Structures of a welfare-oriented sustainable impact assessment model

Gerd Ahlert & Bernd Meyer

ISEE 2014 conference:
Wellbeing and equity within planetary boundaries
13 – 15 August, Reykjavik, Iceland

Institute of Economic Structures Research (GWS)
Heinrichstr. 30
D – 49080 Osnabrück
Tel.: + 49 (541) 40933-170
Email: ahlert@gws-os.com
Internet: www.gws-os.com

Content

1. Introduction
2. Motivation – comprehensive comparison of “green” sustainability studies
3. Key structures of a planetary limited sustainable welfare model
4. From conceptual to practical modelling: The model GINFORS$_3$
5. Application of the model GINFORS$_3$

Research background

1. National accounting (i.a. IO accounts, sequence of accounts and balancing items, balance of payments), environmental accounting, energy balances, international trade, structural change, employment
2. Construction of macro-econometric IO based simulation and impact assessment models: INFORGE, PANTA RHEI, GINFORS

Funding of the work at hand

Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety
Umwelt Bundesamt
SEVENTH FRAMEWORK PROGRAMME
CECILIA 2050 OPTIMAL EU CLIMATE POLICY
POLFREE POLICY OPTIONS FOR A RESOURCE EFFICIENT ECONOMY
ToPDAd TOOL-SUPPORTED POLICY-DEVELOPMENT FOR REGIONAL ADAPTATION

2. Motivation – comprehensive comparison of “green” reform studies

Growth oriented "green" welfare concepts (Q1)

1. Europe 2020 (European Commission)
2. Progressive Growth (USA 2007)
3. Green Growth / Green Growth (OECD, UNEP)
4. Green New Deal (i.a. UNEP, GNDg)
5. GreenTech - Studies (Germany)
6. Climate Prosperity Initiative (Canada: NRTEE)

„Green“ transformation strategies (Q1)

7. Vision 2050 (WBCSD 2010)
8. The great transformation (Germany: i.a. Böll-Stiftung, WGBU)
9. Wuppertal institute (2008), BUND (2011)

Model-based empirical 3E studies (Q1)

10. ETR for Europe (Lutz & Meyer 2009, Barker et al. 2011)
11. Ressource-efficient economic strategies (Germany: Distelkamp et al. 2010, Europe: Meyer 2012)
12. Economic effects of the German "Energiewende" (Germany: Lehr et al. 2012)
13. New Growt Path (Europe: Jaeger et al. 2010)
14. Peristent weakness of economic growth (Austria: Stocker et al. 2011)

Zero-Growth oriented "green" welfare concepts (Q2)

15. New Economy Working Group (USA 2009)
16. Prosperity without growth (Jackson 2009)
17. Managing without Growth (Canada: Victor 2008)

Common weal oriented degrowth concepts (Q2)

18. FEASTA-Konzept (Douthwaite 1992ff)
19. Décroissance (France), De-Growth (Spain, Italy), Postwachstum (Germany)
20. Buen Vivir (Ecuador & Bolivia: i.a. Acosta 2009)

New indicator resp. monitoring concepts **

21. Stiglitz report (2009)
22. CAE & SVR Expertise (France / Germany 2010)
23. Steady State Economy Accounts (O’Neill, 2010)
24. Happiness criteria (i.a. Bhutan)

Fig 1: Schematic overview concerning the results of the synopsis

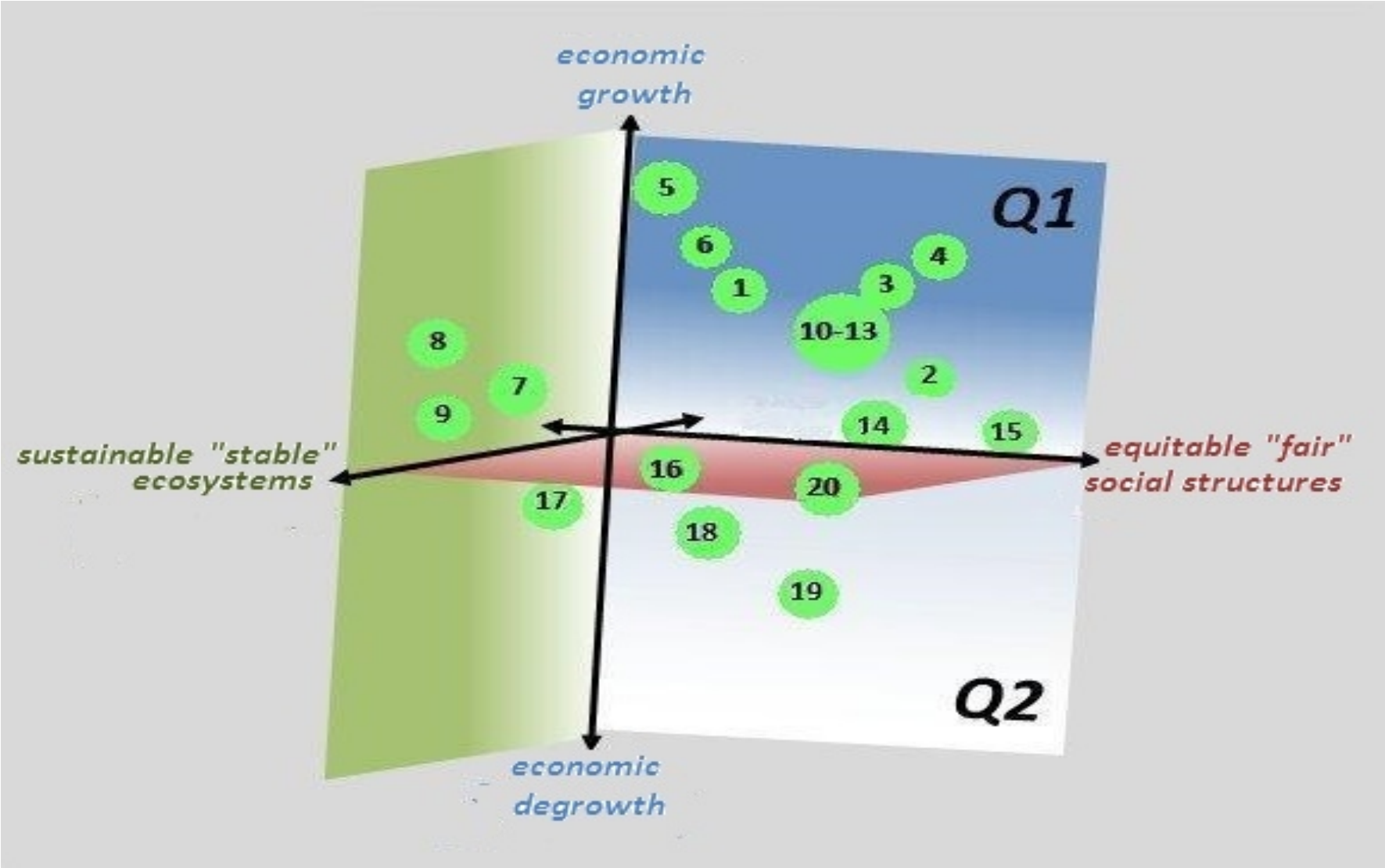


Fig 2: The socio-economic system as a subsystem of the limited planetary ecosystem (basis: Daly 1992)

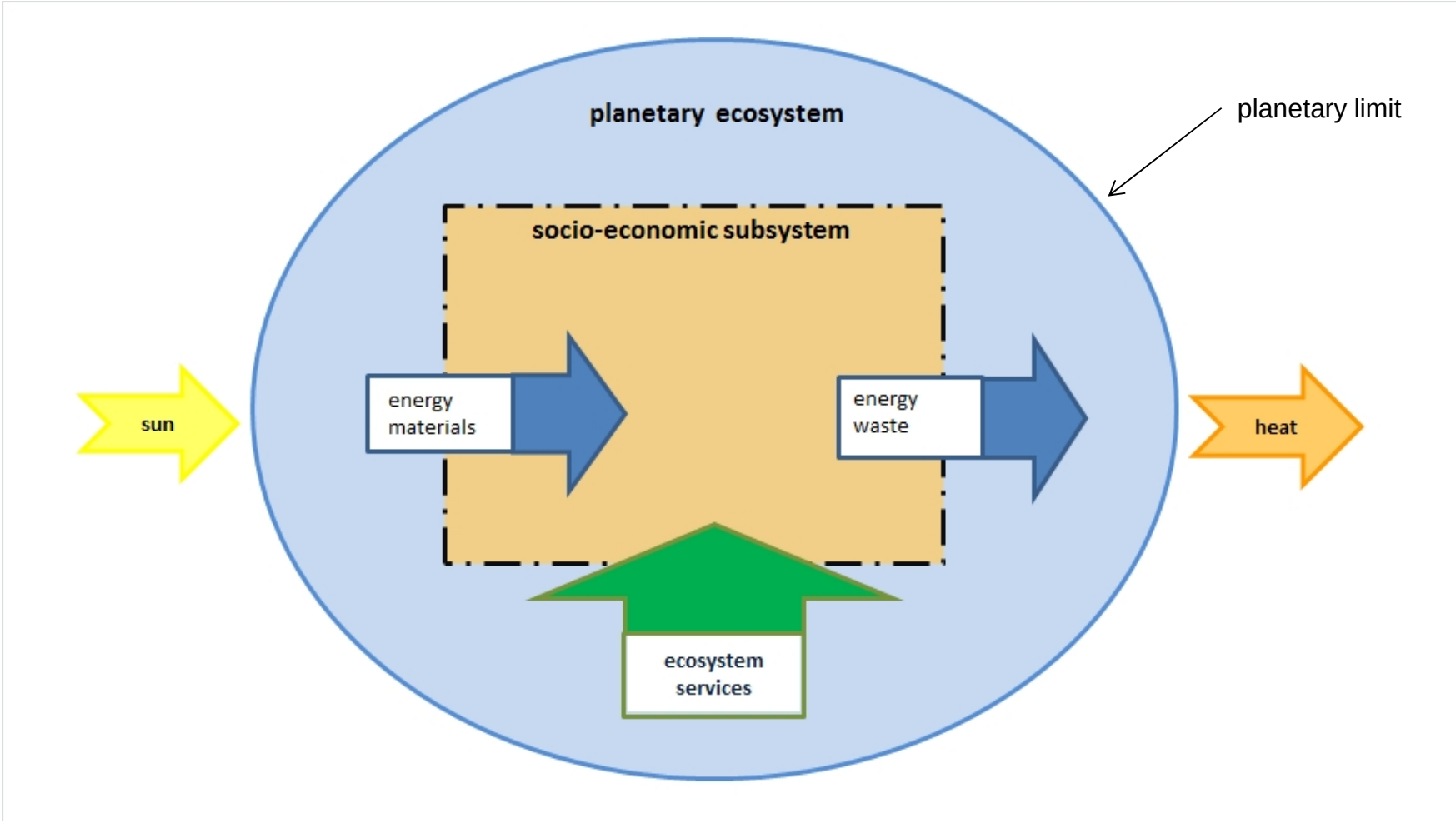


Fig 3: The broadened model of the socio-economic system as a subsystem of the limited planetary ecosystem

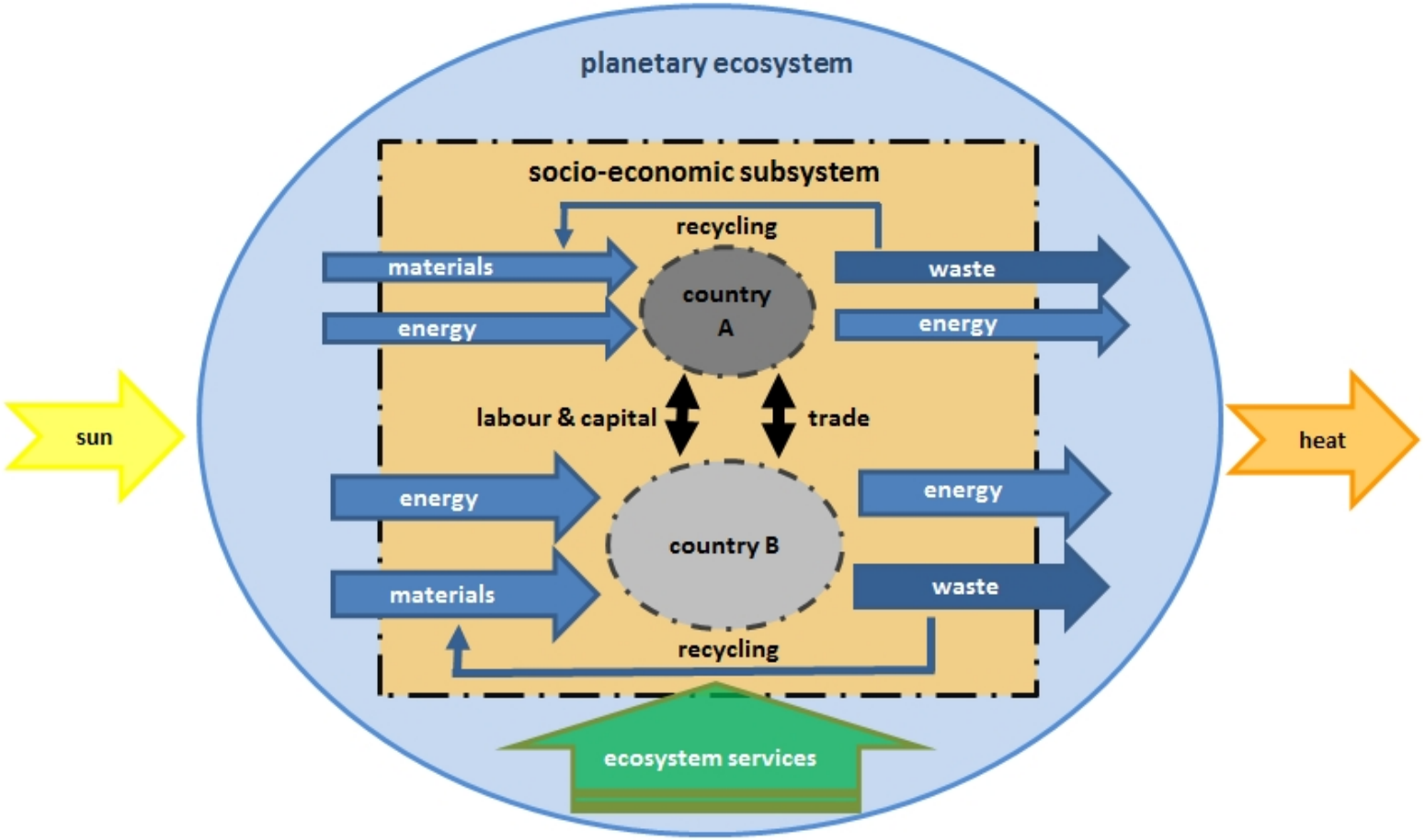


Fig. 4: Fundamental structures of the environmental macroeconomic model

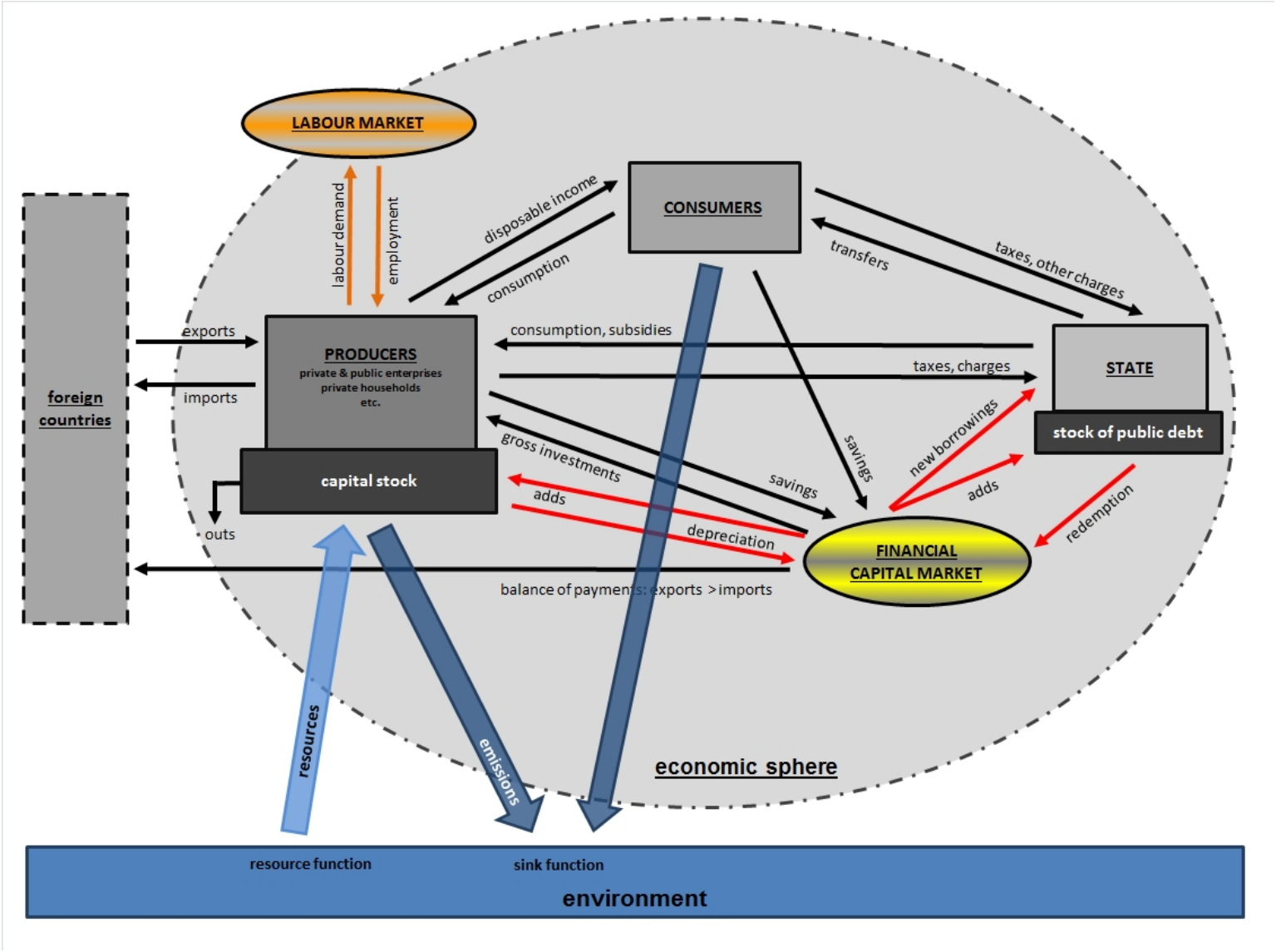


Fig. 5: Fundamental structures of a planetary limited sustainable welfare model

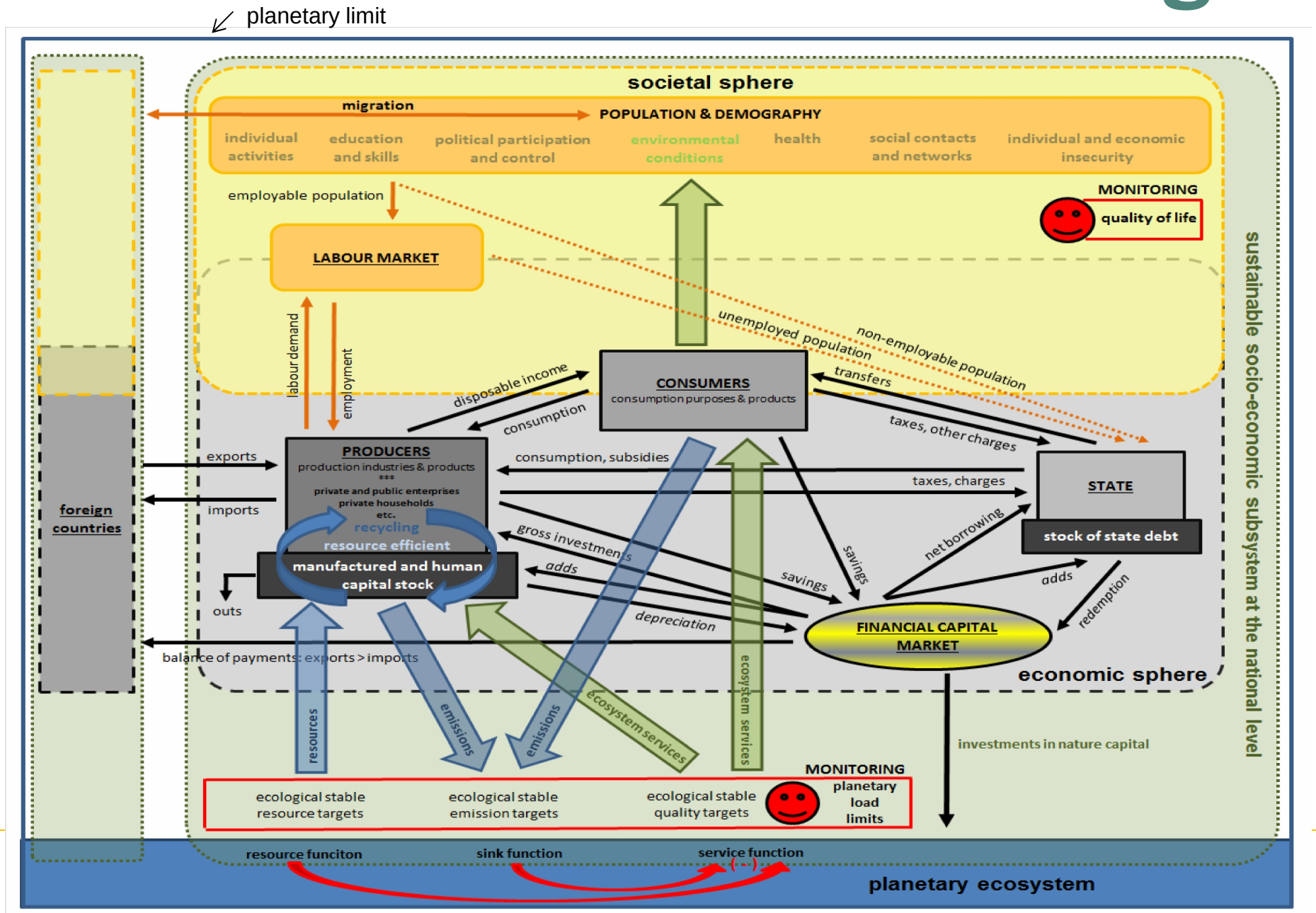
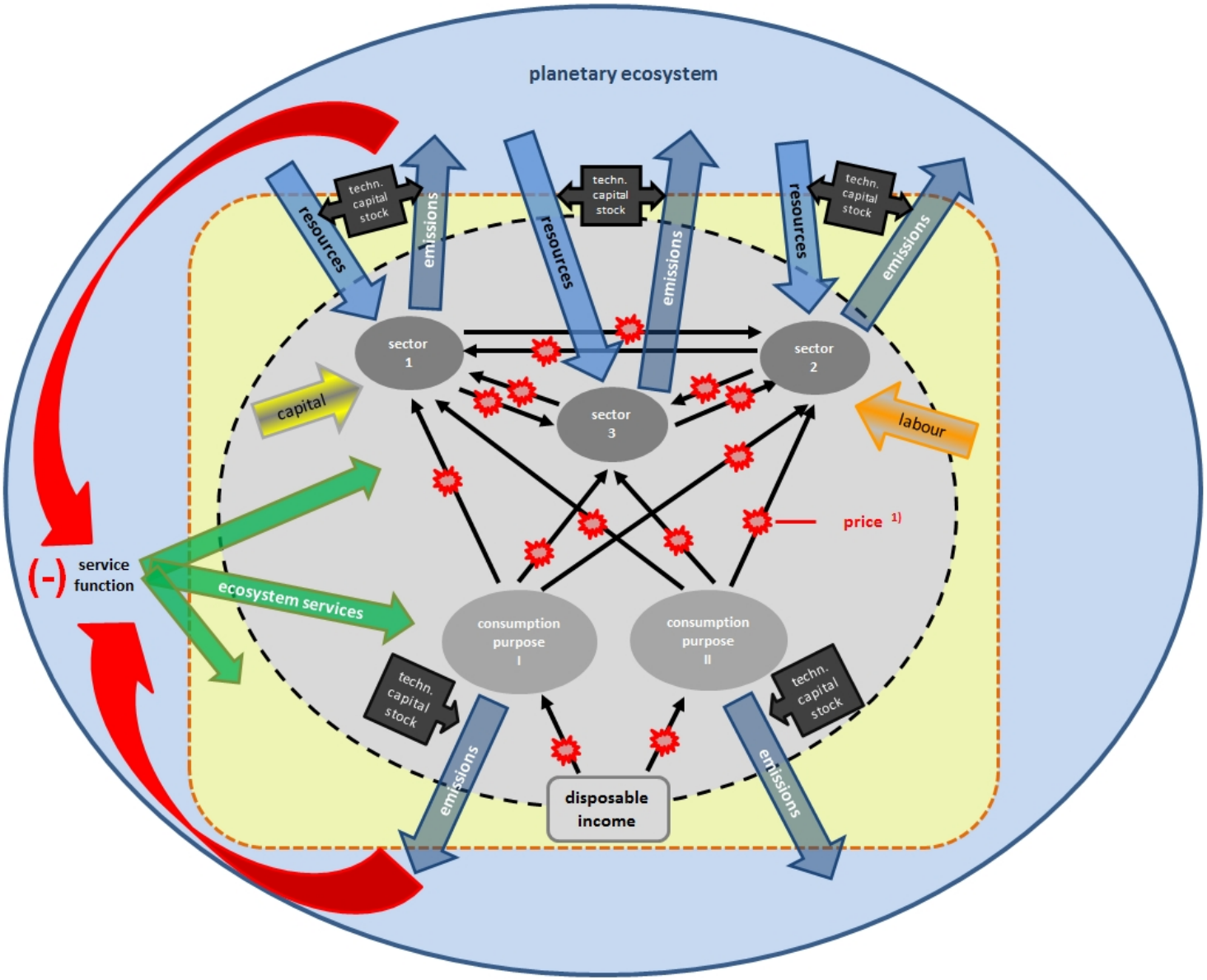


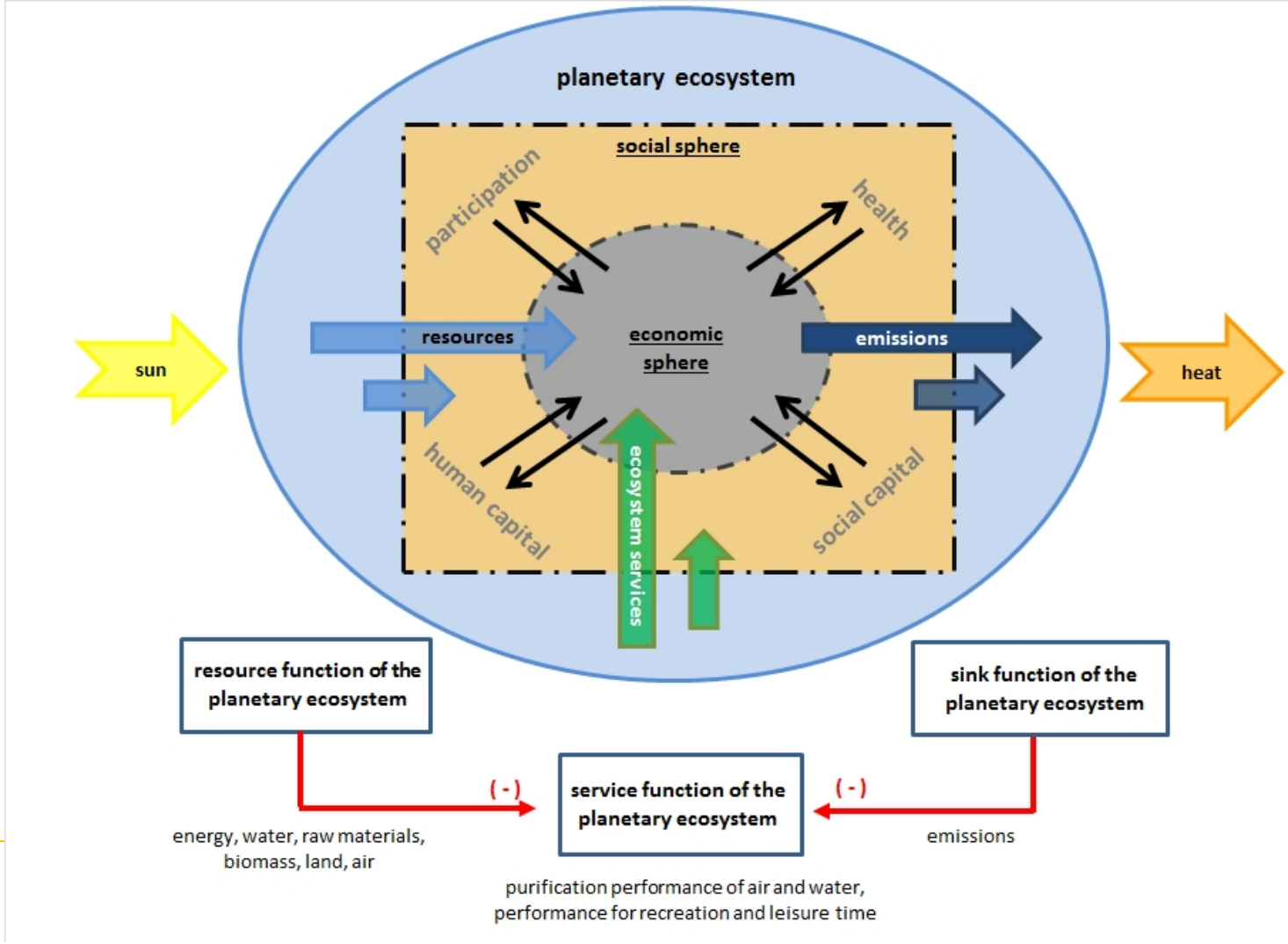
Fig. 6: The role of prices in a planetary limited sustainable welfare model



1) the determination of each individual price is influenced by all prices and volumes

3. Key structures of a sustainable welfare model (6-6)

Fig 7: Basic structures of the sustainable welfare model – interdependence between the economic, the social and the planetary limited ecological sphere



- Main database: **WIOD**
  - All data available as time series (coverage 1995 to 2009)
  - All data available in the same classification (35 industries, 59 product groups)
  - Consistent integration of international trade data for 59 product groups
  - Consistent integration of environmental accounts (i.e. energy use, emissions)
  - Global coverage (38 countries and Rest of World)

- General modeling philosophy resp. general assumption:
  - Agents decide under conditions of bounded rationality on imperfect markets

➢ Socio-economy module

- Input-Output structures (intermediate inputs, final demand, production, gross value added, prices)
- Labour (employment / labour compensation for 3 different skills) and capital inputs
- Bilateral trade for 59 product groups
- Sequence of accounts and balancing items

➢ Energy module

- Energy use and electricity and heat production

➢ Environment module

- Material use
- Water abstraction
- Agricultural land use
- Emissions

➢ Current modelling targets

- What are the likely development paths of the global economy up to 2050 in deep sectoral and country differentiation, taking into consideration the expected population growth and the multitude inter- and intranational interdependencies?

- Which pressure on the environment with a full picture of resource use and emissions of pollutants does this mean up to 2050?

- What are the likely impacts of different policy options on environmental pressures as well as on the socio economic development considering the global interdependencies?

Consistent projections

Scenario analysis

- The development of the GINFORS$_3$ version has started in 2012:
  - POLFREE: Policy options for a resource-efficient economy
    - Linking GINFORS with the bio-physical global ecosystem model LPJmL (PIK)
    - Project lead: University College London
  - CECILIA2050: Optimal EU climate policy
    - Mapping pathways towards a more ambitious policy mix for 2030 and 2050, starting from the current EU climate policy. Two plausible policy scenarios combinations have been analyzed by GINFORS: RCP2.6/SSP1 (global cooperation) and RCP4.5/SSP2 (Middle of the road)
    - Project lead: Ecologic Institute, Berlin

- ToPDAd: Tool supported policy development for regional adaptation
  - The overall environmental and economic impacts of modelling results coming from sector resp. regional climate adaptation models will be linked to GINFORS with regard to different RCP and SSP combinations
  - Project lead: VTT Technical Research Centre of Finland, Helsinki

- SimRess: Effectiveness of policy measures in the field of resource policy
  - Considering a time horizon through 2050, the project will interpret global model simulation results from both the system dynamics WORLD$_3$ model (University of Lund) and the global macroeconometric GINFORS$_3$ model.
  - Project lead: Ecologic Institute, Berlin

Thanks for your attention!