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Scenarios for a sustainable future


From the preliminary results of meetPASS, May 2019

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Outline for today



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- ▶ **Who we are**
- ▶ The meetPASS project
- ▶ Why business as usual isn't an option
- ▶ The meetPASS targets
- ▶ Modelling alternative scenarios with GINFORS
- ▶ Scenarios for a sustainable future
- ▶ The impact on people, prosperity and planet
- ▶ Conclusions

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Who we are



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

- **meetPASS: meeting the Paris Agreement and Supporting Sustainability**
- Funded by the Austrian Climate Research Programme
- Project partners SERI und GWS
- Plus external experts
- Duration: 26 months
- Model-based scenario analysis (global warming <1.5 degrees) for Austria, EU and the world



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



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The meetPASS project

- ▶ Identification of the strongest interactions between climate change mitigation policies and SDGs targets (SDG 13,2)
- ▶ **Working back from 2050** with dynamic economic modelling
- ▶ **Reference scenario:** Business as Usual
- ▶ **Alternative scenario:** meetPASS

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- ▶ Change is possible – and desirable! The impact on people, prosperity and planet

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 **Why business as usual is not an option**



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 **Reference scenario: Business as usual**


Since 1970

- ▶ The world's population has doubled
- ▶ The economy has quadrupled
- ▶ Resource extraction has trebled
- ▶ Greenhouse gas emissions have increased x 2.5

By 2050

- ▶ Global population up 25%
- ▶ Economy up 85%
- ▶ Resources up 60%
- ▶ Greenhouse gas emissions up 38%

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What does this mean for the carbon budget?

- ▶ According to the IPCC, **we can emit 580 to 770 Gt of CO₂ from anthropogenic sources** to limit warming to 1.5 degrees above the pre-industrial level (with a 50:50 chance of success; IPCC, 2018)
- ▶ Emissions are **currently 35 Gt / year and rising**
- ▶ According to meetPASS modelling, if current policies and trends in land and resource use continue, **we will use up this limit by 2033-38** (14-19 years from now)
- ▶ By 2050, CO₂ emitted will be 1,300 Gt – **double the remaining budget**

BAU = Pathway to 3 degrees or more of warming

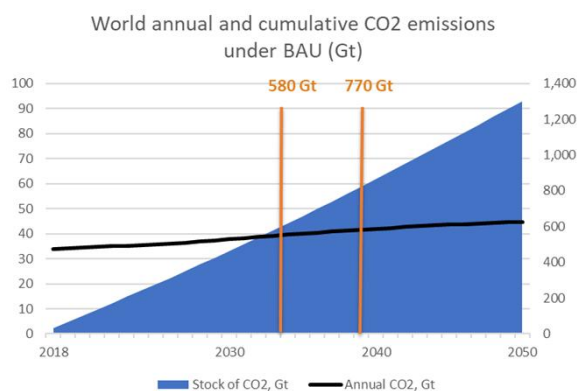
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What does this mean for the carbon budget?



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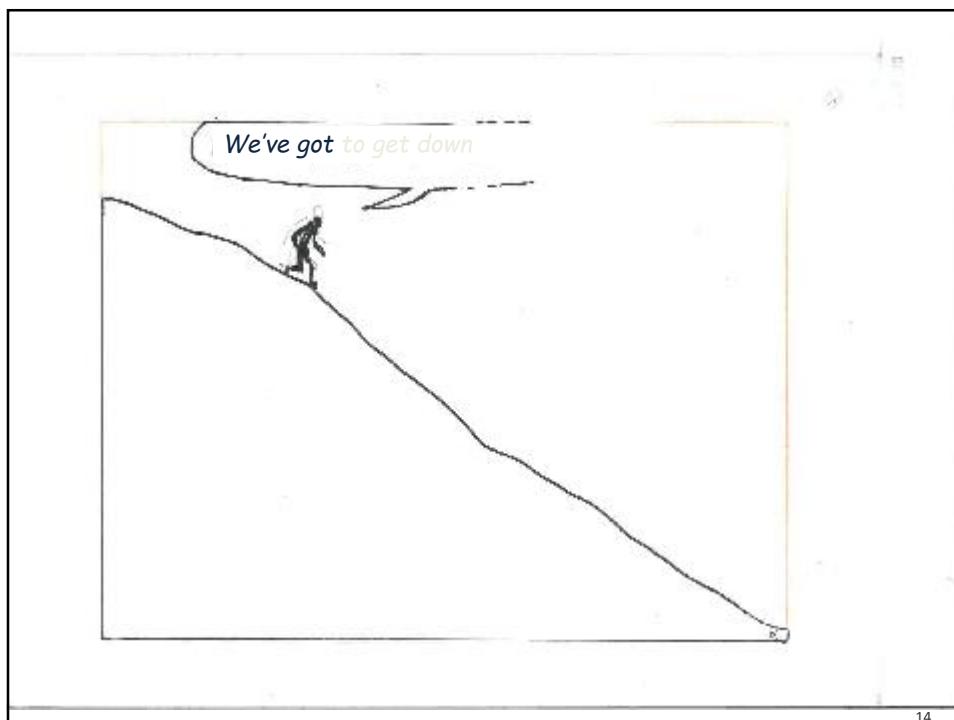
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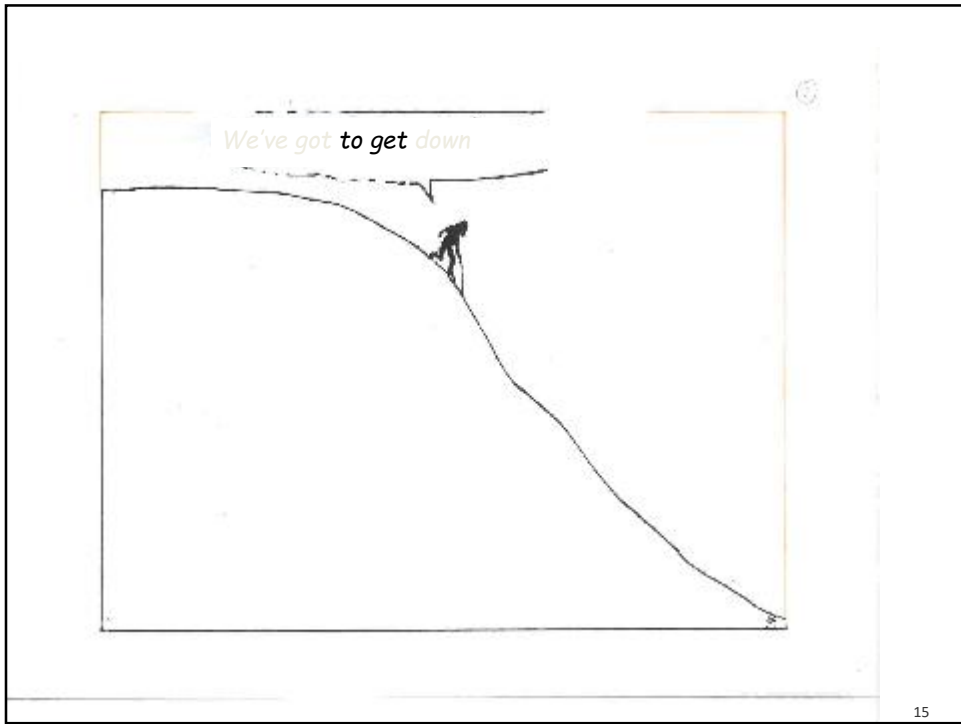
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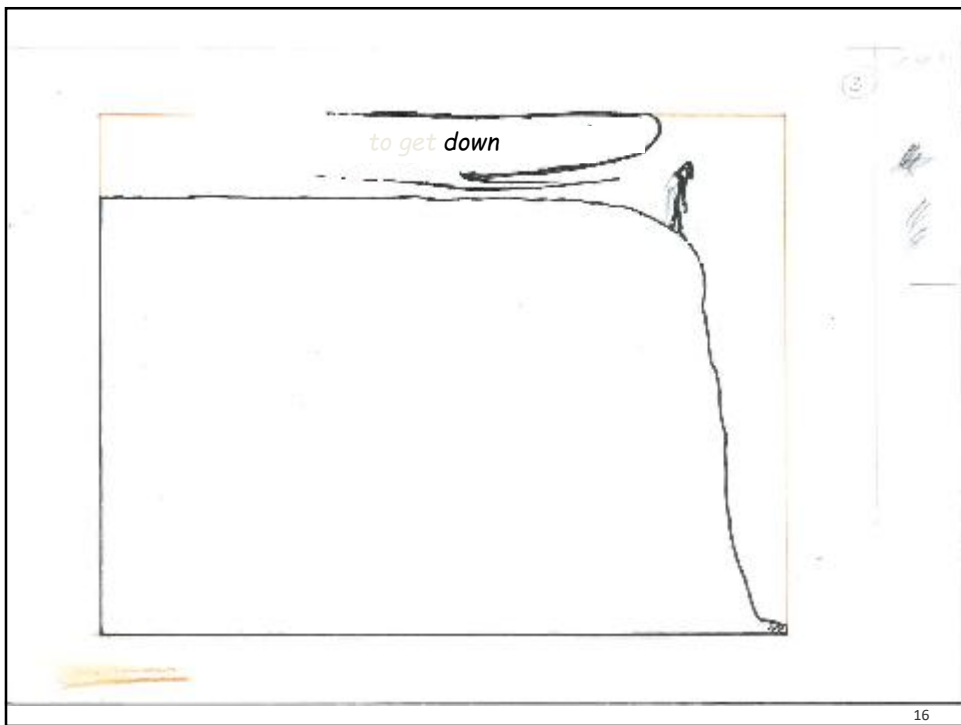
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The meetPASS targets

- ▶ **A carbon budget of 580 to 770 Gt (40 to 53 Gt for the EU)**
- ▶ In order to reach the target, total emissions would have to **decrease significantly to about 1 tonne for each person in the world** by 2050
- ▶ **The sooner we start, the better our chance of success**
- ▶ Europeans (EU) are **currently emitting 8 tonnes** per capita
- ▶ That is a **reduction to about one fifth - by almost 80%**

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The meetPASS targets


Energy policies alone are not enough

- ▶ **50% of emissions** are associated with **the extraction, production and use of resources**
- ▶ **11%** are from **deforestation**
- ▶ **Agriculture and resource extraction** account for **over 90% of water stress and biodiversity loss**
- ▶ Meeting the Paris agreement while feeding a population of 9.7bn will require **targets on emissions, materials, water and land use**

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 **The meetPASS targets**


Consumption rather than production-based approach

- ▶ **Production-based approach:**
CO₂ emissions that occur during **production**
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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 **The meetPASS targets**

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


Country	CO ₂ emissions in Mio. tons	CO ₂ 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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 **The meetPASS targets**


Also including land-use change

- ▶ **Emissions from fossil fuels:**
Transport, heating, cooling and industrial processes (e.g. 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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 **The meetPASS targets**

Summary of targets:

- ▶ **Max. 770 Gt of CO₂, or to 1 t/capita/year by 2050**
- ▶ **45 Gt of Total Material Consumption** (5 t/capita/year by 2050, from 9 t/capita today)
- ▶ **10,000 billions m³ water** (1,000 m³/capita/year)
- ▶ **0.15 hectares per person of cropland** (in-line with the planetary boundaries target to limit expansion of cropland to no more than 15% of the ice-free surface)
- ▶ **Plus a nuclear phase-out in Europe** (and globally by 2060)

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Modelling alternative scenarios with GINFORS


2+ years of research, expert and stakeholder consultation to ensure measures are:

- ▶ technologically
- ▶ politically
- ▶ and humanly possible

Using the GINFORS model to:

- ▶ Captures direct and indirect impacts on economy, resources, energy and emissions
- ▶ Account for rebound effects

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SERI **GINFORS – the model for quantifying scenarios** **GLIS** SPECIALISTS IN EMPIRICAL ECONOMIC RESEARCH

- ▶ 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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SERI **Model-based scenario analysis** **GLIS** SPECIALISTS IN EMPIRICAL ECONOMIC RESEARCH

- ▶ “Nobody knows the future” => we need to make assumptions
- ▶ **Scenarios** give answers to “what if” questions
- ▶ Compare two scenarios: analyse the difference

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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 **dematerialised circular economy** (“Ressourcenwende”)
- ▶ **We need to change how we feed the world** (“Ernährungswende”)
- ▶ **We need to foster new life styles** (“Lebenstilwende”)

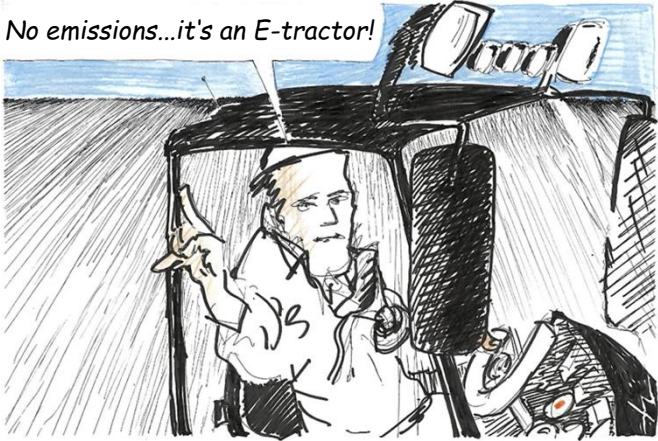
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 “Energiewende”

No emissions...it's an E-tractor!




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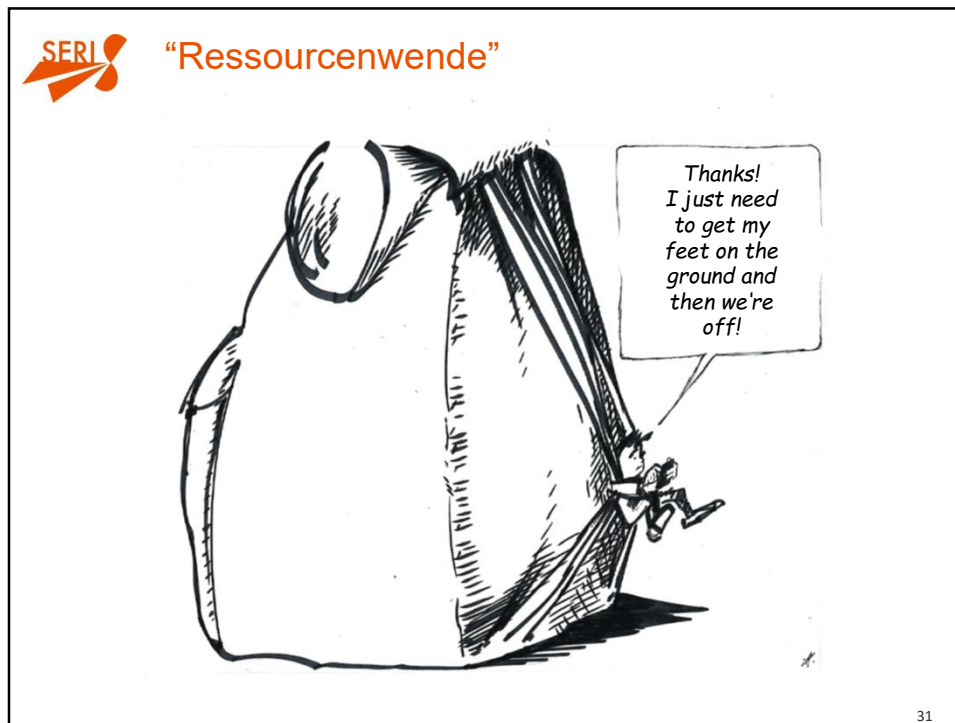
 We need to change the whole energy system (“Energiewende”)

- ▶ **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% globally)
- ▶ **Sharp increase in E-mobility**, to over 70% of vehicles in EU and 50% worldwide, together with investments in mass transport, walking and cycling infrastructure
- ▶ **Fostering energy efficiency** in buildings and homes (by a factor of 5 to 10)

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SERI We need a dematerialized circular economy (“Ressourcenwende”)

- ▶ **Technical solutions** (e.g. new engines) are **not** enough (rebound effects)
- ▶ **Comprehensive “Ressourcenwende”** is needed
- ▶ Promote new business models and strategies that **reduce, reuse, remake, recycle**
- ▶ **Remanufacturing** can reduce emissions and materials by 75-90% (“Factor 10”)
- ▶ **Requires an information programme** for businesses to increase efficiency by 1% per year (5-year pay-back)
- ▶ **Upstream tax** on metal ores and non-metallic minerals (**up to 25%** by 2050) and a **100% recycling target** on these materials


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 We need to change how we feed the world
 (“Ernährungswende”)

- ▶ **Reduction in food waste by 10%**
- ▶ **End to global cropland expansion by 2020**
- ▶ **Shift to agro-ecology** methods to improve soil fertility and climate resilience
- ▶ Major global efforts to **end deforestation**
- ▶ **“Food first” policies** on EU cropland and food imports (only biowaste used for composts, biofuels, chemicals etc)
- ▶ **Reduction of meat consumption** (up to 50% in developing countries, depending on base)

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SERI We need to change lifestyles and mindsets (“Lebensstilwende”)

- ▶ To make all this work, individuals will need to make **conscious decisions** to both **waste less** and **consume less**
- ▶ And embrace **new ways of living and moving**
- ▶ Including a **reduction in average living space by up to 50%**, in industrialised countries
- ▶ And a **25% reduction in air travel**
- ▶ Plus a **shorter working week**, by 20% in developed countries (30-32 hours), which will help lower consumption, improve wellbeing and support sustainable living

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SERI The impacts: Global emissions

- ▶ Under meetPASS, global emissions fall annually to **below 10 Gt (1 tonne per capita)**, almost **75%**
- ▶ Total emissions by 2050 = **≈700Gt** (compared to **1,300 Gt BAU**)

World: Annual CO₂ emissions (in Gt)

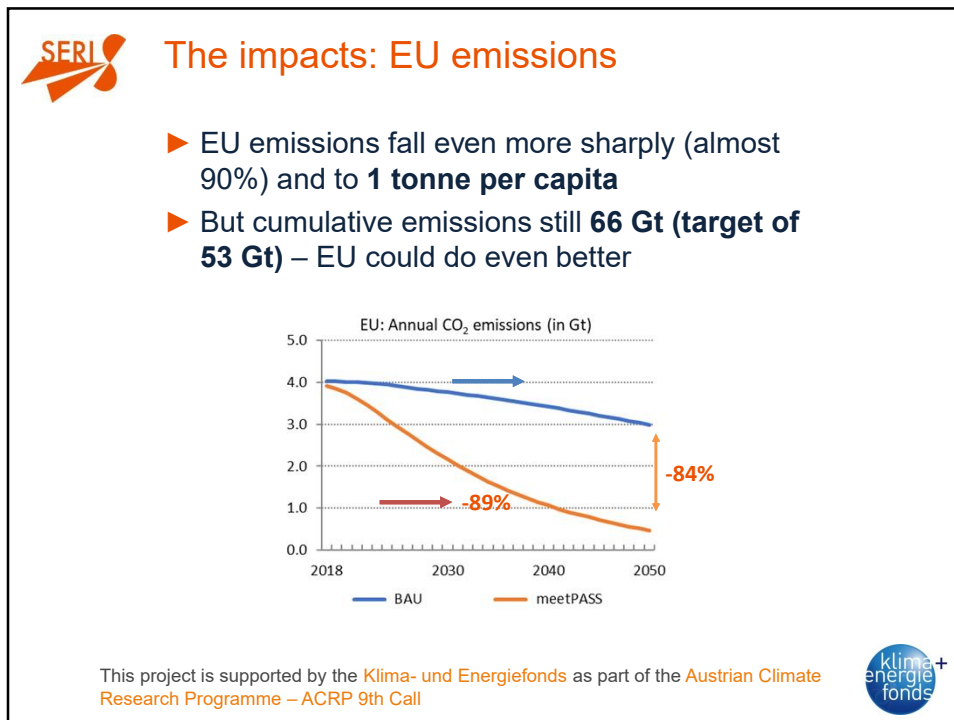
Year	BAU (Gt)	meetPASS (Gt)
2018	33	33
2030	36	25
2040	42	15
2050	45	10

— BAU — meetPASS

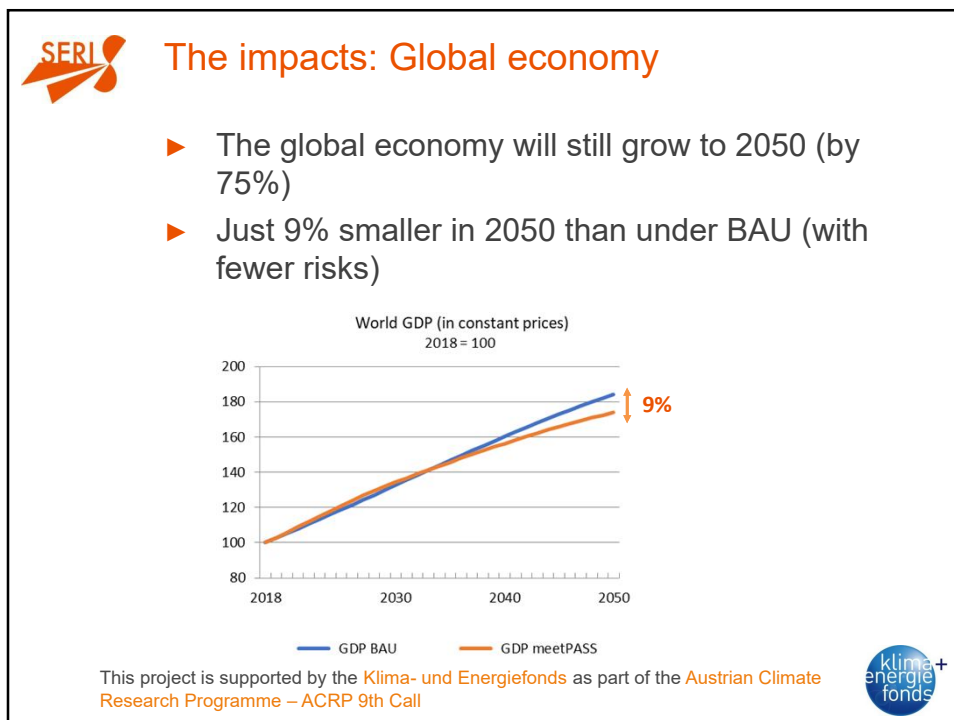
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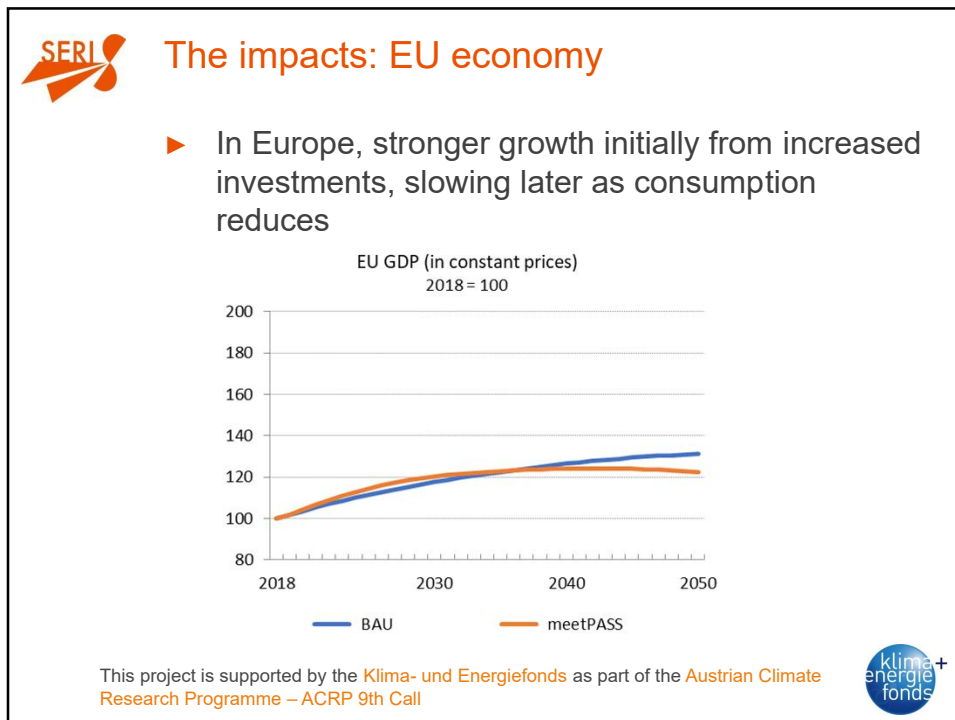
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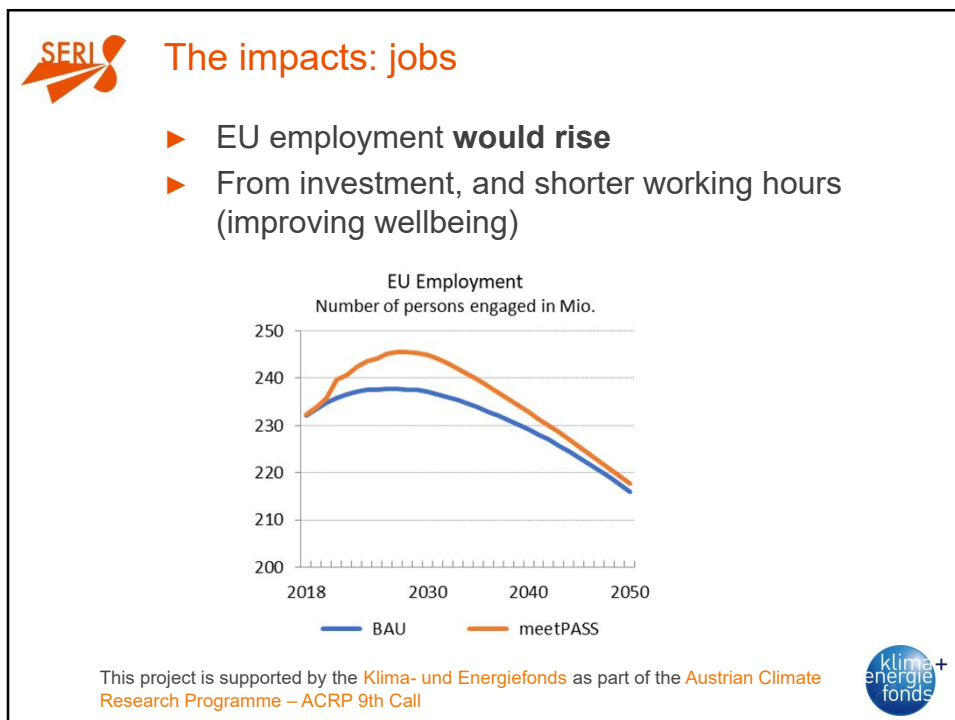
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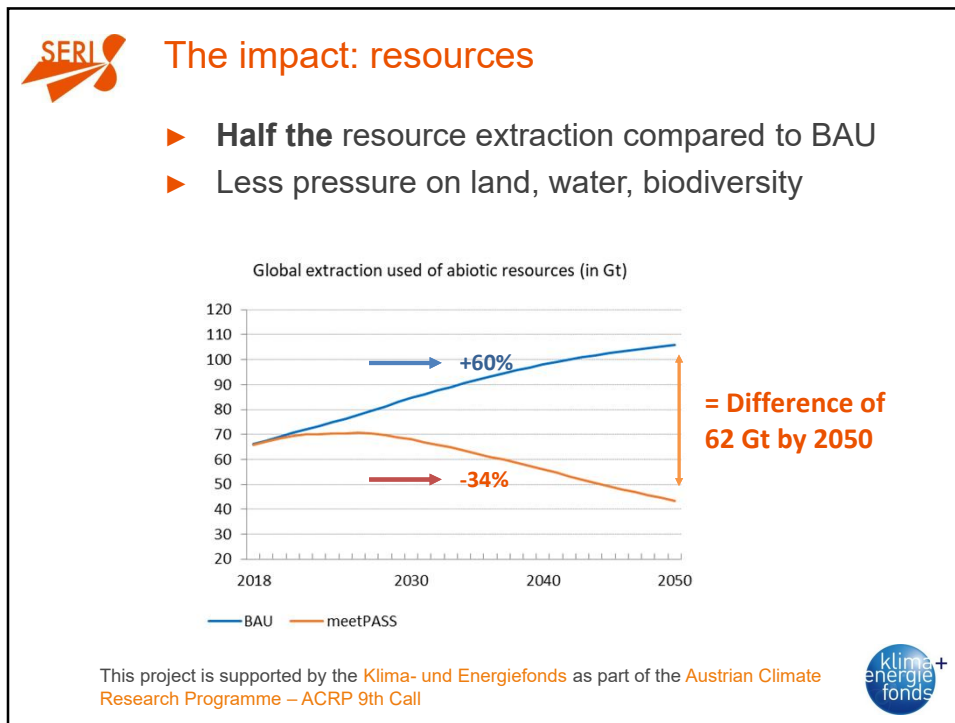
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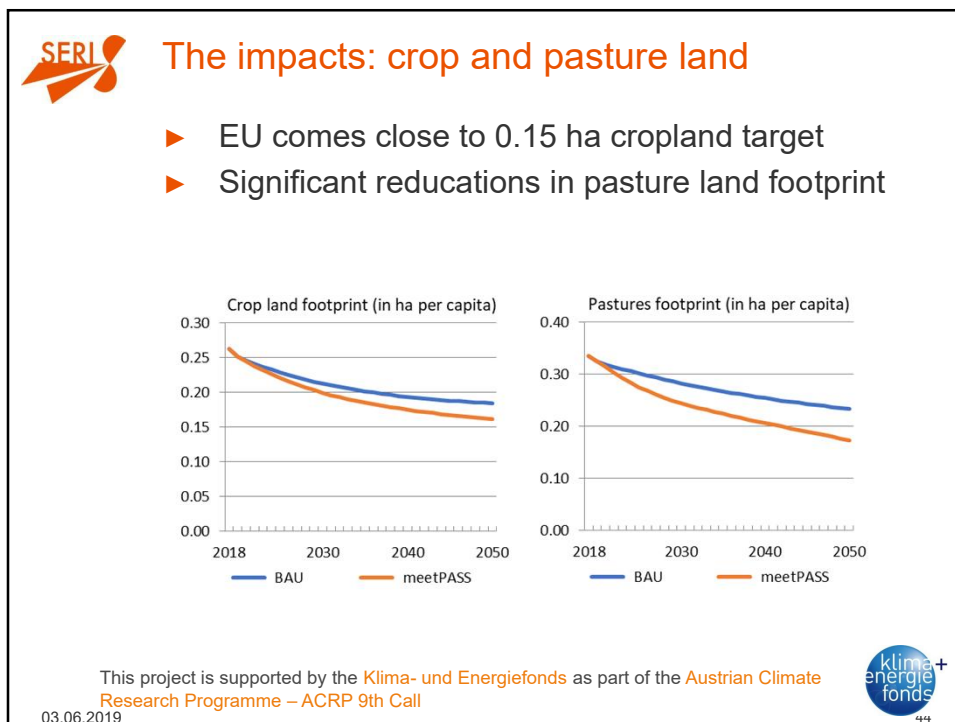
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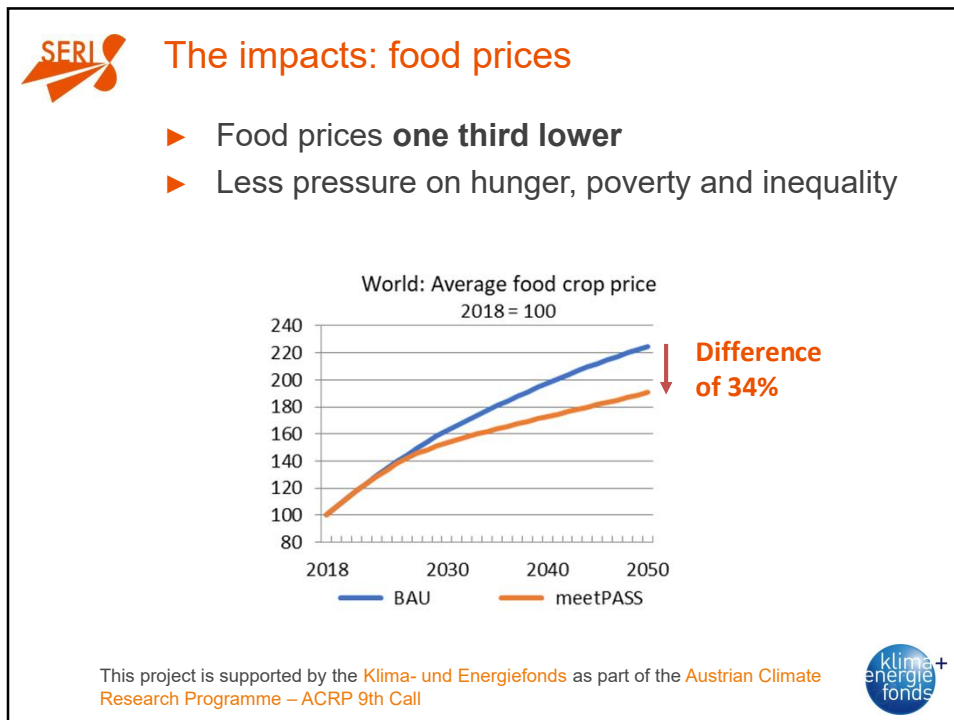
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Conclusions: Change is possible – and desirable!

It requires:

- ▶ A transformation of our **energy systems**
- ▶ A dematerialized **circular economy**
- ▶ A change in how we **feed the world**
- ▶ A change in **lifestyles**

This would **stimulate jobs** in Europe and still produce economic benefits

But:

- ▶ Need to act quickly – the later we start, the harder it is and the greater the risk of failure
- ▶ Some (brown) sectors would lose!

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Thank you!

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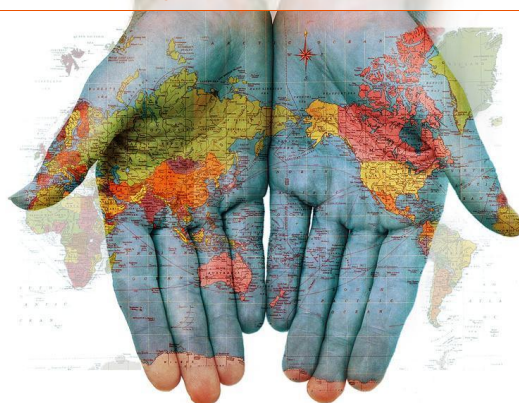


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