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Heating Sector Transition in German Cities – Challenges and Problem-Solving Approaches

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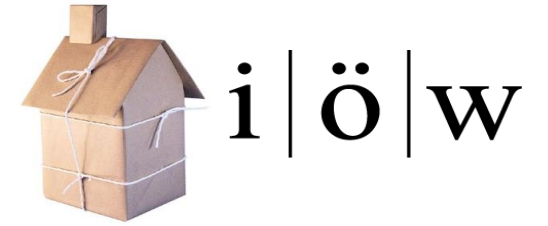
04.06.2019, Helsinki



Facilitator

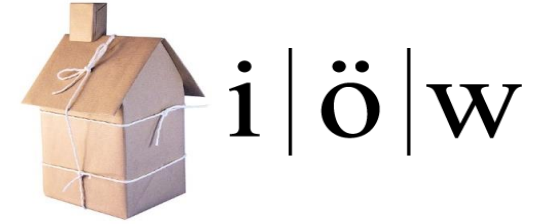


Overview



1. The Heat Shift (Wärmewende) in Germany
2. Urban Heat Shift: The Example of Berlin – Strategies and Challenges
3. Conclusion

IÖW – Institute for Ecological Economy Research

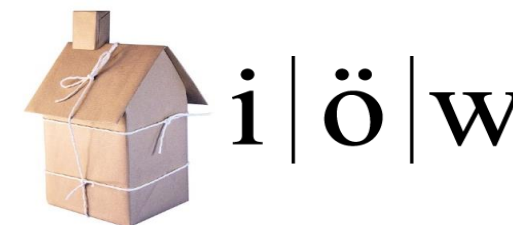


- is a leading scientific institute in the field of practice-oriented sustainability research in Germany
- the independent institute has been funded in 1985 by scientists
- we develop, analyze and evaluate technologies, concepts, political strategies and instruments; of special importance is the practical relevance of our work and the interdisciplinary approach
- ‘Energy and Climate Protection’ is one of its 4 research departments; emphasis is on renewables, energy efficiency, climate protection policy and adaptation measures
- we consider not only greenhouse gas effects but also other aspects of sustainability such as conflicting interests, economic effects and other environmental goals

The „Heat Shift“ (Wärmewende) in Germany



Climate Protection Goals and the Heating Sector



– goals

- Starting position international climate policy: Paris commitment 1,5°C - decarbonization affects all countries & sectors & citizens
- National Climate Protection Plan 2050 (2016): "Greenhouse Gas Neutrality by 2050" – reduction goals CO₂-emissions specific for different fields of action: by 2030 sector buildings – 66-67% cp. to 1990

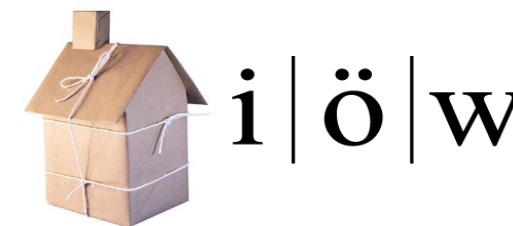
– relevance of heat supply in Germany

- 56% of the final energy demand in Germany for heat (&cold) - most relevant consumption area!
- Renewable share of heat (&cold) in final energy consumption is low

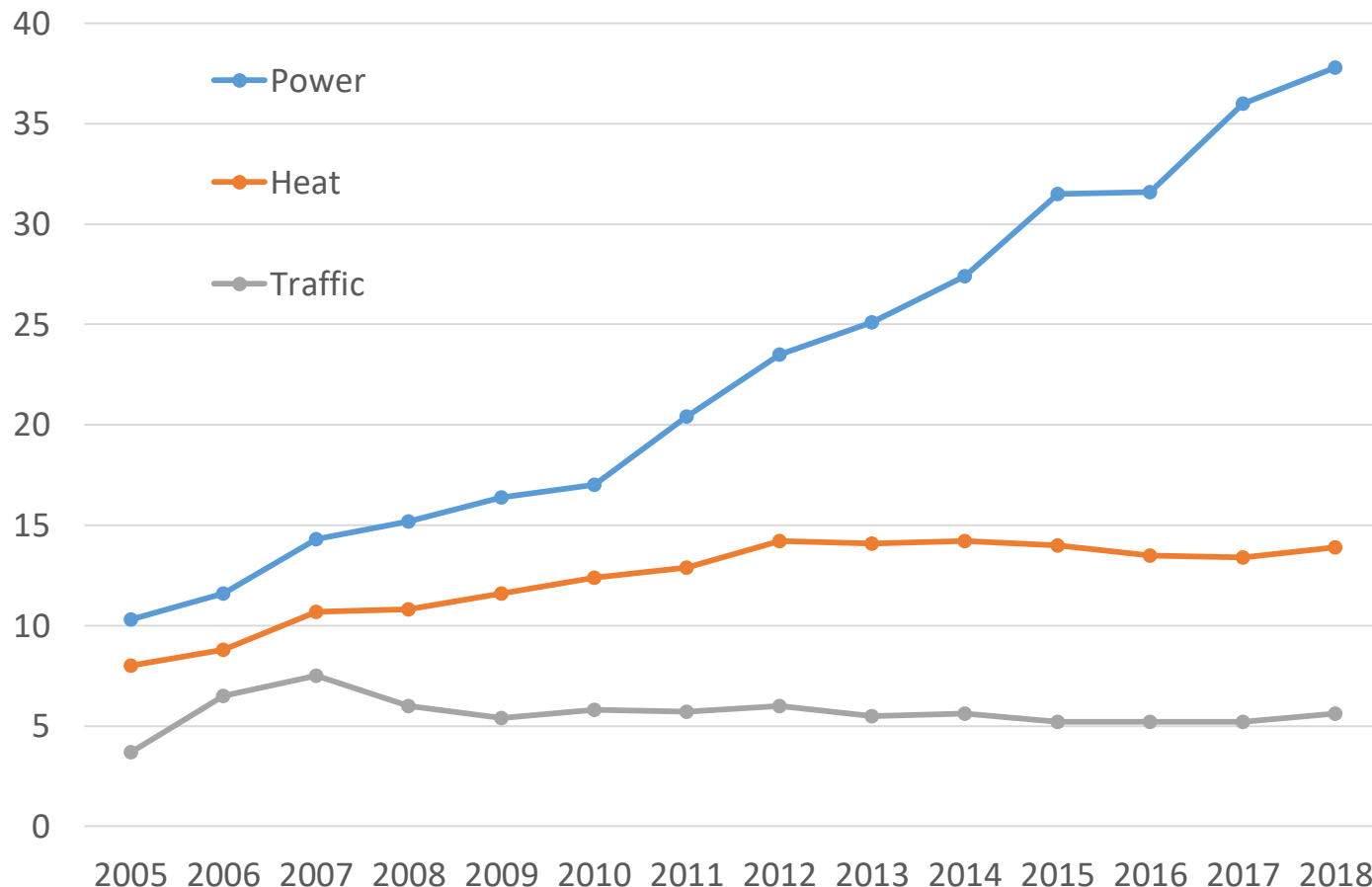
– comprehensive energetic renovations of (almost) the entire building stock necessary by 2050

- switch to renewable energies plus reduction of energy consumption = renovation of building envelope
- Renovation rate at least 2% by 2050 (currently around 1%)
- Goal for renewable share of heat by 2020 14%

Expansion of Renewable Heat too Slow

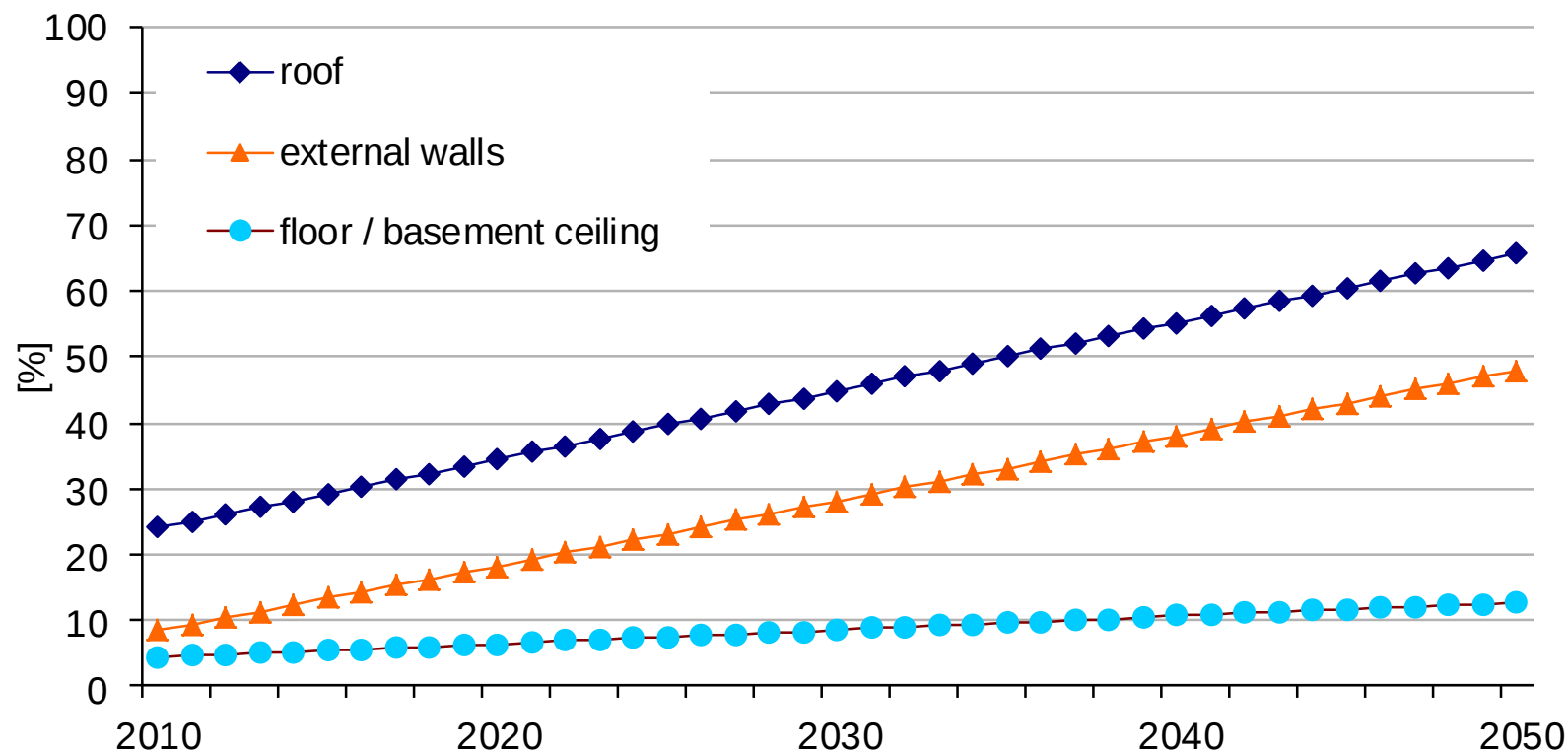
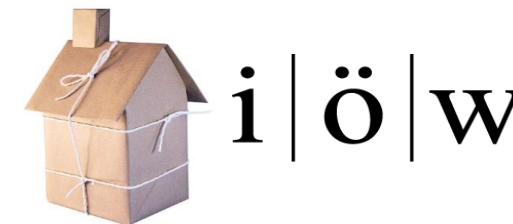


Percentage of Renewables



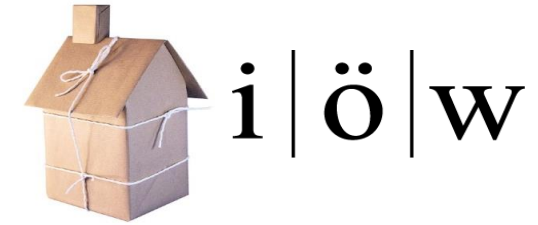
- Expansion of renewables mainly for power production
- Slow growth rate in the heating sector (and traffic)
- Sector coupling (power-to-X) important for decarbonization of other sectors
- But: deducible potential of renewable power limited – esp. regarding acceptance

Energy-Related Refurbishment Rates too Low

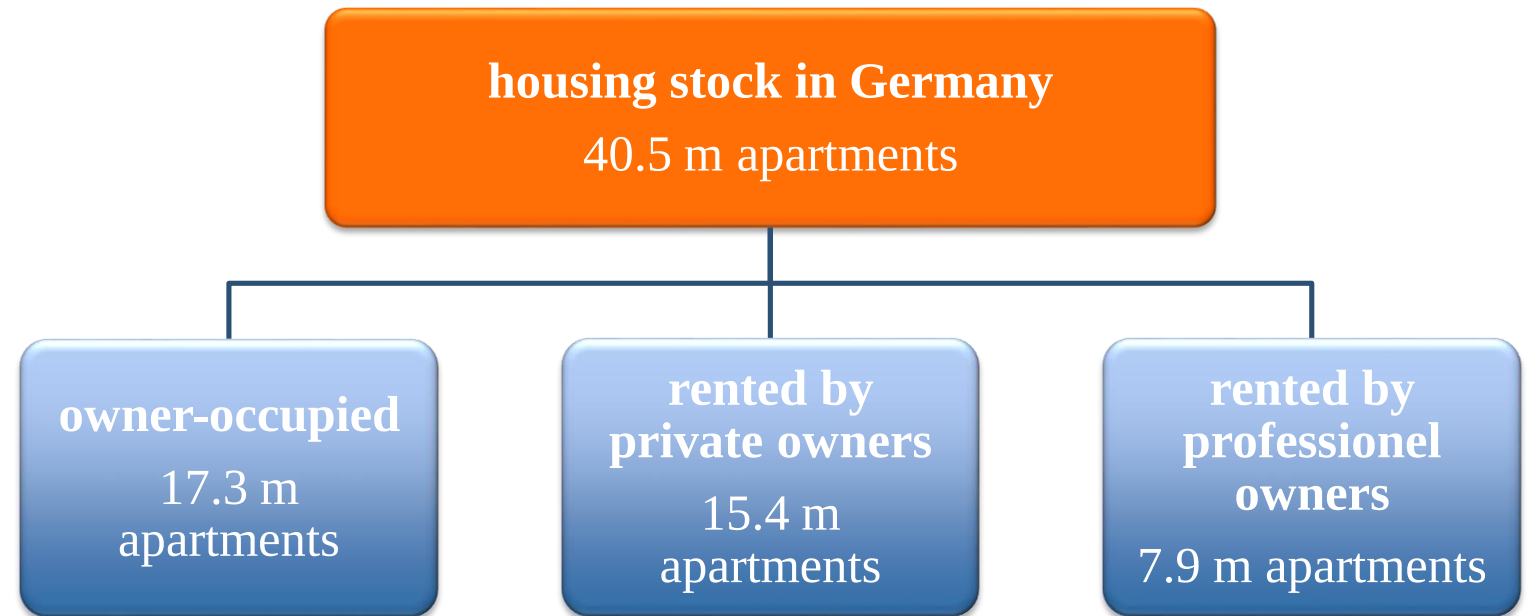


- extrapolation based on refurbishment rates of single-family houses in Germany
- Refurbishment rates during last years slightly higher – but quantity is still too low for decarbonization.
- also quality inadequate (renovation level)

Achieving Climate Protection Targets Dependent on Owners of Building



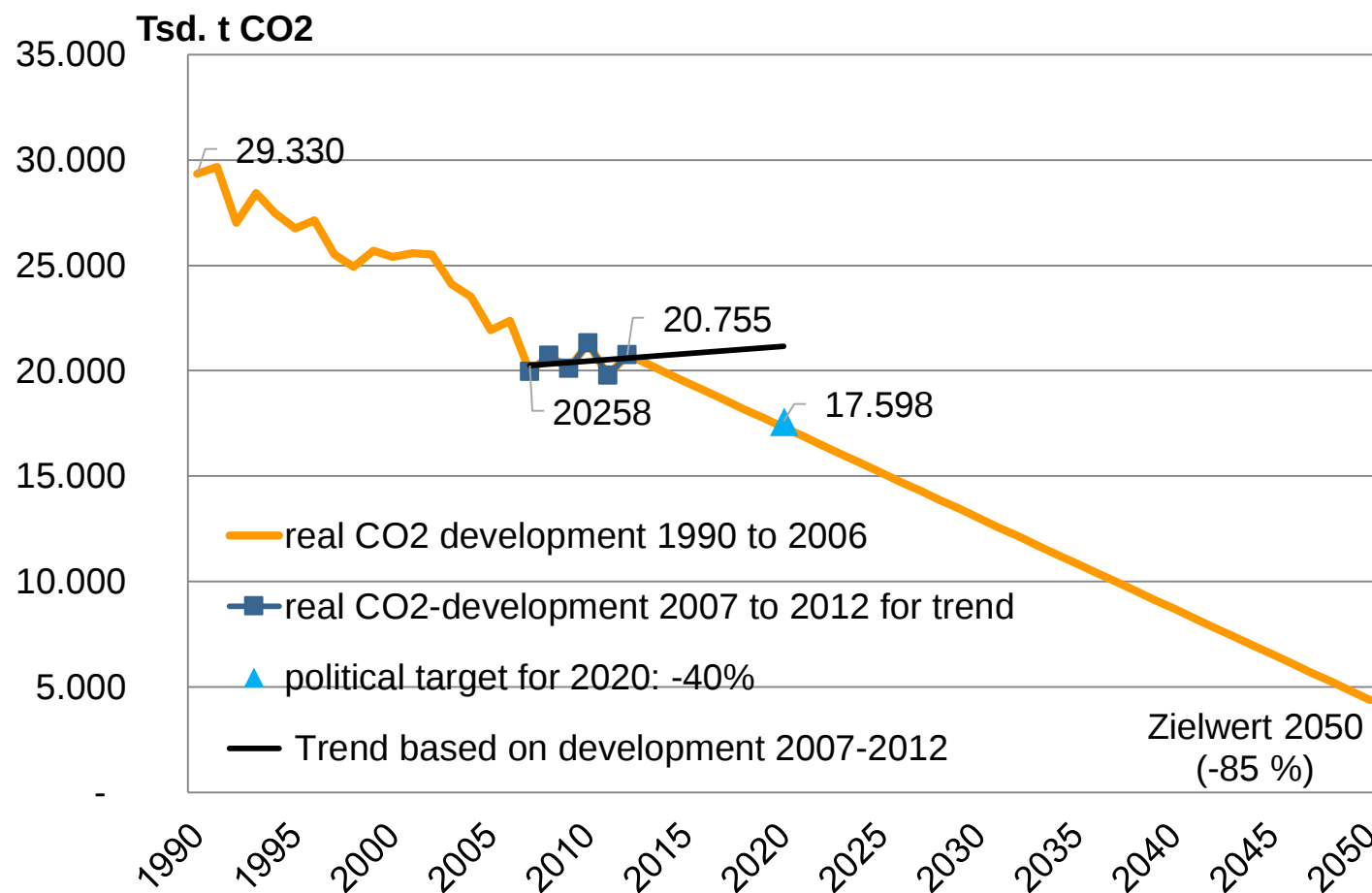
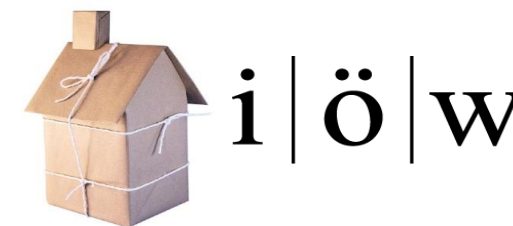
- energy-saving measures prescribed for the renovation of individual components - but at a moderate level
- buildings owned by a large number of owners who have to be motivated
- many residential buildings in the hands of private owners
- ca. 19 million apartments in single-family homes / duplexes



Urban Heat Shift: The Example of Berlin



Berlin – Goals and Development

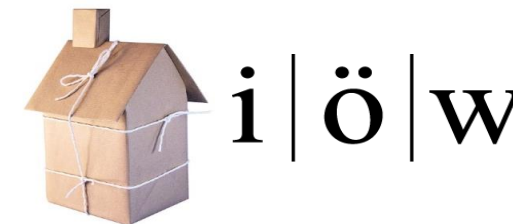


2014: Feasability Study:
Climate Neutral Berlin 2050

2017: Energy and Climate
Protection Program 2030

- drafted with support of scientists and experts
- plan for period between 2017 and 2021
- More than 100 measures
- CO₂-goal: at least -85% until 2050 (cp. to 1990)

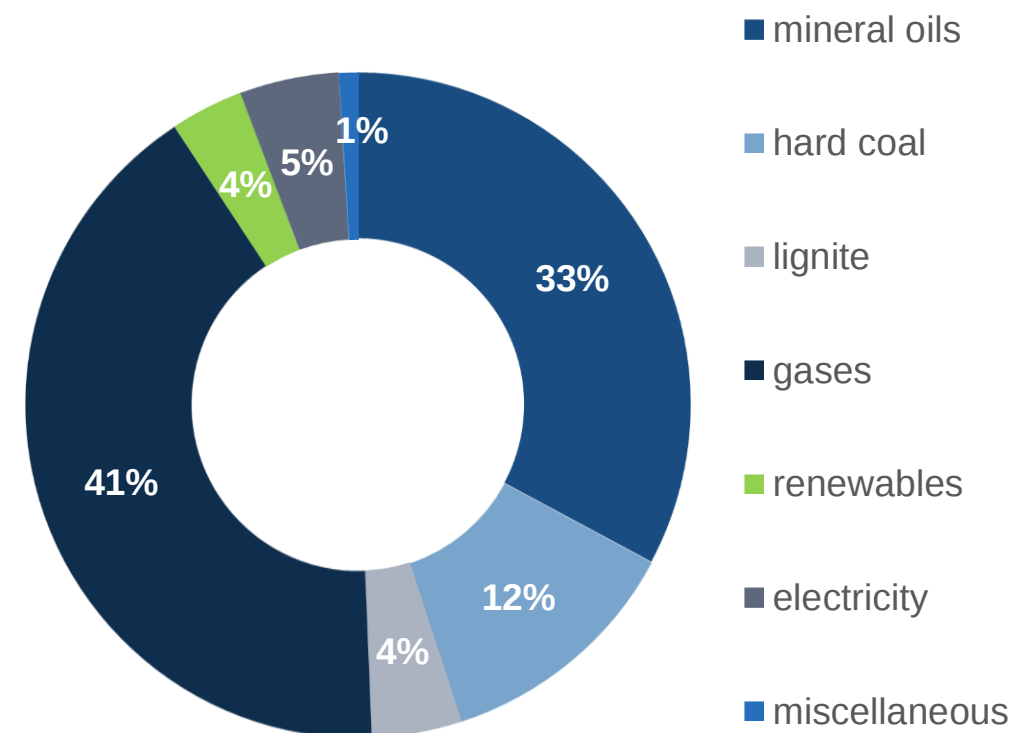
Relevance of Heat for Decarbonisation of Berlin



building sector and heat supply are often the most important CO₂ emitters and energy consumers

- 59% of final energy consumption due to buildings. heating is mainly relying on fossil fuels
- energy consumption dominated by fossil fuels
- district heating is relevant and has a long tradition
- 20% of residential buildings and 32% of units are heated by district heating systems
- district heating mainly is relying on fossil fuels (cogeneration of heat and power)
- coal is still relevant for power generation and CHP

PRIMARY ENERGY CONSUMPTION BERLIN 2012



source: IÖW based on data of Amt für Statistik Berlin-Brandenburg

German-Finnish Smart Heating Conference Urban Heat Shift | 4.6.2019 | page 11

Building Sector in Berlin



CO₂-emissions of buildings: 2012: 10,3 Mio. t

- residential buildings ~60 %
- non-residential buildings ~40 %

2050-goal: 1,6 Mio. t CO₂ (- 85%)

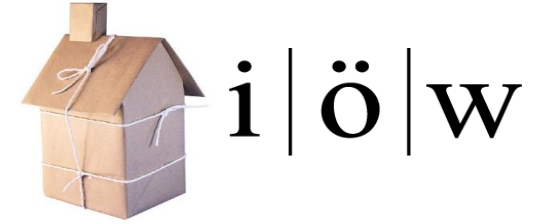
residential building stock dominated by rented apartments

- 15% of units owner occupied
- 35% private owners
- 50% professional landlords
 - 1/3 of them municipal housing associations

17,5% of floor area in historical monuments

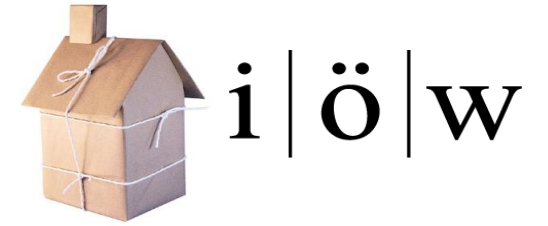
- further buildings worth protection due to architecture („Gründerzeitbebauung“)

Strategies for Energy Production



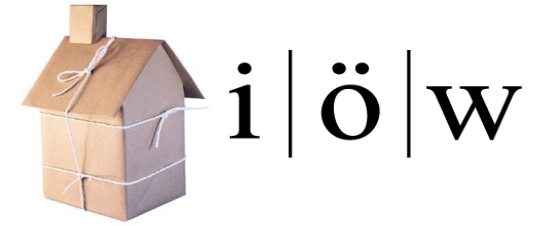
- phase out coal (Lignite by 2020 (2017); hard coal by 2030)
- expand gas-based flexible CHP
- intensify and convert district heating network, heat storage facilities
- markedly reduce oil consumption – boiler exchange program planned
- massively expand solar power (and heat) – Masterplan Solarcity
- expand heat pumps and geothermal energy
- use energy from excess heat and waste
- use excess energy from renewables (P2X), virtual power stations, flexibility
- promote urban energy transition innovations and business models

Building Strategies



- increase average energy-related renovation rate to 2% per year by 2030
 - Slowly increasing, 2.6% from 2030-2050
 - Increase quality of renovations (deep renovation)
- higher standards for new buildings
- reduce per capita consumption of living space
- district (neighbourhood) concepts as integrated approaches
- role model of the public sector
- create easily accessible information and advice options
- take account of social and architectural aspects

Challenges: Low Acceptance of Energy-Efficiency Refurbishments



acceptance of energy-related renovations - especially of insulation measures - is currently rather low in Germany

- aesthetic / architectural reasons: "Disfigurement of Cities"
- perceived dangers of the insulating materials: mould, algae, fire hazards, poisons, "do not let the house breathe"
- opinion insulation is in sum ecologically negative (grey energy, disposal) or unnecessary (change to RE is enough)
- High costs - Is it worth it? And: Who bears the costs?

=> many people have negative attitudes or are insecure

Numerous critical contributions in media



Public dulling / insulation

Schluss mit dem Dämmwahn!
Enough with the insulation madness (Die Zeit 28.10.2010)

Die Burka fürs Haus
The Burka for the house (FASZ 14.11.2010)

Die große Lüge von der Wärmedämmung
The big lie of thermal insulation (Welt 29.03.2013)

Challenges: Financial and Social Barriers in Rental Apartments



landlord-tenant-dilemma:

- landlord finances measures, tenants benefit from savings
- but: costs of modernization can be added to rent (8% of investment costs annually) - increase in monthly net rent often higher than subsequent reduction in energy costs

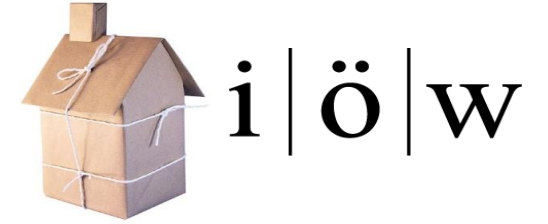
=> cause of rent increase in controlled rental market

social problems due to refurbishments esp. in cities with already rising rents and high number of low-income households, e.g. Berlin:

- more than 50% of households would qualify for subsidized housing
- rents have risen fast since 2000 - housing costs take an increasing part of income

=> rent increases reduce acceptance of refurbishments further

Measures to Reduce Rent Increase Due to Energy-Related Refurbishments

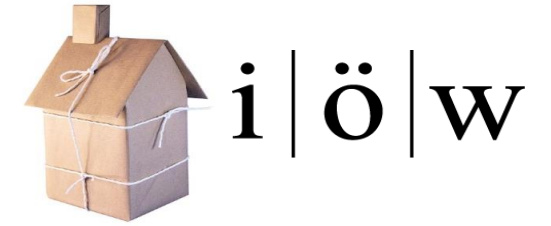


- limitation of rent increase in general
 - existing law on rent control in tense residential areas (“Mietpreisbremse”) excludes energy-related refurbishments
 - good cost-benefit ratio - measures are largely refinanced through energy savings
 - limitation of modernization allocation - reduction of amount, time, capping, hardship case control
 - funding for energy-efficient refurbishment, especially for tenants with low incomes
 - subsidy lowers modernization allocation
 - in milieu protection areas (“Milieuschutzgebiete”) only minimal energy efficiency measures allowed
- => conflicts between social and ecological goals

Conclusion



Urban Heat Shift – Challenges and Strategies



Main Challenges:

- modernization of building stock, socially acceptable and historically preserving
- shift towards renewable energies – locally provided and imported (incl. district heating)

Strategies:

- climate protection concepts and goals - multi-level
- bunch of policies: networking, information, financial support, requirements, research + development
- take into account other aspects than GHG

Outlook: climate change: more heat waves esp. in urban heat islands

- desire for cooling increases => energy demand?
- need for increase in city greens: conflicts with higher density (more flats)



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Thank you for your attention!

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