ARE CURRENT REGIONALISATION APPROACHES SUFFICIENT TO DECOMPOSE ELECTRICITY DEMAND?

- A GERMAN CASE STUDY -

Rainer Elsland, **Anna-Lena Klingler**, Patrick Degner, Yannick Oswald, Martin Wietschel

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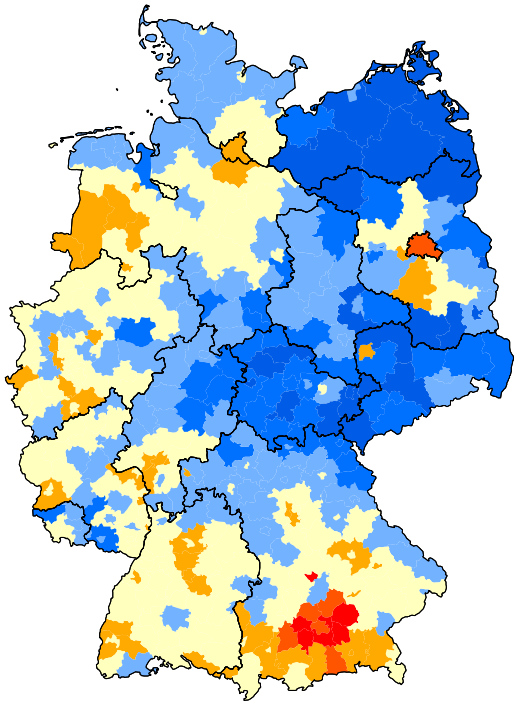

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Introduction

- **Transformation of the energy system**
  - Increasingly decentralised power generation
    - Demand for local flexibility options
    - Expansion of the power grid
- **Need for energy system analysis on a spatial highly resolved level**

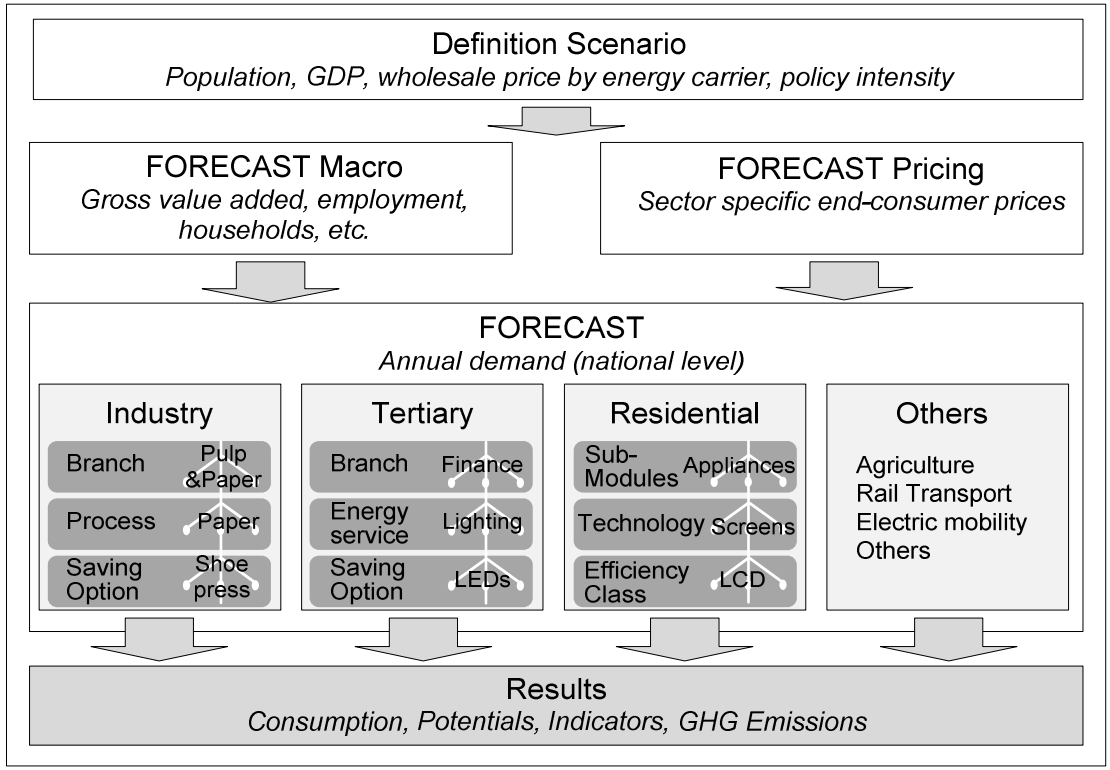
- **Current regionalisation concepts are mostly based on simplified distribution keys**
  - Population and GDP [Consentec and IAEW, 2012; Hinz et al., 2014]

Aim of this study

Development of a new approach to allocate national electricity demand at a district (NUTS 3) / municipality level (LAU 2)

- Distinguished by demand side sector and technology
- Considering structural change

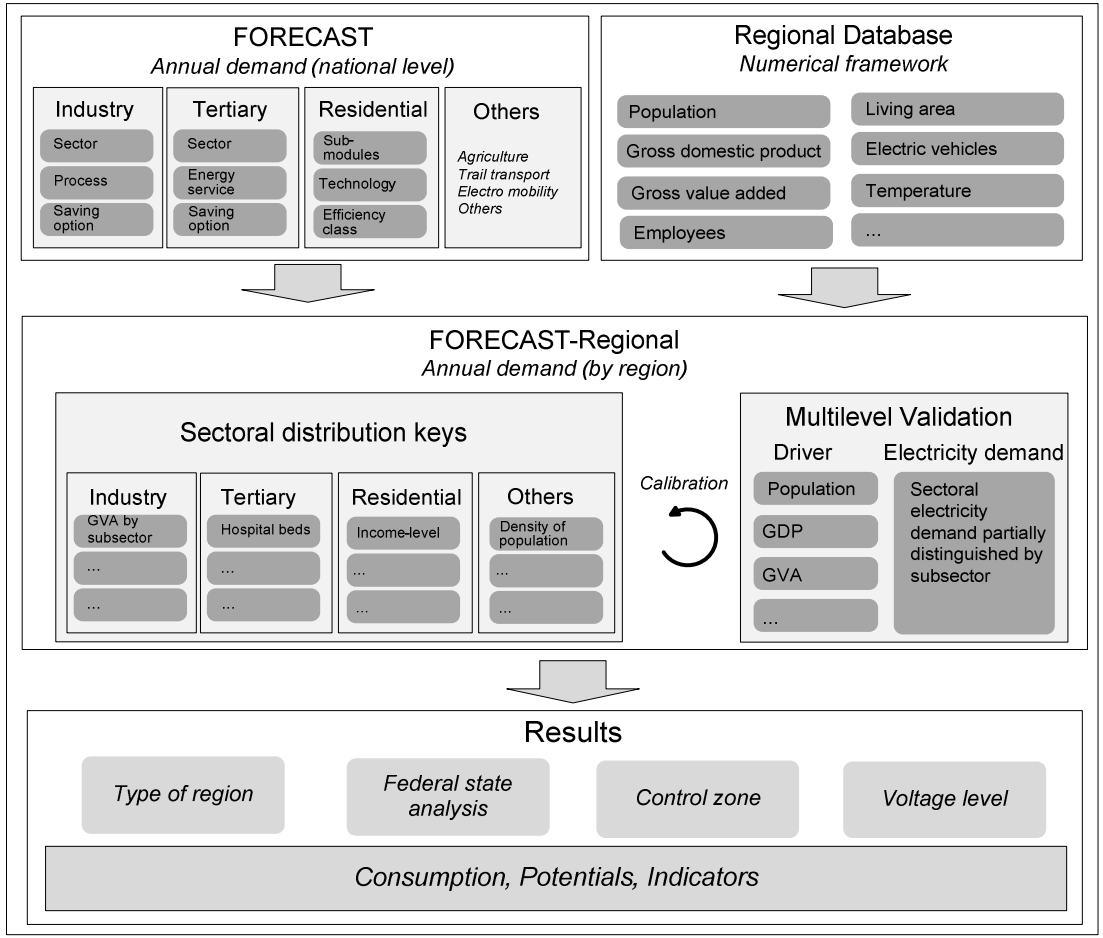
Methodological approach
- FORECAST modelling approach (national level)



- Bottom-up, simulation model
- Structural change modelled through
  - **Activity drivers**: econometric approach in FORECAST Macro
  - **Technology diffusion**: discreate choice approach for investment decisisons / epidemic diffusion

[Fraunhofer ISI, 2015], www.forecast-model.eu

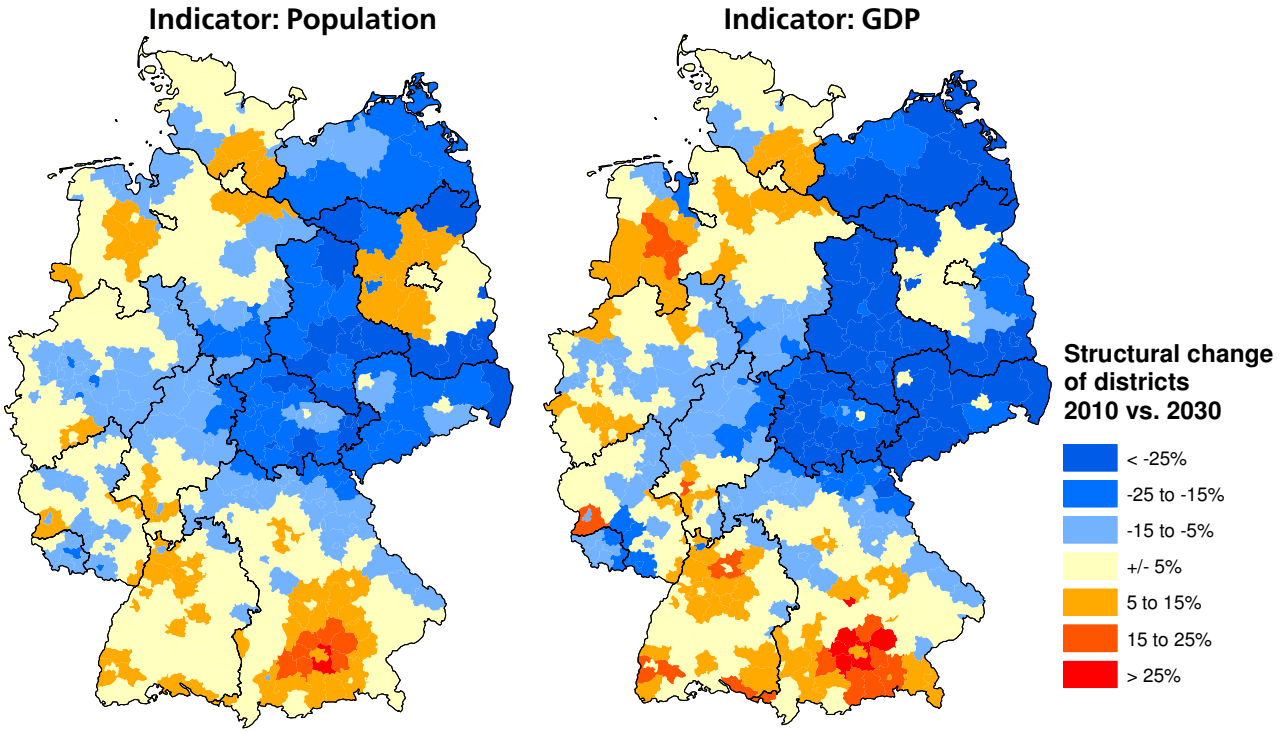
Methodological approach
- FORECAST-Regional modelling approach (regional level)



- Top-down model
- **Sectoral distribution keys** to allocate electricity demand to regional units
  - **Subdivision of sectors** according to their characteristics
- **Mulitlevel Validation** to balance structural data and sectoral demand on different administrative levels

Case study
- Definition and framework conditions

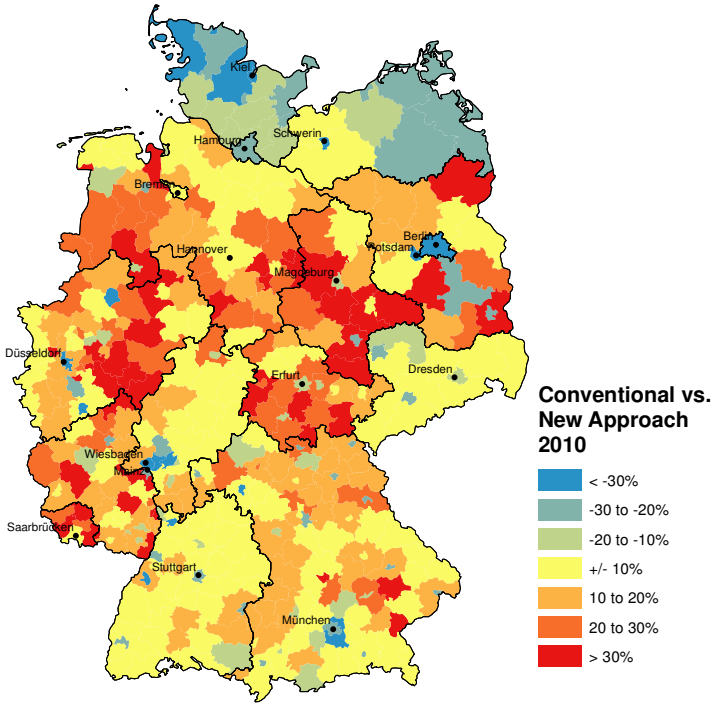
- **FORECAST-Regional vs. Conventional Approach** (split through GDP and POP only)
- Framework parameters:
  - Data projection based on 'Raumordungsprognose 2030' [BBSR, 2015]
  - Other framework data based on 'Klimaschutzszenarien' [Matthes et al., 2014]



Case study
- Comparison of approaches in 2010

Differences in 2010 (base year) due to

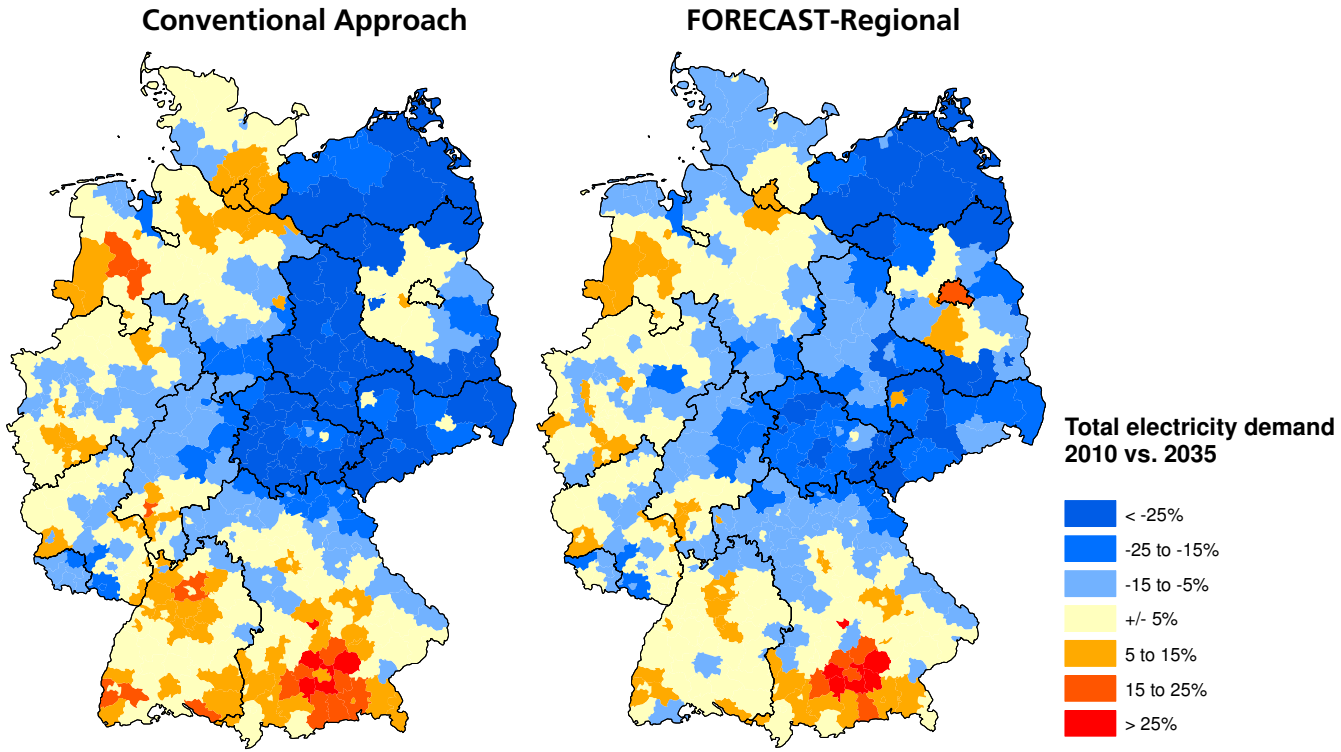
- different **distribution keys** and
- **Multilevel Validation** in the new approach



- Differing results for most of the regional units +/-20%
- **Larger cities**: new approach estimates considerably lower electricity demands
  Expl.: Berlin
- **Sachsen, Hessen, Baden-Württemberg**: GDP and GVA with strong correlation → differences only +/-10%

Case study
- Change in electricity demand 2010 vs. 2035

- Differerences between 2010 and 2035 due to
  - Alternative capturing of **structural change**
  - Considering **sectoral heterogeneity** of regional units



Conclusions and outlook

- **Conclusions**
  - FORECAST-Regional was developed
    - Applying **sectoral distribution** keys, distinguished by demand category
    - Considering **structural change** by activitiy drivers and technology
    - Allowing for regional assessments
  - **Some constraints** are
    - The need to use a top-down approach
    - The assumption of identical technological composition of sector-specific electricity demand in some cases
- **Outlook**
  - Consider distinct regional **electricity prices and energy concepts**
  - Further insights through **temporal segmentation**
  - Extend FORECAST-Regional to **additional energy carriers**

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Thank you for your attention

Anna-Lena Klingler
Fraunhofer-Institut für System- und Innovationsforschung ISI
Breslauer Straße 48, 76139 Karlsruhe