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How can we reduce the world's hunger for forests?

Friedrich Hinterberger



Greenaccord International Forum
San Miniato, 8th March 2019

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SERI and GWS: Who we are

The world's hunger for resources ... and forests

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- The model GINFORS
- Scenario development

Business as usual and how we can reach the Paris
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Who we are

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SERI

Sustainable Europe Research Institute

- ▶ Vienna, founded in 1999, currently 7 employees
- ▶ National, European and international research projects
- ▶ Research, communication and consultation for public sector, NGOs and companies
- ▶ Working areas:
 - Sustainable economic policy and global responsibility
 - Sustainable production, consumption and lifestyles
 - Sustainable communication

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Who we are



GWS

Institute of economic structures research

- ▶ Osnabrück, founded in 1996, around 35 employees
- ▶ Private, independent economic research and business and policy consultancy organization
- ▶ Specialists in empirical economic modelling
- ▶ Working areas:
 - Economic and Social Affairs
 - Energy and Climate
 - Global Developments and Resources

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The meetPASS project

- Funded by the Austrian Climate Research Programme
- Project partners SERI und GWS
- Including external experts
- Duration: 26 months
- Model-based scenario analysis (global warming <1.5 degrees) for Austria and the world
- How to link the Paris agreement with the SDGs



This project is supported by the Klima- und Energiefonds as part of the Austrian Climate Research Programme – ACRP 9th Call





The **meetPASS** project

- **meetPASS**: **meet**ing the **P**aris **A**greement and **S**upporting **S**ustainability
- Identification of the strongest interactions between climate change policies for mitigation (SDG 13,2) and SDGs targets
- **Looking back from 2050** with dynamic economic models
- Business as Usual vs. alternative “meetPASS” scenarios

This project is supported by the **Klima- und Energiefonds** as part of the **Austrian Climate Research Programme – ACRP 9th Call**



meetPASS

- ▶ **Reference scenario:** Business as Usual
- ▶ **2 alternative scenarios:**
meetPASS and meetPASS+
- ▶ **Targets:**
6-700 Gt of Carbon emissions (1 t/capita/year)
45 Gt of Total material consumption (5 t/capita/year)
10,000 billions m³ water (1000 m³/capita/year).
- ▶ **Plus nuclear phase-out in Europe**

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Trade and CO₂ emissions

Will the increase of international freight-related CO₂ emissions jeopardise the Paris Climate Agreement?

No!

But:

- ▶ Trade has a major influence on environment and climate!



Trade and CO₂ emissions

- ▶ Trade has a major influence on environment and climate!

Why?

- ▶ Regulations regarding CO₂ emissions in industrialised countries are often associated with an **export of CO₂-intensive activities** into developing countries
- ▶ Outsourcing manufacturing processes from the rich to the poor parts of the world
→ **Carbon leakage**

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Trade and CO₂ emissions

- ▶ **Production-based approach:**

CO₂ emissions that occur during **production in a country**.

This includes the emissions of goods and services being exported.

- ▶ **Carbon footprint (consumption-based approach):**

CO₂ emissions that occur along **the entire value chain**.

This includes the international production and transport chains to produce products imported to a country (but **not just transport emissions**)

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Trade and CO₂ emissions

- Production-based emissions vs. consumption-based emissions (**CO₂ footprint**) in 2017 (rounded)

Country	CO2 emissions in Mio. tons	CO2 footprint in Mio. tons	Deviation in %
France	490	570	+16
United Kingdom	560	620	+10
Bulgaria	50	30	-40
Denmark	70	50	-29
EU27	4000	4200	+6
China	8800	7850	-10

Source: CO₂ footprint: calculations with GINFORS

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Trade and CO₂ emissions – including land use change !

- **Emissions from fossil fuels:**

Transport, heating, cooling
and industrial processes (eg. steel)

- **Reduced sequestration from land use change:**

Land use change is widely recognized as a net source of greenhouse gas emissions at the global scale. Total carbon **sequestration** is mainly determined by high sequestration in forests, **emissions from cropland and deforestation**

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Example: the production of pork in Austria

- ▶ **5 Mio. pigs/year** (equates to around 2 per 4-person family)
 - Domestic: 4.8 Mio.
 - Import: 183,000
 - Export: 228,000
- ▶ **4.8 Mio. pigs consume 322.000 tonnes of soy p.a.**
- ▶ Austrian production of soy: 200.000 tonnes
(includes 100,000 tonnes soy for food and also a share for feeding cattle and poultry)
- ▶ Large requirement of imported soy
 - (GMO and forest destroying)
- ▶ **860,000 tonnes of CO₂**, i.e. 1% of Austria's emissions
(just for the production and consumption of pork)
could be avoided by use of European Soy or DonauSoy

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The world's carbon budget

- ▶ **The amount of CO₂ emissions from anthropogenic sources that can still be released** to comply with a defined limit (e.g. 1.5 degrees above the pre-industrial level) and take into account the amount that already has been released since the beginning of industrialization.
- ▶ **For a 50:50 chance of meeting the 1.5 degree target, the remaining CO₂ budget is just 580 to 770 Gt.**
- ▶ **For the EU, around 60 Gt**
- ▶ In order to reach the target, total emissions would have to **decrease significantly to about 1 tonne per capita** of the world's population in 2050. Europeans (EU) are currently emitting 8 tonnes per capita. That is a **reduction to about one fifth - by almost 80%.**

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What does this mean?

- ▶ We can only emit a further 600 to 700 Gt CO₂
- ▶ That is 6-700,000,000,000 tonnes
- ▶ **100 tonnes for each person living today**
- ▶ Today the **average European** is responsible for **8.5 tonnes per year**
- ▶ **By 2050 this has to fall to only 1 ton per year**
i.e. less than 3 kg per day (instead of 25 kg today)
- ▶ **For heating, light, transport, food and for all other consumption**
- ▶ **200 g of pork equals 1 kg of CO₂ eq.**
(2/3 of which comes from soy production in Latin America)

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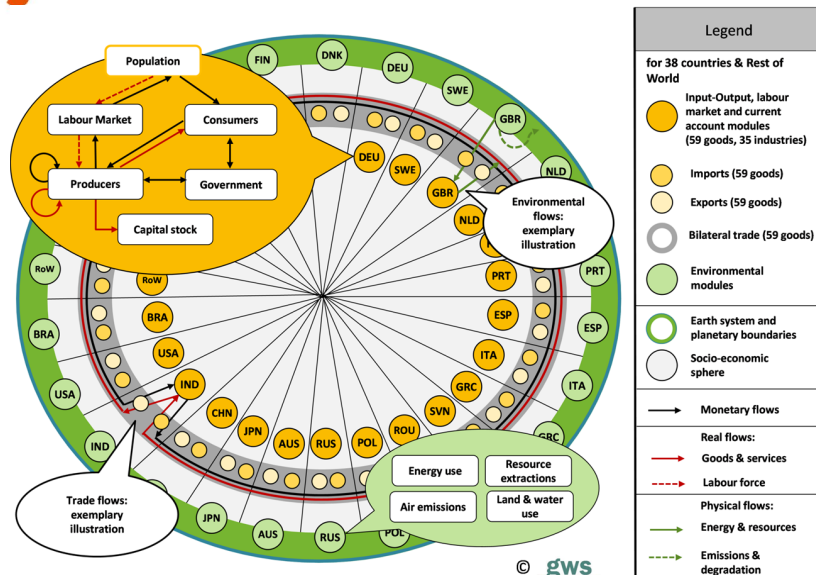
Direct and indirect impacts

- ▶ We need to look not only to energy markets but the **dynamic interactions** in the whole **global economy-environment system**
- ▶ Direct impacts on **investment needs** for renewable, nuclear and conventional power plants under consideration of learning curves
- ▶ Direct impacts on the **volume and structure of intermediate demand** and **labour demand in the electricity sector**
- ▶ Indirect impacts on **electricity prices** and their implications (electricity demand, international competitiveness, etc.)
- ▶ Indirect impacts via **structural changes** and **income cycles**

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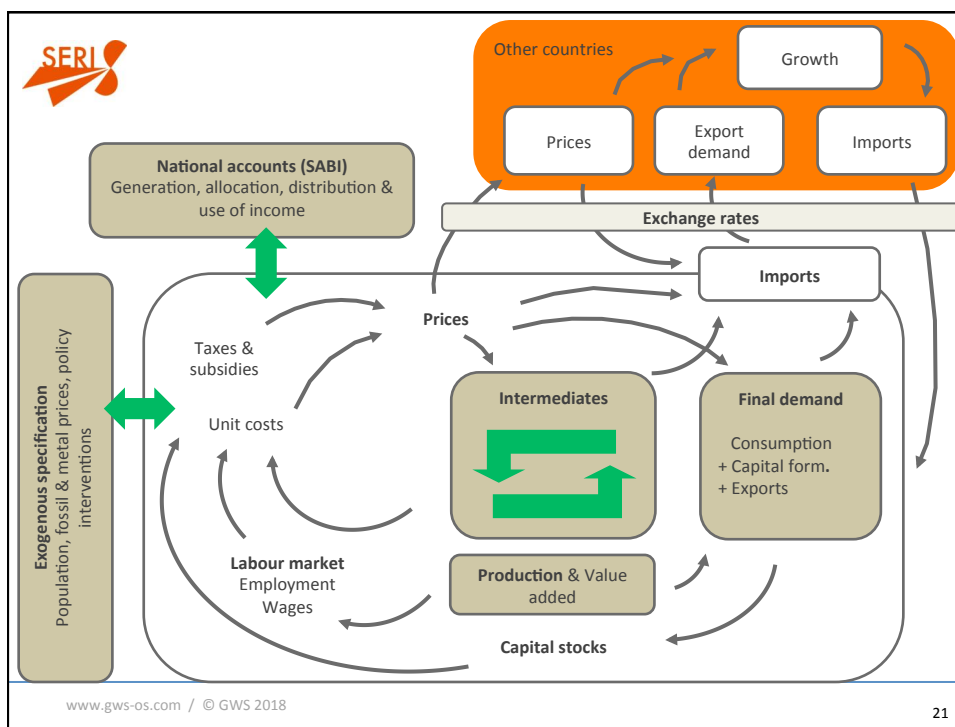


The model: GINFORS

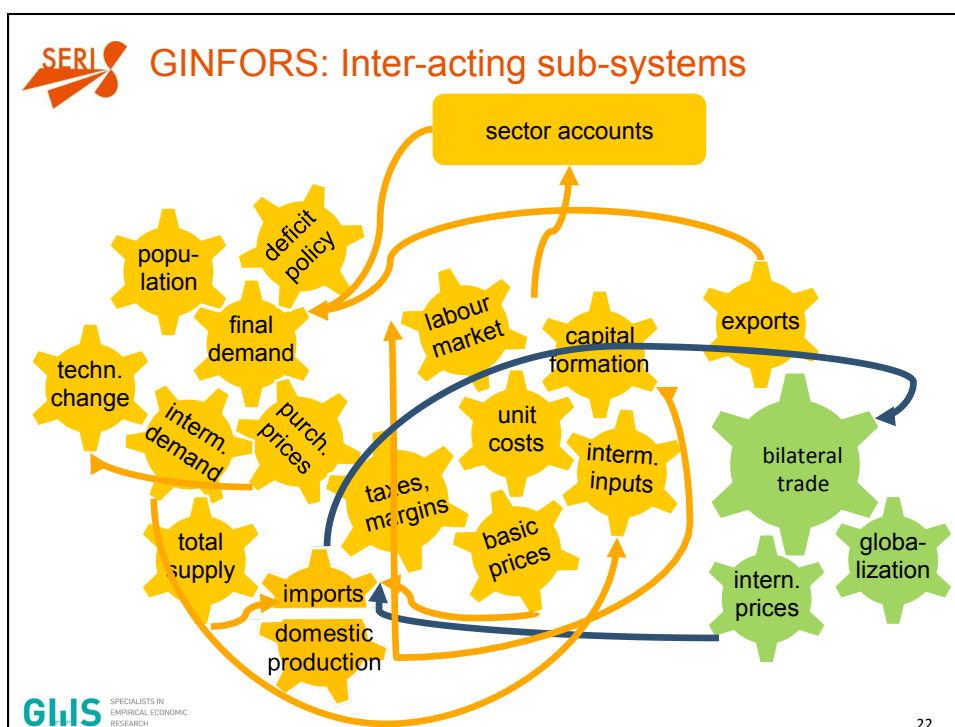


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GINFORS – the model for quantifying scenarios

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- ▶ Macro-econometric modelling until 2050 using **GINFORS** (= Global Interindustry Forecasting System)
- ▶ Countries modelled
 - 27 EU-countries (without Croatia)
 - 10 most important trade partners of the EU
 - “Rest of World”
- ▶ disaggregated by
 - 35 industries
 - International trade flows for 59 product groups
 - 28 energy carriers
 - CO2 emissions and global resource demand (biotic, abiotic, land)

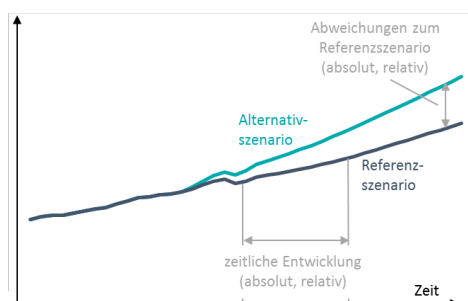
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Model-based scenario-analysis

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- ▶ “nobody knows the future” > we need to make assumptions
- ▶ Scenarios give answers to questions of what-if
- ▶ Analyse the difference:
 - Compare two scenarios
 - Differences are the results of assumed changes



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Business as usual (until 2050)

What WOULD happen if nothing happens?

► Growth of GDP per capita

global: **+43%** EU: **+28%**

► Growth of CO₂-Emissions per capita

global: **+3%** EU: **-28%**

► Growth of CO₂-Emissions (in absolute terms)

global: **+32%** EU: **-26%**

► Cumulative CO₂-Emissions 2018-2050

global: **≈1,300 Gt** EU: **119 Gt**

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Not an option: Business as Usual

- ▶ By 2050 9.5 billion people will need resources (energy, material, land, water) for food and 'westernised' patterns of **consumption**
 - ▶ Rapid increase in **demand for resources** of all kinds
 - ▶ Rapid **price increases** of all commodities
 - ▶ The incidence of **poverty** may increase substantially
 - ▶ Consumers have **less disposable income** to spend
 - ▶ **Economic growth** would come under pressure, and **decrease** from current levels
 - ▶ **Unemployment** would also likely increase
- **A 4-6 DEGREES WORLD!!!**
= by no means sustainable

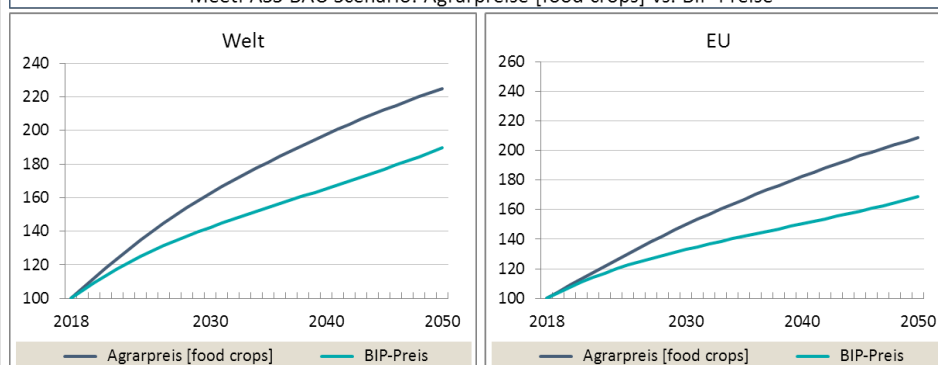
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Business-as-usual

- ▶ Limits of land (area) lead to increasing food prices

MeetPASS BAU Scenario: Agrarpreise [food crops] vs. BIP-Preis



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The meetPASS scenario: how we COULD change the world

- ▶ We need to **change the whole energy system** (“Energiewende”)
- ▶ We need a **dematerialized circular economy** (“Ressourcenwende”)
- ▶ **We need to change how we feed the world** (“Ernährungswende”)
- ▶ **and new life styles**

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We need to change the whole energy system (“Energiewende”)

- ▶ **Increase of carbon price to \$225-265/tonne**
(currently \$11 / tonne in the European trading scheme)
- ▶ **Expansion of Renewable electricity generation**
(phasing out fossil fuels and nuclear completely in EU and down to 9% in the world)
- ▶ **Sharp increase of E-mobility**
- ▶ **Fostering energy efficiency**
(by a factor of 5-10)
- ▶ If we reduce, reuse and recycle (raw) materials, fewer of these heavy and CO₂ intensive raw materials need to be shipped around the world.

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We need a dematerialized circular economy ("Ressourcenwende")

- ▶ **Technical solutions** (e.g. new engines) are **not** enough
- ▶ **Comprehensive "Ressourcenwende"** is needed
- ▶ **Upstream tax** on metal ores and non-metallic minerals (up to 25% in 2050)
- ▶ **Information programme** for fostering resource efficiency (plus 1% per year in 50 key technologies; pay-back period of necessary investment of 5 years)

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We need to change how we feed the world ("Ernährungswende") and foster new lifestyles

- ▶ **Reduction of food waste** (minus 10%)
- ▶ **Reduction of meat consumption** (up to 50% depending on current levels)

Additional scenario "meetPASS+":

- ▶ **Reduction of working time and consumption expenditures** by 20% until 2050 in industrialized countries

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meetPASS scenario (until 2050)

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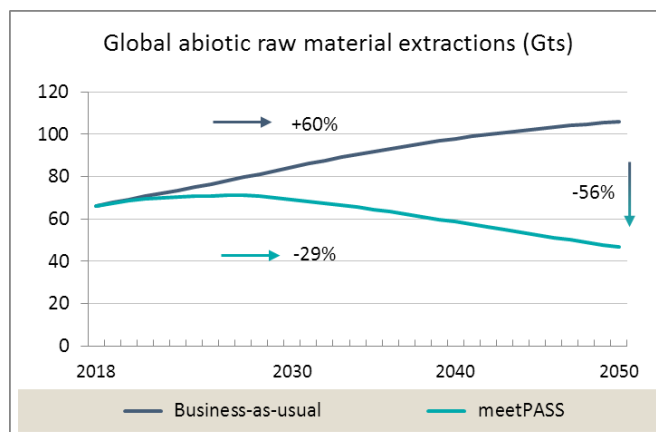
- ▶ Growth of GDP per capita
 global: (+43%) **+55%** EU: (+27%) **+40%**
- ▶ Growth of CO₂-Emissions per capita
 global: (+3%) **-77%** EU (-28%) **-80%**
- ▶ Growth of CO₂-Emissions (in absolute terms)
 global: (+32%) **-70%** EU (-26%) **-87%**
- ▶ Cumulative CO₂-Emissions 2018-2050
 global: (≈1.300 Gt) **≈ 690 Gt** EU: (119 Gt) **64 Gt**

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meetPASS scenario: results [1]

- ▶ Global abiotic raw material extraction



- Cumulative raw material extraction 2018 to 2050: 2.061 Gt
- Raw material extraction avoided 2018 to 2050: 867 Gt

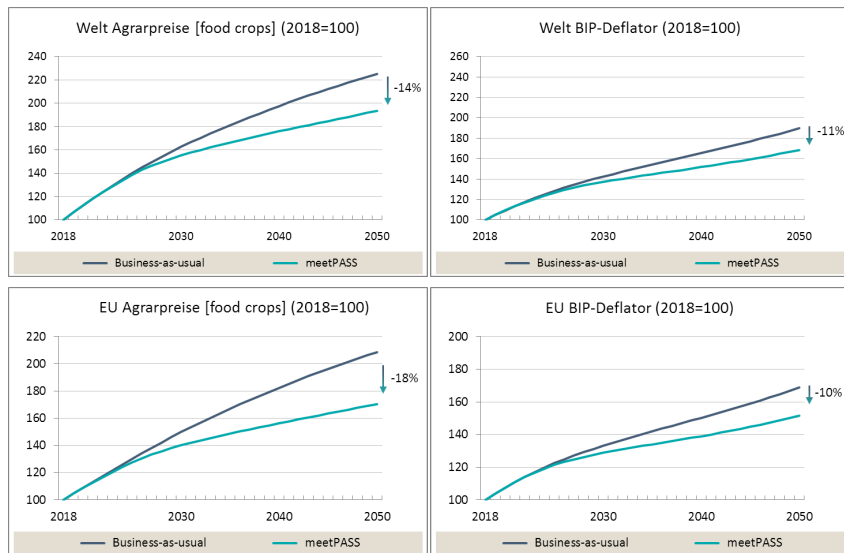
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meetPASS scenario: results [2]

► meetPASS-scenario is a relief to rising food prices

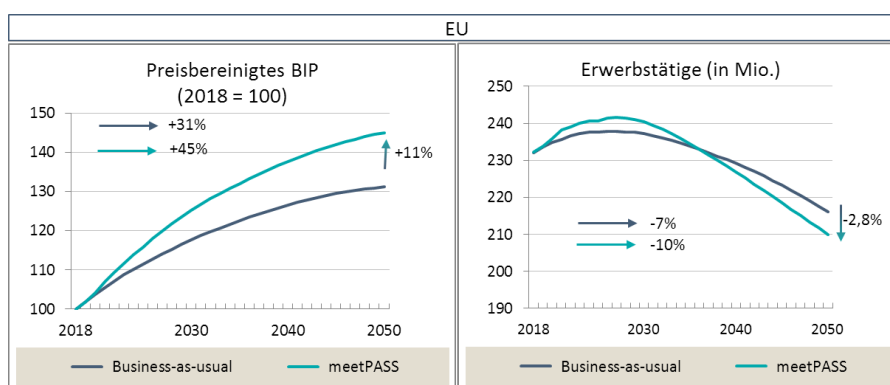


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meetPASS scenario: results [3]

► Implications for economic growth and jobs in Europe



GDP (in real terms)

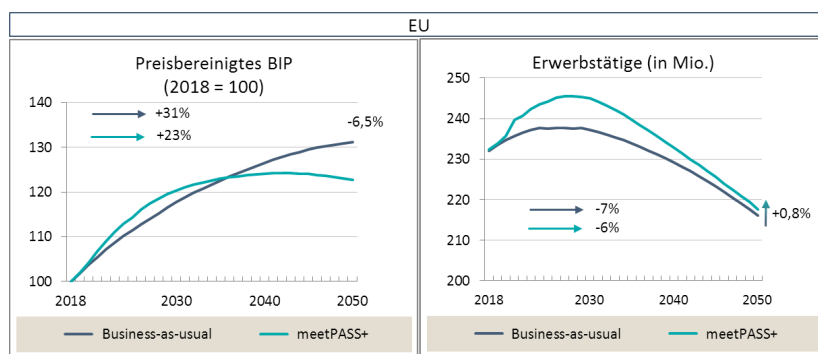
Number of jobs

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Now: meetPASS+

- What would happen if people would like to have more free time and less consumption?
 - Where: in the EU, USA, Japan, Korea, Australia
 - How much: till 2050 up to +/-20%



GDP (in real terms)

Number of jobs

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meetPASS-scenarios match many of the Club of Rome's Climate Emergency Plan (but in more general terms)

1. Halt fossil fuel expansion and fossil fuel subsidies by 2020
2. Triple annual investments in renewable energy, energy efficiency and low carbon technologies for high emitting sectors before 2025
3. Put a price on carbon to reflect the true cost of fossil fuel use and embedded carbon by 2020
4. Replace GDP growth as the main objective for societal progress
5. Improve refrigerant management by 2020

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meetPASS-scenarios match many of the **Club of Rome's Climate Emergency Plan** (but in more general terms)

6. Encourage exponential technology development by 2020
7. Ensure greater materials efficiency and circularity by 2025
8. Accelerate regenerative land use policies and adaptation
9. Ensure that population growth is kept under control
10. Provide for a just transition in all affected communities

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What if: EU goes ahead



- ▶ **EU** pursues a **low-carbon** and **resource-efficient** economy, non-EU countries introduce climate policies of low ambition
- ▶ **Resource efficiency** is key to boosting Europe's competitiveness and protect against potential climate change impacts.
- ▶ All Europeans live in **comfortable, zero-carbon homes**
- ▶ **Zero carbon urban transportation** by 2050
- ▶ **Electrification of the energy system** (generated almost entirely by low- and zero-carbon sources) is widespread
- ▶ Appropriate **price signals** and clear **eco-labelling** show citizens the most resource-efficient products & services

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POLFREE experience if “EU goes ahead”

- A combined “Ressourcen- und Energiewende” in the EU alone would be

an **overall benefit for growth and jobs in Europe**

GDP:  + 50% (until 2050 compared to **2015**)

Jobs:  + 3.7 Mio. (until 2050 compared to **BAU**)

- **But:**
Some (usually well-organized) sectors would lose

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POLFREE experience if “EU goes ahead”

- A combined “Ressourcen- und Energiewende” in the EU would be

an **overall benefit for the environment**

CO₂:  -76% (by 2050 compared to **1990**)

RMC:  from 12 to 5 tonnes per capita (until 2050 compared to **2000**)

Cropland use:  -31% (until 2050 compared to **2000**)

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Trade and CO₂ emissions

But:

- ▶ If Europe reduces its carbon footprint, food prices would decrease and
- ▶ meat demand in other parts of the world would rise.
- ▶ **i.e. the world's hunger for forests would not decline**

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Conclusions

- ▶ The world's **hunger for forests** is limited by the global **land available** for food and other production.
- ▶ **Europe's pork production is currently responsible** for around 1% of our carbon footprint
- ▶ But that would be **10% of the reduced footprint** we are aiming at according to the Paris agreement
- ▶ **If "we" reduce it, "others" will increase their demand**
- ▶ This is fair and necessary, but will not save the forests!

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Grazie mille!

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Thank you very much for your attention!

Friedrich Hinterberger

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