



Energetic renewal of cities



UN ECE International Forum on
“Greening Real Estate Markets”
Session 3: The role of academia and trial projects
Dessau, Germany , 30.11.2010

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Development (BBSR)
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1. Introduction

2. Energetic renewal of cities – approaches and first results

- Energetic urban redevelopment
- Industrial parks as part of the energy efficient city
- The potential of urban areas to produce energy

3. Conclusion



Introduction

Between science and policy advice

The **Federal Institute for Research on Building, Urban Affairs and Spatial Development (BBSR)** within the Federal Office for Building and Regional Planning (BBR) is a departmental research institution in the portfolio of the German Federal **Ministry of Transport, Building and Urban Affairs (BMVBS)**.

Supports the federal government with sectoral scientific consultation in the political areas of

- spatial planning,
- urban development,
- housing and building

on the **national and european level.**

Between science and policy advice



The screenshot shows the BBSR website with a navigation menu on the left and main content on the right. The main content includes a header with the BBSR logo and a navigation bar with links for Home, About, and Contact. Below this is a section titled 'BBSR - Das Bundesinstitut für Bau-, Stadt- und Raumforschung' with a sub-header 'Das Bundesinstitut für Bau-, Stadt- und Raumforschung (BBSR) ist seit Wirkung vom 1. Januar 2009 durch Zusammenlegung des wissenschaftlichen Bereichs des Bundesamtes für Bauwesen und Raumordnung (BBR) unter Integration des Instituts für die Erhaltung und Modernisierung von Bausubstraten a.V. (IEHE), Berlin, entstanden. Als Reserchungsrichtung im Geschäftsbereich des Bundesministeriums für Verkehr, Bau und Stadtentwicklung (BMVBS) hat es die Aufgabe, Bess in den Politikbereichen Stadt- und Raumentwicklung, Stadtplanung, Wohnraum- und Immobilienmarkt sowie Baue und Baukultur auf nationaler und europäischer Ebene zu beraten. Gefragt werden BBSR und sowohl Forschungs- und Entwicklungsleistungen als auch wissenschaftlich basierte Dienstleistungen.

Das wissenschaftliche Selbstverständnis des BBSR stützt sich auf die 2007 von der Bundesregierung beschlossene Konzept für moderne Reserchungsrichtung. Es rechnet sich dadurch aus, dass der Fokus von Forschung und Beratung auf die Schnittstelle von Wissenschaft und Politik ausgerichtet ist. So ist der Arbeit des BBSR präventiv, interdisziplinär ausgelegt, sie besteht Anseher der Wissens transferierung ist und gerichtet vor allem Transferwissen. Hierbei verbindet es kurzfristig überbrückende wissenschaftliche Kompetenz für ad hoc-Aufgaben des Reserchs aber auch der Bundesregierung mit der Fähigkeit, langfristig angelegte Aufgaben kontinuierlich und forschungsbasiert bearbeiten zu können.

Zu den Kernaufgaben des BBSR gehören:

- die Schaffung und Sicherstellung von Informationsgrundlagen,
- die Erarbeitung von Berichten,
- die Erstellung von Experten und Gutachten,
- das Management und die fachliche Betreuung verschiedener Reserchungs- und Förderprogramme,
- der Ergebnistransfer in Politik und Wissenschaft.

Political aims on the national level 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

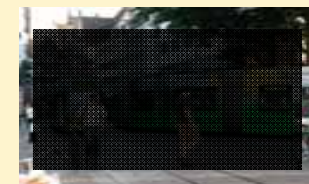
35% of RE in 2020

50% in 2030,
65% in 2040,
80% in 2050,



Achievement reduction of primary energy consumption

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

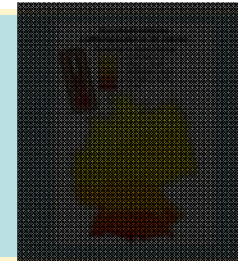


Which role do municipalities play in achieving these goals?

(New) Challenges for a resource efficient urban renewal in Germany

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



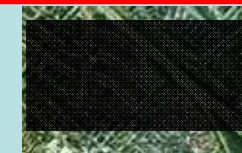
economical (structural) change

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



Land consumption

- 30 ha - aim
- competition for land



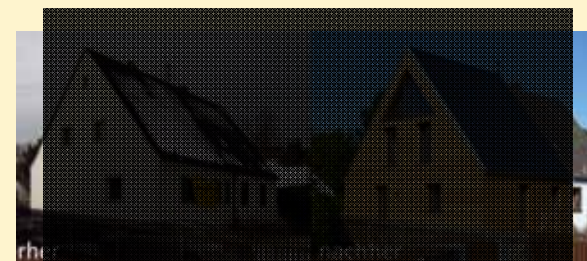
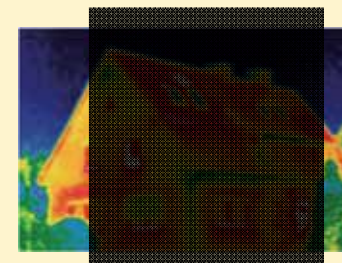
Buildings and energy (efficiency) The big challenge

Inefficient existing building stock in Germany:

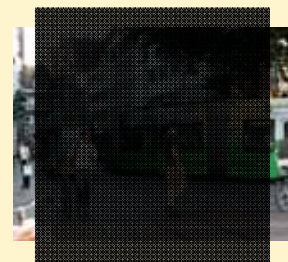
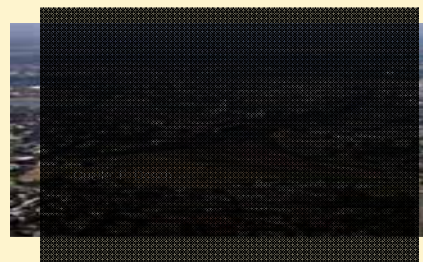
- aprox. 40 % of Germany`s gross energy consumption and
- 2/3 of the CO₂-emissions.

Thus the building stock encloses a huge potential concerning energy efficiency and reduction of CO₂-emissions .

Furthermore: The rate of newly build houses is low and the rate of refurbished buildings per year represents around 1% of the existing building.



And... it is not only the building!





Energetic renewal of cities

approaches

and first results



ExWoSt

Research field : **energetic urban redevelopment**
(in Brandenburg and Saxony Anhalt)

Research field for energetic urban redevelopment

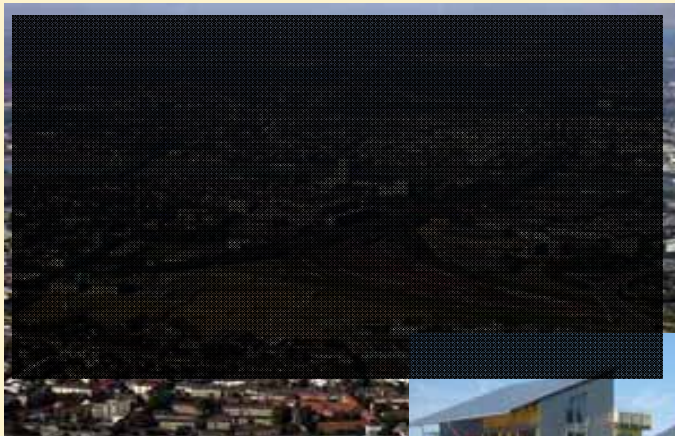
Aim: to contribution to climate protection, to identify and provide recommendations for an **integrated implementation of measures of energetic urban renewal**.

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

The emphasis of research is on the **connection** between

- **power consumption and urban development processes,**
- the basic conditions for the implementation of arrangements of **energetic urban redevelopment** and the **effects on environment, economy and society.**

Levels of an energy and a resource efficient urban development



Energetic urban redevelopment

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?



Quelle: W. Neußer 2009

Source: DBFZ



Quelle: W. Neußer 2009



Quelle DBFZ 2009

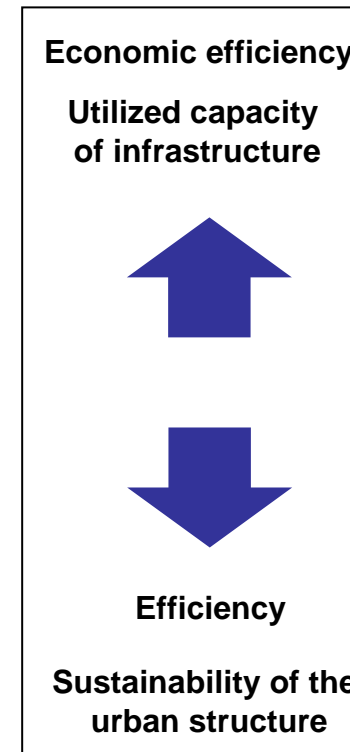
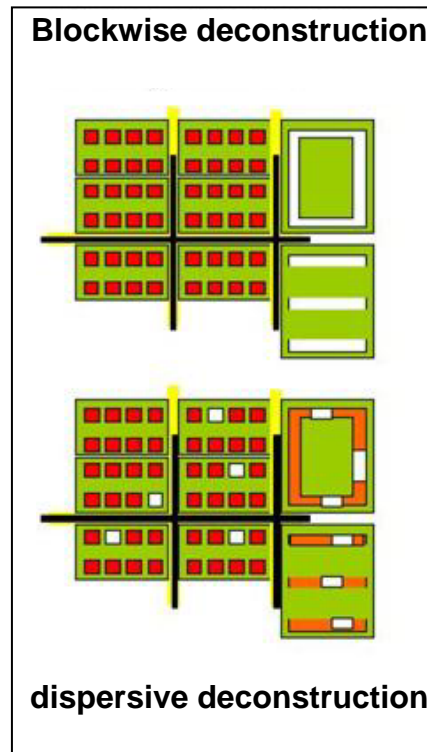
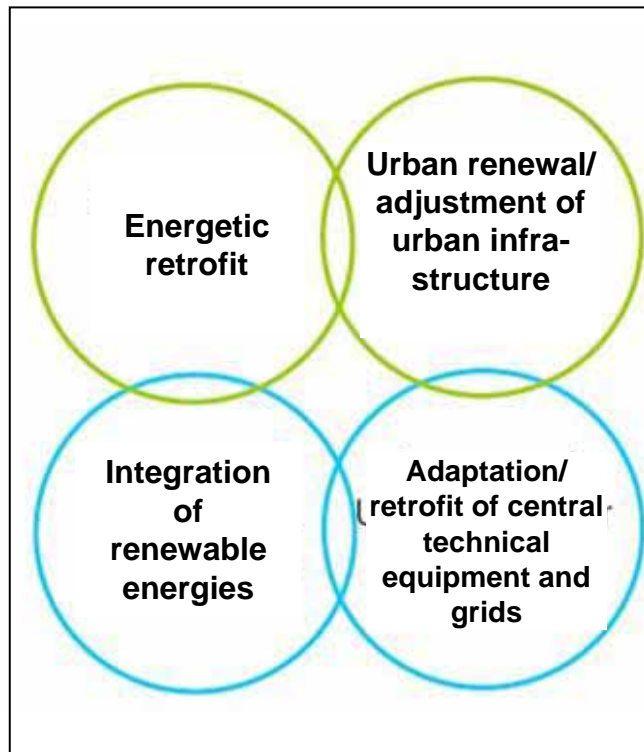


Quelle: Walter, BTU Cottbus

Pilot projects for energetic urban redevelopment



Energetic urban redevelopment – and urban renewal strategies
Urban renewal strategies and fields of action (area: building and techn. infrastructure)

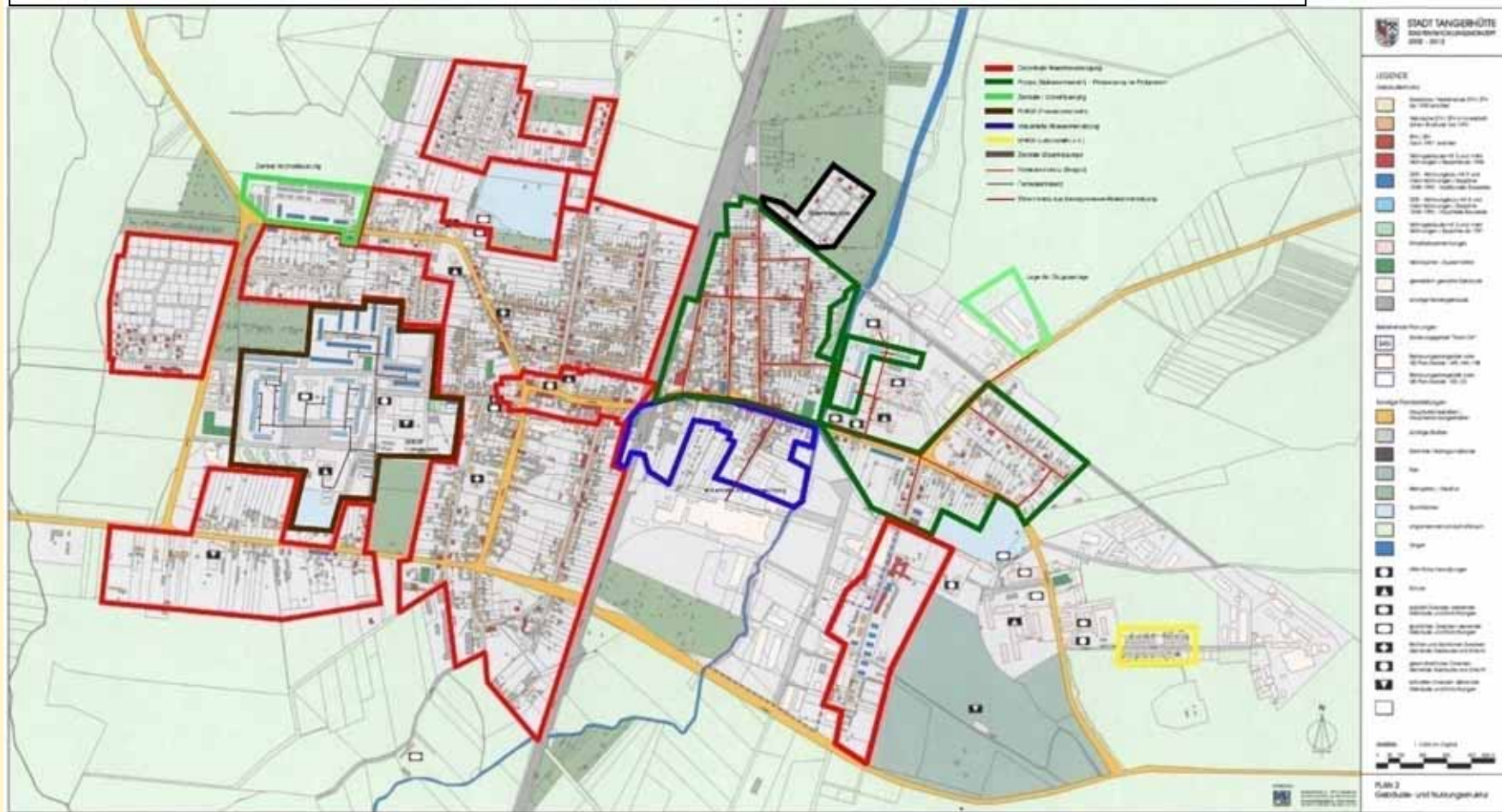


Example Tangerhütte

Different types of heat supply by possible extensions

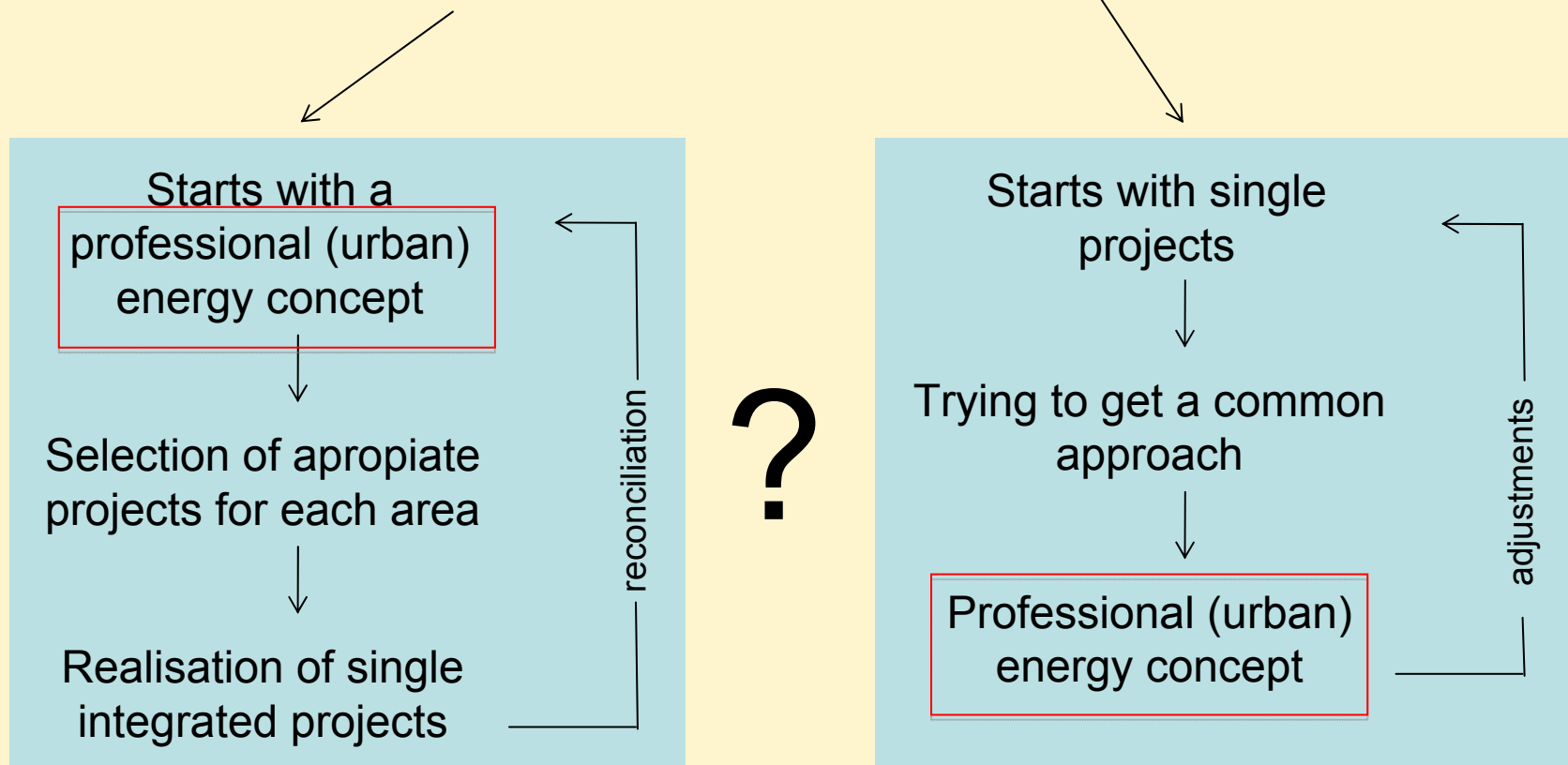


Wärmeversorgungsarten in Tangerhütte (prinzipiell gegliedert nach potentiellen technischen Ausbaumöglichkeiten)



The right course of action?

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





Industrial parks as part of the energy efficient city

Industrial Parks – part of resource-efficient urban development

Bottrop – Industriegebiet "Am Kruppwald & An der Knippenburg"



Amt für Wirtschaftsförderung und Immobilienmanagement, Bottrop

Chempark Bayer
Leverkusen

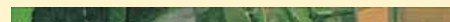


www.leverkusener-anzeiger.ksta.de

Technologiepark Bremen



Dortmund - GVZ Ellinghausen mit IKEA Hochlager



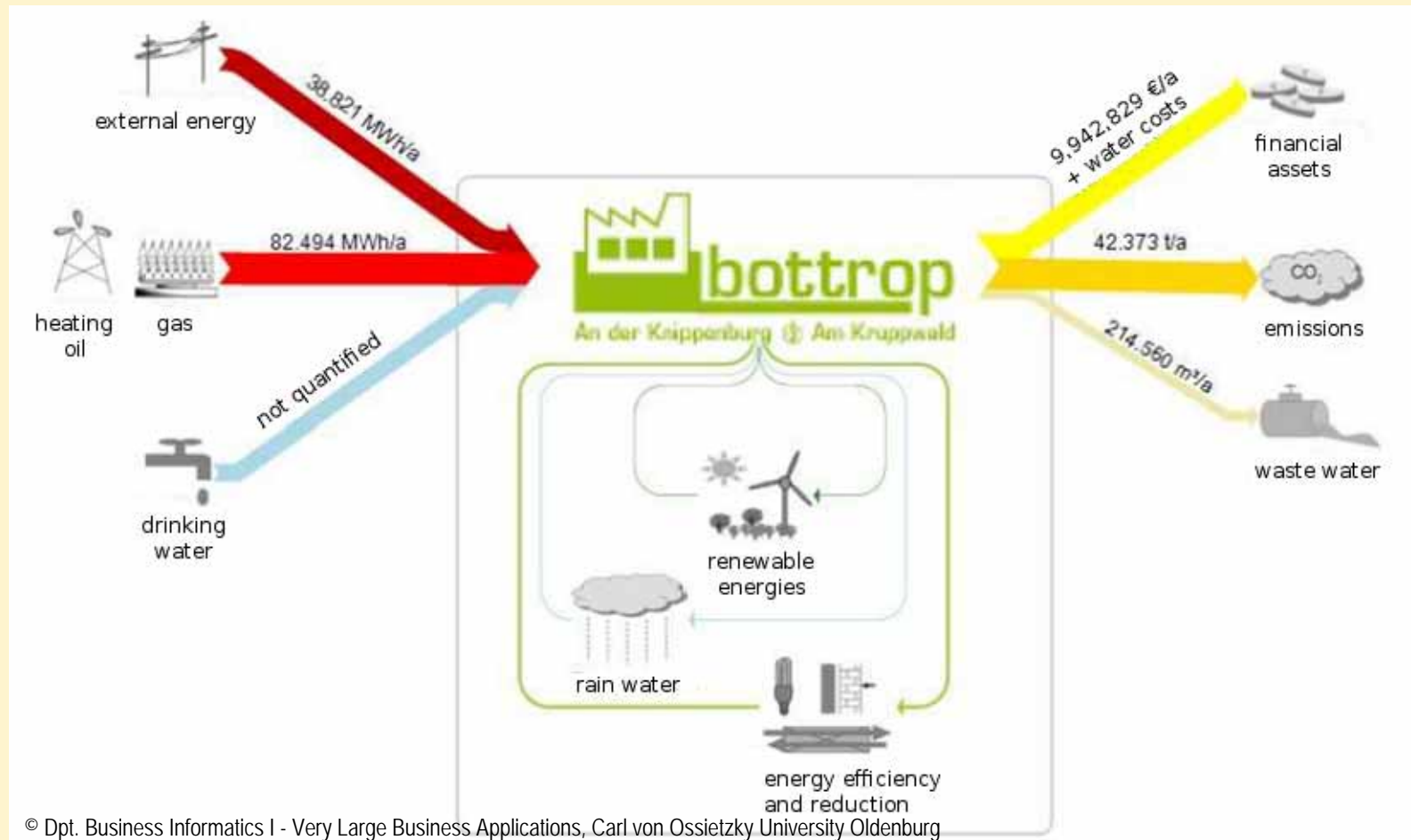
zer@emission park



<http://www.mengede-online.de/>

Material and energy flows

Industrial park Knippenburg & Kruppwald(status quo)



Material and energy flows

Industrial park Knippenburg & Kruppwald(status quo)

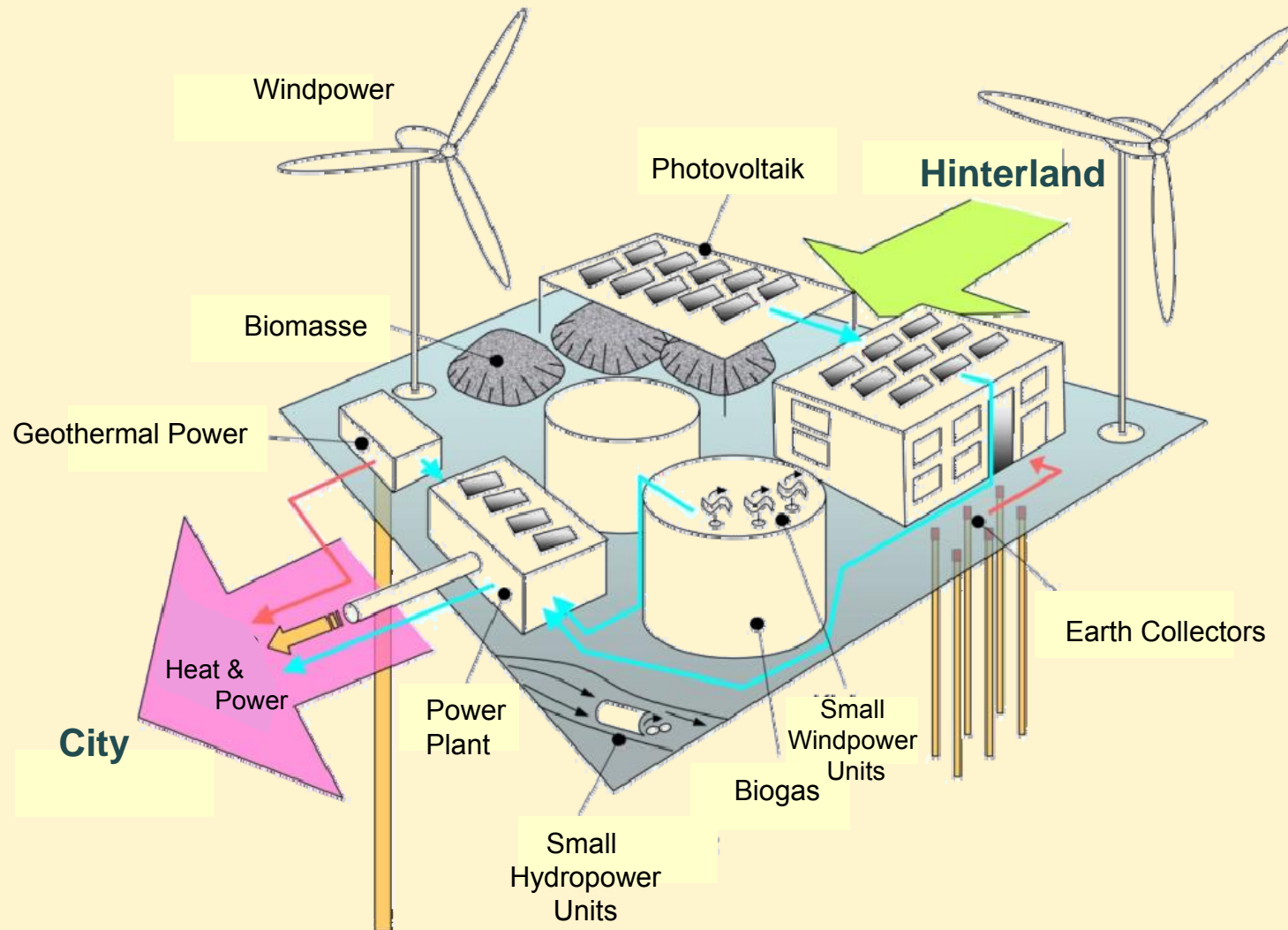
Industrial efficiency actions		Reduction
Waste water reduction	Energy	Ca. 40%
Electric lighting	Energy	Ca. 20-75%
Mechanical energy equipment	Energy	Ca. 3%
Hydraulic heat exchange	Heat	Ca. 30%
Cooling and air circulation	Heat	Ca. 90%
Energetic restauration of buildings	Heat	Ca. 40-80%
Application of renewable energies		
Photovoltaics potential	6.882 MWh	4.295 t CO ₂
Solar heat	14.285 MWh	3.985 t CO ₂
Heat pumps / waste water	1.021 MWh	284 t CO ₂

© Dpt. Business Informatics I - Very Large Business Applications, Carl von Ossietzky University Oldenburg



The potential of urban areas to produce energy

Thesis: Free space are energetically useable spaces

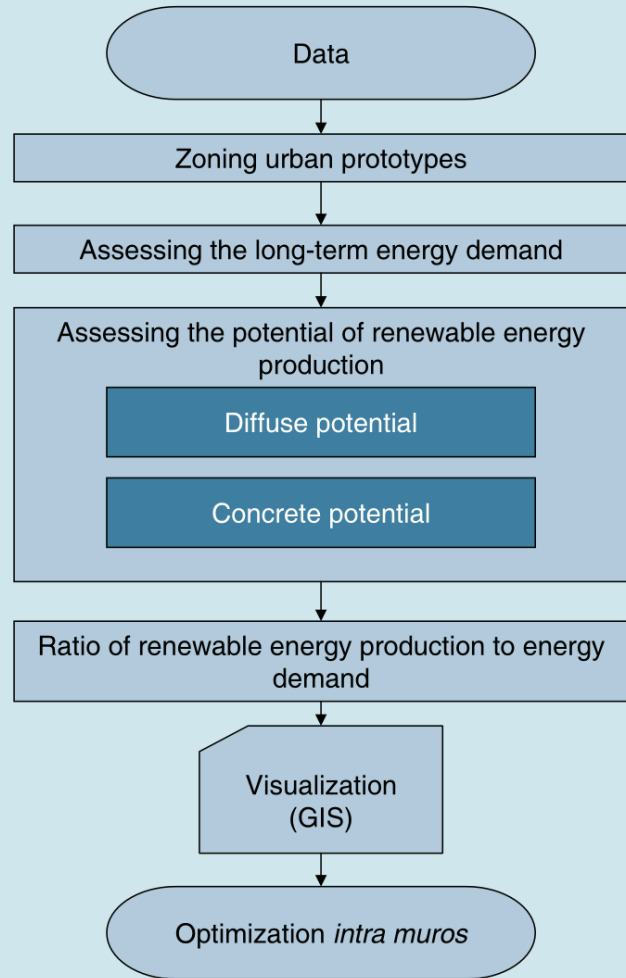


Using renewable energies in urban areas



H

General strategy of deriving maps depicting the potential of renewable energy generation



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

BBSR Bonn 2009

Energy energetic potential



3-steps for the retrofit of a building as a precondition:

- professional rehabilitation
- modern technology (for the building)
- using renewable energies (referring to DENA)

Calculations only for two energy parties :

- households
- business



Prototypes of quarters

Class	No	Subclass	Heat demand in kWh/ (m ² a)	Hot water demand in kWh/ (m ² a)	Power demand in kWh/ (m ² a)
Mixed types	I	Pre-industrial city / historic centre	130	17	20
	II	Building blocks of the 19 th and beginning 20 th century of the central city	50	17	20
	III	Post-war reconstruction (of destroyed buildings)	70	17	20
	IV	Village-like fractured structure	60 ³	17	20
Living	V	Pre-war company housing			
	VI	Social (subsidized) housing of the 1950s			
	VII	High rise apartment buildings of the 1970s and prefabricated block structures (mainly former East Germany)			
	VIII	Apartment buildings since the 1960s			
	IX	Private homes / residential areas (1-family homes)			
Business	X	Business and industry			
Functional buildings	XI	Service buildings, office buildings, shopping malls, etc.			
Park and green	XII	Parks, open air sports grounds, city forests, gardens, graveyards			
Agriculture	XIII	Crops and cattles			
Rest	XIV				

Source: after Everding (2007), modified.

BBSR Bonn 2009

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

Example City of Gelsenkirchen

Background for the calculation of the scenarios:

3-steps for the retrofit of a building as a precondition:

- professional rehabilitation
- modern technology (for the building)
- using renewable energies (referring to DENA)

Calculations only for two energy parties :

- households
- business

Stadtraumtyp

I	VI	XI
II	VII	XII
III	VIII	XIII
IV	IX	XIV
V	X	

buildings	XI	Service buildings, office buildings, shopping malls, etc.
Park and green	XII	Parks, open air sports grounds, city forests, gardens, graveyards
Agriculture	XIII	Crops and cattles
Rest	XIV	

Area calculation based on GIS (gerundet)

BBSR Bonn 2009

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

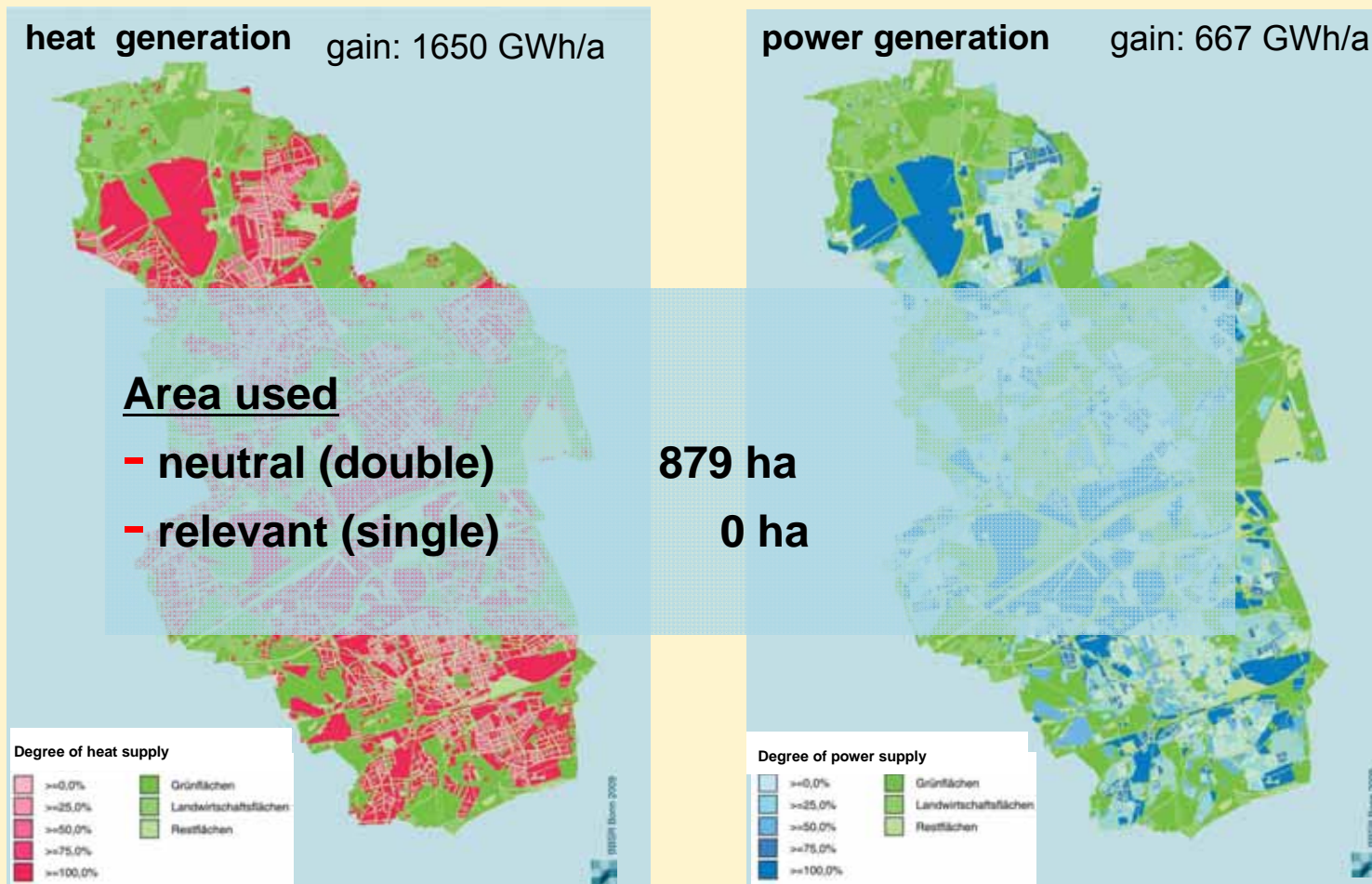
Area in ha
0
78
55
32
101
333
222
100
563
515
19
3784
906
2008
Total 12.319



Szenarios

- Scenario I: Directive (Marburg - 100% solar collectors)**
- Scenario II: Declarative (Gelsenkirchen – solar roof cadaster)**
- Scenario III: Explorative (solar plus further non space consuming options)**
- Scenario IV: selective (shallow geothermal heat only in the winter)**
- Scenario V: Regulative (EEWärmeG: 4 m² sc per 100 m² EBF)**
- Scenario VI: Flexible (sc/pv optimised for the quarter)**
- Scenario VII: kollektive (VI plus space consuming options)**

Example City of Gelsenkirchen scenario VI - flexible



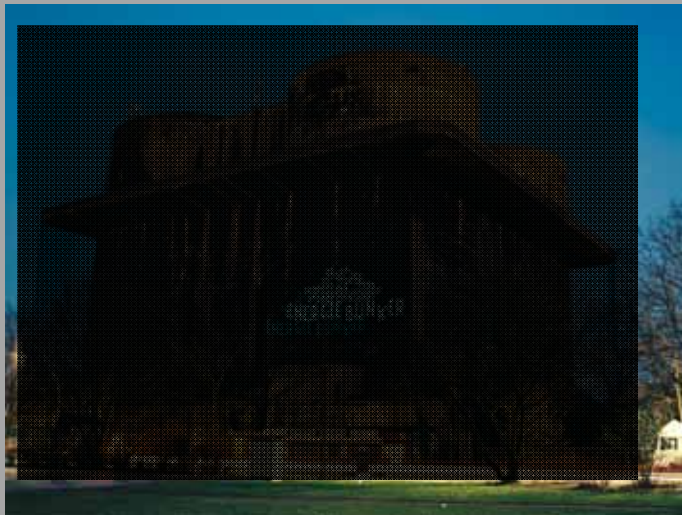
Example City of Gelsenkirchen scenario VII - collective



heat generation gain: 1660 GWh/a

power generation gain: 686 GWh/a

Further development of the methodology by the IBA Hamburg



and give first hints.



Conclusion

Energetic renewal of cities

- **Urban development in Germany changes** – but foremost in existing cities, municipalities, quarters!
- **Greening real estate markets is more than environmentally friendly and energy efficient buildings.**
- It has to be an **interdisciplinary approach** concerning a resource efficient urban development covering the levels from the single building to the complete municipality.
- This means also the real estate companies have to contribute and cooperate!
- **Traffic and transport** have to be considered hardly.
- **Urban areas** have a specific potential for the use of renewable energies. These have to be used!
- **Uncorrodinated small actions** have to be avoided.



Energetic renewal of cities

- **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** und **resource efficient** way.
- The paradigm of the compact and **well-greened up** city has to be **adopted** referring to be **more ressource efficient!**
- The analysis of the spatial structure **should be obligatory element of funding and allowances.**



**Let`s work for a ressource efficient
and better quality of urban life!**

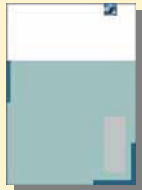
Publications and Internet

BBSR publications:



Perspectives of Spatial Development in Germany

Eds.: BMVBS/BBR, Bonn/Berlin November 2006
(online)



BBSR research news

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



BBSR ExWoSt-Informationen Heft 36 (only German)

Modellvorhaben zur energetischen Stadterneuerung
In den Städten der Bundesländer Brandenburg und
Sachsen-Anhalt (printed and online)

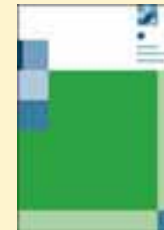
www.bbsr.bund.de - > English

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(effizienz) - vom Gebäude zum Quartier

IzR 9.2010

Nationale Stadtentwicklungs- politik und Ressortforschung

IzR 3/4.2009

Stadtumbau - die Fortsetzung

IzR 7.2009

Zukunft städtischer Infrastruktur

IzR 5.2006

Postfossile Mobilität

IzR 8.2006



Nutzung städtischer Freiflächen für erneuerbare Energien (2009)

Handlungskatalog: "Optionen erneuerbarer Energien im Stadtraum" (2009)



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