EUCALC

Explore sustainable European futures

Challenges and needs of the European deep transformation from policy

& how the European Calculator can support decision making

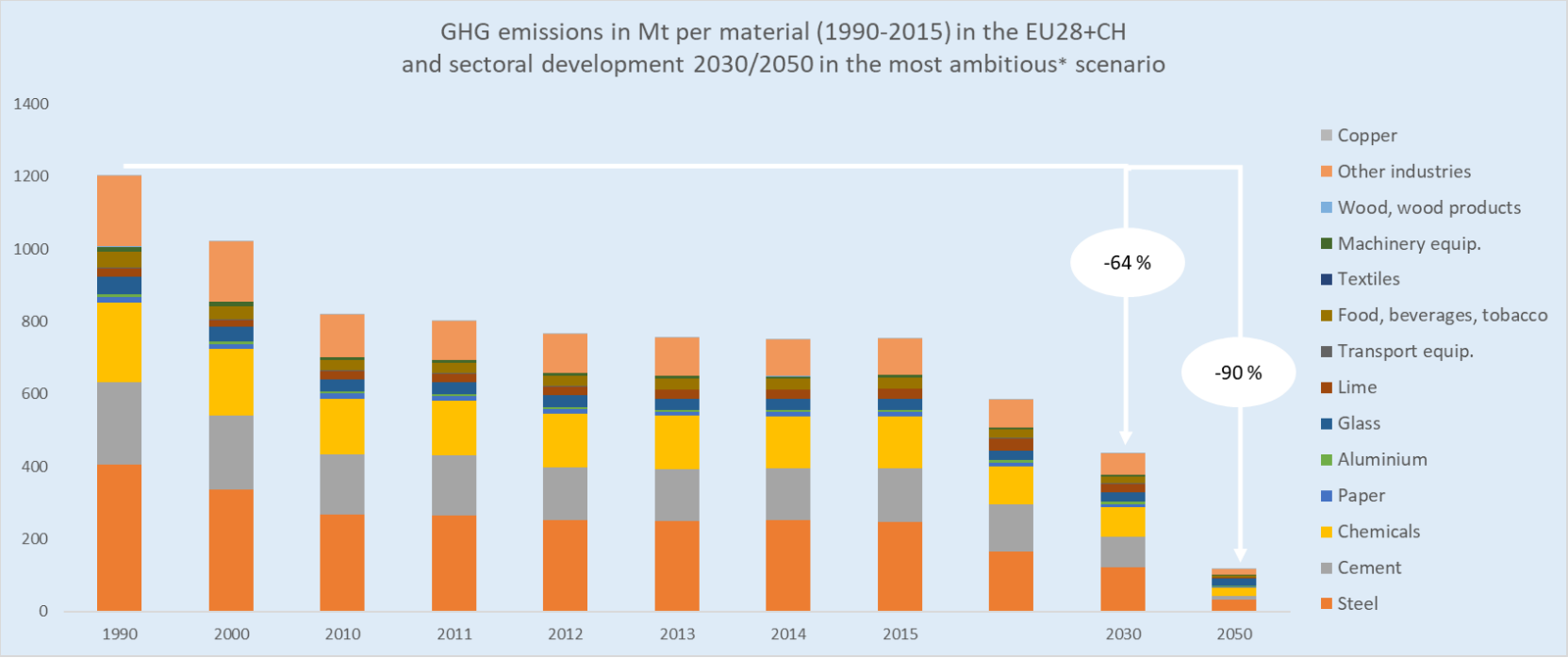
Policy recommendations derived in EU Calculator

- Significant improvements in low-carbon technologies required. Emergence of **breakthrough technologies** or major changes in production are vital. Not solely technological development, but also new business models.
- **Cost reduction as a major priority**. The goal of innovation is the largescale deployment of low-carbon technologies. After some initial support, their scale-up should be without direct governmental financial support and incentives, irrespective of fossil fuel prices volatility.
- Industrial **R&D and piloting** of net-zero technologies would ideally be **pooled** across technology/project portfolios and amongst firms and government entities to allow global **collective learning** and risk and cost **diversification**.
- Stringent **policy setting** and **research priorities**. Finally, while there are many emerging technologies under development, they are insufficiently represented in existing modelling frameworks and in policy discussion.

GHG emissions reduction

Key message

- By changing the fuel mix to **less carbon intensive fuels** (biomass, hydrogen, electrification of heat etc.) GHG emissions can be **reduced by 26 %**
- Up to **70 % of carbon emissions are captured** in some sectors, reducing emissions **by 232 Mt or 45 %** compared to EU-Ref



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European Calculator…

To facilitate an evidence-based, transparent dialogue

- Consideration of **product-to-material(-to-mineral)-links**, representing the interlinkages of demand-side activities and supply.
- Ambitious level setting shows **trade-offs between sectors** (example transport: ambition in modal split or passenger technology increases material demand)
- **15 industrial sectors** covered by up to 4 technologies/sector.
- An increased share of novel technologies, the switch to renewable energy carriers and the electrification of processes in the heavy industry, as well as increasing the energy efficiency leads to a **53 % energy consumption reduction** in 2050 (compared to 1990) and **90 % decrease in GHG emissions**.
- A full decarbonisation of the industrial sector may not be achievable without CCS, in a **EU reference scenario** 24 Mt as well as 230 Mt in a **most ambitious scenario** can be sequestrated in 2050.

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BACK-UP

EUCalc shows how the manufacturing sector can impact other sectors and other dimensions

INPUTS

Lifestyle
- Packaging demand
- Paper and sanitary

Buildings
- Floor area (new and renovated)
- Appliances

Transport
- Cars, Trucks, Ships, …
- Transport infrastructure

Agriculture
- Fertilizer demand

Technology
- Costs
- Energy consumption (incl. feedstock)
- Emission factors (combustion and process)
- Material decompositiion

MANUFACTURING AND PRODUCTION MODULE

Iron & Steel (4)
Non-metallic minerals (5)
Non-ferrous metals (3)
Chemicals (2)
Paper & Pulp (2)
Other industries (6)

OUTPUTS

CCUS
Carbon captured

Climate
GHG emissions

Minerals
Material demand

Supply
Energy demand by fuel

Agri. & Land-use
Bioenergy demand

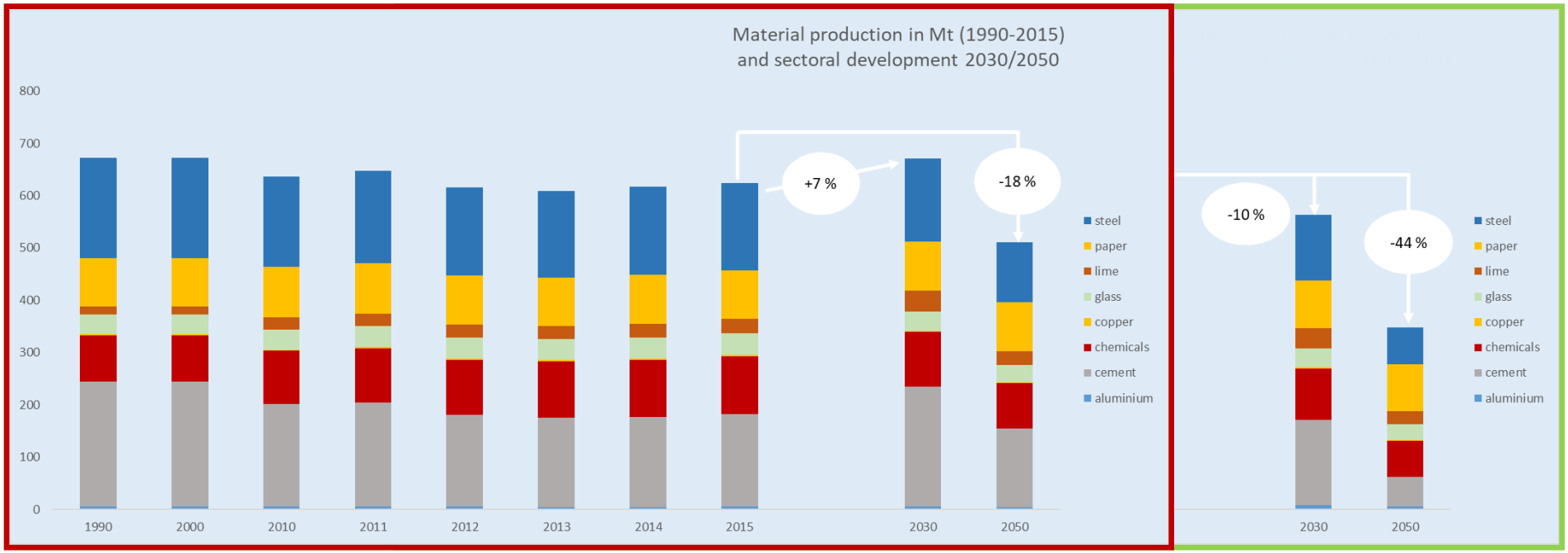
Air quality
PM emissions

Socio-economic
- Costs (CAPEX, OPEX)
- Jobs

Results: Material production

Key message

- **Material efficiency** goes up to 33 % (smart product/material design, re-use of materials) and **reduces total material production by 15 %**
- Substitution of carbon-intensive materials by **lightweight materials** by 30 % **reduces material production by 8 %** compared to EU-Ref



Results: Final energy demand

Key message

- **Energy efficiency measures** in the range of 10 to 35 % cause a reduction of the **energy demand of 17 %**
- Increase of **technology efficiency** (low-carbon technologies, recycling, electrification etc.) reduces the **energy demand by 10 %** compared to EU-Ref