

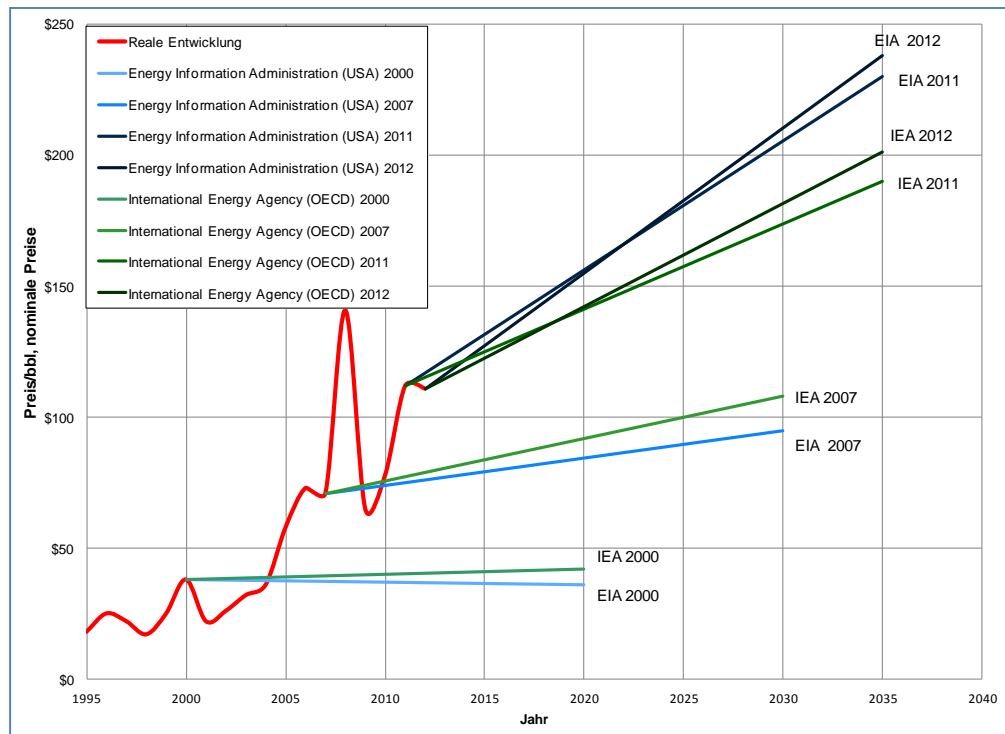
# Integration of a land use transport model into a planning game for developing strategies against rising energy prices

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- Mobility and housing are two important expenditure items for German households
  - Both are dependent on **energy costs**, the development of which has been consistently underestimated



## ■ main questions

- ■ Which **regions** are particularly affected by rising energy costs?
- ■ How will **households** react in the short and in the long run?
- **How will politics respond to this situation?**

## ■ academic consortium

- Hamburg University of Technology
- University of Cologne (FiFo)
- University of Stuttgart (IREUS)

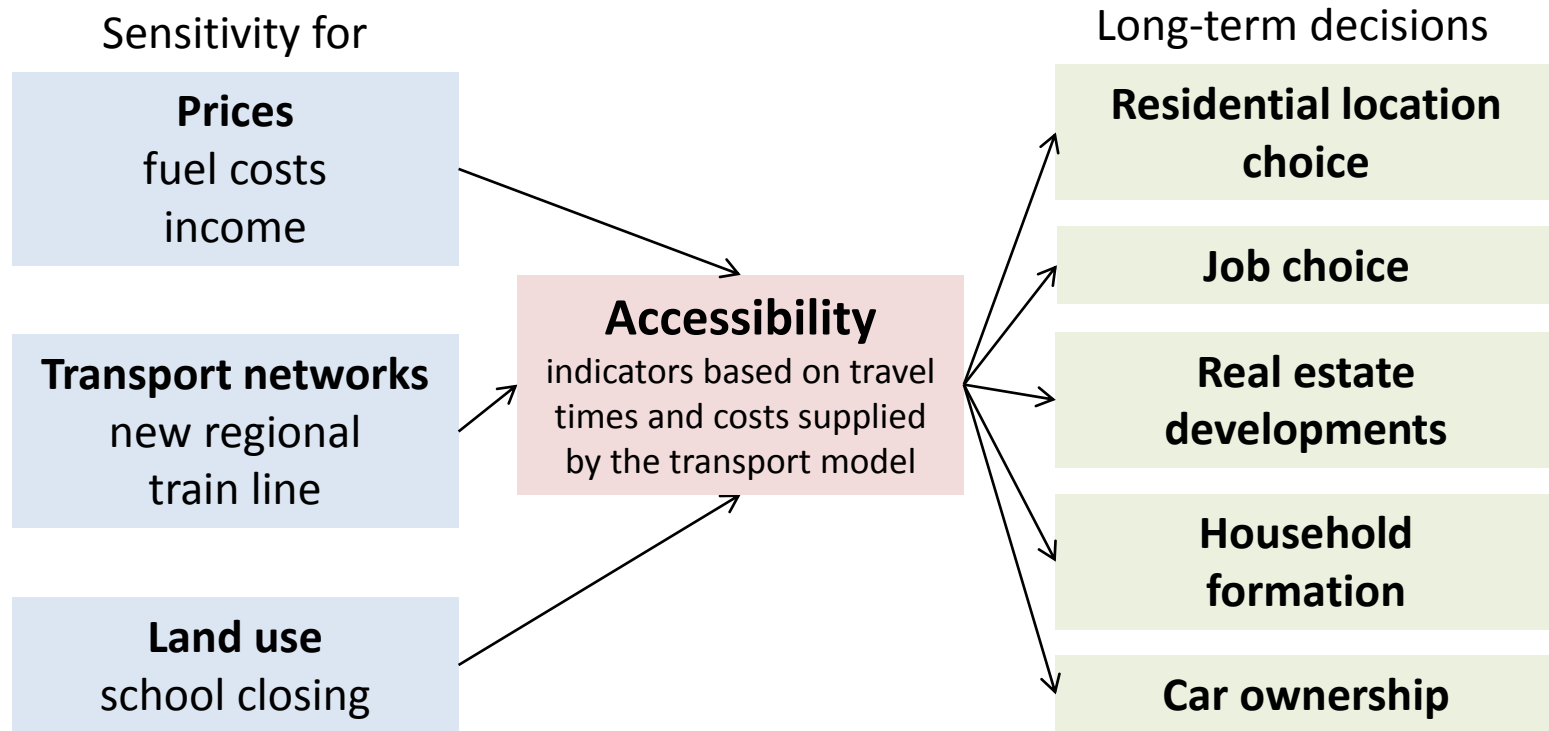
## ■ research period

- October 2010 – March 2014

## ■ funded by the German Ministry for Education and Research

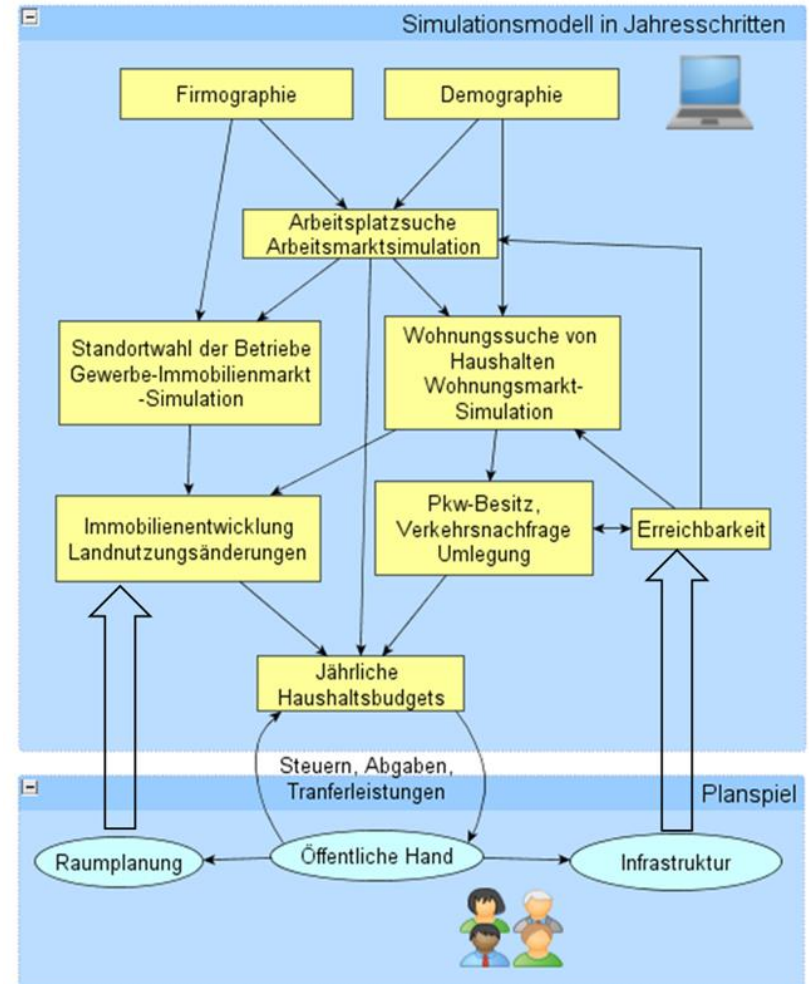
- Research Area: Sustainable Land Management
- <http://nachhaltiges-landmanagement.de/en/>

- Software framework for an agent-based simulation
- Simulation of a series of individual, household and institutional decisions



## ■ Why use a model?

- New energy scenarios are expected to have broad and interdependent spatial consequences for:
  - Mobility
  - Housing
  - Labor market
  - Demographic developments
  - Public finances
  - etc.
- Dealing with complexity

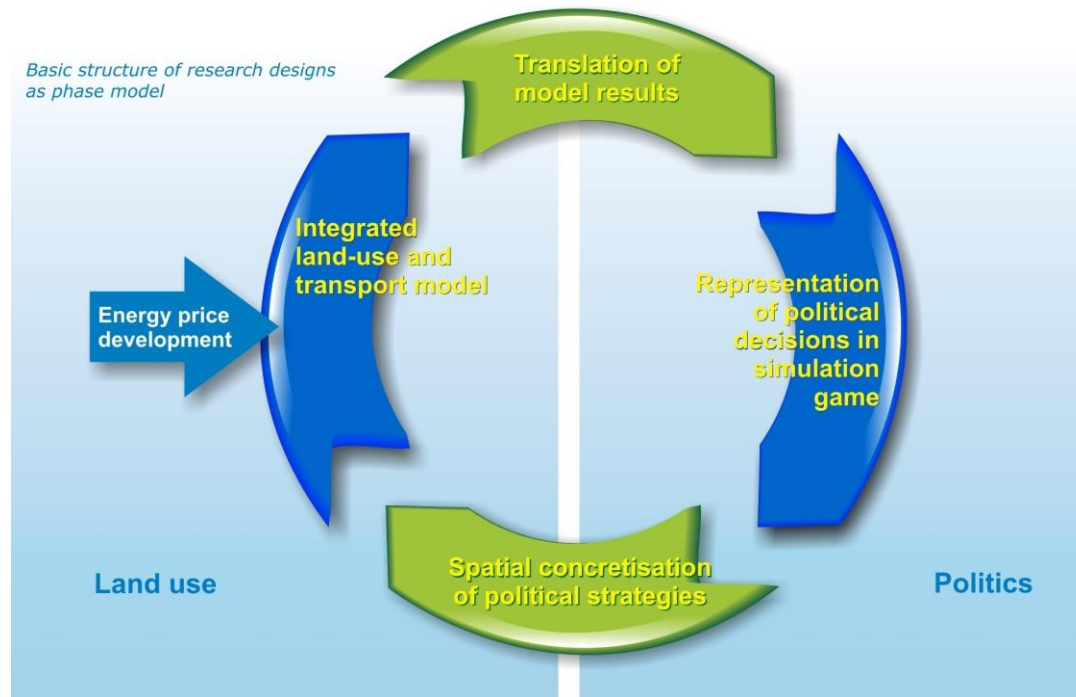


## ■ Why not use only a model?

- Awareness of inherent limits of a quantitative tool
  - Lack of transparency, simplifying assumptions, data hunger etc.
- Models cannot cope with extreme situations
  - Energy prices are not expected to increase only marginally  
→ Usual elasticity calculations may not be helpful
- Models cannot simulate the political process
  - Search for more accurate representation of political responses
  - Provision of more accurate scenarios shall take into account the “human factor”

Are there methodological alternatives to the development of even larger and more sophisticated models for dealing with complexity?

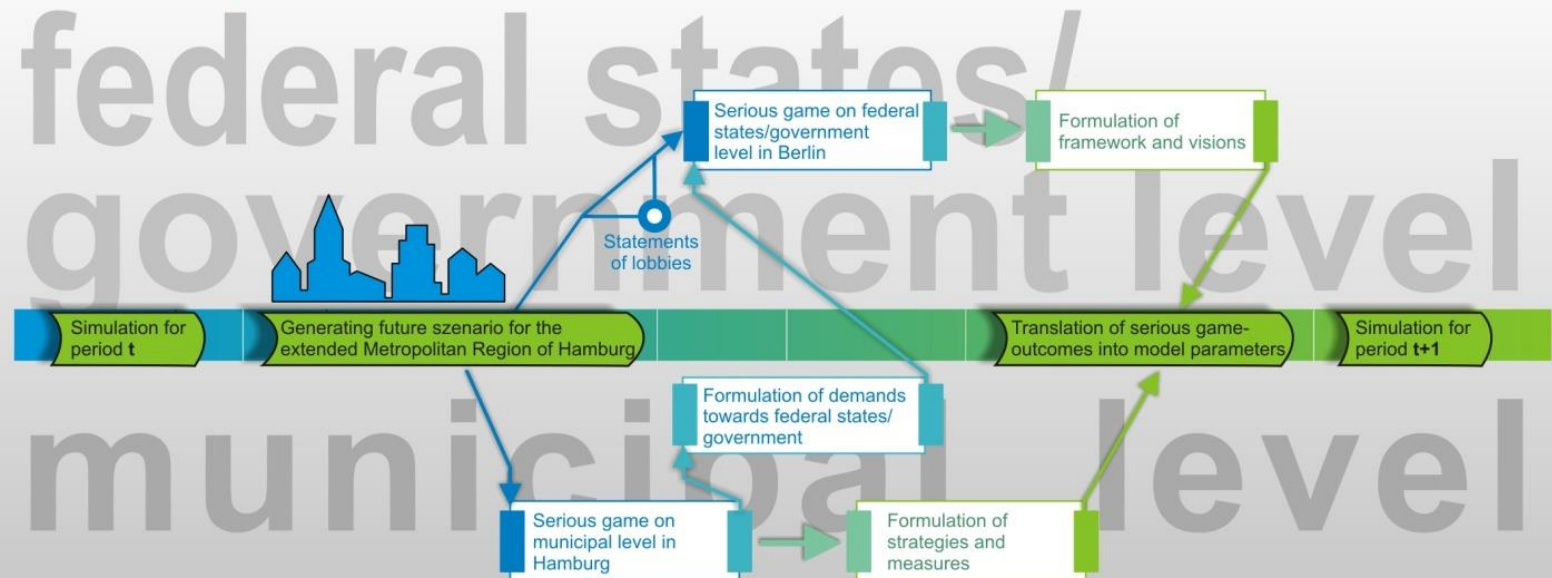
- Coupling a model with a **serious game**
  - provides a planning-political testfield
  - can enhance the quality of decision making
  - explores interfaces between quantitative and qualitative planning methods



# Serious game

- Political science experiment depicts reactions of decision makers
  - series of moderated sessions

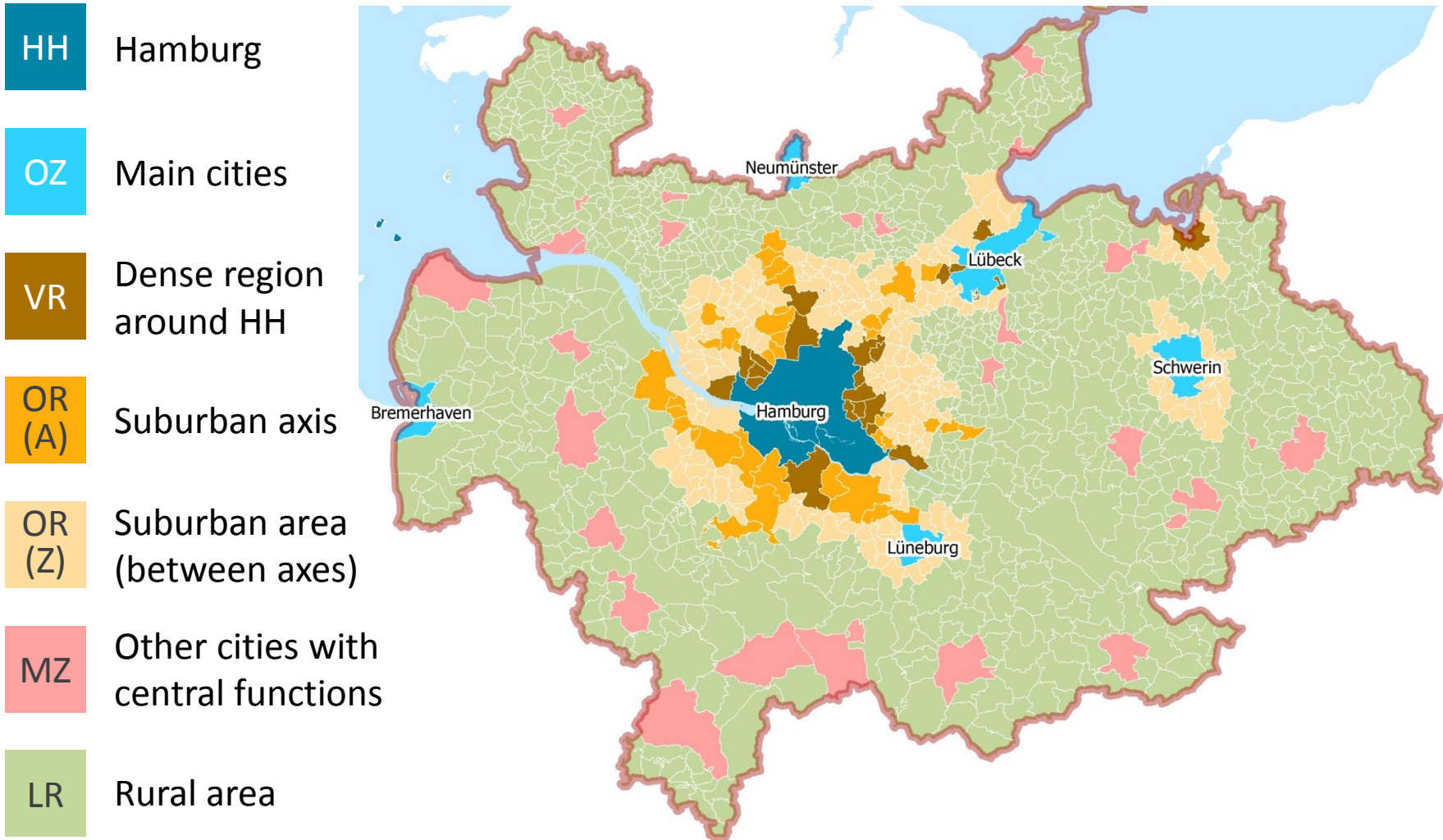
## Two-tier serious game





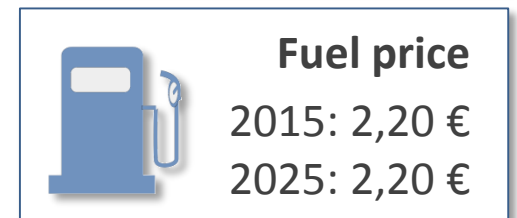
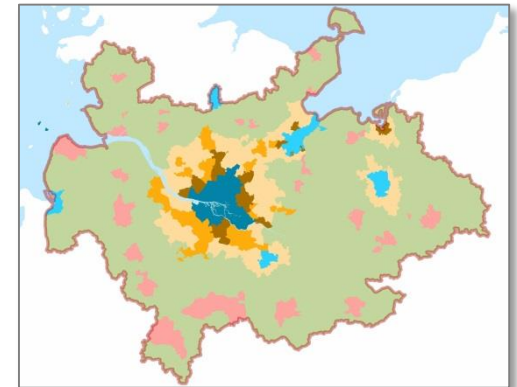
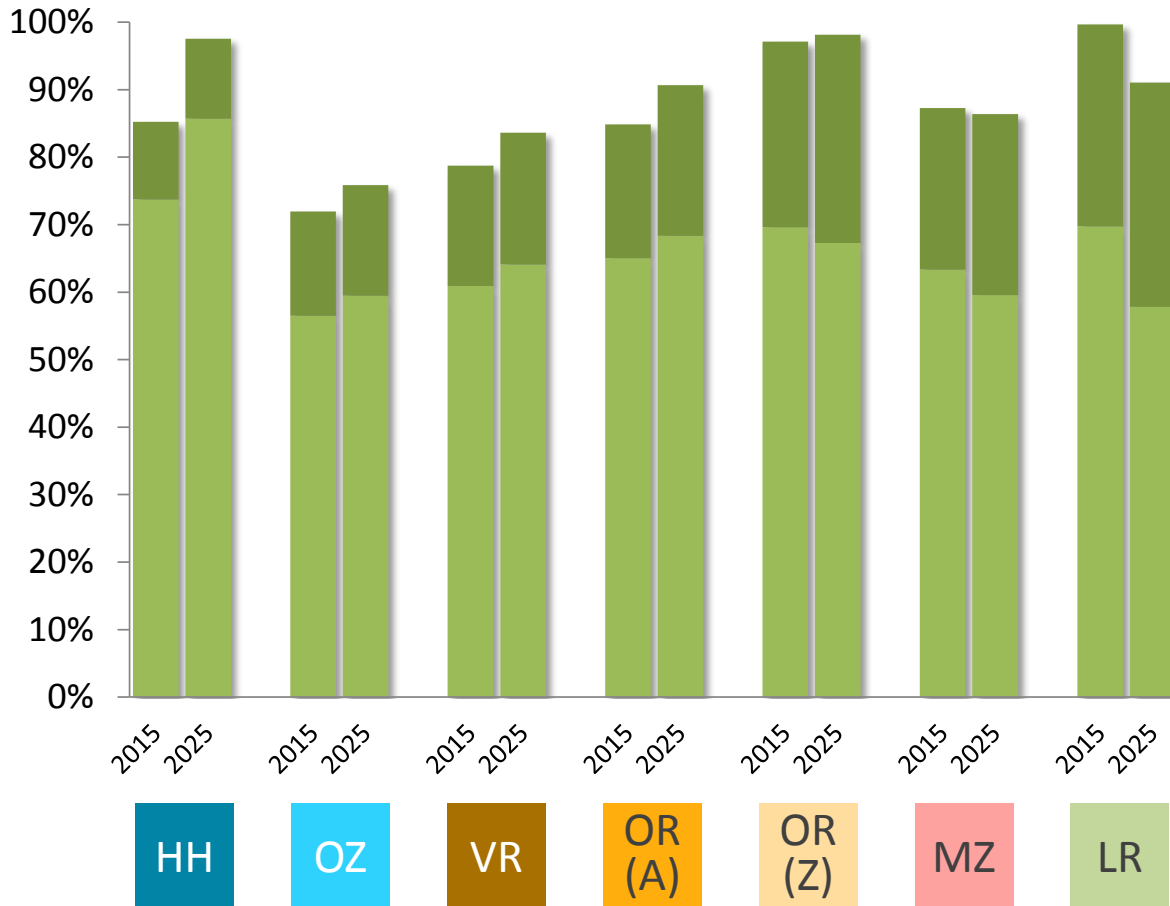
- Scenario forecasts for the years 2015 and 2025:
  - Crude oil barrel price:
    - \$ 200 in the year 2015 (already used in current forecast scenarios)
    - \$ 400 in the year 2025
  - Model indicators for
    - Population growth variation for age classes
    - Housing costs for representative households
    - Mobility costs for representative households
    - Share of housing and mobility costs over net income for representative households
    - Average kilometers travelled by private car per person and day
    - Average kilometers travelled by public transit per person and day
- Aggregated indicator values presented for 7 municipality classes

# Municipality typology

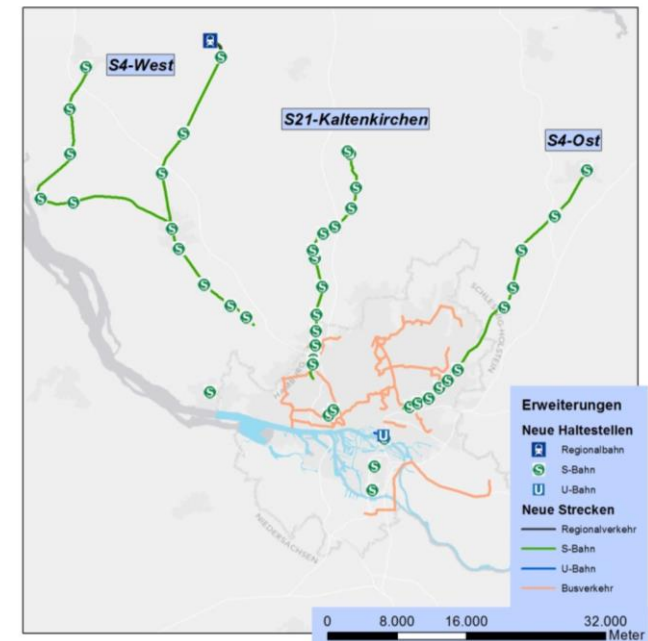


# Presenting model results

Share of income spent **on** mobility and housing -  
Single parent, low income



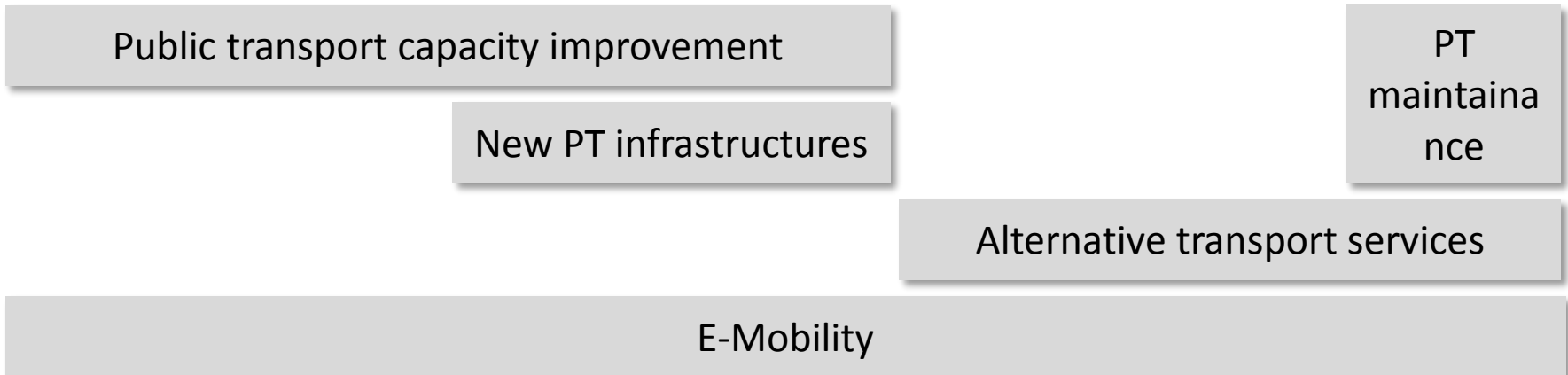
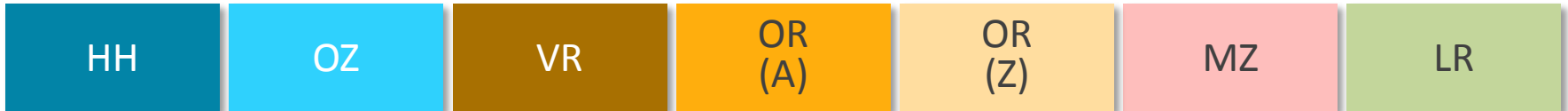
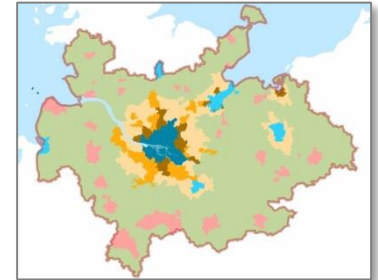
- Strategies, guidelines and measures for dealing with energy price increases (selection)
  - Land use
    - promotion of higher energetic standards for housing
    - improvement of child care opportunities
  - Social and technical infrastructure
    - mobile provision of services (e.g. health)
  - Transport policy
    - expansion of the rail network
    - ride sharing in rural areas
  - Energy and environmental policy
    - energy advice for private households
    - organization of local/regional energy markets- Generalisation and degree of implementation of developed strategies



# Spatial concretization of strategies

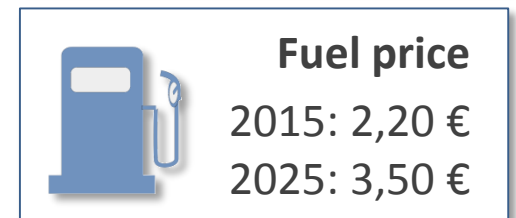
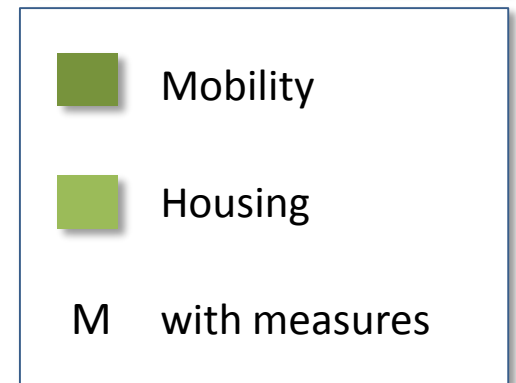
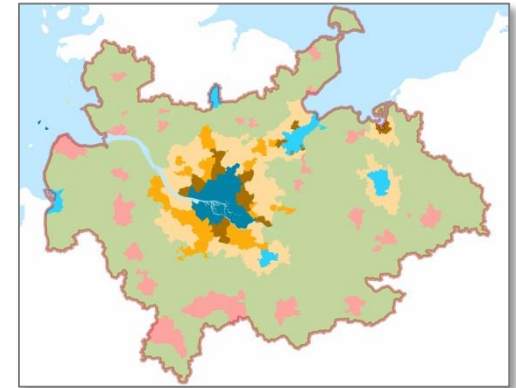
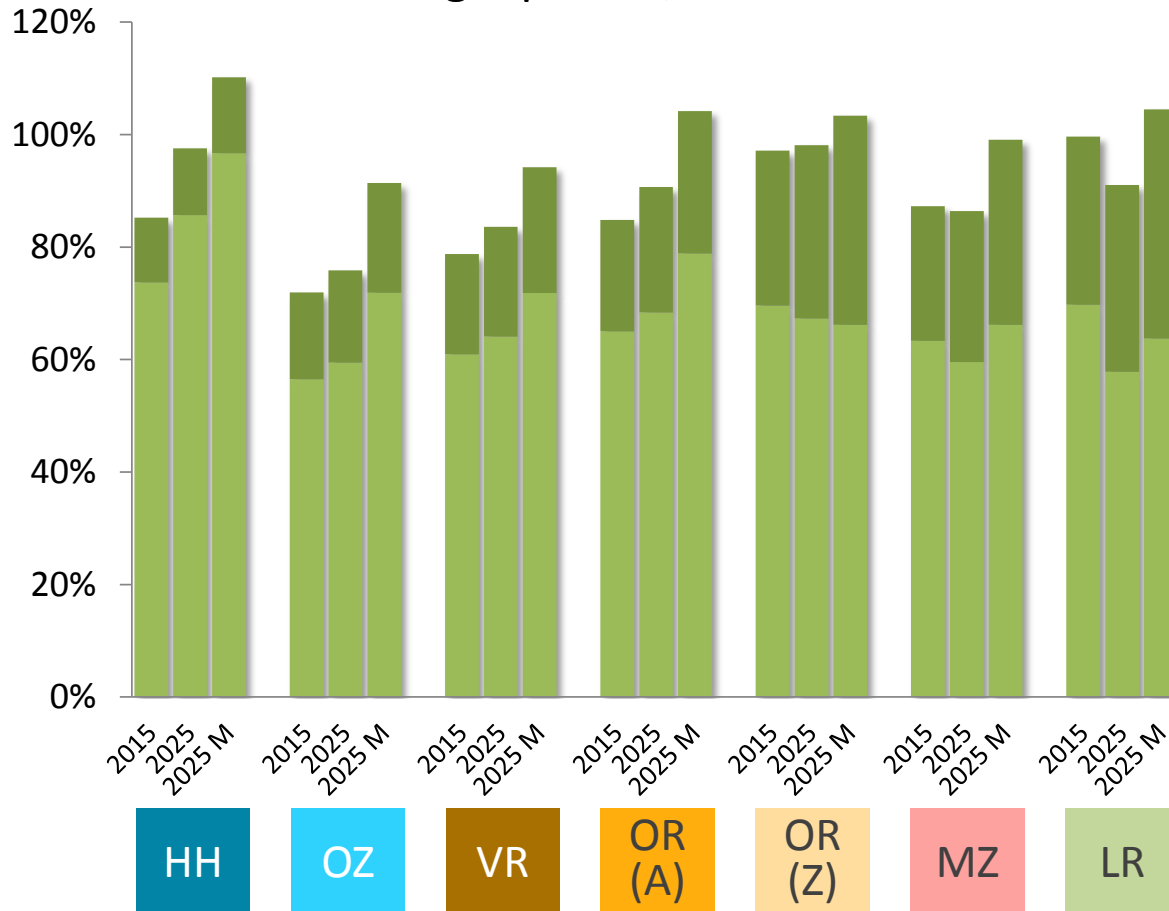
Measure field

## Transport infrastructures



# Presenting model results

Share of income spent for mobility and housing -  
Single parent, low income



- A continuous energy price increase has diverse and multidimensional impacts on land use
  - Connection to other long-term issues like demographics and climate change
  - No general answer on how political stakeholders should react
- Understanding problems by decision-makers can be tackled through appropriate **exchange schemes**
- Models help to deal with complexity. But developing overly complex models can be misleading for decision making
- Solving new, complex and long-run problems demands:
  - **innovative cross-sectoral policy responses** (room for new ideas)
  - which can be tested in a **planning testfield**
  - which can be better implemented on basis of **target-oriented intermunicipal cooperation** (limits of own possibilities under scenario 2025)

**Thank you for your attention!**

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More information on €LAN:  
<http://www.energie-landnutzung.de/>