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Sustainable settlement development – Assessing the effects of state measures in scenario analysis

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1 Introduction

- **Sustainable Settlement Development**
  - Land (also) matters!
  - e.g. ESDP / Policy Aims: “Compact city”
  - National SD-Strategies → avoid/control “urban sprawl”
- **Sustainability Strategy in Germany: The land consumption for settlement and transport is to be reduced to 30 hectares (75 acres / 0.118 square miles) per day in 2020**
- **The project “PANTA RHEI REGIO” started in 2006 to extend the model PANTA RHEI to make it suitable for regional and supraregional analysis of settlement development[1]**

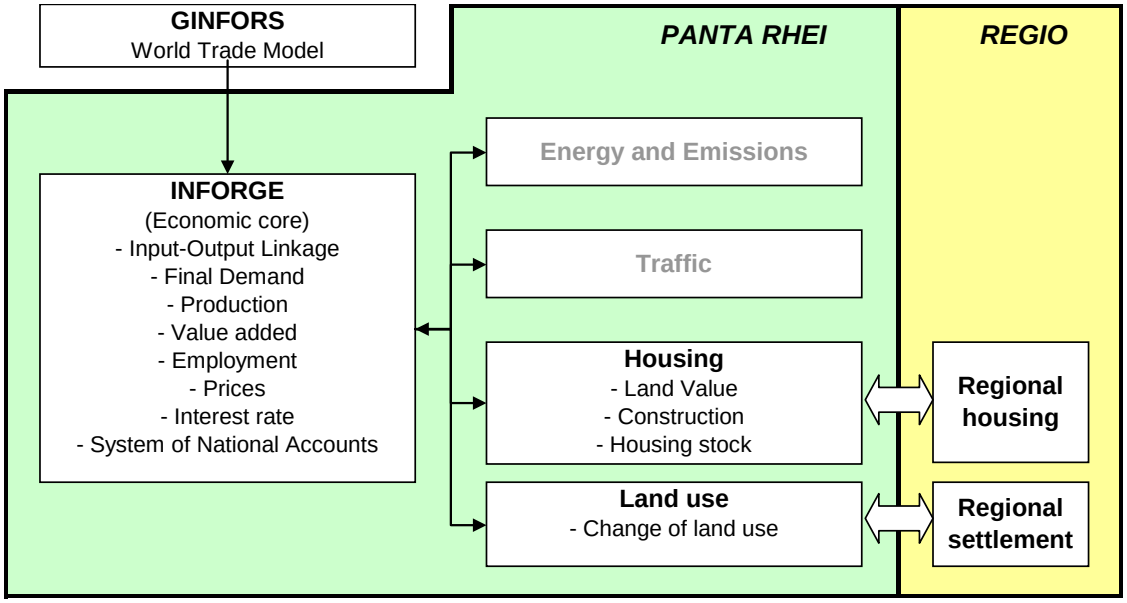
Literature: EEA 2006; Dosch 2008

[1] The project is sponsored by the German Federal Ministry of Education and Research (BMBF) in the funding program “Research for the Reduction of Land Consumption and for Sustainable Land Management” (REFINA)

- **Which political measures or government policies contribute to a reduction of land consumption? What developments can be expected?**
- **Preceding modelling approaches for Germany**
  - 2005: First modelling approach with PANTA RHEI, different fiscal instruments were analysed an a national level
  - 2005/2006: Further development of the model to analyse types of settlement structures
  - → the grade of regionalization remained unsatisfactory, settlement development is regional!
  - 2006: The project “PANTA RHEI REGIO” is launched to extend the model to make it suitable for regional and supraregional analysis of settlement development

2 Land consumption - the Panta Rhei Approach

- **PANTA RHEI: a multisectoral macroeconometric forecasting model for the analysis of environmental issues**

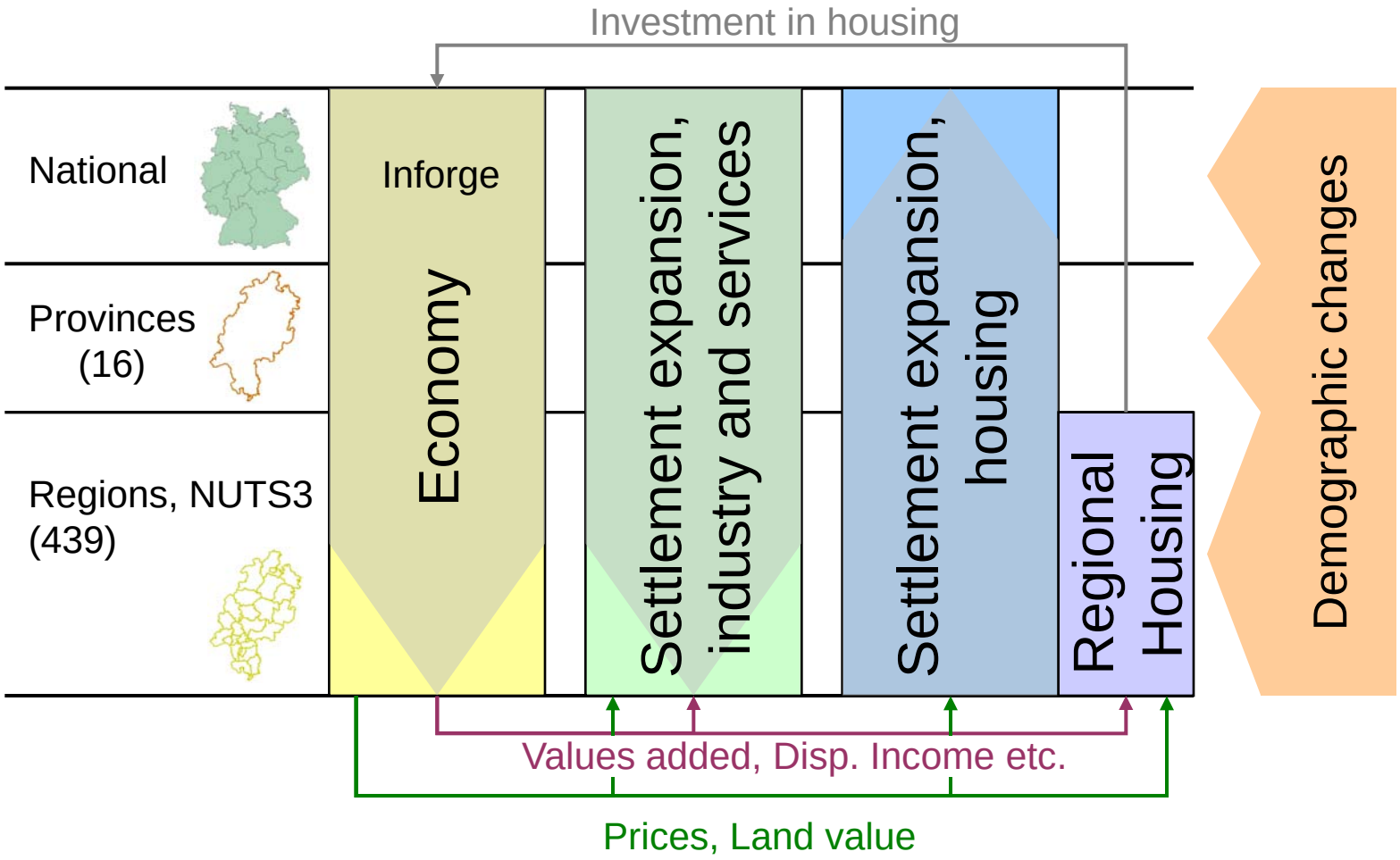


Central tasks and challenges:

- The modules which forecast the economic development have to be **regionalised** and linked to demographic changes in the regions
- The **driving forces** for construction (housing, plants and office buildings) and their impact on land consumption on a regional level have to be identified and implemented into the model

◈ Modelling Approach – the regionalisation

⇨ Both top-down and bottom-up elements



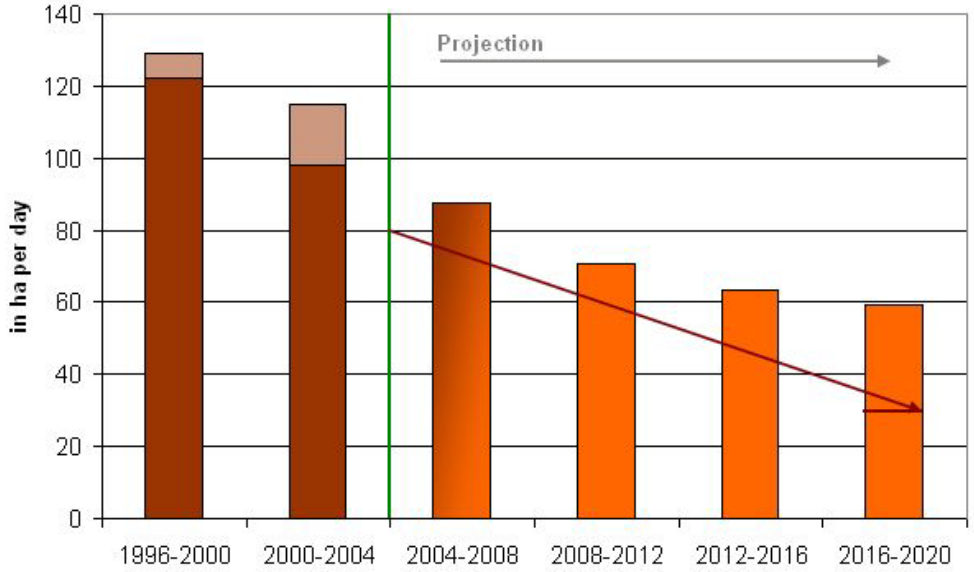
Driving forces of settlement expansion

- Settlement area housing
  - Development of private households
  - Disposable income and cost for house building
  - Age distribution
  - Land value
- Settlement area industry and services
  - Changes in economic structure
  - Productivity per land unit for branches and their changes
  - Density and land value on a regional level
- Other settlement area (e.g. recreation)
- Traffic area

= Built-up and traffic area

Results of the baseline scenario

- Recent growth of “built-up and traffic area” in Germany is at 115 ha per day



- The results of the PANTA RHEI REGIO Projection: In the period 2016 to 2020 the daily consumption of greenfield land amounts to approx. 60 ha per day
- Fundamental change and a rethinking of the protagonists are essential to attain the goal!

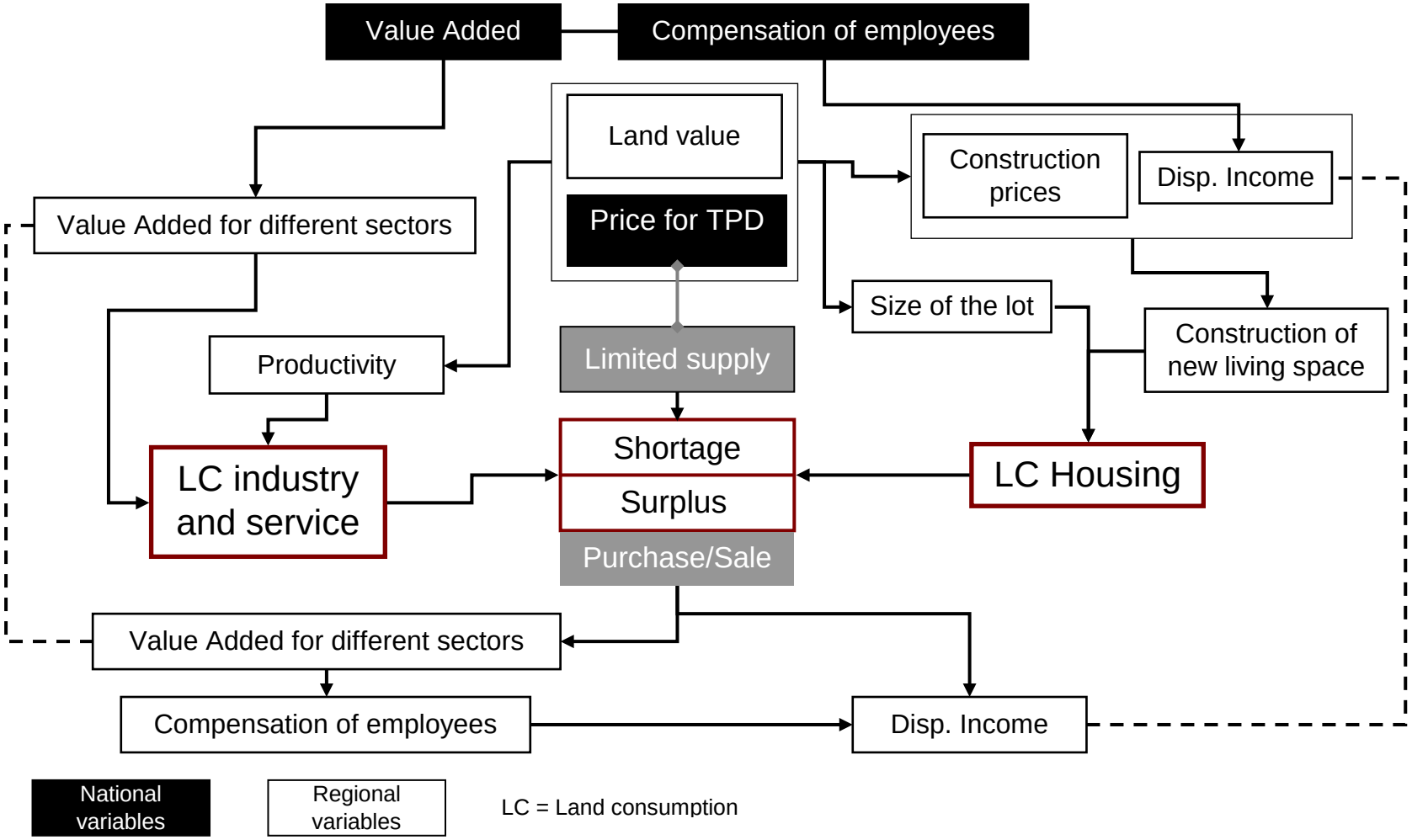
3 Political Measures and TPD

- **Economic Instruments are meant to reduce the land consumption without stronger side effects (in comparison to plain restrictions)**
  - ⇨ Price control instruments (taxes, extra charges)
  - ⇨ Quantity control instruments (cap and trade)
- **Tradable Permits for the Declaration of new sites (TPD)**
  - ⇨ The local municipalities have the authority to declare (greenfield) sites for development
  - ⇨ Given a limited supply of permits a trade system is expected to make municipalities arrange their declaration policy along economic principles
  - ⇨ Prices for TPD evolve in the selling and purchasing process

Literature: Nuissl/Schröter-Schlaack 2009; Walz et al. 2005

- **What are the effects of TPD? Which are the regional patterns of land savings and economic impacts?**
- **Settings and Assumptions in the model**
  - Cap
    - 30-hectare-objective as a nation-wide cap
    - Regions get a quota free of charge
    - Quota distribution via Population-Area-Indicator
  - Trade
    - Regions represent the municipalities
    - Scenario period: 2010 to 2020
    - Annual trade
  - Implementation
    - Price for TPD is treated as surcharge on land value
    - Costs/Revenue of trade is treated as change in value added and disposable income

Implementing TPD to the model

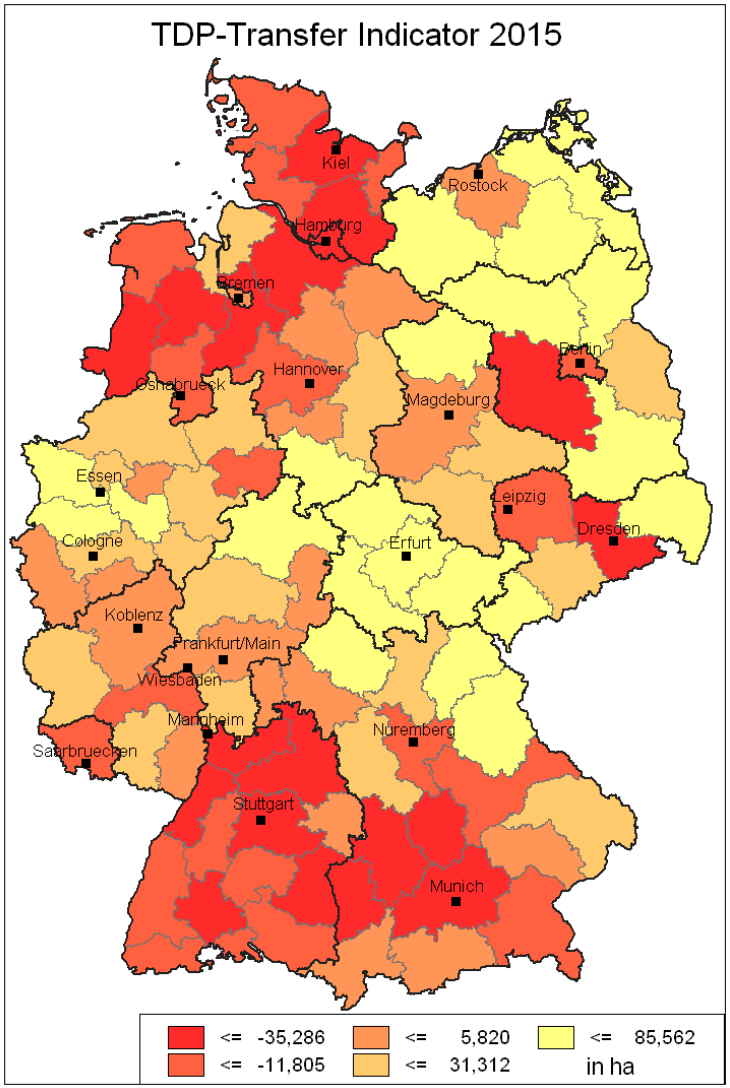


4 The TPD Scenario

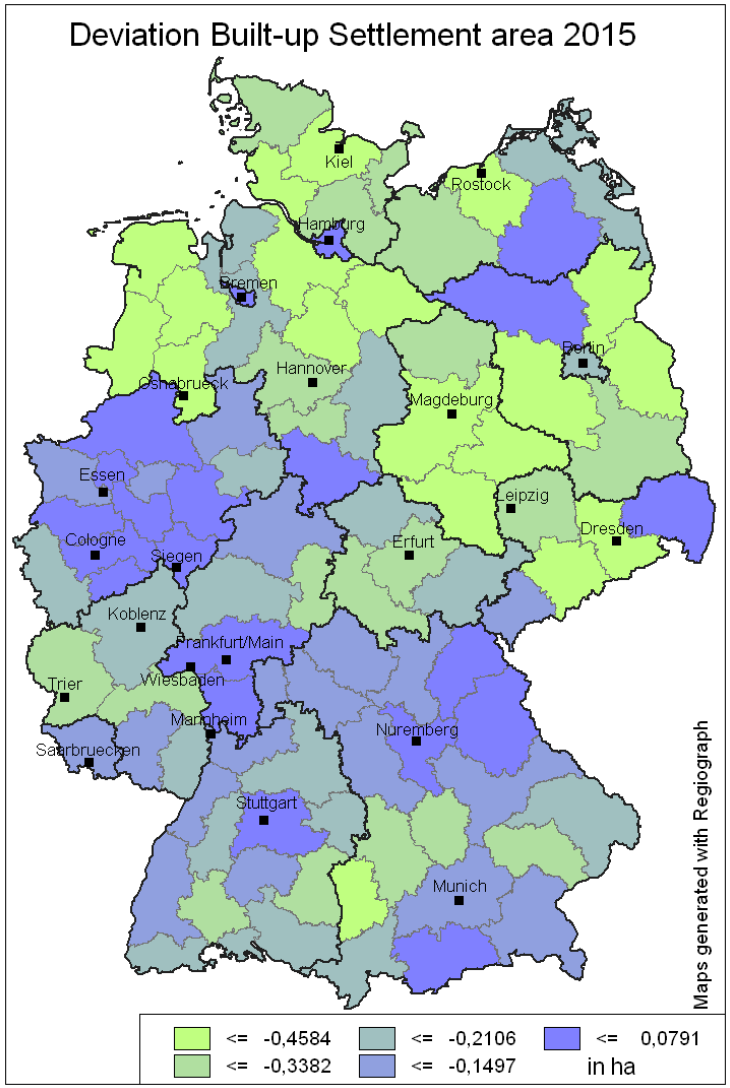
- **General economic effects and outcome of the trade system**
  - Model status 2015:
    - Interim goal for built-up settlement area (28 ha per day) is exceeded in the baseline by + 23%
  - Price for TPD is 42 Euro per sqm in 2015
    - Mean deviation of land value (inkl. surcharge) +29%
  - Hardly any economic effect on a national level
  - Around 50% of the primarily allocated permits are traded
  - Land consumption is at objective level: -19% compared to baseline

◈ Results of the TPD scenario for functional regions

Which are the buyers and which are the sellers ?

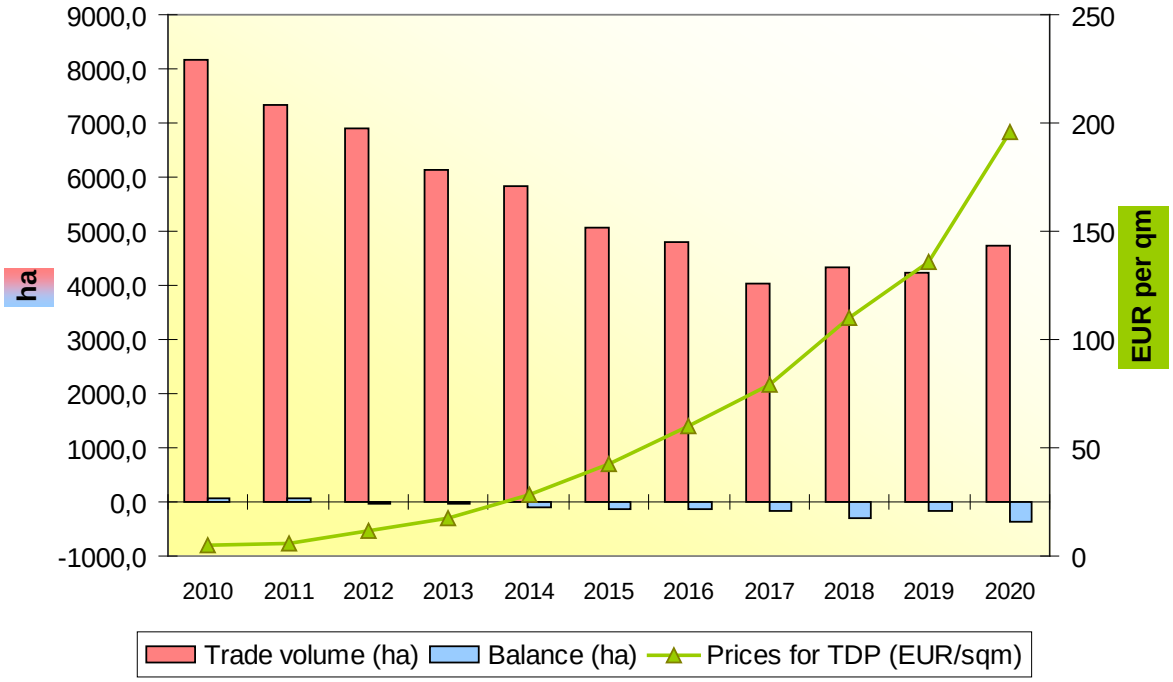


Does settlement expansion change or is it more or less unchanged ?



Results of the TPD scenario – further challenge

- Price generation is not included in the processes – generation beforehand with complications



- Instability of outcome: Analysis of impact assessment is limited to “realistic” prices.

5 Conclusions

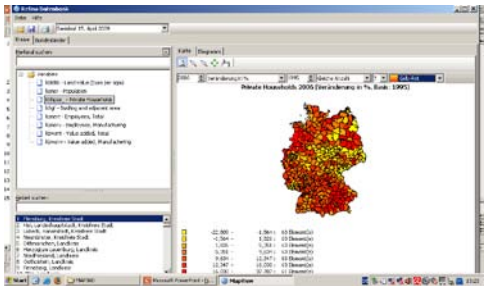
- **Controlling land consumption is a challenge: Price control is not enough!**
- **A trade system with development rights can make sustainability goals attainable. It can reduce the external effects of competing development policies on a regional level**
- **Reduction of land consumption can be attained without strong impact on national economic growth**
- **The model PANTA RHEI REGIO offers the opportunity to analyse impacts of new instruments.**
  Further research:
  - ⇨ Land intensities cannot be modelled in detail on a regional level
  - ⇨ The adoption of regions to a trade system are modelled on a rather general level (e.g. price calculation)

Thank you for your attention!

Further information:

www.gws-os.de/refina

www.refina-info.de



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