

Session: Integrating climate change, land use, socio-economic scenarios.
Lessons from the ALARM project

The links of the ALARM scenarios and the socio-economy in Europe

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Structure of the presentation

- Ideas of **socio-economic modelling**
- The **macro-econometric model** GINFORS
- The **socio-economic modelling process** in ALARM
- First **modelling results**
- **Links** between **socio-economic and natural scientific** scenario simulations





Socio-economic modelling

- **Integrating environmental concerns in economic objectives** more explicitly
- Showing the **inter-linkages of economy and environment** and **support political decision-making**
- Knowledge about possible effects (e.g. on economic growth, employment, interest rate, but also on environmental use and degradation) of different policy measures, in order to derive and determine a **sustainable mix of instruments**



Socio-economic modelling

- Determining possible future developments (formulating different **scenarios**).
- **Evaluating the impacts of key environmental policy measures** on economic and environmental indicators.
- Presenting **quantified policy recommendations** for sustainable biodiversity strategies, considering the interrelations of environmental and economic indicators.





Socio-economic modelling – the requirements

- Global **multi-country** approach
 - **Multi-sector** approach
 - **Disaggregated** bilateral international **trade**
 - **Endogenous** explanation of economic development and its linkage with the environment
 - **Empirical** foundation
- Requirements are fulfilled by **GINFORS**
(Global **IN**terindustry **FOR**ecasting **S**ystem)

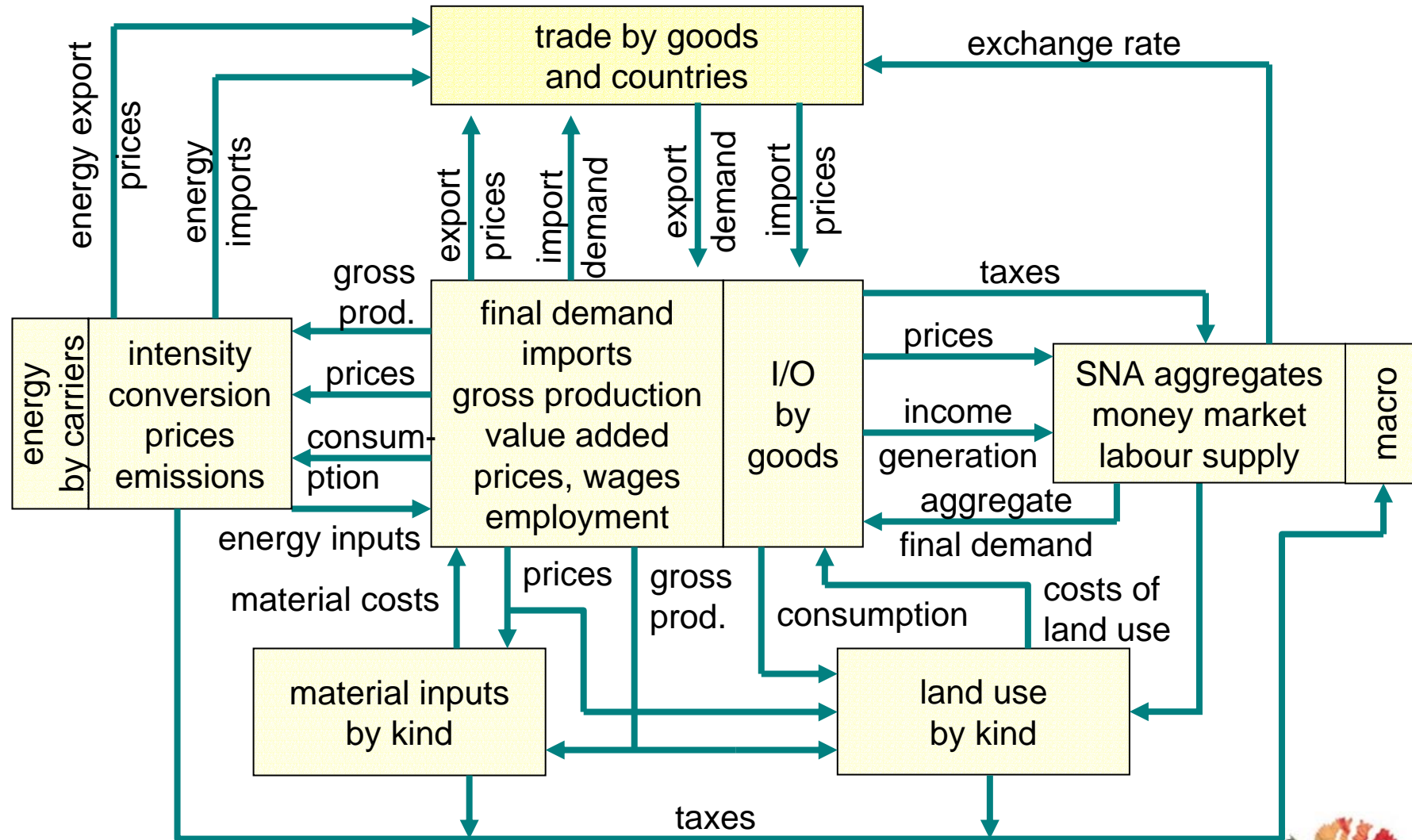


GINFORS

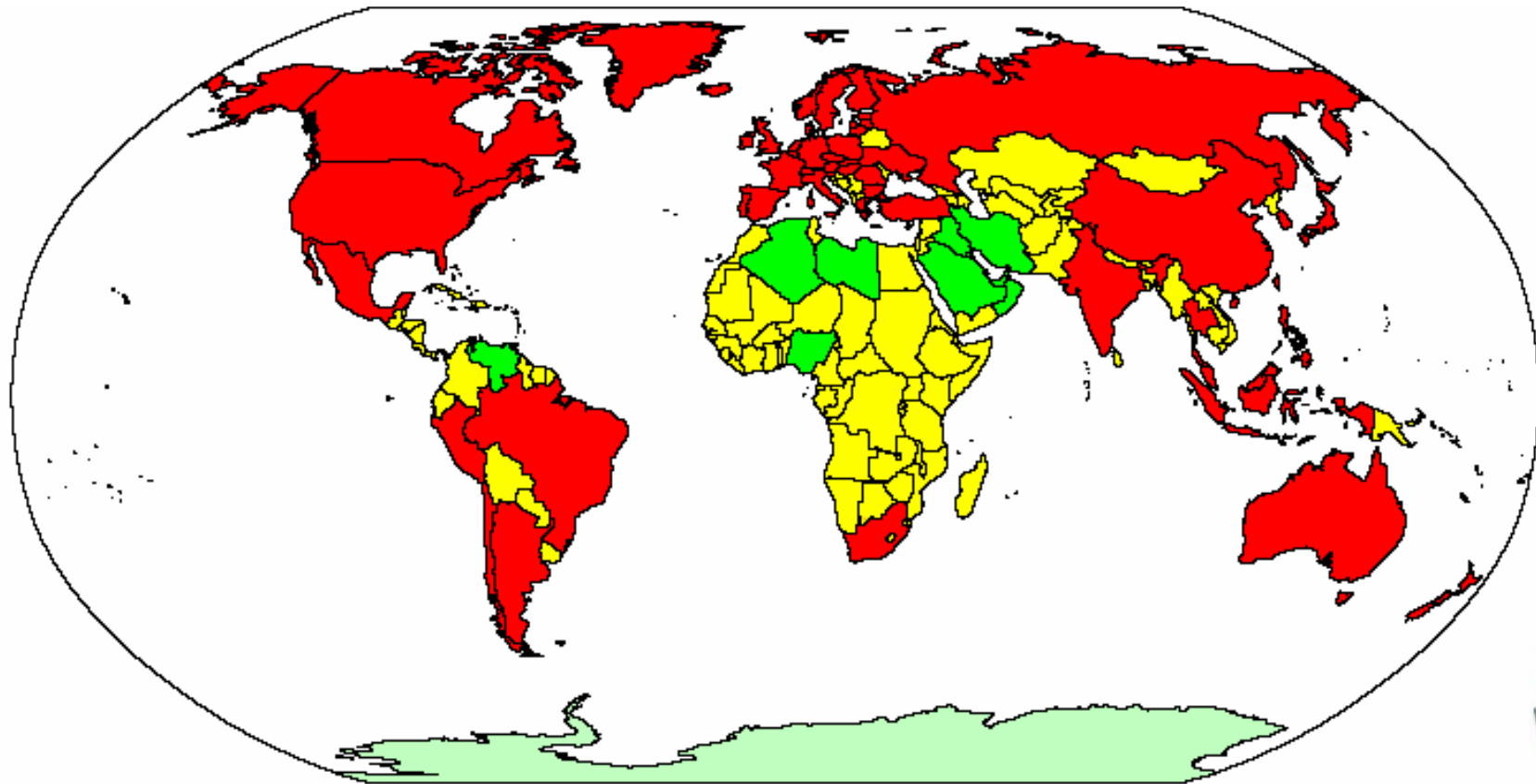
- Developed by Institute of Economic Structures Research (GWS, Prof. Meyer, Osnabrück)
- **Global econometric modelling system** (53 countries, plus OPEC and ROW; time series from 1980-2002)
 - **macro models** (calculate endogenously GDP, employment, ...)
 - **input-output models** (25 countries; 40 sectors)
 - bi-lateral **trade models** (40 countries, 25 commodities and one service sector)
- Extension by **environmental input data** in physical units:
 - energy inputs, material inputs, land cover and land use



Model structure



Country coverage



country models

OPEC ex. Indonesia

ROW



Socio-economic modelling – the process

1. Development of **storylines**
2. Extracting **policy issues**
3. Identifying model **input** parameters and **output** parameters (results)
4. Translate input parameters into **partial scenarios** for all storylines
5. **Simulate** partial scenarios to **understand** impacts
6. *Model all partial scenarios per storyline **simultaneously***
7. *Run **sensitivity analyses***
8. ***Interpret** the results and translate them into **qualitative** reports*





From scenario storylines to model inputs

BAMBU world serves as **baseline scenario**

GRAS world:

- **reduction of labour input** → increase of labour productivity [labour input ↓]
- **reduction of wages** → increase of the EU-competitiveness [wages ↓]

SEDG world:

- **shift in input coefficients**: material input reduction of producing sectors → increase of resource productivity → reduction of material input [MI ↓]
- **increase of wages** [wages ↑]



First results

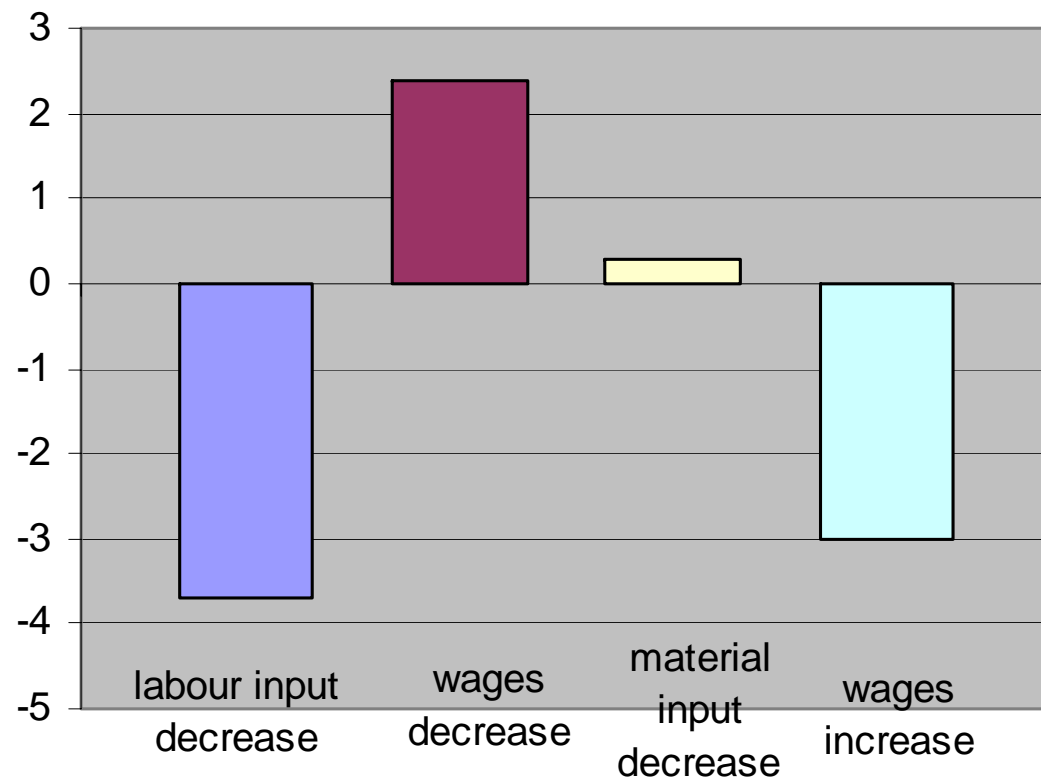
- **Interdependencies** of scenario assumptions and important indicators

	GRAS		SEDG	
	Labour input ↓	Wages ↓	Material input ↓	Wages ↑
Growth	+	+	+	-
Employment	-	+	+	-
Prices	-	-	-	+
TPES	+	+	+	-
Material	+	+	+	-



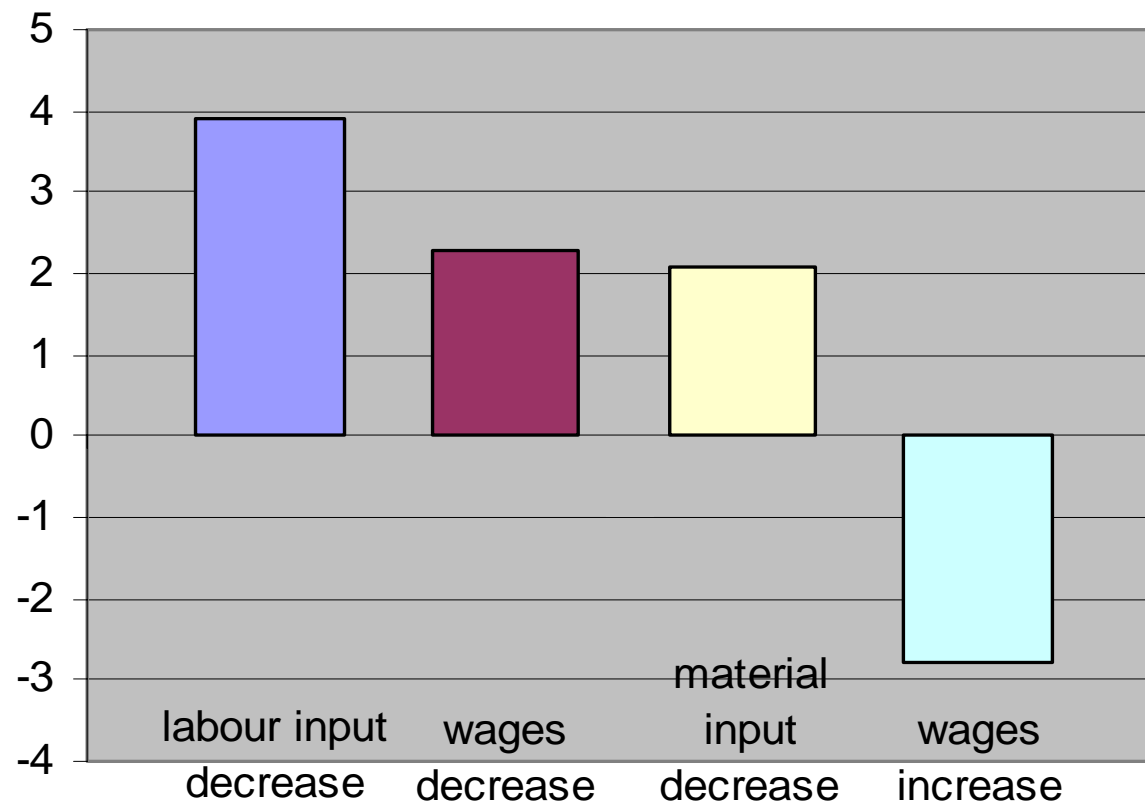
First results

- **Employment:** Percentage Deviation from the Base Scenario in 2020 for EU25



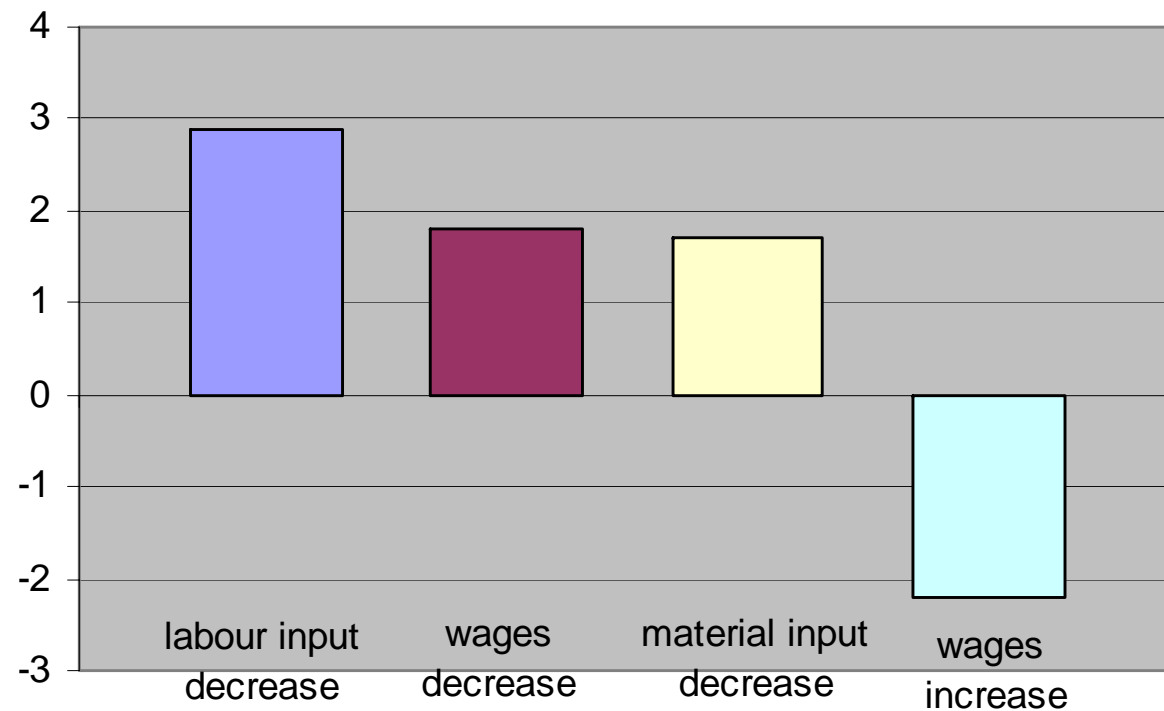
First results

- **Total Primary Energy Supply:** Percentage Deviation from the Base Scenario in 2020 for EU25



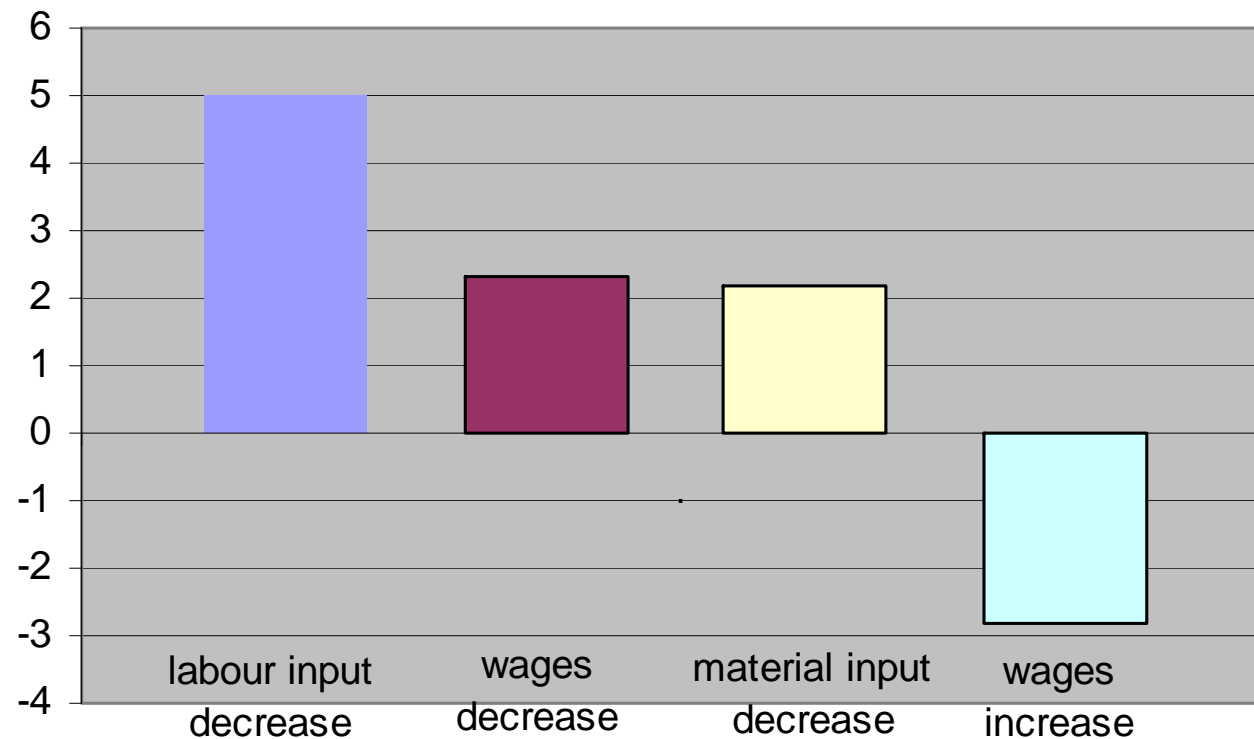
First results

- **CO₂ emissions**: Percentage Deviation from the Base Scenario in 2020 for EU25



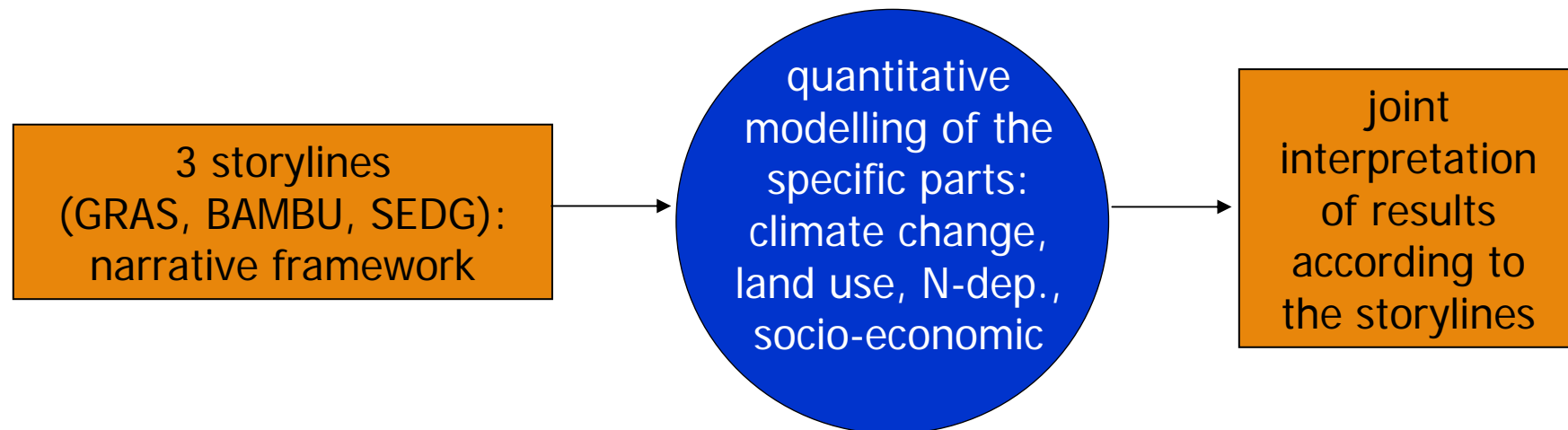
First results

- **Domestic Extraction:** Percentage Deviation from the Base Scenario in 2020 for EU25



Links between socio-economic and natural scientific scenario simulations

1. **Storylines** serve as general framework



Links between socio-economic and natural scientific scenario simulations

2. Exchange of **data input** and **resulting parameters**

Land use ↔ socio-economic

- GINFORS delivers data for land use scenarios (GDP, agricultural demand, prices and costs of agricultural products, biomass)
- Joint qualitative interpretation of the results

Climate change ↔ socio-economic

- Need for climate data input into the THC shock scenario modelling
- Consistency check of CO₂ results

Biodiversity ↔ socio-economic:

- Direct link not possible, but indirectly over pressures (land use, climate change)
- Exception: Link of economic trade model with biological invasions



Thank you for your attention!



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