German energy politics

Relevant laws and rules by the German government – the way to the "Energiewende"
Content

1. Introduction
   - What is the so called “Energiewende”
   - Targets

2. Main drivers
   - Politics
   - Administration

3. Laws and directives
What is the „Energiewende“?

A bridging concept?  A precise definition?

Mainly two aspects:

a) **transition of the energy production and supply towards more sustainability**
   - substitute fossil fuel and combustibles by renewable energies

b) **climate mitigation**
   - nearly emission-free energy supply
     - power, heat and mobility
   - higher energy efficiency

Further goals:
- increase of independence of the market for fossil energies
- increase the value added in energy production and supply

**The final goal is the abolition of coal and other non-renewable energy sources.**

But: there are unknowns!

The challenges of the transformation are extensive and currently not ascertainable in there whole complexity!
Introduction

Political aims on the national level

Three target values of the Energy Concept (2010)

Achievement: increase of renewable energies (gross energy consumption):
heat and power
18% of renewable energies in 2020

Further achievements:
30% in 2030,
45% in 2040,
60% in 2050,

power only
50% in 2030,
65% in 2040,

Part I: Who are the main drivers to reach these goals?

 Achievement: increase of primary energy consumption

Until 2020 compared to 2008 by 20% and until 2050 by 50%.

Part II: Which role do municipalities and regions resp. urban and spatial planning play in achieving these goals?

Achievement: reduction of the greenhouse gas emissions

Until 2030 compared to 2008 by 55% and until 2050 by 80 to 95%.
Main drivers by achieving the goals

- laws and directives
- land use
- urban structure
- existing technical infrastructure
- private sector
- administrations
- politics
- the public
- R&D
- space for facilities
Competences and responsibilities in the German planning system

http://www.arl-net.de/system/files/en_mutual_feedback_principle_0.jpg
Basic political documents by the German government

- Integrated Energy and Climate Programme (IEKP) (August 2007)
- Energy Strategy by the German Government (Sept. 2010)
- Government's priorities for a energy policy concept (June 2011)

Additional aim: nuclear power phase out

March 11, 2011 Fukushima
Directives - laws & directives

Energy, climate mitigation, housing and urban development - laws and rules at a glance

Influencing *European* directives:

- on the energy performance of buildings (2010/31/EU)
- on the promotion of the use of energy from renewable sources (2009/28/EC)
<table>
<thead>
<tr>
<th>abbreviation</th>
<th>official title</th>
<th>short form</th>
<th>translation</th>
<th>type</th>
<th>impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>EEG</td>
<td>Gesetz für den Vorrang Erneuerbarer Energien</td>
<td>Erneuerbare Energien Gesetz</td>
<td>German Renewable Energy Act</td>
<td>sectoral (support the electricity generation from renewable energies)</td>
<td>indirect</td>
</tr>
<tr>
<td>EnEG</td>
<td>Gesetz zur Einsparung von Energie in Gebäuden</td>
<td>Energieeinsparungsgesetz</td>
<td>Energy Conservation Act</td>
<td>sectoral (targets especially at saving energy by means of thermal insulation, plant and system technology and the operation of plants)</td>
<td>direct</td>
</tr>
<tr>
<td>EnEV</td>
<td>Verordnung über energiesparenden Wärmeschutz und energiesparende Anlagentechnik bei Gebäuden</td>
<td>Energieeinsparverordnung</td>
<td>Energy Conservation Regulation (for buildings and building systems)</td>
<td>sectoral (targets energy conserving thermal insulation and energy saving equipment and technology in buildings)</td>
<td>direct</td>
</tr>
<tr>
<td>EEWärm eG</td>
<td>Gesetz zur Förderung Erneuerbarer Energien im Wärmebereich</td>
<td>Erneuerbare-Energien-Wärmegesetz - EEWärmeG</td>
<td>Act on the Promotion of Renewable Energies in the Heat Sector</td>
<td>sectoral (support renewable energies in the heat and cold sector in buildings)</td>
<td>direct</td>
</tr>
<tr>
<td>BauGB</td>
<td>Baugesetzbuch</td>
<td>Federal Building Code</td>
<td>classical planning act</td>
<td>direct</td>
<td></td>
</tr>
<tr>
<td>KWKG</td>
<td>Gesetz für die Erhaltung, die Modernisierung und den Ausbau der Kraft-Wärme-Kopplung</td>
<td>Kraft-Wärme-Kopplungsgesetz</td>
<td>German Combined Heat and Power Act</td>
<td>Sectoral (targets on the maintenance, modernisation and expansion of combined heat and power (CHP) generating, especially grid operators)</td>
<td>indirect</td>
</tr>
</tbody>
</table>
Directives - laws & directives

Energy and regional development

On the regional level resp. for the regional planning the possibilities of intervention via laws are very limited!

The regional planning is only responsible for so called „raumbedeutsame Maßnahmen“ (measures having a certain impact on the territory), installations or plants, like windmills or huge solar plate fields.

What is huge is not defined in general.

Biomass is not regulated.

Different approaches exist: But nothing relevant until now.

Three ways (but limited)

- so called negative planning (negativplanerisch) ⇒ areas where installations are not allowed because of e.g. nature protection

- so called positive planning ⇒ areas with priority for corresponding installations or exception/reservation

Biomass plants
- regulated for urban areas
- partly informal through informal concepts/strategies
Drivers - politics

Research, aid and loan programmes on the federal level

Among others as e.g. *tax advantage*st the government supports the Energiewende by wide range of research, aid and loan programmes, like:

- **Labeling**: e.g. by the German government

- **Research (examples)**:
  - *6th Energy Research Programme of the Federal Government*, plus the dialog within the „Forschungsforum Energiewende“ (research forum Energiewende)
  - Sectoral research programmes, e.g. *EnEff:Stadt* or *EnEff:Wärme*
  - Research in existing programmes, like *ExWoSt* or *MORO* within the fields of urban and regional planning
  - Research on buildings - Research Initiative "Future Building"
  - **100% EE regions**

- **Competition (example)**:
  - *Bioenergiedörfer (Bio-Energy-Villages)*
Drivers - politics

Research, aid and loan programmes on the federal level

- Aid and loan programmes in the urban context:
  - National Climate initiative
    - among others: climate protection in municipalities, in social and cultural institutions
  - KfW (KfW-Bankengruppe)
    - Energy-efficient refurbishment programme
    - KfW-Programm Energieeffizient Bauen - Energy-efficient construction programme
    - Social investment programme – energysaving building refurbishment
    - Energy-efficient infrastructure …
    - Energetic urban renewal

A wide range of aid, loans, research programmes, etc. can be used and mixed from housing via neighbourhoods, municipalities to regions.
Knowledge and creativity is the key.
Further Information (miscellaneous selection)

Federal German Laws and Regulations (by the Berliner Informationsstelle Klimaschutz)

General information on the German planning system
- http://www.arl-net.de/commin/germany-deutschland/germany

Energy efficient buildings and urban development

Ministry for Transportation, Housing and Urban Development

Innovative energy-efficient urban renewal in cities of the German federal states of Brandenburg and Saxony-Anhalt

EnEff:Stadt

Cities and climate Change
Further Information (miscellaneous selection)

6th Energy Research Programme of the Federal Government
- http://www.bmwi.de/EN/Service/publications,did=477502.html

Kfw

Klimaschutzinitiative (Climate Initiative – for Germany)
http://www.bmu.de/en/topics/climate-energy/climate-initiative/general-information/

Internationale Klimaschutzinitiative (International Climate Initiative)
German energy politics
Consequences for the urban development

Lars Porsche

DIFU
Spatial Planning and Energy for Communities in all Landscapes (SPECIAL)
03.09.2013
Berlin
Main drivers by achieving the goals

- land use
- laws and directives
- space for facilities
- urban structure
- the public
- private sector
- R&D
- administrations
- existing technical infrastructure
Content

1. Introduction
   - thesis
   - renewable energies in Germany
   - (new) determining factors in Germany for urban and regional development

2. Potentials and fields of activities of energy related urban renewal
   - Energetic urban renewal
   - Example: Munich Freiham
   - Using urban superfcies for renewable energies

1. Conclusion
For urban and regional development the energy issue is of high importance, because nearly all renewable energies need space!

Cities and municipalities do have the potential capacity and capability to increase energy efficiency and the use of renewable energies.

But these are currently developed only to a little percentage and in piecemeal fashion.
Introduction

Germany‘s electricity mix in 2011 and the share of renewable energies

What could urban areas provide?

Which effect does it have on housing, neighbourhoods, municipalities…?
Introduction - Challenges

Urban development and energy (efficiency)
Between density and sprawl

Which type is energy efficient?
Which type allows the optimal production of renewable energies?

We have to face up to the reality!
Inefficient existing building stock in Germany:
• approx. 40 % of Germany's gross energy consumption and
• 2/3 of the CO$_2$- emissions.

Thus the building stock encloses a huge potential concerning energy efficiency and reduction of CO$_2$- emissions.
(further) Challenges for a resource efficient urban renewal in Germany

**Introduction - Challenges**

climate change
- global warming
- mitigation
- adaptation

energy
- from the „fossil“ to the „post-fossil“ age
- change of mobility

demographic change
- social as well as infrastructural adaptation (before “Stadtumbau”, today also small cities in the “periphery”)

economical (structural) chance
- on the way to the (blue) knowledge society and green economy

land consumption
- 30 ha - aim
- competition for land
2. Potentials and fields of activities of energy related urban renewal

three research examples
Research field: energetic urban renewal
(in Brandenburg and Saxony-Anhalt, incl. the city of Marburg since 2009)
Energetic urban renewal

Research field for energetic urban renewal

Aim: to contribute to climate protection, to identify and provide recommendations for an integrated implementation of measures of energetic urban renewal.

Search: exemplary ways for an energetic reorientation of urban development.

The emphasis of research was on the connection between
• power consumption and urban development processes,
• the basic conditions for the implementation of arrangements of energetic urban renewal and the effects on environment, economy and society.

All municipalities which participated in the German „urban restructuring“ programme, too.
Energetic urban renewal

Energetic retrofit – demolition – „retreat“

Potentials and consequences of the existing stock

What do these interventions mean for (the prevention of) the identity of places, municipalities, cities?

Source: W. Neußer 2009

Source: DBFZ 2009

Source: Walter, BTU Cottbus
Energetic urban redevelopment – and urban renewal strategies

Urban renewal strategies and fields of action (area: building and techn. infrastructure)

- Blockwise deconstruction
- Dispersive deconstruction

Economic efficiency

- Utilized capacity of infrastructure

Efficiency

Sustainability of the urban structure

Source: Koziol 2008
Energetic urban renewal

Retrofit, infrastructure, economic feasibility and energetic efficiency

Economic feasibility?

(total) energy efficiency?

Source: modified according to Koziol 2008
ExWoSt „Energetische Stadterneuerung“

Quelle: www.plan-zwei.com
Quelle: BMVBS
Energetic urban renewal

The right course of action?

Concept Orientated (top down)  <->  Project Orientated (bottom-up)

Concept Orientated (top down):
- Starts with a professional (urban) energy concept
- Selection of appropriate projects for each area
- Realisation of single integrated projects

Project Orientated (bottom-up):
- Starts with single projects
- Trying to get a common approach to professional (urban) energy concept
- Adjustments to energy concept / strategy as part of the (integrated) urban development concept

The right course of action?
Energetic urban renewal requires a conceptual approach / definition:

The energetic urban renewal includes the strategic development and coordination of:
- energy saving measures,
- measure for the increase of energy efficiency and
- the use of renewable energies.

It is an interdisciplinary task, involving relevant stakeholders and the interrelation of technical infrastructures on the level of:
- the building,
- the quarter/ residential area and
- the complete city.
Energetic urban renewal

Result: understand and consider the connection between the systems

Interrelation between urban development and energy demand

source: BMVBS (edit.): Handlungsleitfaden zur energetischen Stadtenerneuerung (2011)
Final Result: connection between the systems – fields of activity, stakeholders, ...integrated strategies and measures

Schematic illustration of an energetically optimized urban development strategy

Source: BMVBS (Hrsg.): Handlungsleitfaden zur energetischen Stadtterneuerung (2011)
National Stadtentwicklungspolitik

Example: München Freiham connecting an existing neighbourhood with a new area for housing estate
Example: München Freiham – connecting an existing neighbourhood with a new area for housing estate

München - Freiham Nord and Neuaubing

Development of an 190 ha area for new housing estate for aprox. 20,000 inhabitants in Freiham

The existing neighbourhood quarter (Neuaubing) from 1960 will be integrated in the planning process for Freiham

aim: „energetic urban development“

Connecting the new area for housing estate with the redevelopment of the existing neighbourhood.

Source: Stadt München

Source: Hochschule für Technik Stuttgart
Example: München Freiham – connecting an existing neighbourhood with a new area for housing estate

München - Freiham Nord und Neuaubing

Basic understanding:

• An “energy-equitable urban development” overcomes the unilateral energetic-technically examination of the housing.
• It combines the criteria for housing, urban development, economy and social aspects
• An “energy-equitable urban development” thus encloses various aspects: first step: to reduce the energy consumption and change to renewable energy

• All groups of residents should profit from the high energetic standard.
• The combined “energy-equitable urban development” of Freiham and Neuaubing should foster the coalescence of the neighbourhoods and a growing common identity.

Source: Stadtwerke München GmbH (SWM)
Energy efficient urban development

Example: München Freiham – connecting an existing neighbourhood with a new area for housing estate

Source: Stadt München
Using undeveloped urban areas and urban superficies for renewable energies
Using renewable energies in urban areas

Thesis: Free space are energetically useable spaces

- Windpower
- Biomass
- Geothermal Power
- Heat & Power
- Power Plant
- Small Hydropower Units
- Biogas
- Earth Collectors
- Photovoltaik
- Hinterland

Source: BBSR: Nutzung städtischer Freiflächen für erneuerbare Energien (2009)
Using renewable energies in urban areas

Example of Gelsenkirchen
Methodological approach

<table>
<thead>
<tr>
<th>Class</th>
<th>No</th>
<th>Subclass</th>
<th>Total area in ha</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mixed types</td>
<td>I</td>
<td>Pre-industrial city / historic centre</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>II</td>
<td>Building blocks of the 19th and beginning 20th century of the central city</td>
<td>178</td>
</tr>
<tr>
<td></td>
<td>III</td>
<td>Post-war reconstruction (of destroyed buildings)</td>
<td>155</td>
</tr>
<tr>
<td></td>
<td>IV</td>
<td>Village-like fractured structure</td>
<td>32</td>
</tr>
<tr>
<td>Living</td>
<td>V</td>
<td>Pre-war company housing</td>
<td>401</td>
</tr>
<tr>
<td></td>
<td>VI</td>
<td>Social (subsidized) housing of the 1950s</td>
<td>333</td>
</tr>
<tr>
<td></td>
<td>VII</td>
<td>High rise apartment buildings of the 1970s and prefabricated block structures (mainly former East Germany)</td>
<td>1222</td>
</tr>
<tr>
<td></td>
<td>VIII</td>
<td>Apartment buildings since the 1960s</td>
<td>400</td>
</tr>
<tr>
<td></td>
<td>IX</td>
<td>Private homes / residential areas (1-family homes)</td>
<td>563</td>
</tr>
<tr>
<td>Business</td>
<td>X</td>
<td>Business and industry</td>
<td>2515</td>
</tr>
<tr>
<td>Functional buildings</td>
<td>XI</td>
<td>Service buildings, office buildings, shopping malls, etc.</td>
<td>919</td>
</tr>
<tr>
<td>Park and green</td>
<td>XII</td>
<td>Parks, open air sports grounds, city forests, gardens, graveyards</td>
<td>3784</td>
</tr>
<tr>
<td>Agriculture</td>
<td>XIII</td>
<td>Crops and cattles</td>
<td>906</td>
</tr>
<tr>
<td>Rest</td>
<td>XIV</td>
<td></td>
<td>2008</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Total 12.319</td>
<td></td>
</tr>
</tbody>
</table>

Area calculation based on GIS (gerundet)

Source: BBSR, edit.: Nutzung städtischer Freiflächen für erneuerbare Energien, 2009
Using renewable energies in urban areas

Example: City of Gelsenkirchen

Background for the calculation of the scenarios:

3-steps (assumptions) for the retrofit of a building as a precondition:
- professional rehabilitation
- modern technology (for the building)
- using renewable energies
(refering to DENA)

Calculations only for two energy parties:
- households
- business

<table>
<thead>
<tr>
<th>buildings</th>
<th>Park and green</th>
<th>Agriculture</th>
<th>Rest</th>
</tr>
</thead>
<tbody>
<tr>
<td>XI</td>
<td>XII</td>
<td>XIII</td>
<td>XIV</td>
</tr>
<tr>
<td>Center buildings, offices, shopping malls, etc.</td>
<td>Parks, open air sports grounds, city forests, gardens, graveyards</td>
<td>Crops and cattles</td>
<td></td>
</tr>
</tbody>
</table>

Area calculation based on GIS (gerundet)

Source: BBSR, edit.: Nutzung städtischer Freiflächen für erneuerbare Energien, 2009

Total 12,319
Using renewable energies in urban areas

Example: City of scenario VI – flexible (optimized to the needs of the housing resp. neighbourhood)

Area used
- neutral (double) 879 ha
- relevant (single) 0 ha

Heat generation
- gain: 1650 GWh/a
- coverage: 91%

Power generation
- gain: 667 GWh/a
- coverage: 86%

Attention: These are only approximate values to show the potential and give first hints.

- aprox. 120 ha could be used for biomass, etc.
Further development of the methodology by the IBA Hamburg

- Area used
  - neutral (double): 879 ha
  - relevant (single): 0 ha

Attention: These are only approximate values to show the potential and give first hints.
Conclusion

The need for an integrated action
Conclusion

The need for an integrated action
The mutual feedback principle as big chance and a key

http://www.arl-net.de/system/files/en_mutual_feedback_principle_0.jpg
Conclusion

The need for an integrated action

- Urban development in Germany changes – but foremost in existing cities, municipalities, quarters
- The complexity of urban development, energy efficiency, renewable energies and the protection of resources can be solved.
- The paradigm of the compact and well-greened up city has to be adopted referring to be more resources efficient!
- Climate protection and –mitigation have to be realised within an integrated approach taking into consideration the aim of a redensification.
- The whole city/ municipality with its different types of urban areas and spatial levels has to be analysed and dealt with. One level or area is not enough!
- Uncoordinated small actions have to be avoided.
Conclusion

The need for an integrated action

- Energy concepts offer a possibility to integrate:
  - more than supply and disposal infrastructure –
  - the current as well as future challenges,
  - energy saving, efficiency and production,
  - the real estate market into urban planning and development in a sustainable and resource efficient way.

  - Integrated energy and climate concepts have to be integral parts of urban planning.

  - But these have to be assisted and fostered. Cities and municipalities can not shoulder the new task alone.

  - The analysis of the spatial structure should be obligatory element of funding and allowances.

http://de.structurae.de/structures/index.cfm?ID=s0001474 – Mont Cenis, Herne, Germany
Further information

Publications and internet

BBSR publications:

- Perspectives of Spatial Development in Germany
  Eds.: BMVBS/BBR, Bonn/Berlin November 2006
  (online available)

- BBSR research news
  The information bulletin informs in short reports
  about the work and research results of the BBSR
  (online available)

- BBSR ExWoSt-Informationen Heft 36
  (only German)
  Modellvorhaben zur energetischen Stadterneuerung
  In den Städten der Budnesländer Brandenburg und
  Sachsen-Anhalt (printed and online)

www.bbsr.bund.de - > English

Further publication:

- 100 Per Cent Renewable - Energy Autonomy
  in Action. Edited by Peter Droege
  Chapter 15: Urban Energy Potentials: A Step towards the
  use of 100% Renewable Energies

- Energie(efizienz) - vom Gebäude zum Quartier
  IzR 9.2010

- stadt:pilot special - Renewable energies, energy efficiency and
  climate protection in the city of Tomorrow (online available)

- Nutzung städtischer Freiflächen für erneuerbare Energien (2009)
  (online available)

- Erneuerbare Energien: Zukunftsaufgabe der Regionalplanung (2011)
  (online available)
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