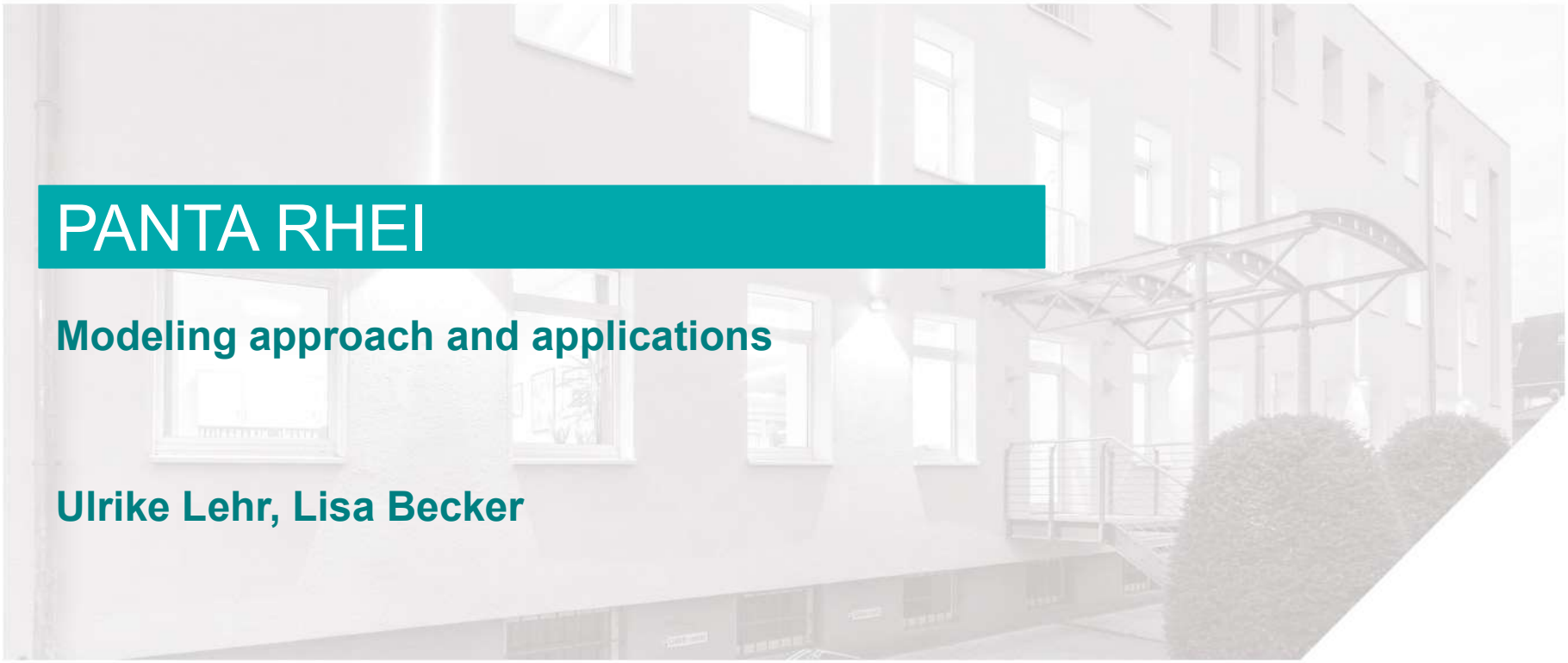
GWS SPECIALISTS IN EMPIRICAL ECONOMIC RESEARCH



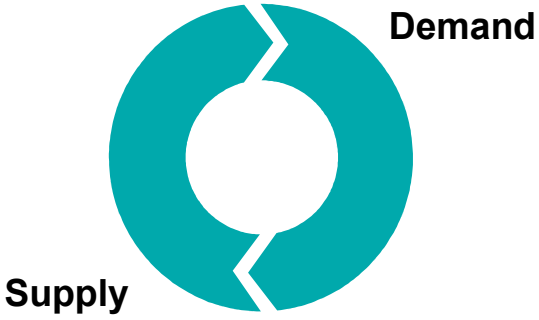
PANTA RHEI

Modeling approach and applications

Ulrike Lehr, Lisa Becker

Modelling philosophy

- Macro-economic
  - ⇨ System of national accounts
- Low level of sectoral aggregation
  - ⇨ Input-output tables
- Representation of economic actors
  - ⇨ Private households, government, corporations
- Empirical base
  - ⇨ OLS estimation of behavioral parameters
- Bottom up & total integration
  - ⇨ Low levels of aggregation → high levels of aggregation
  - ⇨ Iterative solution to account for interdependencies
- Assumptions
  - ⇨ Limited rationality of agents
  - ⇨ Imperfect markets
  - ⇨ Neither demand nor supply-side driven



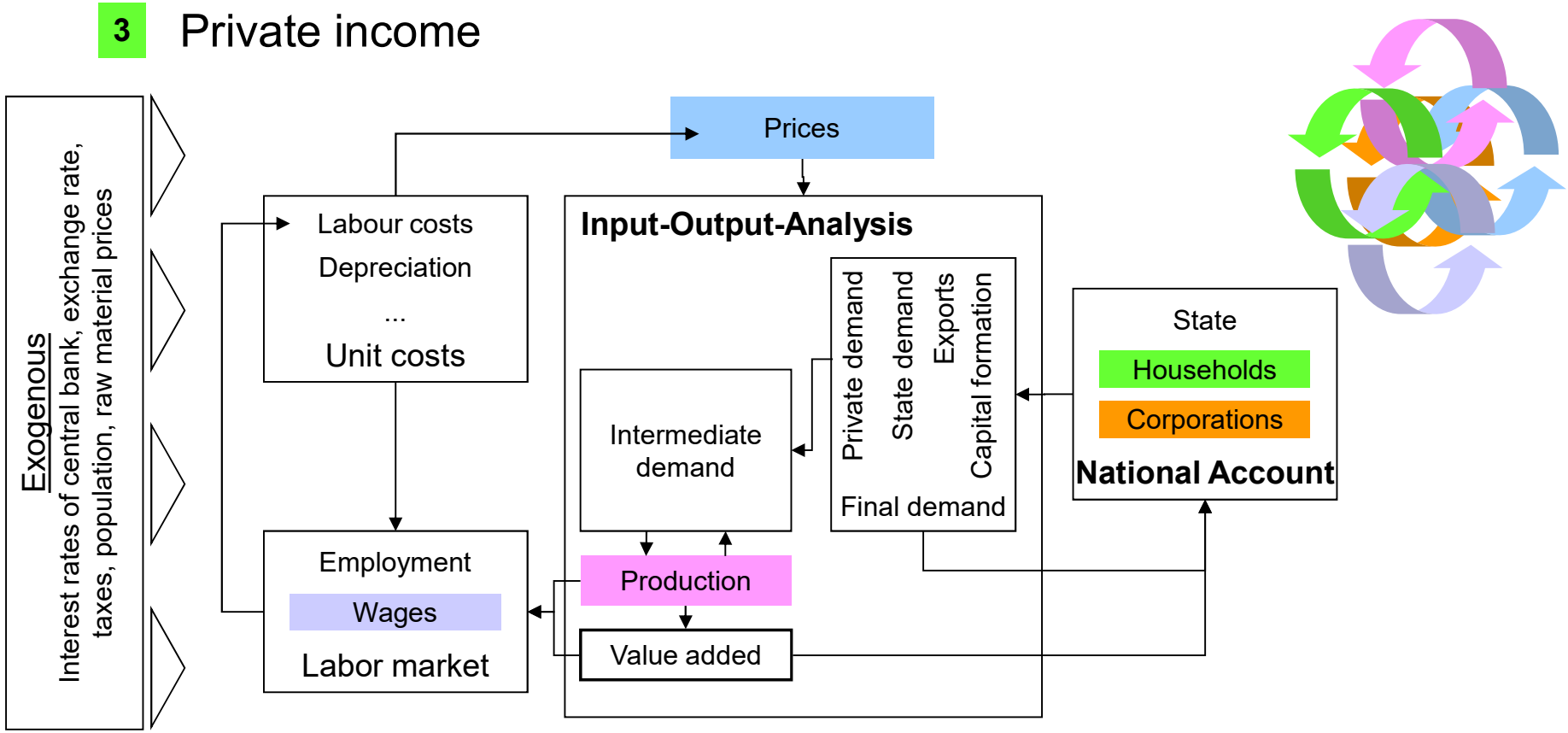
Economic core

- Main variables
  - ⇨ Foreign trade (imports and exports by goods and services)
  - ⇨ Private consumption (by purposes of use)
  - ⇨ Production (by economic activities)
  - ⇨ Employment (by economic activities)
  - ⇨ Prices
  - ⇨ Government revenues and expenses
- Exogenous assumptions for national models
  - ⇨ Economic performance of importing countries
  - ⇨ Import prices (especially oil price)
  - ⇨ Interest rates
  - ⇨ Exchange rates
  - ⇨ Population development

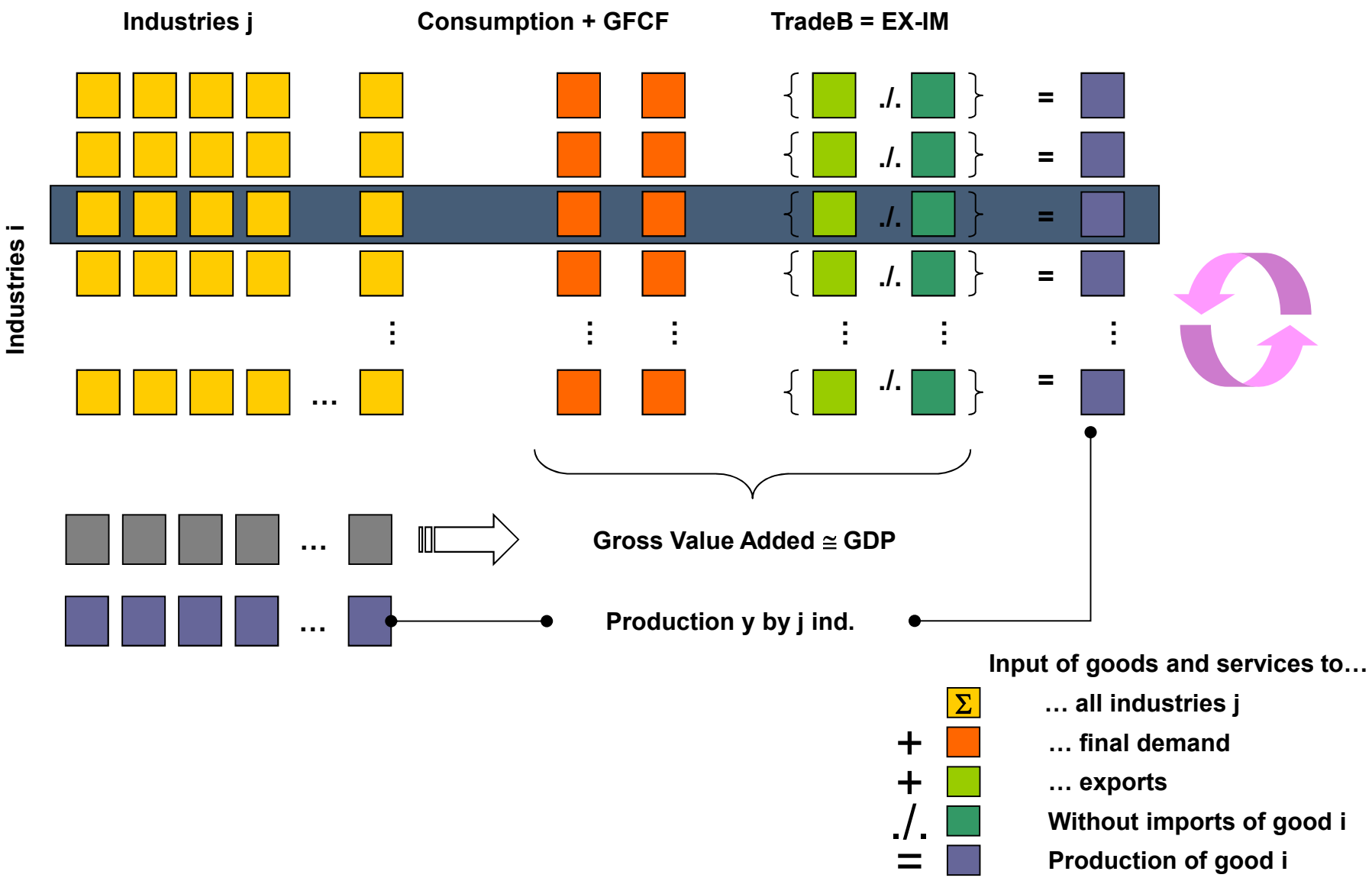
Economic core cont‘d

Five important economic drivers / multipliers

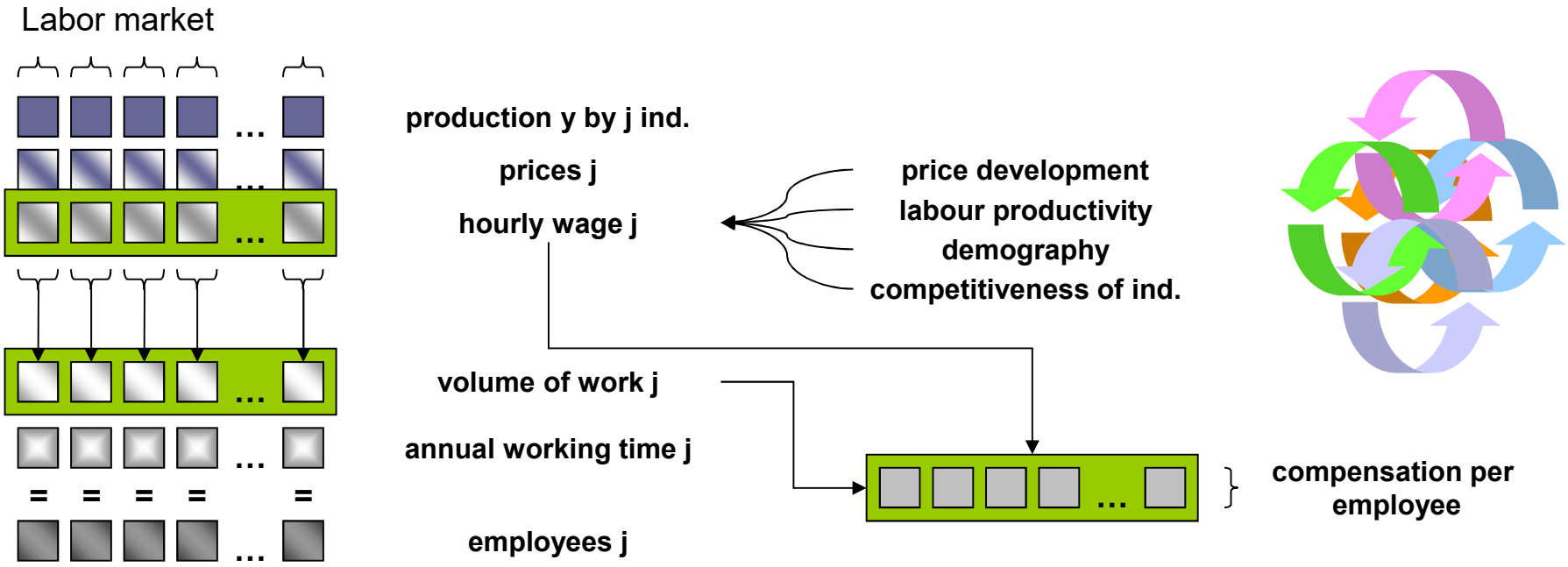
1 Production
2 Prices
3 Private income
4 Investments
5 Labor market (wages)



Economic Core: Production



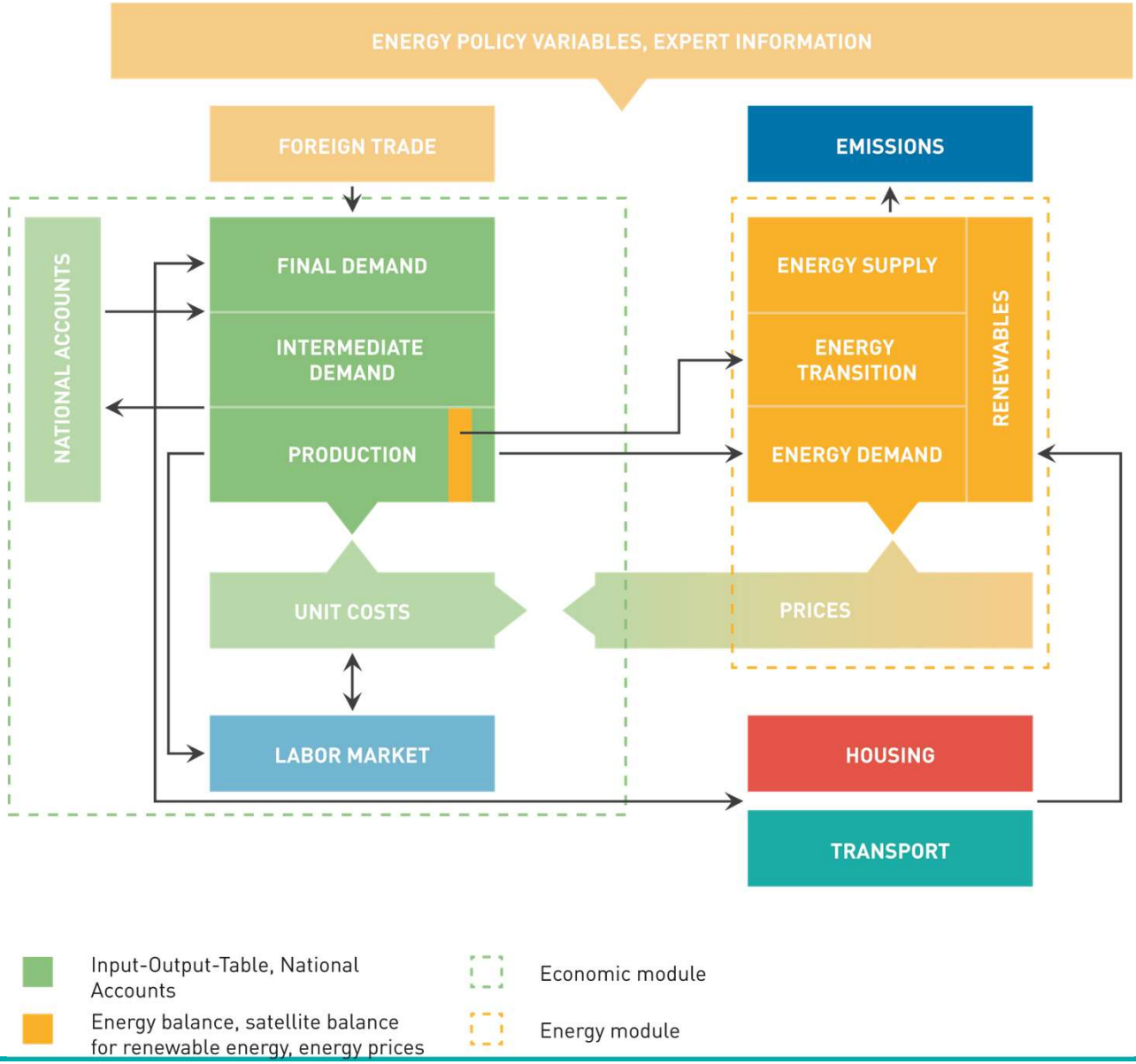
Economic core: labor market



Interdependences within the model

- Inter-industry relations
  intermediate demand between sectors/industries
- Price model
  unit cost calculation (material, employees, …) and mark-up
- Income of private households
  wages and earnings for disposable income
- Corporations
  production, investments, social contributions, earning
- Labor market
  Production, wages & prices
  ➔ labor demand and wage income

Plus energy, plus environment = PANTA RHEI



Contribution to sustainability indicators

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- Pollutants

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- Renewable energy (share in TFC, electricity generation)

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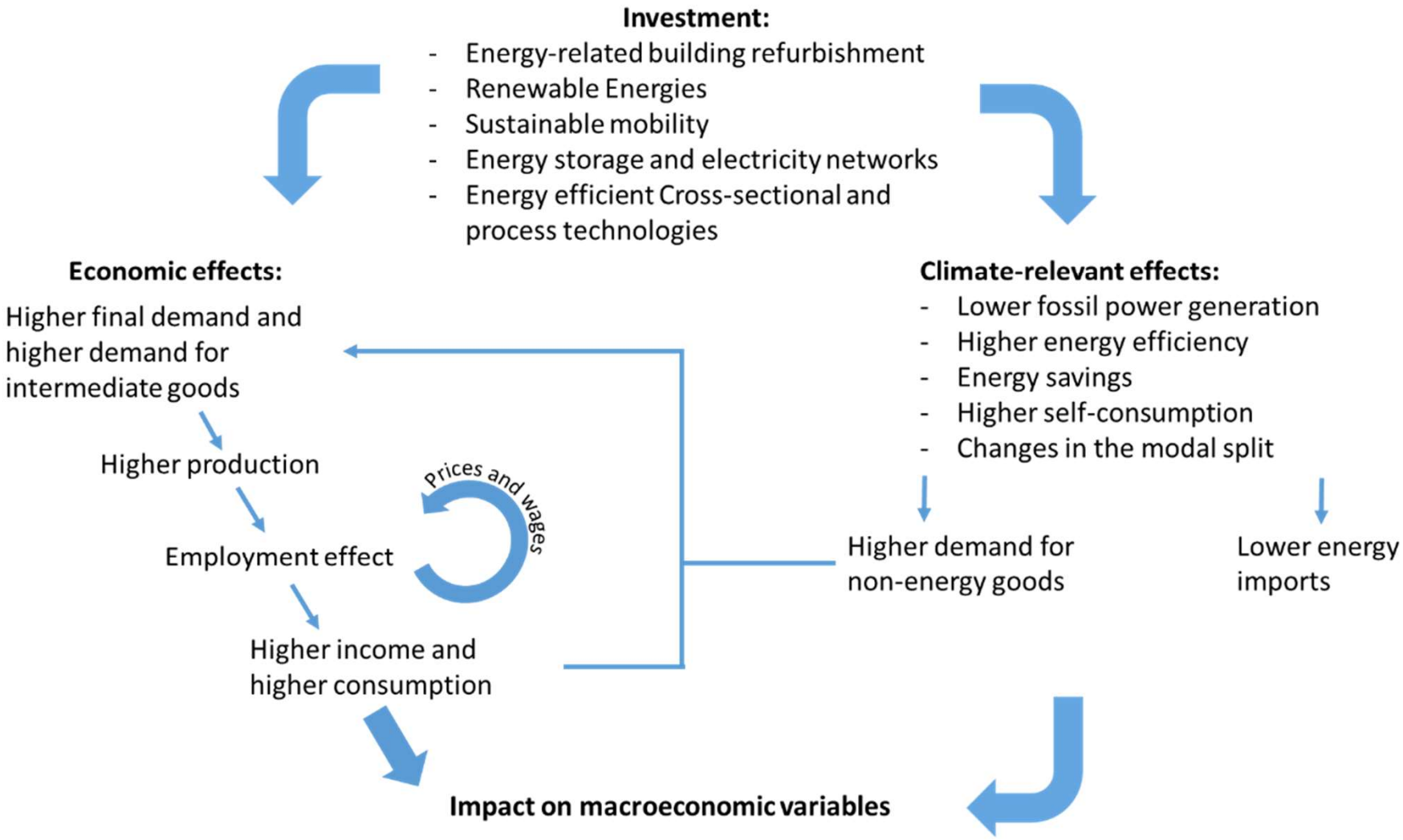
- GHG emissions

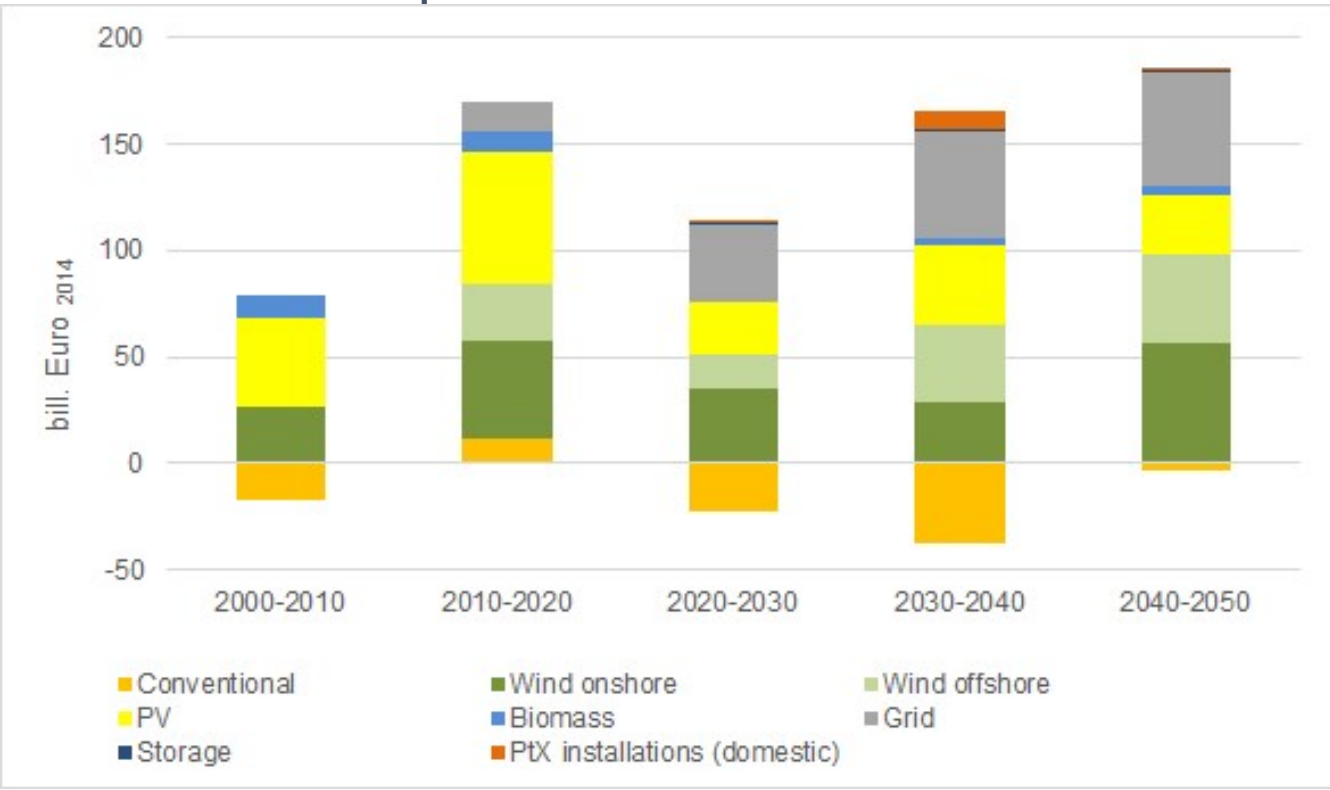
Example: Effects of energy transition investment



Source: GWS

Typical simulations and results

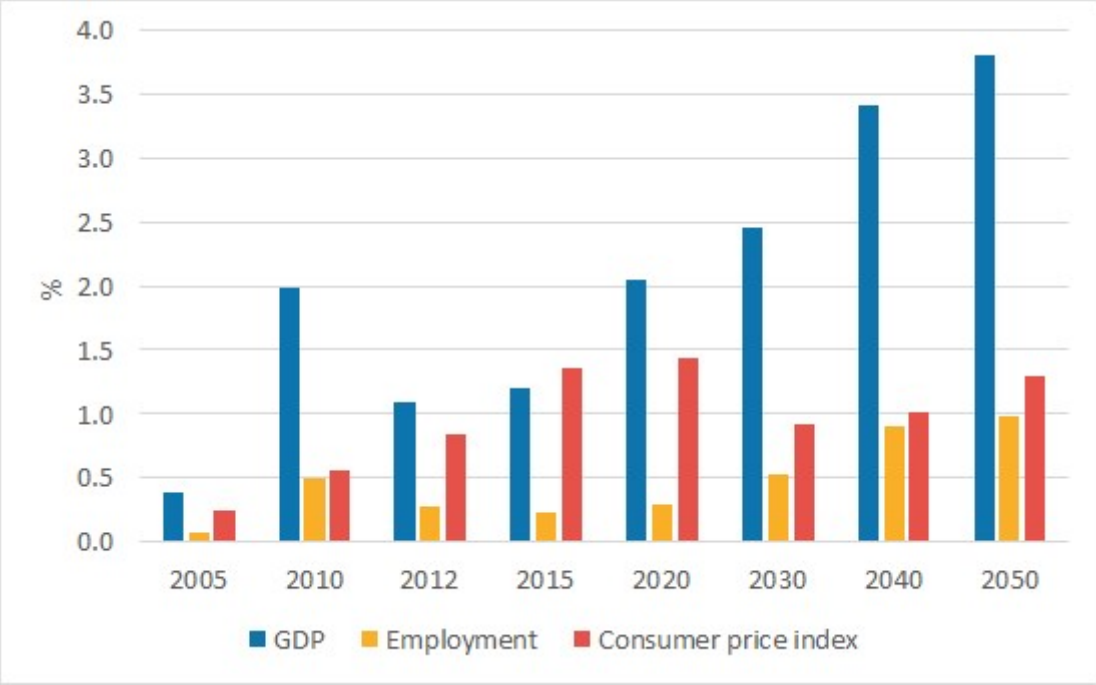
Input: Cumulated additional investment for energy supply (power generation, storage,…) in the energy transition scenario compared to contrafactual world



Macroeconomic results – GDP, jobs, prices

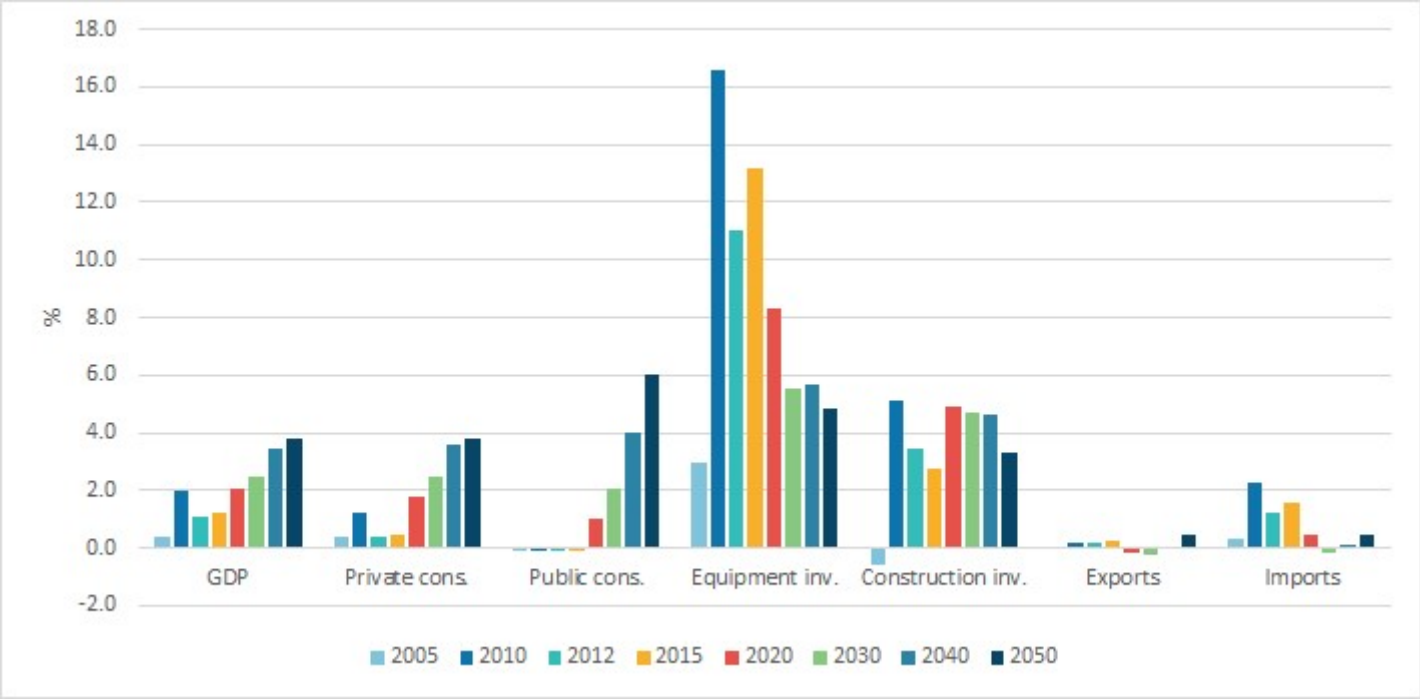
Results for ETS compared to CFS

- Higher GDP in energy transition scenario (ETS)
- Also more employment and higher prices



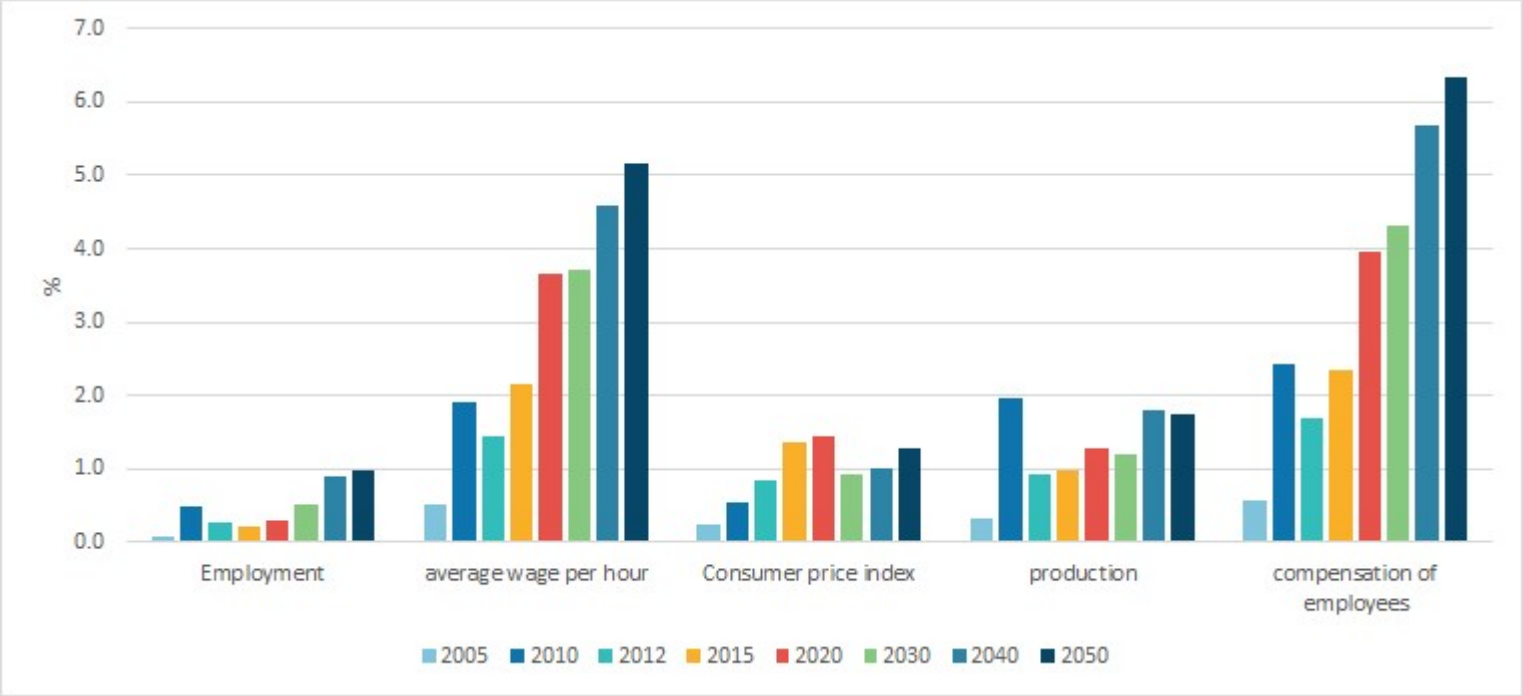
Macroeconomic results – GDP and its components

- Mainly driven by additional investment
- More consumption and reduced energy imports important in the long term



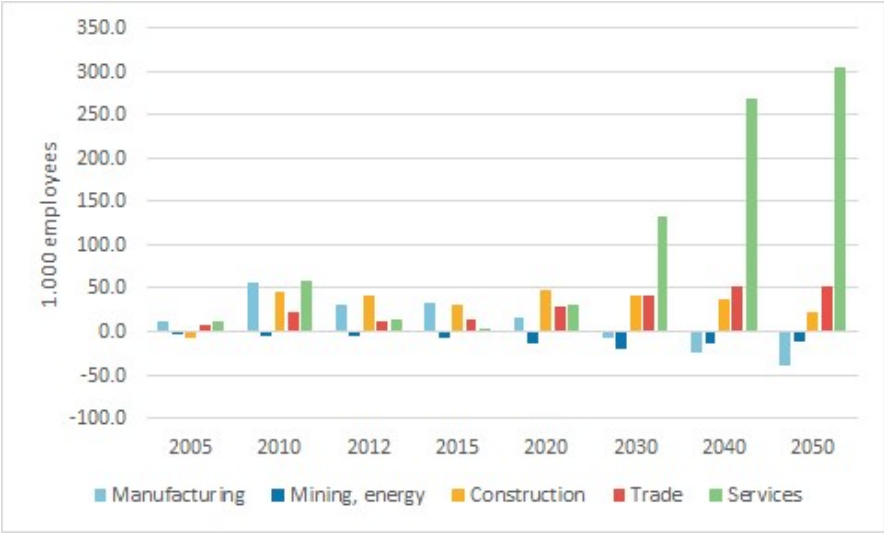
Macroeconomic results – employment

- Positive impacts on the labor market

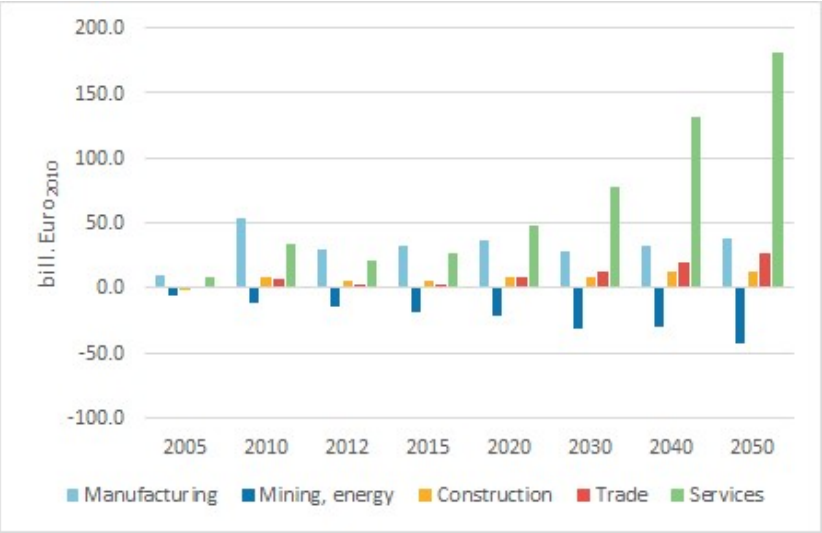


Sector results

► Employment



► Production



Thank you for your attention!

Ulrike Lehr

T +49 (0) 541 40933 - 280
E lehr@gws-os.com

Head of Division Energy and Climate

Lisa Becker

T +49 (0) 541 40933 - 287
E becker@gws-os.com

Researcher Energy and Climate

GWS SPECIALISTS IN EMPIRICAL ECONOMIC RESEARCH

www.gws-os.com

Gesellschaft für Wirtschaftliche Strukturforschung mbH
Heinrichstr. 30
49080 Osnabrück
Tel + 49 (0) 541 40933-280
Fax + 49 (0) 541 40933-110
lehr@gws-os.com

To be discussed

- What are further interesting variables from the economic realm to be reported?
- Which trade-off of decarbonizing can be illustrated from the economic perspective?
- How can we improve the economic model together?