EU Effort-Sharing: required system transformations and implied carbon prices

Renato Rodrigues
Luderer Gunnar
Robert Pietzcker
Emission Trading System

Carbon price for heavy energy-using installations

ETS carbon price

- 2020: 21% lower than 2005
- 2030: 42% lower than 2005
Effort Sharing Decision

ETS  Emissions

~40%  100%
Effort Sharing Decision

ESD regulation

~40%

ETS Emissions

Non-ETS* emissions by sector
*outside of the EU emissions trading system

Effort-sharing regulation

Total emissions for 2015

= 60% of EU greenhouse gas emissions

- Transport (excluding aviation and shipping)
- Buildings
- Agriculture
- Industry, energy supply and product use
- Waste

888 Mt
421 Mt
437 Mt
634 Mt
139 Mt

All numbers are in megatons.
Source: European Environment Agency
Effort Sharing Decision

Countries with carbon tax regulation under ESD sectors

- First phase (2020 emission reduction)
- Second phase (2030 emission reduction)
Effort Sharing Decision

PIK report on carbon pricing necessary to achieve the German ESD target (middle path)

German announced Climate Action Programme carbon pricing
• Substitution **elasticities are limited** to describe economies and energy use under strong structural change

• There is the need to test the reliability and **validate current country policies** in place to comply with the Effort Sharing Decision regulation

• It is important to identify **bottlenecks and required efforts** for an effective mitigation policy design

**There was the need to estimate a mitigation based implicit carbon price necessary to comply with the European ESD regulation**
Integrated Assessment Model (IAM)

REMIND

**Macro-economics**
- Drivers of growth and energy demand
- Capital accumulation and investment
- International trade
- Consumption and welfare impacts

**Energy System**
- Primary energy resources
- Energy conversion technologies
- Technological change and learning
- Industry, transportation and buildings energy demands

**Land-use**
- agriculture and forestry
- bioenergy supply

**Climate Module**
- Radiative Forcing
- Temperature

**Other environmental impacts**

**Water demand**

**Air pollution and health effects**
Integrated Assessment Model (IAM)

REMIND - EU
Integrated Assessment Model (IAM)

REMIND - EU
Scenarios based on main uncertainty sources

Sensitivity to Final Energy demand levels

We assume three different FE demand trajectories compatible with the SSPs for industry, buildings and transportation demands.
Main sources of uncertainty

Sensitiveness to Final Energy demand levels

Cooperation to achieve European target – country level emission allowance trade

Supporting Policies can represent the difference between the adoption or failure of alternative decarbonization pathways
Under the cooperative scenario there is a single European wide optimal carbon tax level.
Final energy demand levels are extremely important to current carbon price policy effectiveness.
EU country cooperation to achieve the ESD targets implies:

- public acceptance for meaningful money transfers between countries;
- perfect ESD market allowances mobility;
- implementing mitigation measures that affect national champion industries and beliefs;
- extra difficulties to achieve post 2030 emissions reduction targets because postponed policies.
Under **national** only mitigation, ESD carbon policy must be much **stronger**.

**ESD Carbon Price (€/tCO2eq)**

- 2020
- 2030

**FE**
- Low
- Medium
- High

**Seg.**
- No supp. policies

**Coop.**
- Supp. policies

**PIK** Leibniz-Gemeinschaft
The importance of **supporting policies** cannot be underestimated.
ETS emissions have lower short-term mitigation costs, however transfers between ETS and ESD markets increase pressure on longer-term targets.
• Future final energy demand levels are of summary importance for the ESD sectors carbon pricing policy;

• Implementing supporting policies in parallel to carbon pricing is a must for the success of emission reductions;
• Future final energy demand levels are of summary importance for the ESD sectors carbon pricing policy;

• Implementing supporting policies in parallel to carbon pricing is a must for the success of emission reductions;

• Emission mitigation in Effort-Sharing sectors is more costly than current ETS targets;

• Delayed action could put pressure in ESD national trade allowances permissions;

• Policy sequencing is crucial to the definition of Effort Sharing Decision policy.
Thank you!