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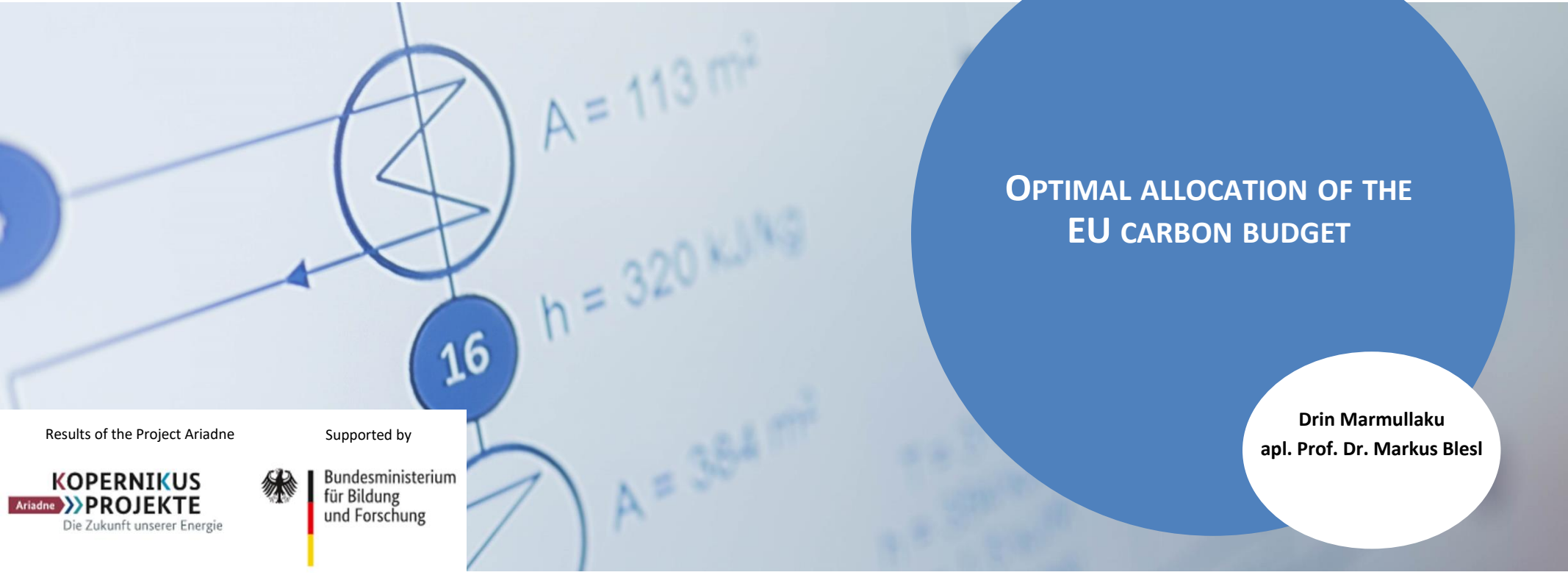

Optimal allocation of the EU carbon budget

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Results of the Project Ariadne

KOPERNIKUS Ariadne PROJEKTE
Die Zukunft unserer Energie

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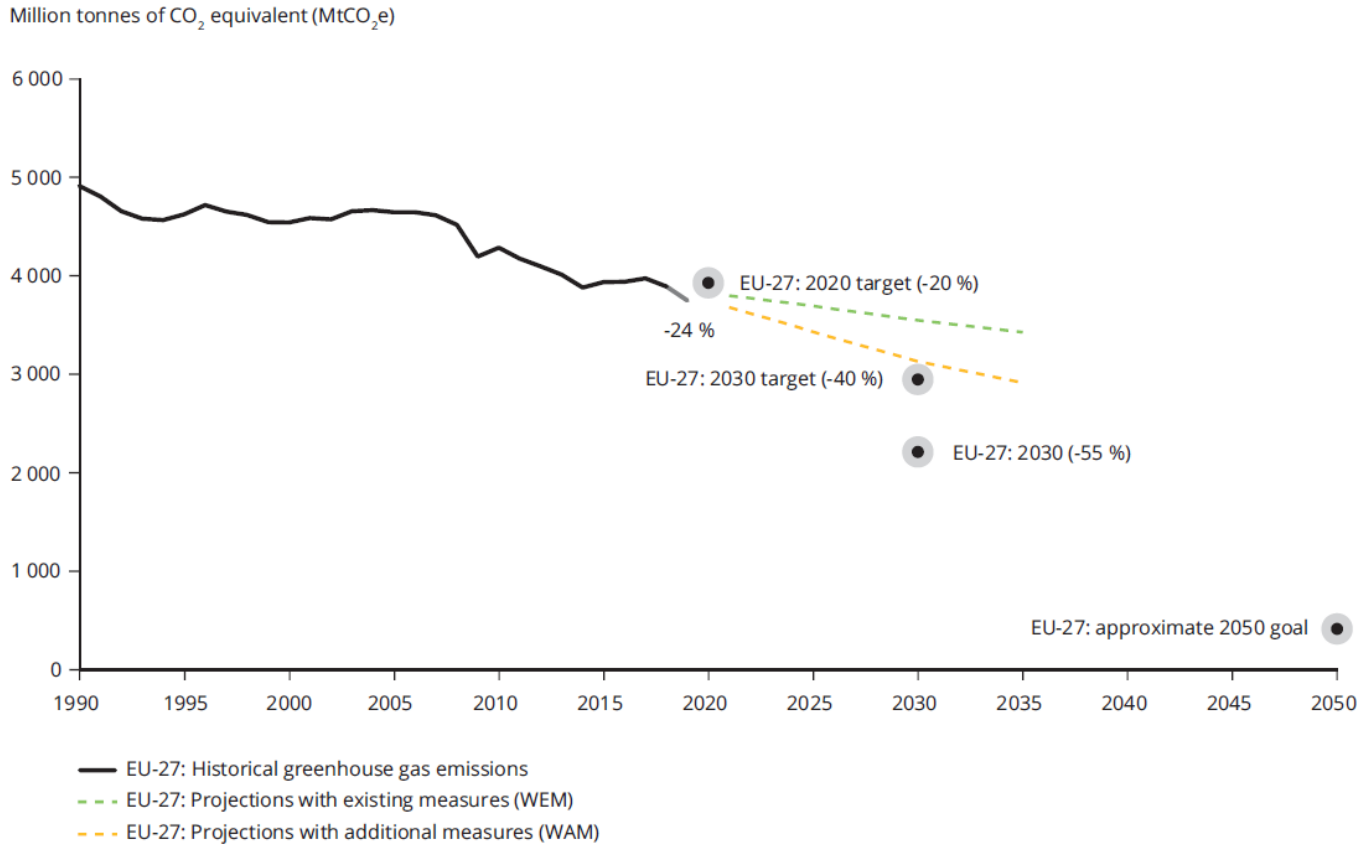
Agenda

- **Motivation**
- **Methodology**
  - Overview TIMES-PanEU
  - Scenario definition
- **Results**
- **Conclusion**

Motivation

1. Motivation

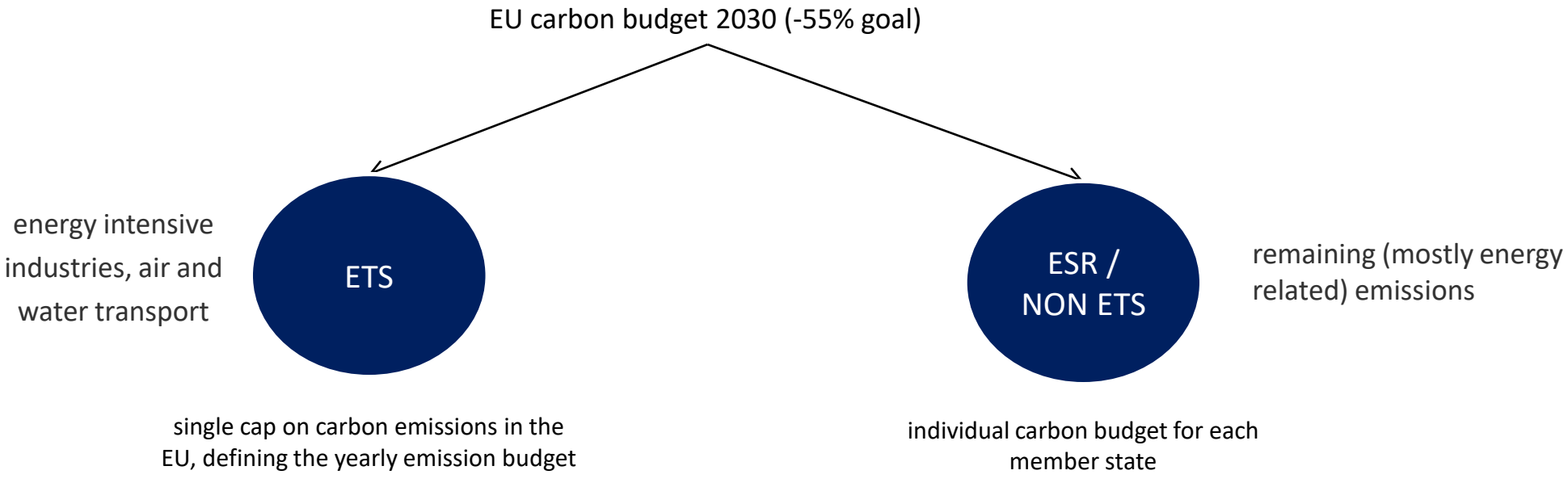
Greenhouse gas emission targets, trends and Member States' MMR projections in the EU, 1990-2050



EEA (2020f, 2020j, forthcoming_b)

1. Motivation

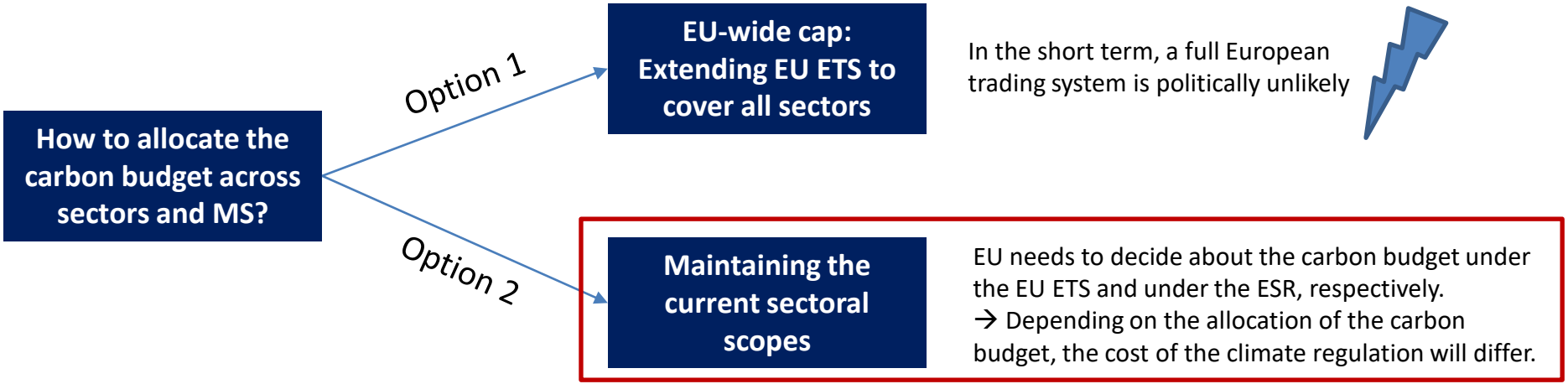
Green New Deal – Allocation of the carbon budget



The EU needs to decide: How to allocate the carbon budget across sectors and MS?

1. Motivation

Green New Deal



EC proposes to **attribute 64% of total emissions to the ESR sectors** and the rest to the ETS. According to the EC's impact assessment, this split results in ETS price estimates **between 50€/tCO2 and 80€/tCO2** depending on additional measures.

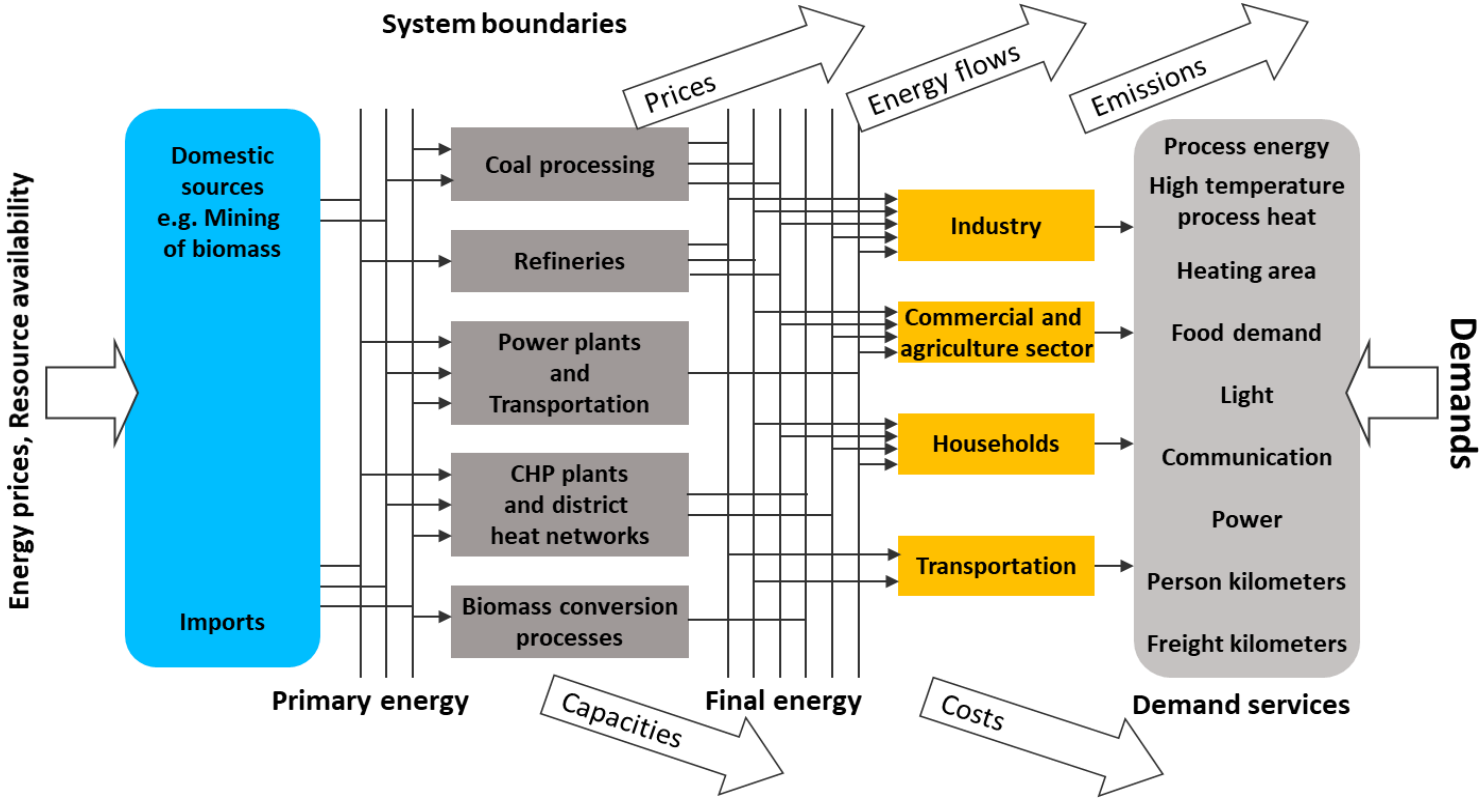
Model-based analysis:

- What is the optimal allocation of the EU carbon budget to ETS and ESR sectors?
- What are the resulting carbon prices?

Methodology

2. Methodology

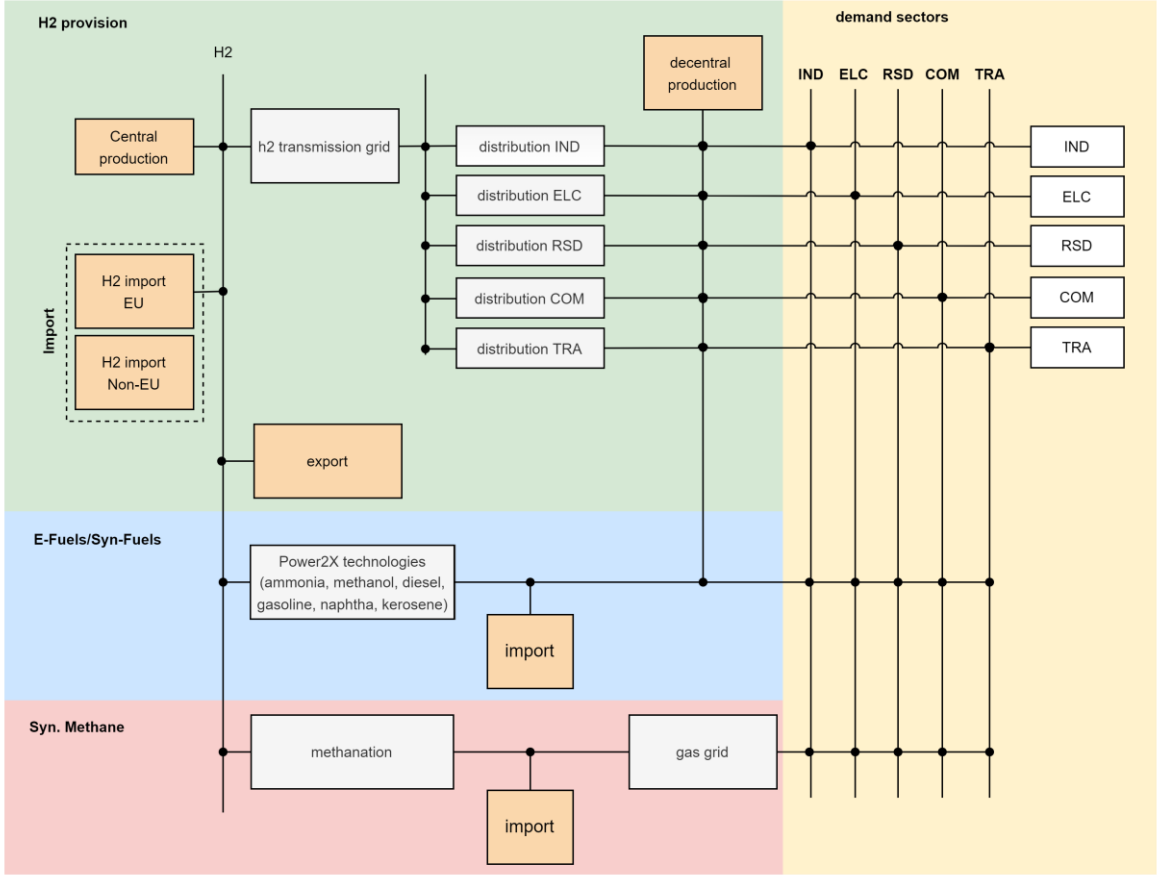
TIMES-PanEU energy system model: Overview



- Multi-regional (EU27 + UK, CH, NO)
- Time horizon 2010-2050
- Commodity Trade between regions

2. Methodology

TIMES PanEU energy system model: Decarbonization options via hydrogen

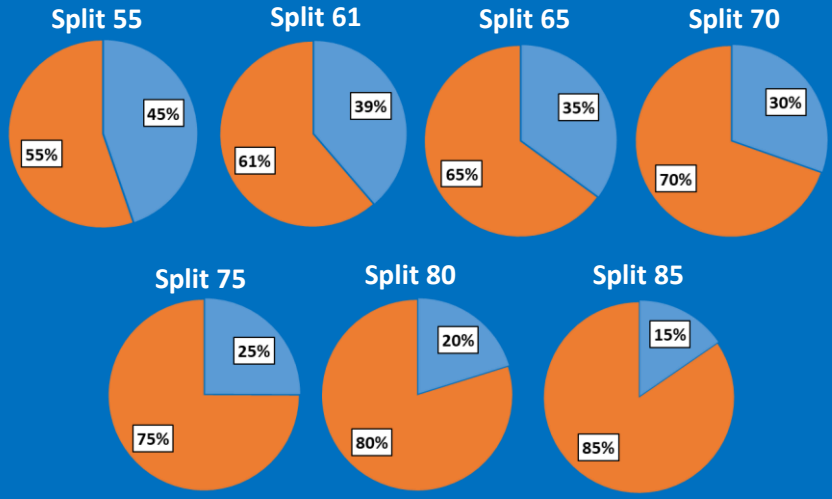


*simplified overview of the hydrogen module

2. Methodology

Scenario definition

climate goal: -55% in 2030 and net zero emissions in 2050



Exogen allocation of the carbon budget for 2030 between ETS and NON-ETS

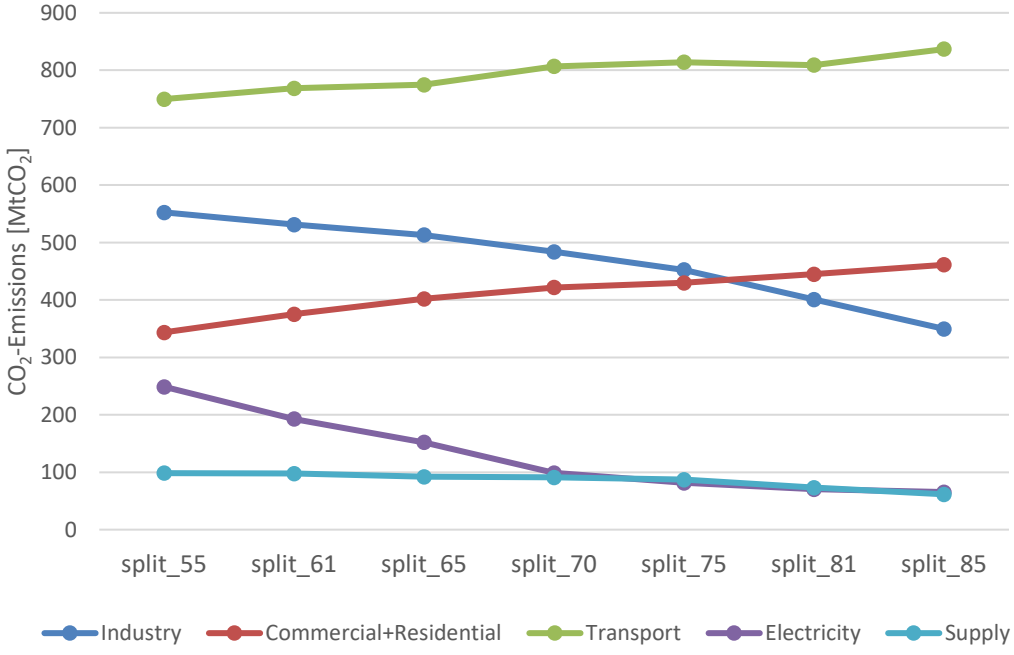
Fulltrade scenario as reference point with a single EU carbon trading system resulting in a single carbon price.

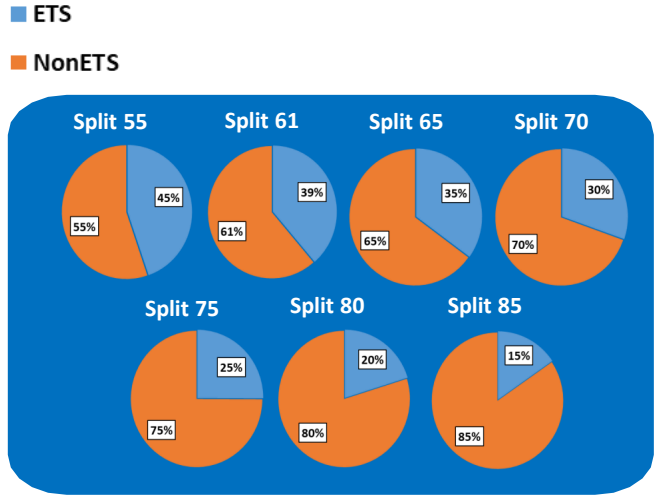
→ 8 Scenarios in total

Results

3. Results

Sectoral CO_2-Emissions for 2030

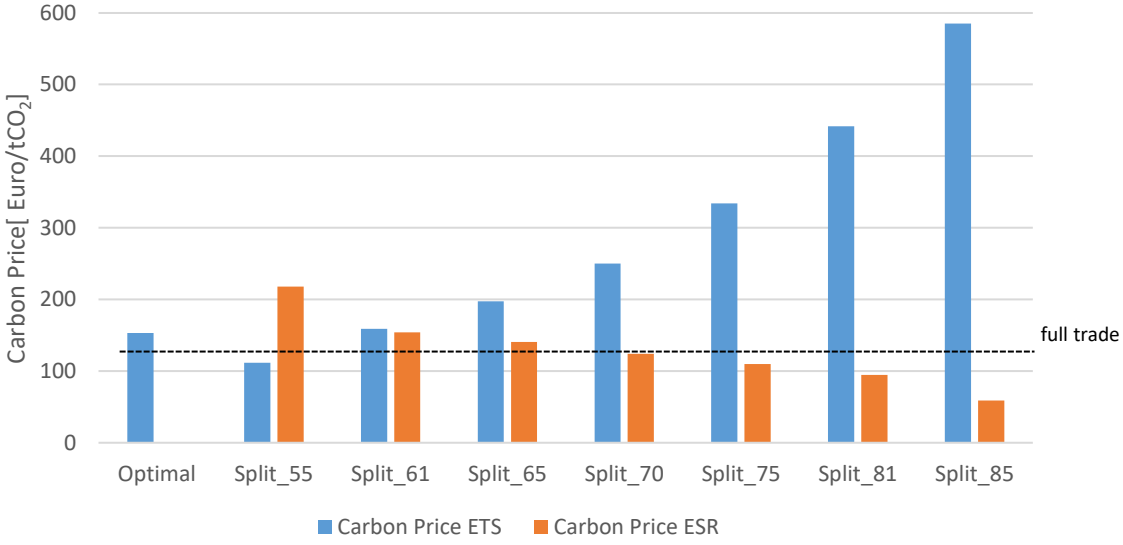


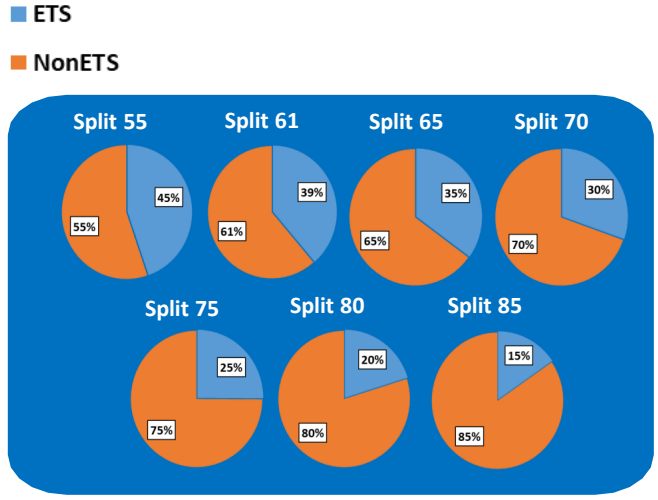


- With increasing split:
  - Emissions decrease in Industry, Electricity due to higher effort in ETS
  - Emissions increase in Commercial, Residential and Transport due to higher effort in NON-ETS

3. Results

ETS & NON-ETS Carbon Price for 2030

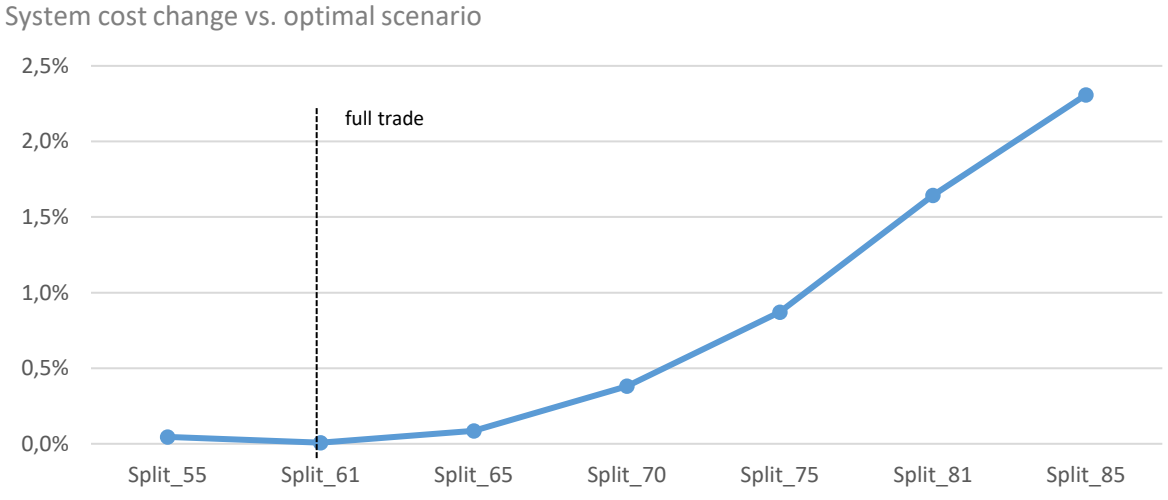


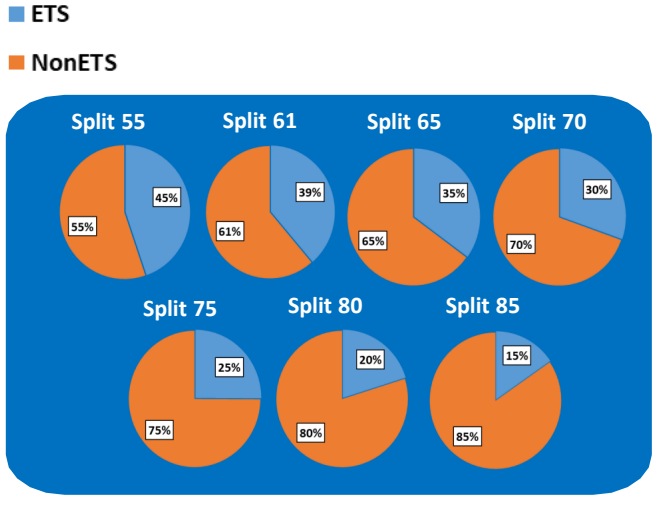


- Carbon price ETS increases with higher Split
- Carbon price ESR decreases with higher Split
- Under full trade the model allocates 61% of the EU's carbon budget to the ESR sectors with a resulting CO_2 price of 153 Euro/tCO_2
  → significantly higher than the prices assumed by the EC (50€/tCO_2 and 80€/tCO_2)

3. Results

Annual System Cost for 2030

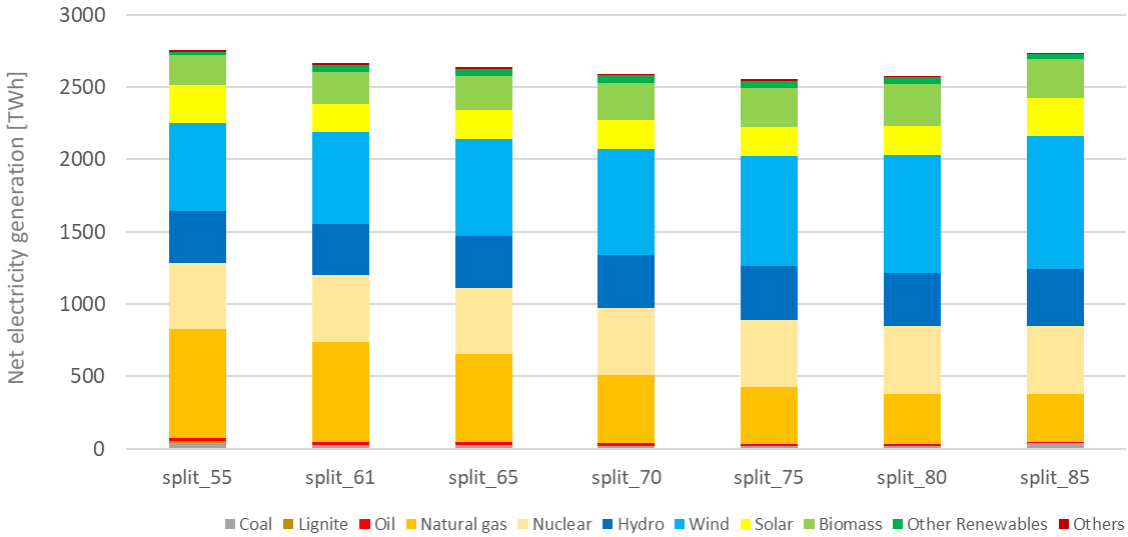


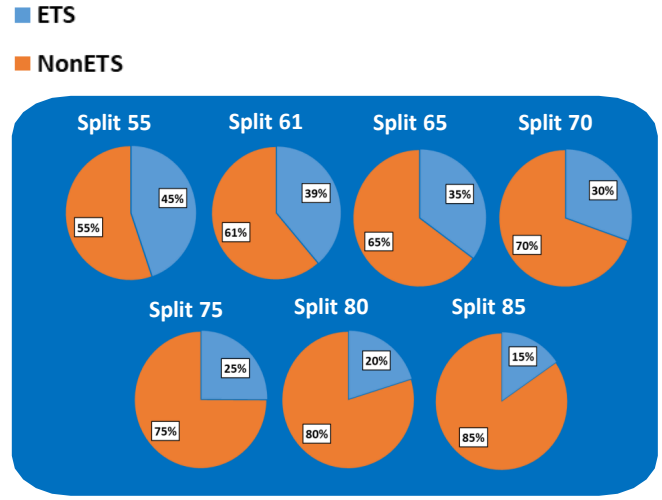


- The allocation of carbon budgets between ETS and ESR sectors has no major consequences on system cost →this implies that slight changes of the split of several per cent do not significantly affect the system cost.

3. Results

Electricity Generation for 2030





- With increasing split → two main effects:
  - Increase of wind
  - Decrease of natural gas

Conclusion

3. Conclusion

- In the optimal scenario, the model allocates 61% of the EU's carbon budget to the ESR sectors.
- No major cost disadvantage for the ESR share of around 64% currently proposed by the Commission → this indicates flexibility to shift the budget split.
- The corresponding EU ETS price is clearly higher than the ECs "predictions" → Need to be prepared for higher carbon prices.

Sources

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Thank you!

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Thank you for your attention!

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