State of play of the industry transition in Europe

Webinar

Agora Energiewende and Wuppertal Institute

01.06.2021
Why EU industry needs to kickstart the transition before 2030

Prof Stefan Lechtenböhmer, Wuppertal Institute
The transformation of industry is imperative to reach the goals of the Paris Agreement; industry accounts for 40 percent of global CO₂ emissions

- If the electricity and heat requirements of industry are taken into account, industry is responsible for around 40 percent of global CO₂ emissions (33 Gt)
- The 5 basic industries of steel, cement, chemicals, aluminum and paper alone account for 20 percent of global CO₂ emissions
- CO₂ emissions triggered by industry have grown the most in absolute terms since 1990
- Demands for basic materials are increasing globally
- Without a comprehensive transformation of industrial production, the climate protection targets of the Paris Agreement cannot be achieved

Global CO₂ emissions from industry

- Steel: 24%
- Chemicals: 19%
- Paper: 8%
- Cement: 6%
- Aluminum: 3%
- Others: 40%

IEA, 2017
Climate neutrality 2050 is only one investment cycle away: all investments from now on must be compatible with climate neutrality.

Technical lifetime of primary production plants in the steel, chemical and cement sectors.

- Blast furnaces: Relining (20 years)
- New steelworks: Integrated route (50 years)
- Steam crackers: 50 – 70 years
- Cement kilns: 60 years

Agora Energiewende / Wuppertal Institute, 2021
The situation is urgent: Reinvestments before 2030 determine the viability of climate neutrality by 2050

Re-investment needs by 2030 and direct employment in cement, steel and basic chemicals in the EU

Agora Energiewende / Wuppertal Institute, 2021
The European industry has a vital role in achieving higher climate ambition in 2030 & 2050 – breakthrough technologies are needed to reverse recent trends of stagnating emissions

CO2 emissions of EU27 industry from 1990 to 2018 and proposed sector reductions for 2030 and 2050

Agora Energiewende / Wuppertal Institute, 2021
EU ETS industrial GHG abatement needs under a -55% climate target for the EU in 2030 and the available strategies for meeting the objective

Three decarbonization levers are available to reduce industry sector emissions significantly by 2030:

1. New processes:
   - DRI/EAF (steel),
   - Chemical recycling (chemicals)
   - Oxyfuel CCS (cement),

2. Fuel switching:
   - Power-to-heat,
   - Hydrogen
   - Biomass

3. Circular economy & resource efficiency:
   - Enhanced recycling
   - Eco-design
   - Efficiency in manufacturing & construction

Agora Energiewende / Wuppertal Institute, 2021
As part of the project we assessed 13 key low-carbon technologies for the sectors, steel, cement and chemicals. Many of them can be market-ready before 2030.

Selection of different technology fact sheets

Agora Energiewende and Wuppertal Institute have prepared a short, comprehensible overview on technology fact sheets for 13 key low-carbon technologies in the steel, chemical, and cement sectors.

The technology fact sheets are intended to summarise key messages on the key low-carbon technologies in the steel, chemicals, cement sectors.

These include: CO₂ abatement costs, potential CO₂ abatement contribution, specific incremental costs, existing pilot projects, reinvestment cycles, and technology development rate.

Interim results were made available to industry associations and companies for consultation.
Key climate neutrality-compatible technologies are available and must be deployed to accelerate scale up for 2050. Already by 2030 1/3 of total emissions from key sectors can be abated.

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CO2 abatement potential of selected key low-carbon technologies in the steel, chemical and cement sectors by 2030

Agora Energiewende / Wuppertal Institute, 2021
Demand-side: circular economy will reduce the amount of green energy and infrastructure needed and make EU industry less dependant on imports from other regions.

Demand-side decarbonisation levers for climate neutrality

- Secondary materials use 50 to 90% less energy than primary materials
- That holds also for the new breakthrough technologies / renewable energy sources
- Thus circularity massively reduces the investment and costs of the industrial transition towards climate neutrality
- Key reduction levers:
  - Increase recycling rates and avoid downcycling
  - Increase material efficiency
  - Implement circular business models (materials as a service)

Material Economics, 2018
Deep-Dive Steel

Wido K. Witecka, Agora Energiewende
The steel sector is the largest emitter of the industrial sector – today it is mostly relying on coal, but this can change substantially until 2030…

- Largest emitter of the industrial sector
- Production processes: 60% coal-based blast furnace route; 40% secondary steel route
- Challenge: Replacing primary steelmaking capacity that reaches end-of-life with technologies that are compatible with climate neutrality 2050

Breakdown of emissions in the steel sector:
- Integrated blast furnace route: 180 MtCO₂ in 2017
- Secondary steel route (scrap-based): 8 MtCO₂ in 2017
The deployment of technologies that are compatible with climate neutrality well before 2030 will allow the steel industry to reduce its emissions by one third.

### CO2 abatement potential of selected key low-carbon technologies in the steel, chemical and cement sectors by 2030

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Agora Energiewende / Wuppertal Institute, 2020
The EU steel industry is at the crossroads: ~50% of blast furnaces will reach their end-of-life before 2030. Investments into climate-neutral technologies are needed before 2030.

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Σ EU 187.9 8.2 65.8 179.7 95.1 87.2 18.4 (18%) 31.5 (30%) 26.4 (25%) 27.9 (27%)
Using the reinvestment window to deploy key technology: DRI technology is mature. Initially it could be operated with natural gas (-66% emissions), later on with clean H2 (up to -97%)

Earliest possible market readiness of direct reduced iron technology
EU steel companies have already announced targets to build 28 Mt of low-carbon steelmaking capacity by 2030. However, there’s a stark imbalance amongst EU member states…

How do the low-carbon steelmaking announcements of European steel companies match up the reinvestment requirements by 2030?

- Black: Blast furnace capacity with end-of-life before 2030
- Blue: Announced primary low-carbon steelmaking capacity by 2030

Agora Energiewende, 2021
Summary: What is needed to kickstart the transformation in steel sector now?

Before 2030, 50% of the EU’s blast furnace (BF) capacity requires relining, offering an opportunity to reinvest with key low-carbon technologies:

→ 10% of primary BF capacity can be converted to EAF to produce an additional 4.6 Mt of secondary steel.
→ 90% of primary capacity can be converted to produce 41 Mt of Direct Reduced Iron (DRI).

Additional CAPEX requirement: ~27 bln EUR (uptake: 6.8 Mt DRI/year starting in 2025; €660 million per 1 Mt of annual production capacity)
Additional OPEX requirement: ~30 to 60 bln EUR (all DRI plants run on 65% share of clean H2 in 2030; low to medium clean H2 costs)

Policy recommendations:

→ CAPEX: The EU and member states must make sure that part of the Recovery Fund money is used to invest in low-carbon steelmaking technologies. The EU Innovation Fund can also fund up to 60% of the investment costs, but does not have sufficient funds to do so for all the required investments by 2030.

→ OPEX: the Industrial Strategy proposed the introduction of CCfDs on the EU level paid by funds of the EU Innovation Fund – good start, but not sufficient to address the scale required

→ CAPEX + OPEX: add. costs can be covered by green lead markets (Daimler, Volvo announced to use green steel)
The EU chemical industry caused 18% of industrial emissions. Three processes account for the majority of its emissions: heat production, the plastics value chain and ammonia.

- Largest energy user of the industrial sector (energy and non-energy purposes)
- 3rd largest emitter of the industrial sector
- Challenge: The sector requires carbon feedstock for its products even in a GHG neutral world

Largest source of emissions in the chemical sector:
- Industrial power plants (55 MtCO₂ in 2017)
- Steam crackers (32 MtCO₂ in 2017)
- Grey H₂ production for ammonia (24 MtCO₂)
Key low-carbon technologies can be deployed before 2030 to lead to stark emissions reductions in all three processes.

### CO2 abatement potential of selected key low-carbon technologies in the steel, chemical and cement sectors by 2030

<table>
<thead>
<tr>
<th>Technology</th>
<th>Required Emission Reduction Industry under EU ETS</th>
<th>Potential Emission Reduction</th>
<th>Further emission reduction potential (e.g. efficiency, biomass use)</th>
<th>Direct reduced iron (Steel)</th>
<th>Electric arc furnace (Steel)</th>
<th>Power-to-Heat (Chemicals)</th>
<th>Green hydrogen (chemicals)</th>
<th>Chemical recycling (Chemicals)</th>
<th>Oxyfuel-CCS (Cement)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>142</td>
<td>165</td>
<td>20</td>
<td>15</td>
<td>66</td>
<td>49</td>
<td>17</td>
<td>25</td>
<td>31</td>
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<td></td>
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<td>145</td>
<td>15</td>
<td>5</td>
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<td>8</td>
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<td>25</td>
<td>6</td>
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<td></td>
<td>8</td>
<td>31</td>
<td>6</td>
</tr>
</tbody>
</table>

- **Required Emission Reduction Industry under EU ETS**: The required reduction in emissions to meet EU ETS standards.
- **Potential Emission Reduction**: The potential for emission reduction.
- **Further emission reduction potential (e.g. efficiency, biomass use)**: Additional reduction potential beyond the initial reduction.
- **Direct reduced iron (Steel)**: Emission reduction potential for steel production.
- **Electric arc furnace (Steel)**: Emission reduction potential for steel production.
- **Power-to-Heat (Chemicals)**: Emission reduction potential for chemical production.
- **Green hydrogen (chemicals)**: Emission reduction potential for chemical production.
- **Chemical recycling (Chemicals)**: Emission reduction potential for chemical production.
- **Oxyfuel-CCS (Cement)**: Emission reduction potential for cement production.

**Legend**:
- **lower bound**: DRI with natural gas only
- **higher bound**: DRI with additional hydrogen

Agora Energiewende / Wuppertal Institute, 2020
Power-to-Heat: With an accelerated coal phase-out in Europe, PtH can be deployed on a much larger scale

Agora Energiewende / AFRY, 2021

Comparison of heat production technologies: PtH vs. H2

- PtH should be considered first before thinking about producing heat from H2
- The EU COM's impact assessment of the EU 2030 climate target of -55% saw only 2% coal in the EU power mix by 2030.
- Low and medium temperature heat in the chemical industry accounts for 1/3 of the total EU industry’s heat demand
- Hybrid use: E-boilers could operate mainly in times when RES are abundant and electricity is cheap and substitute NG-fired boilers or CHP in those hours
- We assume that the total steam demand up until 500°C of 342 TWh in the chemical industry can be supplied by 10% of heat pumps for lower temperatures, 40% of electrode boilers (2,000 FLH), and 50% of conventional CHP plants and natural gas-fired boilers (GHG intensity of 223 gCO2/kWh)
- For a business case for PtH, the electricity price has to be competitive (incl. sensible tariffs and surcharges)
Plastics: The direct emissions along the plastics value chain in the EU account for ~130 MtCO2. A chemical industry based on circular carbon cycles is key to climate-neutral plastics.

### Process steps and CO₂ emissions in the plastics/synthetics value chain

<table>
<thead>
<tr>
<th>CO₂ emissions in the chemical sector</th>
<th>CO₂ emissions in other sectors</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.3 t</td>
<td>0.2 t</td>
</tr>
<tr>
<td>0.3 t*</td>
<td>0.8 t</td>
</tr>
<tr>
<td>0.4 t</td>
<td>3.1 t</td>
</tr>
</tbody>
</table>

*CO₂ emissions from electricity use required in various process steps in the plastics value chain.

In total: 5.1 tCO₂ per t of plastic
Chemical recycling has the potential to reduce the majority of upstream emissions and during the end-of-life.

**Process steps and CO₂ emissions in the plastics/synthetics value chain**

<table>
<thead>
<tr>
<th>Process Step</th>
<th>CO₂ emissions (t)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crude oil</td>
<td>0.3 t</td>
</tr>
<tr>
<td>Refinery</td>
<td>0.2 t</td>
</tr>
<tr>
<td>Naphtha</td>
<td>0.8 t</td>
</tr>
<tr>
<td>Steam crackers</td>
<td>0.3 t*</td>
</tr>
<tr>
<td>Olefins e.g. ethylene</td>
<td></td>
</tr>
<tr>
<td>Aromatics e.g. benzene</td>
<td></td>
</tr>
<tr>
<td>Plastic</td>
<td>0.4 t</td>
</tr>
<tr>
<td>Old plastics</td>
<td>3.1 t</td>
</tr>
</tbody>
</table>

* CO₂ emissions from electricity use required in various process steps in the plastics value chain.

*In total: 5.1 tCO₂ per t of plastic*
In order to reduce the emissions on the steam crackers it is possible to electrify steam crackers or equipping them with CCS.
Chemical recycling technologies are almost market ready, but economically still not competitive

<table>
<thead>
<tr>
<th>Project, Site</th>
<th>Country</th>
<th>Company</th>
<th>Status Quo</th>
<th>Fuel</th>
<th>Timeline</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td>cial plant for converting 15 k</td>
<td></td>
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<td></td>
<td></td>
<td>t of pyrolysis oil from chemical recycling per year (TRL 6-7).</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Waste to Chemicals, Rotterdam</td>
<td>AirLiquide, Enerkem, NOVYEN, Shell</td>
<td>Chemical Recycling: production of methanol from residual waste. 200,000 t of methanol production capacity/year (TRL 6-7).</td>
<td>Residual waste</td>
<td>2020: planned start of construction</td>
<td></td>
</tr>
<tr>
<td>Carbon4PUR project, Marseille Fos</td>
<td>Covestro, ArcoleMatte, Rectical</td>
<td>CCU in long-lived products: pilot plant to convert metallurgical gases of steel production to polyurethane (TRL 4-5).</td>
<td>Waste gases</td>
<td>2020: construction of pilot plant</td>
<td></td>
</tr>
<tr>
<td>Rheticus project, Marl</td>
<td>Evonik, Siemens</td>
<td>Electrochemical process: Pilot plant with a capacity of 20,000 t per year for the conversion of waste gases to specialty chemicals (TRL 4-5).</td>
<td>Solar-driven electro-chemical reduction</td>
<td>2020: pilot plant started operation</td>
<td></td>
</tr>
<tr>
<td>E-Cracker, Ludwigshafen</td>
<td>BASF, Sabic, Linde</td>
<td>Electrified steam cracker: plan to build multi-megawatt demonstration plant (TRL 6-7)</td>
<td>Electricity</td>
<td>2023: demo plant</td>
<td></td>
</tr>
</tbody>
</table>

EU petrochemical industries’ plans for commercialisation of alternative production processes before 2030

→ Although it is not clear how the future of refinery will impact the chemical industry, it is important to establish alternative climate-neutral production technologies before 2030 to meet the -55% reduction target and to secure the EU chemical industry’s long-term competitiveness.

→ Chemical recycling should be combined with other processes such as electric steam crackers, MTO to close the carbon cycle for plastics.

→ Improving product design is primordial to retain its value and utility for as long as possible. A design for reuse, repair, and recycle avoids virgin feedstock production and waste generation.
Hydrogen will be needed in sectors with a lack of alternative decarbonisation options such as chemical feedstock and as a reaction agent.

- The H2 demand (~300 TWh) is constant until 2050, however there is a complete shift in the dominance of refineries in 2020 (which we assume to close in 2050) to a dominant steel sector in 2050.
- Apart from steel, ammonia production has a significant share in H2 demand in 2050, followed by chemical recycling and methanol production.
- Green H2 demand for ammonia production could be lower in 2030 since N2 is needed from an air separation unit and CO2 is needed to produce urea.

![Estimated industrial hydrogen demand for the EU steel and chemicals industry](chart)

AFRY, 2021
Deep-Dive Cement

Clemens Schneider, Wuppertal Institute
Cement: State-of-play and recent sector roadmapping

CEMBUREAU 2030 Roadmap

- Relative emission reductions (about 15%) have been achieved since 1990.
- Several levers to further reduce CO₂ emissions available along the value chain cement / concrete.
- However: clinker still needed in the long term → „unavoidable“ (process) emissions
- Cement industry envisions CCUS to be the largest mitigation lever (-280 kt CO₂ / t cement; Cembureau 2050 Roadmap) – but past 2030
- Increased EU climate ambition will create additional pressure for rapid mitigation
- In addition to and complementing other mitigation strategies, early deployment of CCS seems feasible
By 2030 several well-located cement plants in Northern and Southern Europe can be connected to offshore storage sites.

EU cement clinker production sites and CO2 offshore storage sites

Legend
- potential offshore CO2 storage
- sites with > 1 CO2 Mt/a
- sites with < 1 CO2 Mt/a

- There are several offshore CO2 storage sites under development
- Most of the storage sites are in the North Sea (Norway, UK, Netherlands), but recent plans to develop a storage site in the Mediterranean (Italy)
- This opens up the possibility for early deployment of CCS in the cement sector both in Northern and Southern Europe.
- By 2030, in an ambitious scenario between 10 and 20 (mostly coastal) cement sites could be connected to CO2 storage sites.
- This would enable a CO2 reduction between 9 and 17 Mt CO2/year
- By 2030 these cement plants could already generate negative emissions via BECCS
Different CCS technologies can be market-ready by 2030 to be deployed in the cement sector. The first commercial-scale project will go live in Norway 2024

### Overview of EU CCS projects by the cement industry

<table>
<thead>
<tr>
<th>Project, Site</th>
<th>Country</th>
<th>Company</th>
<th>Status Quo</th>
<th>Timeline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brevik CCS project, Brevik</td>
<td>Norway</td>
<td>HeidelbergCement</td>
<td>The project foresees to build an industrial-scale plant to capture and store 0.4 MtCO₂/year in 2024.</td>
<td>2024: commercial CCS</td>
</tr>
<tr>
<td>ECRA-CCS project, various sites</td>
<td>European Union</td>
<td>European Cement Research Academy and various companies</td>
<td>The project has been studying the economic and technical feasibility of carbon capture in the cement sector since 2007. The project is currently in Phase IV which involves developing a concept for a demonstration plant (TRL 6-7).</td>
<td>2020–2023: building demonstration plant</td>
</tr>
<tr>
<td>Catch4climate, Mergelstetten</td>
<td>Germany</td>
<td>Buzzi Unicem-Dyckerhoff, Heidelberg Cement, SCHWENK Zement, Vicat</td>
<td>Plans to build demonstration plant for Oxyfuel-capture (TRL 6-7). The captured CO₂ is intended to be used to produce 'reFuels' such as kerosene.</td>
<td>2021–2024: demo plant</td>
</tr>
<tr>
<td>LEILAC II, Hannover</td>
<td>Germany</td>
<td>HeidelbergCement, Cemex</td>
<td>Planned construction of a CCS demonstration plant that captures 0.1 MtCO₂/year (TRL 6-7)</td>
<td>2025: demo plant</td>
</tr>
<tr>
<td>LEILAC I, Luxhe</td>
<td>Germany</td>
<td>HeidelbergCement</td>
<td>Pilot plant has a production volume 10 t of cement clinker/hour (TRL 4-5)</td>
<td>2019: started pilot operation</td>
</tr>
</tbody>
</table>

→ **Post-combustion CCS-technology** is most advanced and ready for implementation (Brevik). Upscaling the share of captured CO₂ on plant level is feasible.

→ **Oxyfuel-CCS** is energy-efficient and allows capturing both process- and energy related CO₂. Expected full-scale availability: 2025-30.

Summary: What is needed to kickstart the transformation now

- **Regulatory framework**: legal status of CCS needs clarification (in some countries, e.g. Germany)
- Implementation of **CCS** approx. **doubles cost of clinker production**: business models and effective carbon leakage protection required
- For **rapid upscaling of CCS**: Pan-European CO₂-infrastructure required to access hinterland cement plants → maybe start from local hubs, but dimensioning the pipelines requires a bigger systemic picture
What policy priorities need to be met to kickstart the EU industry transition

Dr. Oliver Sartor, Agora Energiewende
EU is implementing a new «European Green Deal» during this legislative period (2019-2024)

- Reduce GHG emissions by 55% by 2030
- New Law: Climate Neutrality by 2050
- Strengthen carbon pricing (ETS reform)
- Clean Hydrogen Strategy
- 2nd Circular Economy Action Plan
- New Renewable Energy & EE legislation
Industry transformation faces several barriers that a high CO2 price does not resolve on its own: Key elements of “Clean Industry Package”

**Upstream** (Infrastructure, energy & raw materials)
1. Development of clean energy & CO2 infrastructure
2. Availability of climate-neutral raw materials

**Midstream** (Basic materials & intermediate products)
3. Competitiveness of climate-neutral process technologies
4. Incentives to switch to zero emissions heat sources

**Downstream** (Final products)
5. Incentives for material-efficient and circular product design & manufacture
6. Market demand for climate-neutral materials & final products

7. Enhanced materials re-use and high-quality recycling
Extend and strengthen policies for material efficiency and circularity to most CO2-intensive basic materials

- Reduces challenge of new technology and infrastructure deployment.
- Need for a stronger link between CEAPs and industrial CO2 strategy (esp. Buildings, concrete and cement)

**Key policy tools:**
- Embedded carbon requirements on final products
- Eco-design for material efficiency & enhanced recyclability
- Improved end-of-life management obligations
- Unlock key enabling conditions for more closed loop recycling

Material Economics, 2018
Unlock high fuel switching potential in industries using low and medium temperature heat (RED3 + energy taxation policy)

40% of EU industrial natural gas use goes to heat below 100°C and can be supplied with heat pumps or other mature solutions.

FFE (2020). See the publication for distribution by EU member states. Agora Energiewende (2021)
Infrastructure for industry decarbonisation requires governance, finance and appropriate sustainability rules…

1. Assign responsibility for provision and financing decarbonization infrastructure for industrial transformation (e.g. Clean power, H2, CCS), e.g. via the gas/power network operators

2. Public co-financing & de-risking first strategic and “high capex” projects

3. Workable but 2050-compatible sustainability criteria for fossil free energy sources (e.g. under RED3)
A CBAM + carbon pricing won’t solve it all…
Key low carbon technologies will need support to kickstart deployment pre-2030

![Graph showing CO2 abatement costs and expected CO2 prices in the EU ETS until 2030](image)

- **Direct reduction with natural gas (Steel):**
  - Lower range 2030: 60€/t
  - Upper range 2030: 90€/t

- **Direct reduction with hydrogen (Steel):**
  - Lower range 2030: 100€/t
  - Upper range 2030: 165€/t

- **CCU of waste gases of the blast furnace route (Steel):**
  - Lower range 2030: 231€/t
  - Upper range 2030: 439€/t

- **Green hydrogen from electrolysis (Chemicals):**
  - Lower range 2030: 170€/t
  - Upper range 2030: 430€/t

- **Methanol-to-olefin/aromatics route (Chemicals):**
  - Lower range 2030: 160€/t
  - Upper range 2030: 355€/t

- **Carbon capture with the oxyfuel process (Cement):**
  - Lower range 2030: 70€/t
  - Upper range 2030: 131€/t

Even with very optimistic lower-range 2030 CO2 abatement costs of low-carbon technologies that already factor in learning rates of these technologies, most of them won’t have a business case by 2030.

The volatility of the carbon price adds an additional layer of uncertainty that will withhold stock-listed companies from making final investment decisions into an uncertain business case.

Agora Energiewende / Wuppertal Institute, 2021
An overview of design options: Carbon Contracts and Carbon Contracts for Difference

Comparison of the design of Carbon Contracts under the current allocation rules or as Carbon Contracts for Difference CCfD in the event of an adjustment or discontinuation of free allocations.

How to fund CCfDs?

EU Level: ETS Innovation Fund expanded under ETS Revision and dedicated CCfD vehicle created – would be part of solidarity mechanisms for lower income MS (5% of allowances)

MS Level: 2 main options:

1. Earmark auction revenues for sale of EUAs to EII sectors as CBAM phased in and free allocation phased down (gradually)

2. 1% VAT Materials charge on CO2-intensive final goods (e.g. buildings, works, automotives)
Scaling up demand for climate neutral, material efficient and circular industrial products via Sustainable Products legislation

→ Put limits on embedded life cycle emissions in material-intensive final products and reduce over time.

Justification: unlocks demand for full set of decarbonization options (material efficient design, circular and low-CO2 virgin materials) without distortions of intermediate product markets.

Condition: For limits on embedded carbon to work, downstream purchasers must have transparent and comparable data.
The big picture: How do these supply and demand side measures fit together over time?

Source: CISL, Agora Energiewende (2021)
Carbon leakage: a robust alternative to free allowances is needed by 2030, but the EU must be careful with CBAM

Free allocation and the EU ETS emissions cap with an EU-wide -55% in 2030 and climate neutrality in 2050 target…

The EU therefore needs to shift to an alternative system

It also needs to stop creating distortions from free allocation

CBAM offers to potentially these problems,

But there are very strict conditions for CBAM to be effective, WTO compatible and internationally acceptable.

Source: Agora Energiewende
Key elements of “Clean Industry Package” vs. key EU regulatory files needed to take them forward

Upstream
(Infrastructure, energy & raw materials)

1. Development of clean energy & CO2
2. Availability of climate-neutral raw materials

H2 Strategy, Renewable Energy Directive 3.0

Midstream
(Basic materials & intermediate products)

3. Competitiveness of climate-neutral process
4. Incentives to switch to zero emissions heat sources

Carbon Contracts for Difference, ETS reform, Carbon leakage protection

Downstream
(Final products)

5. Incentives for material-efficient and climate-neutral final products & recycling
6. Market demand for climate-neutral materials & final products

Sustainable Products Initiative, Ecodesign, EPBD

Circular Economy Action Plan 2.0
Thank you for your attention!

Questions or Comments? Feel free to contact me:
Oliver.Sartor@agora-energiewende.de

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