as a base load. A hot water pipeline to the existing district heating grid in Munich's central city has already been laid. The hot thermal water will be used in a particularly efficient way by cooling it down to a 35°C return flow temperature within the new residential district of Freiham. The low temperature grid there requires specially adapted heating and construction technology of a kind that is best realised in new redevelopment areas. The development of the district heating grid in Freiham is already to be considered in the early planning phase of the urban development competition. That is why a discussion on the necessary construction density was conducted within the framework of the public award announcement. Since energy consumption is low due to the high energy standards in the new construction project, a district heating grid is only economical if the construction density can guarantee sufficient heat consumption. Energy concepts for new development districts are frequently only discussed in regard to energy-efficient building standards. In other words, high construction density contributes just as much to energy-efficiency. The compact city of short distances not only makes it easier to develop an energy-efficient district heating grid, but also helps in (energy-) efficiently developing and utilising space. A concept for Freiham that is both energy-efficient and integrates urban development concerns not only guarantees compact building structures. The distribution of land uses will also benefit the district heating grid by placing the largest heat consumers as close to the heating plant as possible.



Schematic view of project sequence. Source: HFT Stuttgart

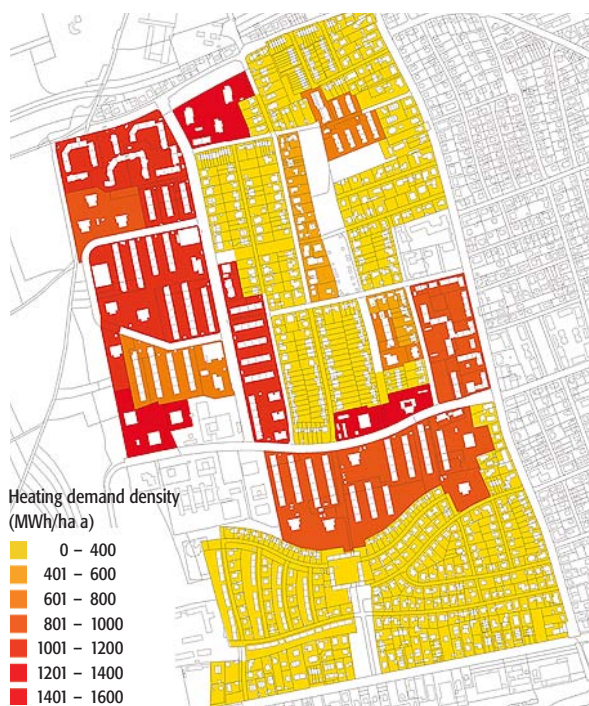
Energy master plan for Neuaubing

The innovative low temperature grid in Freiham is the precondition for supplying thermal energy from the new geothermal heating station to the existing districts as well. Heating needs were examined and an energy register was set up for the development of a comprehensive thermal heating grid in Neuaubing. In a preliminary step, an energy profile was developed for all residential buildings according to the directives of the Institute for Housing and the Environment (IWU). The buildings were allotted average heating needs based on type and age. Heating needs for the entire district were estimated on the basis of living space. In a second step, the energy register was significantly refined for a portion of the building stock by charting the redevelopment status of all multi-storey residential buildings. Comprehensive

	🏠 Very low building density Floor Area Ratio (FAR): 0.4	🏠🏠🏠 Low building density FAR: 0.7	🏠 Medium building density FAR: 0.9	🏠🏠 High building density FAR: 1.3
EnEV new construction standards Heating demand: c. 82.5 kWh/m ² annually	132	231	297	429
Efficiency house 55 Heating demand: c. 52.5 kWh/ m ² annually	84	147	189	273
Passive house Heating demand: c. 27.5 kWh/ m ² annually	44	77	99	143

Depiction of heating demand in a residential area according to building density and energy-efficient building standards in megawatt hours per hectare and year*
 *Parameters: net building plot share 50%, living space 80% of gross floor space, kWh/m²a: kilowatt hours/(m²/year), heating needs: sum of heating needs and lump sum of 12.5 kWh/m²a for heated water. Source: HFT Stuttgart

local surveys made it possible to register windows, facades and roofs. The precise redevelopment status, a building’s respective age and type provided the basis for a simplified calculation of heating needs in accordance with the Energy Saving Ordinance (EnEV). As a result, an energy register was created for Neuaubing providing sufficiently precise data for all residential buildings, including hard-to-catalogue single-family homes. It also registered multi-storey residential buildings in detail.



Heating demand based on building structure (rendered anonymous by clusters), MWh/ha a: megawatt hours per hectare and year. Source: HFT Stuttgart (Data base: State Capital of Munich)

Many procedures to ascertain the heating needs of residential areas are based on a classification according to urban patterns, but there has so far been scarcely any registration of individual buildings. The procedure that has been developed within the research project points to considerably higher data accuracy and is well suited to assessing individual building stock on the neighbourhood level. It helps to identify areas where particularly large quantities of energy can be saved. Moreover, areas are being identified where there are good conditions for a district heating network or that are suitable for retroactive densification to

increase heat absorption from a district heating standpoint. In the future, for example, energy registers will play an important role in so-called preparatory studies and in delimiting formal redevelopment areas in accordance with the Federal Building Code.

Outlook

Over the further course of the research project, the consequences of energy-efficient redevelopment will be examined in more depth for selected model areas in Neuaubing. The first area to be examined will be a listed factory housing estate from the 1930s. The estate’s appearance is of great significance in regard to energy-efficient redevelopment. Due to its long-established residents, the analysis will also include the social effects of redevelopment. In a further model area, a large housing estate from the 1960s, the potential for a district heating linkup will be examined together with building owners. Already halfway through the research project it has become evident just how great the significance of integrated neighbourhood concepts is for energy-efficient urban development. Energy efficiency concerns are not only important when it comes to building planning and redevelopment, but they also touch on numerous other planning fields such as urban development, infrastructure, transport and social planning. These can be brought together in an integrated energy master plan presenting specific action and funding needs for each respective neighbourhood.



Prof Dr Ursula Eicker directs the research centre for sustainable energy technology at the HFT Stuttgart and researches renewable energy systems for highly efficient buildings and urban districts.

Heiko Huppenberger (on the right) works as a research associate at the HFT Stuttgart within

the framework of the research project on energy-efficient urban development. He also serves as an environmental consultant for the community of Eching, located north of Munich.

Prof Dr Detlef Kurth (on the left) is the dean of the masters degree course in urban planning at the HFT Stuttgart and is director of the Centre for Sustainable Urban Development.

Energy topic

Building culture and architectural conservation

Energy-efficient urban renewal measures, with their exterior heat insulation, overhead power lines, wind energy systems, solar roofs and solar fields, are transforming our urban spaces and landscapes. They are frequently associated with a deterioration of cultural landscapes. This not only applies to listed buildings and ensembles, but also to many buildings of high and 'average' architectural quality both inside and outside of central cities. As an architectural-cultural consciousness takes shape within the framework of energy-efficient redevelopment schemes, aesthetic concerns can be more strongly integrated into the implementation of the energy transition. This can improve acceptance for this complex issue.



Even 'normal' buildings and neighbourhoods need to be examined in terms of their building culture. Shown here: a vision for Luckenwalde.

Introducing design principles to energy-efficient redevelopment

Conflicts can arise when design standards, architectural conservation concerns and structural-technical demands such as the Energy Saving Ordinance (EnEV) all come together. Municipal practice shows that many differences can be negotiated informally, e. g. between the state conservation office and the municipalities. Nevertheless, there is a strong desire for formal instruments. The conservation bylaws have shown themselves to be only partly effective since they can only be applied at high expense in urban districts of particular significance regarding building culture. The situation is different when it comes to the Urban Development Promotion Programme. Energy efficiency goals can be better brought into play in urban development and design-focused procedures, just as architectural-cultural aspects can be introduced to energy-efficient urban renewal. In the future, such concerns can be even better supported by adapting energy-efficient redevelopment funding to architectural-cultural goals and safeguarding them through design directives.

Paying attention to design quality outside of historic central cities as well

An energy-efficient redevelopment scheme that fails in terms of

design will quickly draw fire from critics. This particularly applies to properties in historic central cities. Public appreciation and professional attention are particularly sensitive there. Aside from that, less prominent buildings in single-family and multi-storey estates from the 1920s to 1970s are given virtually no attention. This can cause a widespread loss of quality through redevelopment projects that are insensitive to building culture or else through demolition and new construction, since the necessary values are apparently unattainable.

Pushing an energy-efficient perspective on the neighbourhood level

From a citywide perspective, the results of an appearance-impairing thermal insulation scheme, for example on the façade of an old building, can easily be overlooked. When endeavouring to avoid such a negative effect, it is advisable to develop the goals of an energy-efficient urban development on more of a neighbourhood level. This also applies to general plans, e. g. for local heating supplies and efficient energy (re)production. Instead of focusing mainly on the energy-efficiency of an individual property, one can take a comprehensive approach. By balancing total energy consumption and CO₂ emissions on the neighbourhood level, the energy benefits in historic



When design takes a back seat, the cityscape can be seriously distorted – as shown here in Saarbrücken.

neighbourhoods arising from density and mixed use can be taken into consideration. In this way, it is possible to reduce the pressure to redevelop monuments and old buildings with appearance-changing exterior insulation.

Developing awareness and competence in building culture improves acceptance

Energy-efficient renewal influences a town’s appearance and also affects its identity. Redevelopment schemes are frequently regarded from a technical viewpoint without any attention to their design impact. However, as a topic with an architectural-cultural dimension, energy-efficient urban renewal demands new approaches from all actors. This particularly applies to municipal policy-makers and specialised authorities. When it comes to doing justice to growing architectural-cultural demands on redevelopment measures for public buildings in a time of declining municipal funds, it is essential to involve the actors as actively as possible. For this, both transparent processes and comprehensive communication are essential. Providing outside consulting for building culture is also an important approach. However, the necessary professional skills and long-term capacities can only be developed with the corresponding staff and financial outlays – particularly in smaller communities.

Six points for successful energy-efficient redevelopment:

- 1 A thorough survey of the building from a technical point of view
- 2 Early development of technical details by the planners and discussions with the conservation office
- 3 Good humidity-related planning for construction details, e. g. in terms of internal insulation and rising damp
- 4 Sufficient number of local meetings in the early planning phase to approve solutions
- 5 Sufficient planning fees for participants
- 6 And... plenty of stamina!!

Commentary

Architectural Conservation and energy-saving construction

Like climate protection, architectural conservation efforts obey the principle of sustainability. The continued use of buildings while maintaining their original structural fabric and their original appearance protects resources. A simultaneous energy-efficient enhancement prevents climate-damaging emissions. Both goals entail a search for feasible solutions that are consistently based on individual case-related assessments and evaluations. When it comes to planning and implementation, a high degree of flexibility is needed on the part of owners, architects and workers. That is why a project’s success is always traceable to intensive discussions between the participating parties and painstaking attention to detail. It is always advisable to plan such complex redevelopment projects in a dialogue with all participants and to supervise the implementation intensively. Sustainable solutions and general satisfaction with the results can be assured in this way. It has been shown with some buildings that, even with historic building fabric to consider, thoroughgoing climate protection measures are possible in accordance with the regulations of the conservation agencies. A good example of this is the Nun House in Tübingen, built in 1488, which was awarded the 2008 Historic Preservation Prize, and which is known as “Germany’s oldest low-energy house” (quote from Mayor Palmer).



Olaf Hildebrandt is managing director of ebök Planung und Entwicklung Gesellschaft mbH in Tübingen.

Housing companies as protagonists

Jumping hurdles with a lot of energy

Housing companies are important actors in the energy transition. With their often wide-ranging building stock, they can provide a twofold contribution: a technical one, by testing innovative solutions in grand style, and also a quantitative one, because in precisely this way they can help implement the Federal Government's ambitious energy goals. However, the conditions under which they can implement redevelopment schemes vary greatly in Germany due to demographic and structural disparities. While the municipal housing company in the Brandenburg city of Prenzlau still sees a need to redevelop its building stock, the demand there is relatively low. The situation is different in Ludwigshafen in Rhineland-Westphalia. In the prosperous Rhine-Neckar region the demand for well-redeveloped flats is high. In the case of LUWOG, the housing company of BASF, the pressure is even increased by the company's own requirements.



Accessibility and architectural conservation in an intelligent combination: arcade entrances in Prenzlau.

Despite all the local differences that exist, Dr Andreas Heinrich, second associate director of the city of Prenzlau, and André Zaman, executive planner and project manager for LUWOG, can agree on one point: the demands on energy-efficient redevelopment are high, particularly when listed building stock is at stake. Many aspects must be brought under one roof through integrated planning. In concrete terms, this means, for example, that residential floor plans need to be reduced, accessibility must be guaranteed and, of course, energy-saving potential must be made full use of despite architectural conservation concerns. Retrofitting to renewable energies has been an important issue in Prenzlau for a long time and the 'City of Renewable Energies' guiding principle is firmly anchored in the integrated urban development concept (INSEK). The result: already today, the town is producing more electricity from renewable energy sources than it is consuming. Moreover: energy-efficient redevelopment has been an issue for a long time as well. Within

the ExWoSt demonstration project a concept was developed that not only calls for the energy-efficient retrofit of three at least partially listed buildings belonging to the city's housing company, but also links them to demands for family and senior-suitable living in the city centre. The three late nineteenth century buildings with their elaborate stucco facades are among the few remaining landmarks in Prenzlau. That is why the town has specifically protected them through a framework resolution, thus greatly raising the bar for redevelopment. Protecting the stucco elements on the façades and ceilings made interior and exterior insulation practically impossible. In addition, the listed building with two open side wings included a series of energy-inefficient

exterior walls. However, a feasibility study and a competition based upon it showed that energy-efficient retrofit was possible! By 'puncturing' the building, the 120-150 m² flats were reduced to several 50-60 m² units. In the future the building will be accessible through arcades located at the rear of the structure. By tearing down one of the side wings, it was possible to improve both energy-efficiency and comfort, since it would now be possible to install a lift. This means that the flats will be fully accessible. It is certainly also an advantage that there is only one owner, namely the city's housing company. This simplifies the difficult financing of the 4.5 million euro project, which in the end is being largely financed by Federal and state funds. "We managed to push the project forward within the constantly closing time windows of the funding troughs," Andreas Heinrich says with a knowing smile. The demonstration project made it clear to him that potential for savings in existing structures is limited and that a corresponding energy efficiency result is only possible on a citywide scale.



Exterior insulation and new lifts in the courtyard: the historic facades of the Hohenzollern-Höfe facing the street are here to stay.

Starting in the autumn of 2013, twenty-seven residential units are available for rent. The demand is already high – even though the buildings are located on a busy street. This illustrates how well-renovated, attractive flats will always find tenants, even when the general demand is low – as long as the price is right. With similar goals, but a different concept, LUWOGÉ approached the energy-efficient retrofit of the Hohenzollern-Höfe in Ludwigshafen. There they worked with existing tenants from the start. Their needs and desires, e. g. for accessibility, larger balconies and new communal areas, were considered at the centre of the planning process together with the question of how to limit the transfer of redevelopment costs to the tenants as much as possible. In the course of modernisation, the buildings are being gutted and entirely reconceived. All the standard 100 m² flats are being transformed into a variety of one to seven-room flats. When it comes to the structure's frequently older and single residents, less living space means a reduced basic rent that can now rise very slowly thanks to a cautiously graduated rent. The energy-efficiency measures are also paying off for the tenants. According

to André Zaman, the ancillary costs have been reduced by more than half. He assumes that many of the residents will move back in following the redevelopment. At the same time, he says: "In the pursuit of sustainable urban development, it was important for LUWOGÉ to involve the middle and upper management level in Ludwigshafen. The superior living comfort and the special atmosphere of the Hohenzollern-Höfe are attractive to many better-off people in the region." So it's no wonder that the demand is already very high – long before the first construction phase is completed in 2016. Around half of the approximately 200 flats are to be sold. There was a lot of work to be done before the plan could be implemented. And without a couple of dazzling ideas, Zaman and his team might never have completed the redevelopment. For example, there is the idea they came up with when the time came to install energy technology in the building complex that was built for BASF employees in 1923 and which is today listed as a historic monument. After close consultation with the architectural conservation agency, LUGOWE used a test building to try out alternative solutions, including some involving insulation. In the end, the result convinced everybody. While interior insulation was installed on the street-facing walls with their decorative features, exterior insulation was installed on the rear side. One learning experience for all parties involved was that when it comes to mastering new challenges at the interface of energy technology and architectural conservation, there is no way around a flexible process and the bundling of expertise. This always makes it possible to respond to unexpected challenges. For André Zaman, the National Urban Development Policy provided decisive support: "As a demonstration project, we were able to take experts on board and initiate projects that never would have been possible otherwise."

Commentary

Monitoring energy efficiency on a citywide and long-term basis

When people discuss sustainable building, they usually look at individual buildings isolated from the urban context. For example, when taken by themselves, 'plus-energy' houses located far from town are very efficient. But if one looks at them in terms of the energy that is needed to develop them, along with what is needed for shopping and other aspects of everyday life, then their efficiency drops. But how can it be that, from today's point of view, a freestanding building is superior to a redensified neighbourhood? Inner-city buildings do not have an energy-efficient 'credit' for short distances and resource protection. And yet, dense construction alone provides a city with energy-efficiency benefits. That is why additional factors aside from the characteristics of an isolated building and/or the density of the insulation used should be considered in energy-efficiency monitoring. In any case, new construction represents only a very small portion of energy consumption. Existing buildings have a much larger share in energy consumption. That is why we are seeing more and more how in the case of supposed energy-efficient redevelopment schemes for existing buildings, entire streets lose their beauty by being sheathed in a new exterior skin and need to be redeveloped again after twenty or thirty years. The aspects of urban design and durability are subordinated to a short-term vision of energy-efficiency. And yet it is precisely the atmospheric quality of existing facades that we look for in medieval cities and appreciate so much in late nineteenth century neighbourhoods.



Prof Christoph Mäckler holds the chair for urban design at TU Dortmund and is the director of its German Institute for Civic Art.

Energy as a topic for the Federal Government's ministries Interfaces: what are the others doing?

Energy is everybody's business! That is why the Federal Government has no energy ministry. Instead, energy is a cross-cutting issue that has been located in five ministries. It is also a 'top-level issue', since the overall strategy for Germany's energy policy is coordinated in the Chancellor's Office. The Energy Concept of the Federal Government of September 2010 presents this interdepartmental, long-term energy policy in its basic points. The following briefly outlines the focus set by each ministry.

The Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU)

Climate protection and renewable energies are central environmental protection issues, and the activities of the BMU are correspondingly comprehensive. At the BMU, energy is above all part of national and global climate protection policy. So as not to lose sight of the whole, all elements are bundled beneath the common 'climate initiative' umbrella. www.bmu.de

The Federal Ministry of Economics and Technology (BMWi)

At the Economics Ministry, the economic aspects of supply security and price stability, the value creation effects of renewable energies as well as technology funding take centre stage. Current focal points include the adaptation of network infrastructures to the needs of renewable energies, in addition to the utilisation of the renewable energies growth market for export and the domestic market. www.bmwi.de

The Federal Ministry of Education and Research (BMBF)

Research into renewable energies represents a comprehensive field of scientific inquiry. This represents the interface to the BMBF's tasks. Twelve core research policy statements on the redevelopment of energy systems, as formulated by the National Academy of Sciences, are a current result of this scientific support for the energy transition (Energiewende). www.bmbf.de

Federal Ministry of Food, Agriculture and Consumer Protection (BMELV)

Agriculture and rural areas profit from the energy transition in a special way due to the increasing significance of wind energy and biomass production. Energy farming represents a new field of activity for the Ministry. In the field of consumer protection, it is at the same time largely responsible for the concerns of citizens as energy consumers and customers. The BMELV mainly provides consultation work in this area. www.bmelv.de

Federal Ministry of Transport, Building and Urban Development (BMVBS)

Alongside energy-efficient and climate-friendly urban development as well as energy-related issues for land-use and spatial planning, topics such as electro-mobility, alternative fuels and activities for sustainable building, e. g. energy-plus houses, are important areas for the Federal Government's energy policy within the responsibility of the BMVBS. www.bmvbs.de



Top-level solar energy: vacuum tube collectors on the roof of the Federal Chancellery

Glossary

Building culture (Baukultur)

Building culture encompasses the production and treatment of a built environment. It encompasses planning, building and communication about them. Good building culture demands great attention to the quality of the built environment and requires the support of many people. It reveals itself in the selection of suitable procedures and in an integrative approach that brings together socio-cultural, ecological, design, technical-functional and economic quality concerns into a balanced, sustainable overall quality. Building culture arises daily in German towns and municipalities and largely determines their appearance and the quality of life they provide in regions and states.

Climate protection and energy concepts

Urban development and regional planning can provide important contributions to climate protection. This particularly applies to efforts that safeguard and further develop -saving urban and housing structures. Complementary to urban climate protection, **urban and regional energy concepts** seek to link the professional planning approaches in the energy field with the spatial level (city and region). The concepts are intended to reduce energy consumption and thus reduce costs, improve resource use and strengthen local and regional economies.

Energy-efficient urban renewal

Energy-efficient urban renewal unites the urban planning, technical and economic aspects of urban development against a backdrop of energy savings and increased energy-efficiency on a multidimensional basis. The range of measures encompasses energy savings in building renovation and in new construction on the individual building level, efficiency-enhancing measures by central energy generation and supply facilities on the urban and regional levels, the energy-efficient optimisation of transport flows in urban spaces, the energy-efficient optimisation of regional material and economic cycles as well as the integration of regenerative energies into urban development processes. Different perspectives are presented on pages 8/9, 20/21 and 34/35.

Energy transition (Energiewende)/ Energy Concept of the Federal Government

The Energy Concept approved by the Federal Government in September 2010 formulates long-term directives for increased energy efficiency and greater utilisation

of renewable energies in Germany. By 2050 the share of renewable energies in gross final energy consumption (heat and electricity) is to rise to 60%. Further emphasis and operationalisation of these directives came with the Federal Cabinet's decisions on the energy transition from 6 June 2011. By means of the various decisions and legal regulations, they also have a strong influence on urban and regional development, from energetic retrofit to the use of renewable energies, all the way to the expansion of the electricity transmission grid. On page 40 you can read how the Federal Cabinet's decisions are developed within the individual Federal ministries.

Experimental Housing and Urban Development (ExWoSt)

ExWoSt is a research programme of the Federal Ministry of Transport, Building and Urban Development (BMVBS) and is supervised by the Federal Institute for Research on Building, Urban Affairs and Spatial Development (BBSR). Innovative housing and urban development approaches are developed in scientifically supervised **demonstration projects**. Beyond that, expert opinions and studies as well as initiatives for public discussions on urban development are promoted. These experiences are intended to provide suggestions for the further development of urban development and housing policy and support knowledge transfer, with the results disseminated in the form of publications and professional events. The demonstration projects of the ExWoSt field of research on energy-efficient urban renewal are presented on page 48.

Integrated Urban Development Concepts (INSEK)

Sustainable urban development requires an integrated urban development policy that links urban development tasks and instruments with those of other specialised, space-related policies – economics, social welfare and ecology. This principle is expressed in municipal practice in the form of Integrated Urban Development Concepts (INSEK). This has been developed into an **INSEK**® to contain energy-efficiency targets within the framework of the ExWoSt field of research on 'energy-efficient urban renewal'. Further information on this can be found on pages 10/11.

National Urban Development Policy

The National Urban Development Policy is a joint initiative of the BMVBS and the BBSR

together with the states, cities, municipalities and associations. Its goal is to explore the issues of urban development processes, the instruments of the Urban Development Promotion Programme, as well as general planning and building within a public discourse. Since 2008, nearly 100 **model projects** have been implemented in the areas of civil society, the social city, economic development, building culture, climate protection and regionalisation. A depiction of the model projects in the 'Building the city of tomorrow – climate protection and global responsibility' field can be found on page 48.

Neighbourhood (Quartier)

The word neighbourhood (Quartier) generally refers to an urban substructure that distinguishes itself from the outside environment due to its specific structural peculiarities and the presence of a (visible) boundary. Precisely what is meant by structural peculiarities must be left to the respective scientific question being pursued. The structural boundary can go beyond purely physical characteristics. Within the context of energy and climate protection, the term neighbourhood must above all be understood as a spatial unit referring to the level of action between an individual building and the town as a whole.

Urban Development Promotion of the Federal and state governments

Within the framework of the Urban Development Promotion Programme, the Federal and state governments join together in providing funds for investments in the renewal and development of cities and municipalities. Alongside the strengthening of central cities and the elimination of urban deficiencies and grievances, one central goal is the creation of sustainable urban structures. Programmes with varying focal points have been created since the introduction of the Urban Development Promotion Programme in the 1970s. These range from urban development and redevelopment measures to the **Preservation of Urban Architectural Heritage** and the **Social City**, as well as **Urban Restructuring in East and West Germany**, all the way to the most recent programmes for **Active City and District Centres** and **Smaller Cities and Municipalities**. Further information on the role of the Urban Development Promotion Programme within the context of energy efficiency and climate protection can be found on pages 18/19.

Energy topic

Inter-municipal cooperation

Energy consumption is concentrated in cities, whereas rural areas show the greatest potential for developing renewable energies. Due to local energy sources and relatively low consumption volumes they have favourable conditions for the production of surplus energy. Wind energy, biomass, water power, solar fields – these energy sources first of all require space or, like wind energy, are even legally privileged in white land sites. They stand in functional conflict with other urban uses, at least for now – biogas production in one's back yard is still a hard sell! The utilisation of electricity and heat generated from renewable energies within the city calls for involving producers in the more thinly settled and rural vicinity, cooperation with neighbouring communities and a link to the region. Regional town-country partnerships can gain a new foundation by sharing the tasks of the renewable energy economy.



The view beyond the town boundaries is particularly important for small communities, such as here in the Spreewald.

Inter-municipal cooperation in the Spreewalddreieck energy concept

Cooperation with neighbours is very important for smaller towns, whose infrastructure is already set up on an inter-municipal basis and is frequently organised in joint bodies. The Spreewalddreieck energy concept model project shows that this sort of inter-municipal cooperation can also be expanded beyond infrastructure and be applied to additional areas that would not be feasible for a small community by itself. In this case, the energy-efficient development of four municipalities is being conceived in view of inter-municipal synergies across the entire spectrum, ranging from a joint consumer counselling structure and energy management scheme all the way to a comprehensive solar roof register. As important as cooperation is, it is always important to keep a close eye on responsibilities and competencies. The network infrastructure is under the aegis of the energy suppliers via plan approval procedures according to German administration legislation. Location planning for wind energy is provided with decisive structures via the land-use decisions of regional planning authorities. However, municipalities have genuine control competence when it comes to biogas and extensive solar facilities. Here, municipalities with rural structures and large areas can take

advantage of efficiency margins not only in regard to individual projects but also by comprehensively linking energy production, network distribution and the linkup of (large) local consumers. While settlement development and resulting mobility behaviours must be observed on a large scale, they are primarily controlled using municipal approaches.

Regional and municipal interaction in Neustadt am Rübenberge

The municipal climate protection and settlement development action programme in Neustadt am Rübenberge encompasses all facets of these large-scale and regional approaches in an exemplary fashion. One important impulse for this model project came from the regional level, namely the region of Hanover. The



Bioenergy facilities put their stamp on the cultural landscape...



...as do wind energy stations.

Climate Protection Agency there was aware that the region's ambitious but abstract climate protection goals in the regional climate protection programme need to be operationalized and further developed by the member municipalities in the region via local climate protection action programmes. The corresponding programme by the city of Neustadt, which focuses on settlement development, places a particular accent on climate-friendly and energy-efficient urban structures in the total balance. Mobility and transport connections, local supply and housing construction – these topics must always be viewed within the

context of the development conditions prevailing in the greater Hanover region. However, the climate protection action programme is not only solidly based on expert knowledge but also functions as a communication instrument. The intensive action programme discussions, supported by the Hanover Climate Protection Agency, also managed political conflicts in the city parliament and developed an approach to energy and climate policy that all parties could accept. In this way, it became possible to implement the previously sensitive land-use planning for biogas locations in a constructive manner.

Why is cooperation becoming increasingly important in the region?

stadt:pilot special: Climate protection and energy are firmly institutionalised both municipally and regionally via the Climate Protection Agency. How do the two levels work together?

Udo Sahling: For ten years, the Climate Protection Agency of the region of Hanover has been networking the administration, energy supply companies, the skilled trades and specialist retailers on the regional level. In our actors' forums, regional information and consulting campaigns are being planned and implemented in the various areas of climate protection. These campaigns provide many market impulses. We distinguish regional, semi-regional and municipal actions, which we implement in coordination with our various partners. Over the past three years, after approving the climate protection framework programme for the region, we have begun implementing climate protection action programmes with many municipalities. In these programmes we develop scopes of action for each respective municipality and provide recommendations for their implementation. By the spring of 2013 it is likely that all municipalities will have developed corresponding programmes and will be advancing their municipal implementation on an accelerated timetable.

stadt:pilot special: What status do informal cooperative forms of regional development have as a supplement to formal spatial planning?

Sahling: In the past, the work of the Climate Protection Agency has depended almost entirely on informal cooperation, networking and communication. Regional and municipal policy has only found its voice and become viable through the climate protection programmes. In this way, administrations have increasingly integrated the topic of climate protection into the relevant specialised tasks. Spatial and regional planning are particularly significant for planning and measures that influence land-use, such as wind energy generation. Further land-use planning goals are largely ineffective. The alignment process for the Regional Spatial Planning Programme (RRPP) will show whether and in what areas climate protection concerns will be given priority.

stadt:pilot special: Can the region also learn from the municipalities?

Sahling: Yes! In the so-called regional technical discussions. There, all regional planning issues are debated in common and the best examples for successful planning and measures are presented and discussed.



Udo Sahling is managing director of the Climate Protection Agency of the region of Hanover, which successfully networks regional actors associated with the topic of climate protection.

Efficiency in energetic urban renewal

Consider the overall efficiency!

by Matthias Koziol

1. Fields of action for energy-efficient urban renewal

Evaluating the efficiency of energetic measures can only occur by balancing a town's entire system. Only citywide results provide us with indicators of how the energy transition's political goals are being implemented. The action fields for energy-efficient urban renewal refer to the utilisation and the provision of heat and electricity for individual buildings, for neighbourhoods and the city as a whole. To these must be added the areas of urban development and urban land-use planning, particularly regarding their impact on areas of existing construction. Last but not least, there is the issue of mobility.

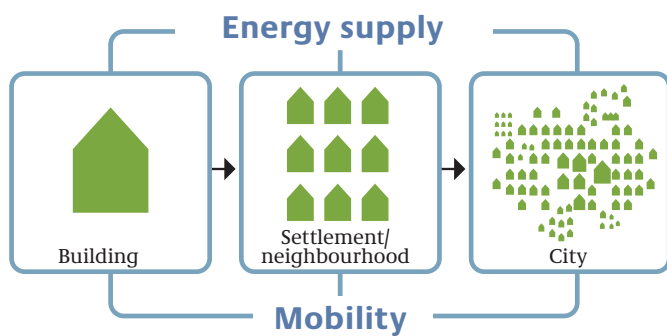


Fig. 1 Spatial levels of energy-efficient urban renewal. Source: BTU Cottbus

Aside from the energy efficiency aspects that can be achieved through increased electro-mobility, long-term location planning is essential for transport-relevant land use. The positioning of leisure, business and shopping sites, along with traffic control, are the main focus. Overall, when it comes to planning and implementing projects, it is essential to give equal attention to the opportunities and risks of energy-efficient urban renewal. Energy-efficient urban renewal can provide a significant contribution to climate protection! That is why it is worth the effort to take a nuanced view of the connections and implementation conditions.

2. Energy-saving potential is largely to be found in existing structures

The 2009 Energy Saving Ordinance (EnEV 2009) defines the energy-efficiency standards for new and modernised existing buildings. Figure 2 depicts possible savings potential for residential buildings by relevant construction year. If one compares the energy-efficiency standards of new buildings with those of non-retrofitted building stock from the period before the Second World War, one arrives at a purely mathematical figure of approximately 5-7. The 2012 Energy Saving Ordinance (EnEV) raises energy efficiency standards. In Figure 2 it is called the 'energy-optimised standard'. In comparison with the heat energy demands of non-retrofitted existing buildings vis-à-vis new buildings in accordance with EnEV 2012, we can assume a factor of 10. If one takes the current redevelopment figure for older constructions into consideration, this results in average factors of 3-5 for additional consumption. As energy prices continue to rise, this fact could make a considerable contribution towards reducing the attractiveness of older building stock in the central cities. Ancillary cost-driven vacancies could be the result. It is interesting that, when it comes to energy saving potentials in existing building stock, there are clear differences between eastern and western Germany. The single-family housing stock in the east was to some extent built only after 1990, and thus will not be considered for energy-efficient upgrading in the coming years. Multi-storey buildings (prefab housing blocks) have been much more heavily redeveloped in the east (over 80 percent) than in the west (around 45 percent). These already redeveloped structures will only be partially available in the coming years, if at all. What remain are not yet redeveloped, largely Wilhelmine-era building stock and/or structures from the period before the Second World War. In the west, the situation is very different. In that region there is a relatively large, energy inefficient stock of single-family homes dating from the 1960s and 1970s. Moreover, there are fewer redeveloped multi-storey buildings from the post-war period in the west than in the east.

Opportunities and risks of energy-efficient urban renewal

Opportunities	Risks
<ul style="list-style-type: none"> ➔ Reduction of energy demand ➔ Reduction of CO₂ emissions ➔ Stabilisation of residential neighbourhoods through increased attractiveness due to the stabilisation/reduction of operating costs ➔ Strengthening of regional economic cycles 	<ul style="list-style-type: none"> ➔ Reduction in the efficiency of the energy input of existing systems, e. g. combined heat and power ➔ Cost-driven vacancies ➔ Misguided investments in non-marketable housing stock

Thus the main focus must be placed on mobilising the energy-efficiency potential of ‘difficult stock’ in urban districts. This older building stock is characterised by multiple individual owners, many richly decorated facades and frequently also architectural conservation regulations. Particularly in these districts it can be helpful to utilise energy efficient central supply infrastructures. Using the benefits of local and district heating on a cogeneration basis, high overall efficiency can be achieved despite these problems. The consistent implementation of meas-

effects can be expected due to the uncoordinated retrofitting of solar panels for water heating in competition with an existing local or district heating supply. What is also interesting here is the effect of different urban restructuring strategies on the development of the efficiency of existing district heating systems. Here, two strategies differ greatly in their basic effect: the wholesale demolition of entire settlement units vs. dispersed demolition throughout an area. Both approaches are depicted schematically in Figure 3. It is clear that area-wide demolition –

Housing stock in Germany and savings potential in relation to non-retrofitted building conditions

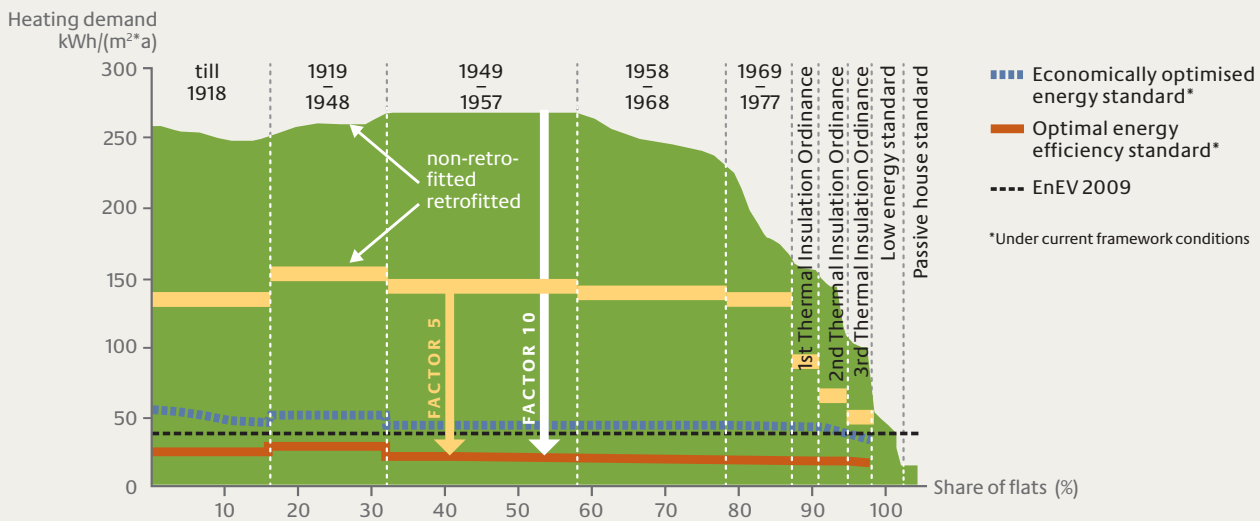


Fig. 2 The illustration shows possible savings potentials for residential buildings, both new and existing. Non-retrofitted and energy-optimised buildings can vary widely in their energy demand. The result: high ancillary costs and possible vacancies. Source: AREHNA 1993, IWU 1994, Bundesarchitektenkammer 1995, Schulze Darup 1998/2000, EnEV, Koziol 2011

ures is essential to success. Conversely, uncoordinated urban development and restructuring processes can actually lead to a deterioration in overall efficiency. This has particularly been the experience with dispersed demolition within the framework of the Urban Restructuring programmes. In this context, it is worthwhile observing the reciprocal effects between measures on the building level and the utilisation of innovative central supply structures.

3. The haphazard development of innovative systems and shrinkage processes can considerably threaten overall efficiency

Relevant experiences have been collected in recent years in connection with the accompanying research from model projects in the Energy-Efficient Urban Renewal research field of the BMVBS/BBSR. These projects show that, due to shrinkage processes as well as extensive, uncoordinated (energy-efficient) building modernisation schemes, district heating supply systems in many eastern German cities have become noticeably more inefficient. The reduced demand for useful heat confronts a clearly rising (relative) loss of heat distribution. The same

from ‘the edges to the middle’, whenever possible – generally shows far better results than dispersed demolition when it comes to overall efficiency. This becomes evident in regard to the considerably lower increase of grid losses with the simultaneous reduction of heat demand.

4. Energy-efficient redevelopment or demolition and new construction?

One on-going discussion revolves around the question of whether it makes more sense to tear down energy-inefficient



Fig. 3 Urban restructuring strategies. Source: BTU Cottbus

¹Housing stock of members in the GdW (Federal Association of German Housing and Real Estate Companies)

older buildings and replace them with new buildings that have been constructed in accordance with current energy standards. This, some argue, is the only way to achieve a significant reduction in heat consumption of more than 60-90% according to the previously stated factors. Others argue that old buildings should be improved and retrofitted using energy efficiency measures. If one looks at the overall balance of such a strategy on the basis of a study by the Chair for Energy Economics and Climate Technology at TUM (University of Technology, Munich), doubts arise regarding this radical demolish-and-rebuild strategy (Figure 4). Over the course of their entire fifty-year use cycle, existing buildings perform more poorly than new buildings in terms of energy efficiency. However, this does not take into account the energy that has already 'flowed' into these buildings during their construction. If one includes this figure in the overall heat consumption balance sheet, the picture changes. If a building is demolished and replaced with a new structure, the remaining difference amounts to less than fifty percent. This deviation can be reduced by innovative supply systems, e. g. by utilising local or district heating on a combined heat and power basis. For this reason, and in view of the considerable loss of architectural values and urban spatial qualities this strategy entails, the energy-efficient redevelopment of existing structures is worthwhile.

Cumulative energy expenditure for residential buildings over a useful life of fifty years

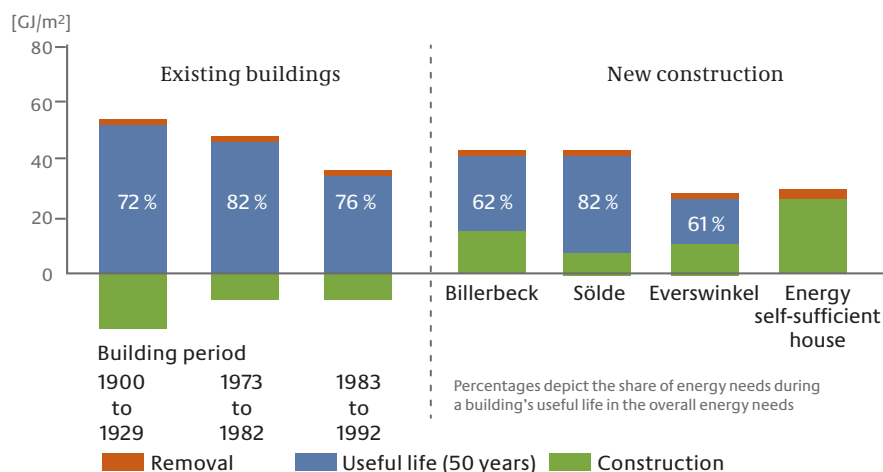


Fig. 4 In determining a building's energy balance sheet, one should consider not only heat consumption but also the energy needed for construction. It then becomes clear that the difference in the overall balance sheet between existing buildings and new construction declines considerably. Conclusion: the energy-efficient redevelopment of existing buildings is worth it! Source: Chair for Energy Economy and Power Plant Technology, TUM., modified by BTU Cottbus

5. An energy-efficiency plausibility check for urban restructuring and urban development concepts

Due to these connections and reciprocal effects, urban restructuring and urban development concepts should undergo an energy-efficiency plausibility check. The goal of such a check is to recognise the suitability of technical systems for different

urban districts. The check tests how the fit of local and district heating on a combined heat and power basis changes as energy-efficient modernisation standards increase. This estimated calculation can be used to prevent the development of systems today that may turn out to be energetically and economically inefficient in the future.

6. The housing industry – energy prices and rentability

Why is it important for the housing industry to observe the contingencies of energy-efficient urban renewal? Assuming that energy prices will continue to rise over the coming years – which is highly probable – this will have an impact on the rentability of housing stock in many cities. It will particularly affect flats with a rental rate inclusive of heating which surpasses the standard local rental potential and relatively high heat consumption. Due to rising energy prices, settlement structures with high energy consumption run a relevant risk of becoming unattractive and being rendered vacant in the medium term. In the post-reunification years, the vacancies in the eastern states were among other things caused by people moving from the prefab estates to newly erected single-family homes on the outskirts of town or in surrounding communities. A second wave of vacancies due to

energetic (and cost) reasons could affect less attractive inner-city districts with existing building stock. Under the current conditions, a basic problem in the rental sector is becoming visible: the investor-user dilemma. In relaxed housing markets, investors cannot pass modernisation costs for achieving high energy efficiency onto the rent exclusive of heating under existing market conditions. Landlords have no recognisable motive for making investments. There will be either no cash return at all in the short and intermediate term, or else it will occur only on a restricted or reduced basis. In tense housing markets, too, there is no motivation to upgrade the energy-efficiency of building stock. Returns are frequently higher without taking action than with it.

The model projects of the Energy-Efficient Urban Renewal research field have shown that passing the costs of comprehensive

energy-saving and modernisation measures onto rent exclusive of heating is not viable in the market. The starting point was an average rent exclusive of heating of 4.60 euros. The total modernisation of a Wilhelmine-era building would require a rent exclusive of heating of 8.50 euros to cover the refinancing of the measures. It is scarcely possible to find tenants willing to pay such a rent in many eastern German cities. Funding



Overall view: in Havelberg, the energy-optimised Integrated Urban Development Concept (INSEK[®]) provides important indicators for the implementation of future projects.

programmes should not be the only means of restricting the of restricting rises in rent exclusive of heating. It is at least equally important to develop a balanced housing market and/or an urban development or urban restructuring concept oriented towards such a market. This provides the conditions for a rental level that covers costs, and thus also for a comprehensive energy-efficient urban renewal programme. This is a great challenge and control opportunity for municipal planning and policy. When it comes to user-owned buildings, the situation is different. In this case, investors themselves also profit from savings accruing from energy-efficient redevelopment measures. If these measures pay off within a relatively short period of time, one can assume there will be a strong motivation to implement them.

7. Conclusions

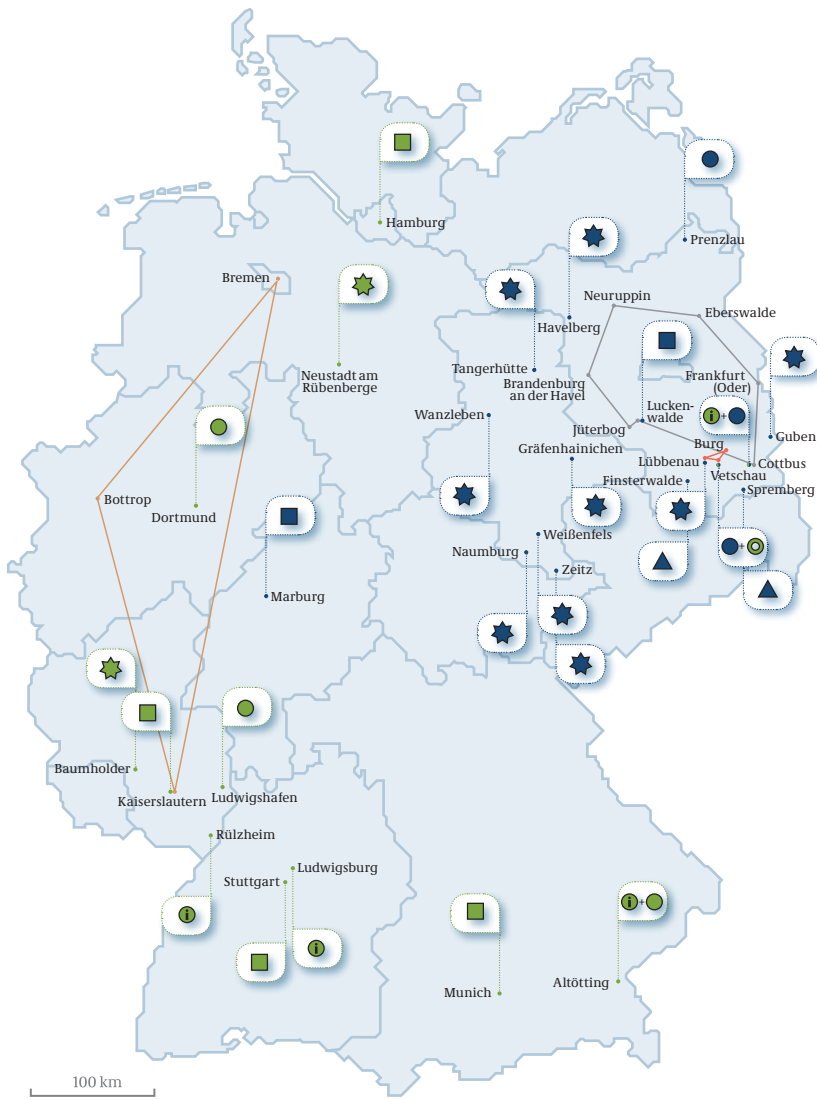
An overall consideration is important for developing a sustainable energy policy in an urban context, and it should include reciprocal effects. That is why integrated urban development planning should be used as the basis for energy-efficient urban renewal in the future. Within this framework, cities and communities should consistently formulate local energy strategies that

they can develop and implement on a nuanced, long-term and reliable basis. It is also essential to recalibrate funding systems. For example, there is currently no possibility of setting a spatial focus or making distinctions regarding different project starting situations via the KfW programmes. It would make sense to fund measures for selected upgrade zones or neighbourhoods. In view of the energy transition, integrated consideration of a city from building to neighbourhood to overall city is a (future-oriented) policy issue for Germany as a whole!



Prof Dr-Ing Matthias Koziol has been a professor at the Chair of Urban Technical Infrastructure at the Brandenburg University of Technology (BTU) in Cottbus since 1997. There he conducts research on the topics of energy, water, waste, environmental and building technology, as well as transport/urban planning. In addition, he oversees urban redevelopment processes and supervised the demonstration projects of the ExWoSt field of research on Energy-Efficient Urban Renewal.

Model projects and demonstration projects



* The thirteen model projects of the National Urban Development Policy from the 'Building the City of Tomorrow – Climate Protection and Global Responsibility' action field are concerned with different strategies for resource-efficient urban development. Settlement development, energy-efficient urban design, inter-municipal cooperation on regenerative energy supply as well as information and consultancy offers are central to these model projects.

** The sixteen demonstration projects of the ExWoSt field of research on 'Energy-Efficient Urban Renewal' examine and initiate exemplary measures concerned with energy conservation, increased energy efficiency and the application of renewable energies in model communities. Existing urban construction as well as property and neighbourhood-focused approaches play a large role in these projects.

- Model projects of the National Urban Development Policy*
- ExWoSt demonstration projects**
- BraNEK
- Zero-Emission-Park
- Spreewalddreieck

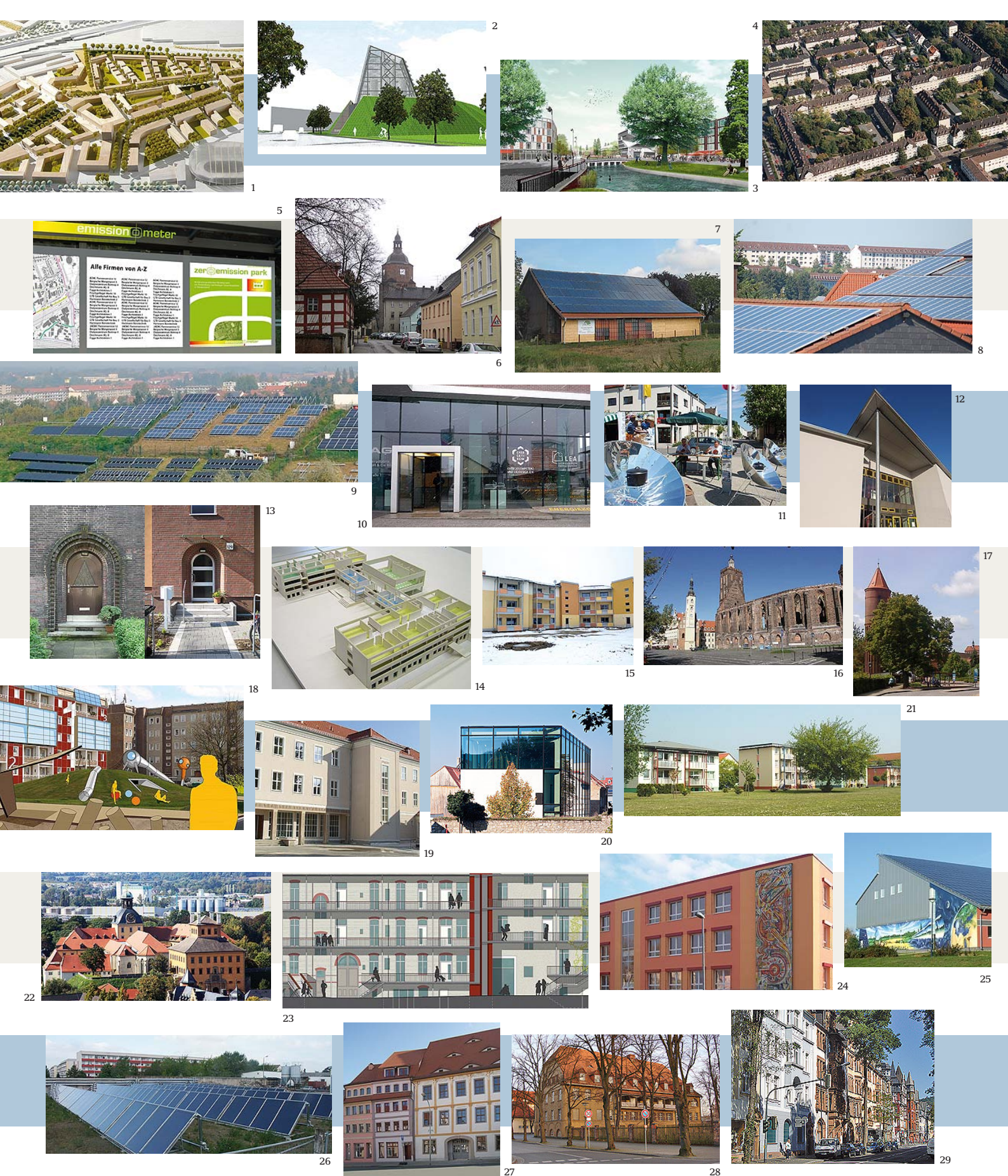
Working level

- Building
- Building complex
- Neighbourhood
- ★ Overall city
- ◎ Regional
- i Information / consultancy

Status: 15.09.2011
 Data base: on-going spatial observations of the BBSR in the BBR

Model projects of the National Urban Development Policy	
1	Living by the Veielbrunnen – LowEnergy as a location factor Stuttgart
2	Energy-efficient urban development – opportunities for existing building stock through innovative, energy-friendly development areas Munich-Freiham
3	Neighbourhood with foresight – Jenfelder Au in Hamburg Hamburg
4	'Prima Klima' in the Hohenzollern-Höfe: live a fair and energy-aware life! Ludwigshafen
5	'Zero Emission Park' – interstate project for the development of sustainable commercial zones in Germany Bottrop, Bremen, Kaiserslautern
6	'Spreewalddreieck' regional energy concept Burg, Lübbenau, Vetschau
7	'KKAP – Kommunales Klimaschutz-Aktionsprogramm' (Municipal Climate Protection Action Programme) Neustadt am Rübenberge
8	Energy City Baumholder 2020 Baumholder
9	BraNEK – Brandenburg Urban Network. Energy-efficient city and climate protection Brandenburg on the Havel, Cottbus, Eberswalde, Frankfurt (Oder), Jüterbog, Luckenwalde, Neuruppin
10	Energetikom –Centre for Energy Competency and Ecodesign Ludwigsburg
11	Integrated Energy and Resource Management Altötting
12	'Energiekultur' – Energy Agency Speyer-Neustadt/ Southern Palatinate Rülzheim
13	Cityscape and energy: sustainable urban development through energetic optimisation, sustainable building and identity-compatible cityscapes Dortmund

ExWoSt demonstration projects	
14	Creation of a generalisable refurbishment approach for the 'Erfurt' school type Cottbus
15	Update of the urban development concept on the 'City With New Energy' model Gräfenhainichen
16	Optimisation of a district heating-based energy supply including regenerative energies Guben
17	Development and implementation of a citywide energy concept including regionally available energy sources Havelberg
18	Exemplary improvement of the overall energy balance of a neighbourhood Luckenwalde
19	Development and implementation of the Energy Concept - Lübbenau, Naumburg, Tangerhütte, Zeitz
23	Energy-efficient redevelopment of partially listed old building stock in Schwedter Strasse 25-29 Prenzlau
24	Inner-city educational and leisure centre Spremberg
25	Community centre with energy Vetschau
26	Family-friendly city Wanzleben
27	Development and implementation of an overall technical energy supply strategy Weißenfels
28	Exemplary energy-efficient urban renewal in the sport and leisure site in Finsterwalde-West Finsterwalde
29	Exemplary improvement of the overall energy balance of a Wilhelmine-era neighbourhood Marburg



Picture credits:

Title: HFT Stuttgart (on the basis of an aerial view of the state capital Munich) Simulated thermal analysis: The detected surface temperature shows spots with a lot of heat and therefore high expected levels of energy loss; interior front and 11: Alain Roux, 1 r: BMVBS, Frank Ossenbrink; 2, 3: Alain Roux; 5 l: E. Budinsky, r: City of Wanzleben; 7: Cida de Aragon; 8: City of Stuttgart, Mr Staudinger; 9: SWG Tangerhütte GmbH, Mr Dahms; 11 t: Bernd Poloski, b: Bundestransferstelle Städtebaulicher Denkmalschutz c/o complan GmbH; 12 (background): Free and Hanseatic City of Hamburg/West 8 urban & design architecture, b: Hamburg Wasser; 13 l, m, r.t.: Markus Motz, r.b.: Martin Cors, both German Institute for Civic Art, TU Dortmund; 15 m: Foto-Atelier Schild-Vogel, b: Mathias Klenke; 16/17: Ariane Ruff; 19 t: City of Baumholder, b: FORUM, Bremen; 20: Urbanizers; 21: KEWOG Städtebau GmbH; 23: City of Ludwigsburg; 24/25: Göran Gnaudschun; 26: KEWOG Städtebau GmbH; 27: City of Spremberg, Stadtplanung; 28: City of Zeitz; 29: Hanseatic City of Havelberg; 30 t: TIZ Stadtwerke Marburg, b: Richárd Ongjerth; 31 l, b.r: Johannes Koziol; 32: City of Vetschau; 33: City of Gräfenhainichen; 35: HFT Stuttgart; 36: City of Luckenwalde; 37 t: Markus Motz, German Institute for Civic Art, TU Dortmund, b: ebök; 38: Keller-Mayer-Wittig Architekten Cottbus; 39 t: LUWOG, b: Hardy Müller; 40: Federal Government/Andrea Bienert; 42 t: City of Vetschau, b: Kirsten Klehn; 43 t: plan zwei, b: Klimaschutzagentur Region Hannover GmbH/Mirko Bartels; 47 t: Hanseatic City of Havelberg, b: Johannes Koziol; interior back (in numeric order): state capital Stuttgart; Stadtwerke München GmbH; Free and Hanseatic City of Hamburg/West 8 urban & design architecture; LUWOG; sign one; Urbanizers; Kirsten Klehn; City of Baumholder; cf. p. 24/25; City of Ludwigsburg; EnergieAgentur Altötting; Fotoagentur Klaus Landry; Alexander Pellnitz, German Institute for Civic Art; City of Cottbus; City of Gräfenhainichen; City of Guben; City of Havelberg; cf. p. 36; City of Lübbenau; NDZ; City of Tangerhütte; cf. p. 28; Keller-Mayer-Wittig Architekten Cottbus; City of Spremberg, Stadtplanung; City of Vetschau; cf. p. 5; cf. p. 21; City of Finsterwalde; Marion Kühn.

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