State of play of the industry transition in Europe

Webinar

Agora Energiewende and Wuppertal Institute

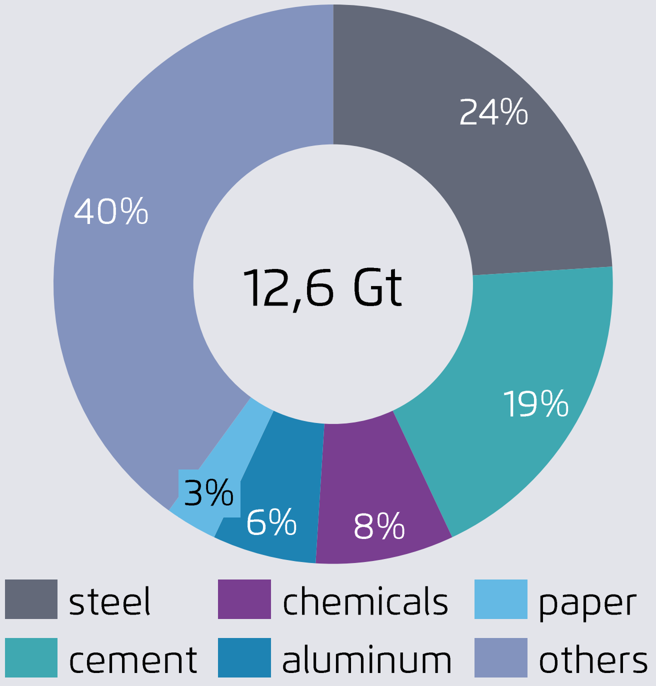
01.06.2021

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 CO_2 emissions

Global CO_2 emissions from industry

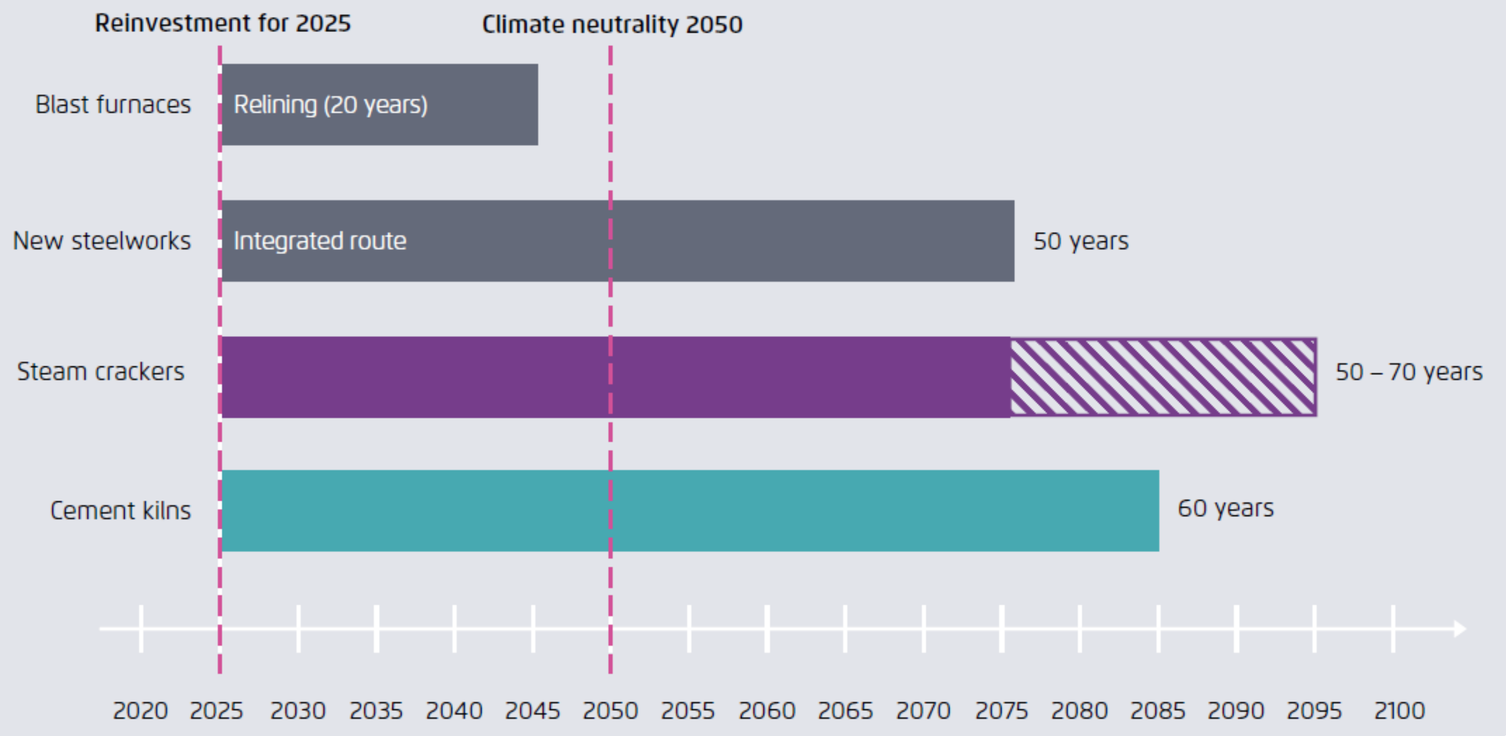


IEA, 2017

- If the electricity and heat requirements of industry are taken into account, industry is responsible for around 40 percent of global CO_2 emissions (33 Gt)
- The 5 basic industries of steel, cement, chemicals, aluminum and paper alone account for 20 percent of global CO_2 emissions
- CO_2 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

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



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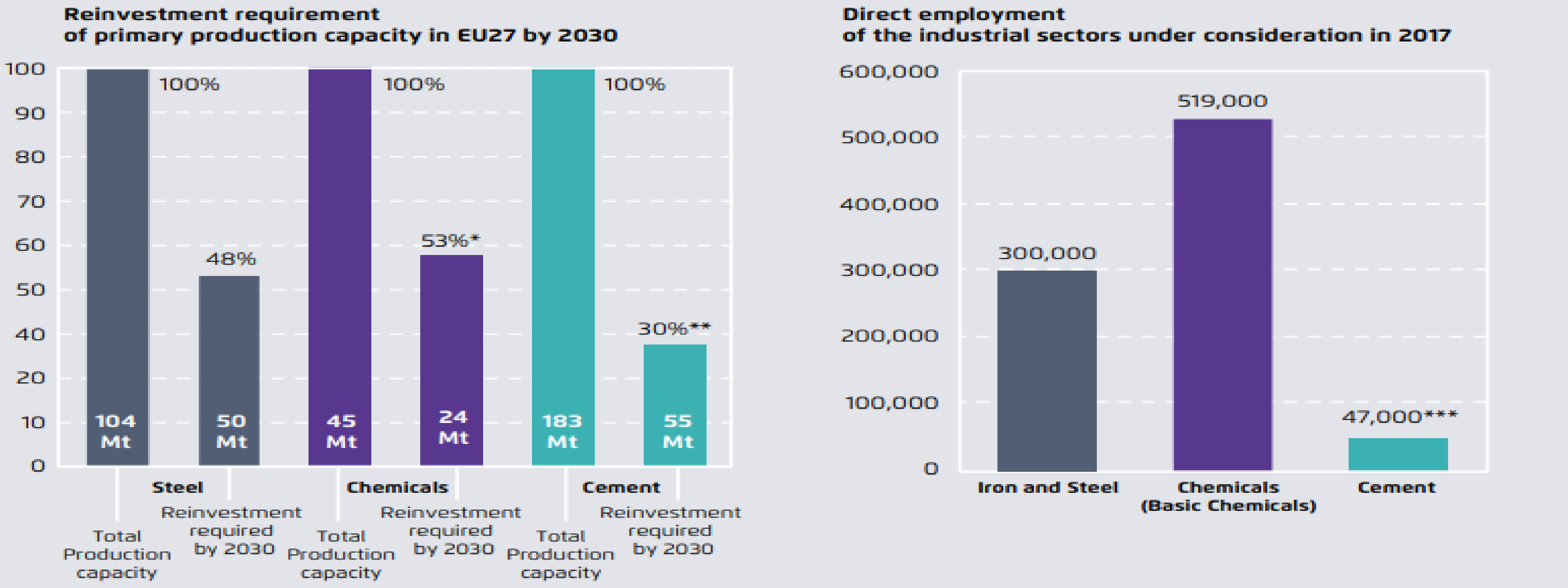
The situation is urgent: Reinvestments before 2030 determine the viability of climate neutrality by 2050

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



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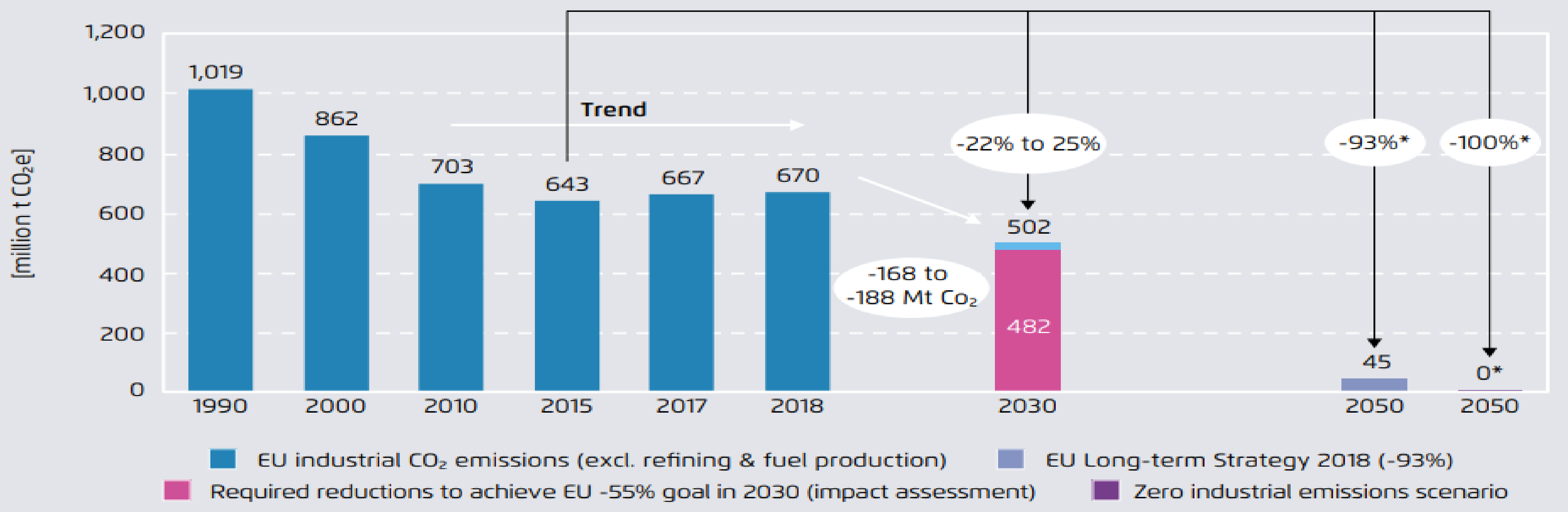
The European industry has a vital role in achieving higher climate ambition in 2030 & 2050 – breakthrough technologies are needed to reverse recent trends of stagnating emissions

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



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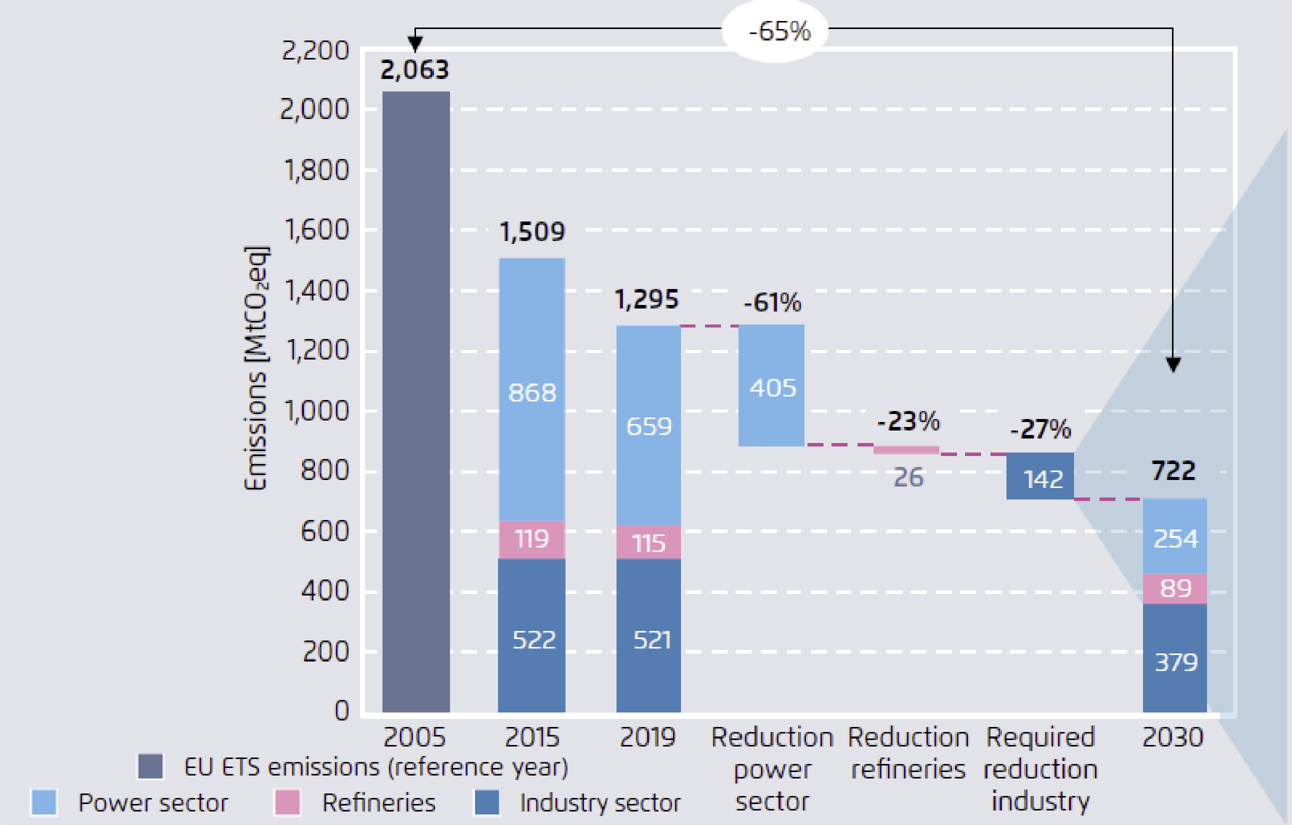
EU ETS industrial GHG abatement needs under a -55% climate target for the EU in 2030 and the available strategies for meeting the objective



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

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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.

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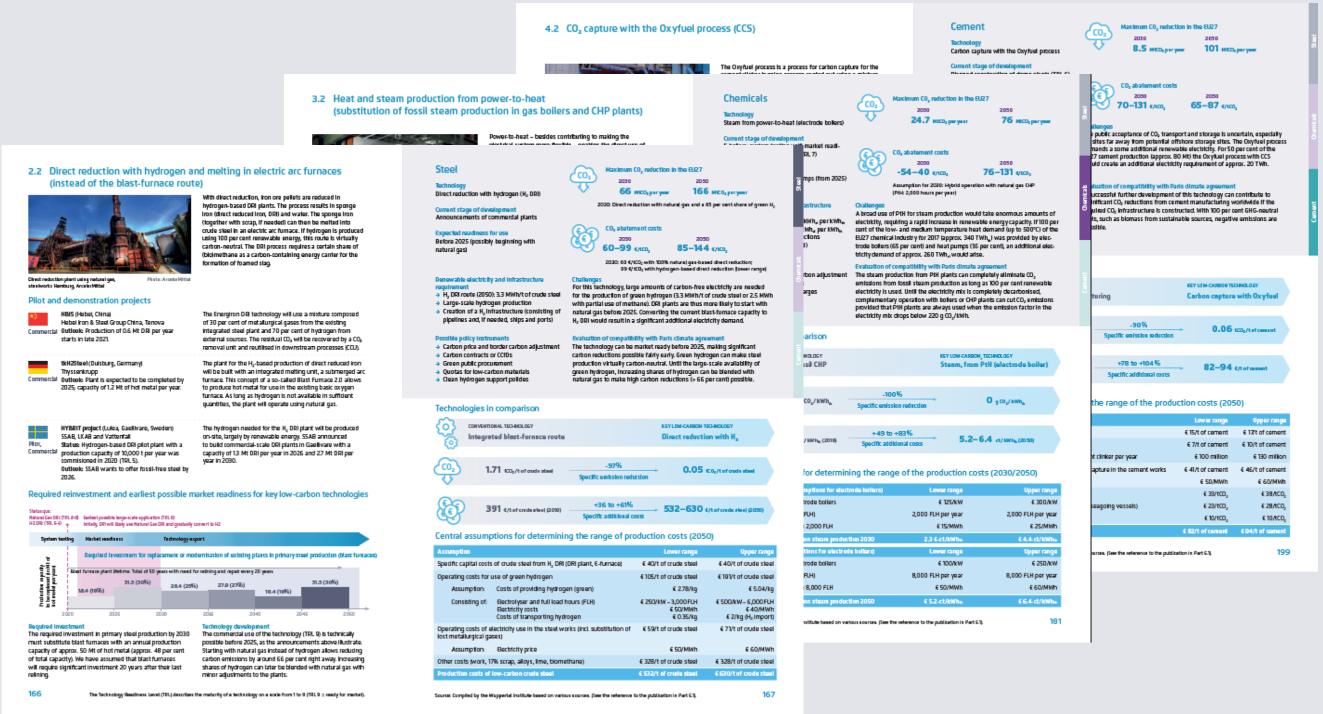
Selection of different technology fact sheets



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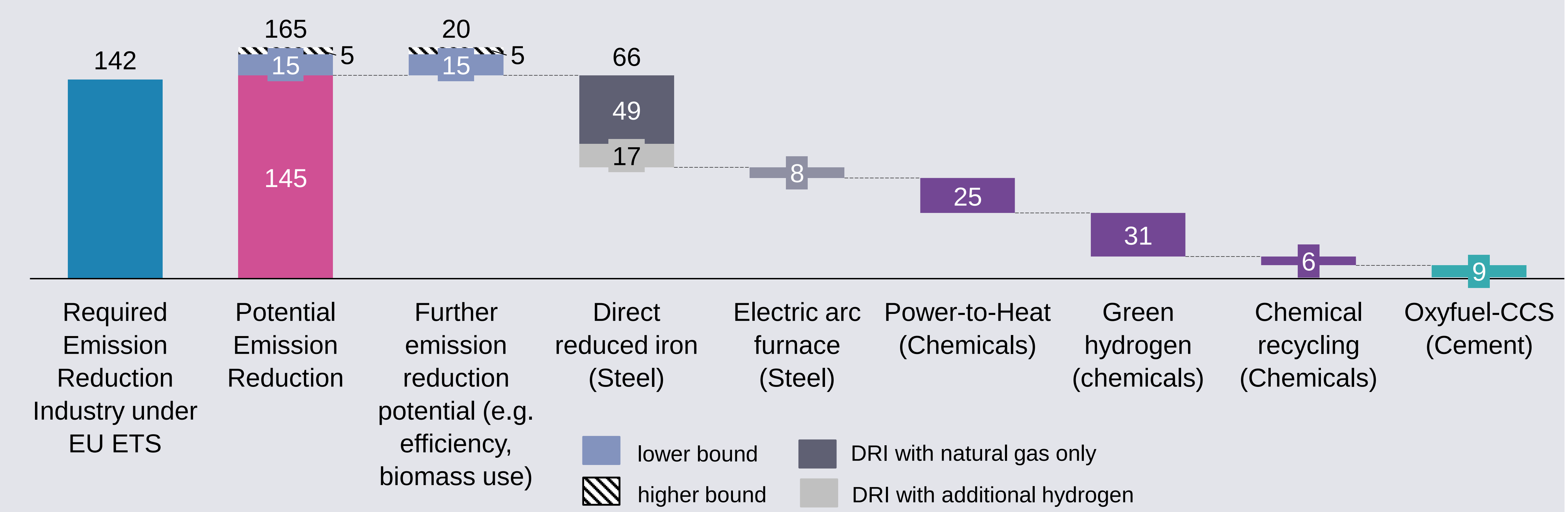
- → Agora Energiewende and Wuppertal Institute have prepared a short, comprehensible overview on technology fact sheets for 13 key low-carbon technologies in the steel, chemical, and cement sectors
- → The technology fact sheets are intended to summarise key messages on the key low-carbon technologies in the steel, chemicals, cement sectors
- → These include: CO_2 abatement costs, potential CO_2 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.

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



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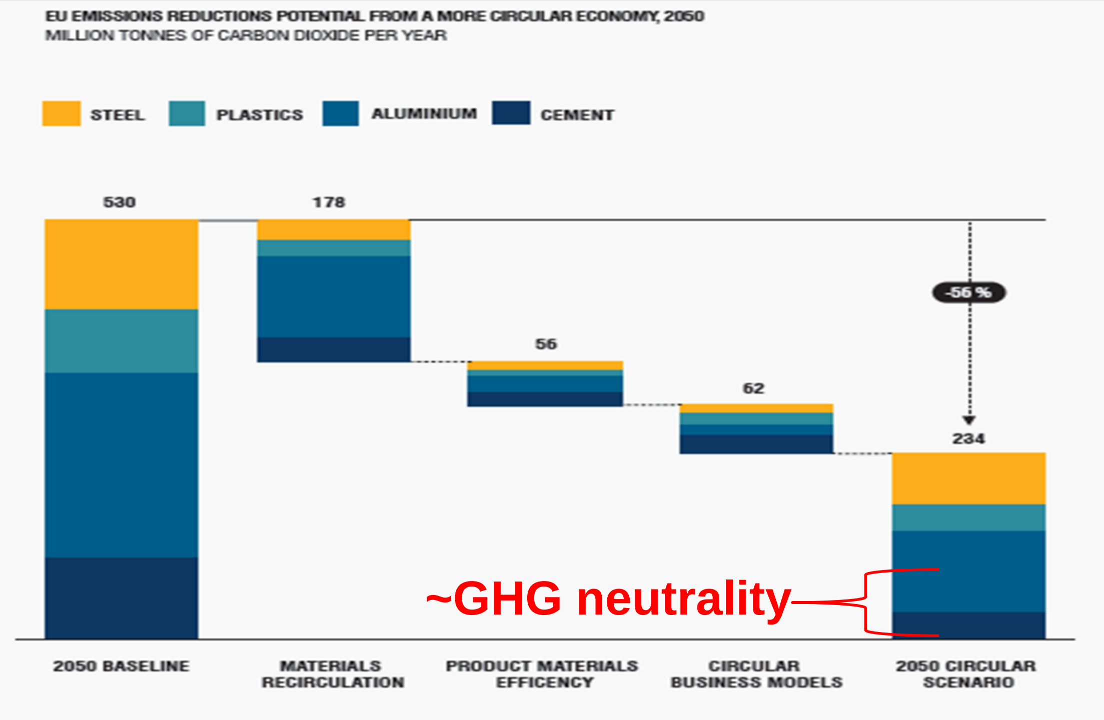
Demand-side: circular economy will reduce the amount of green energy and infrastructure needed and make EU industry less dependant on imports from other regions

Demand-side decarbonisation levers for climate neutrality



Material Economics, 2018

- 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)*

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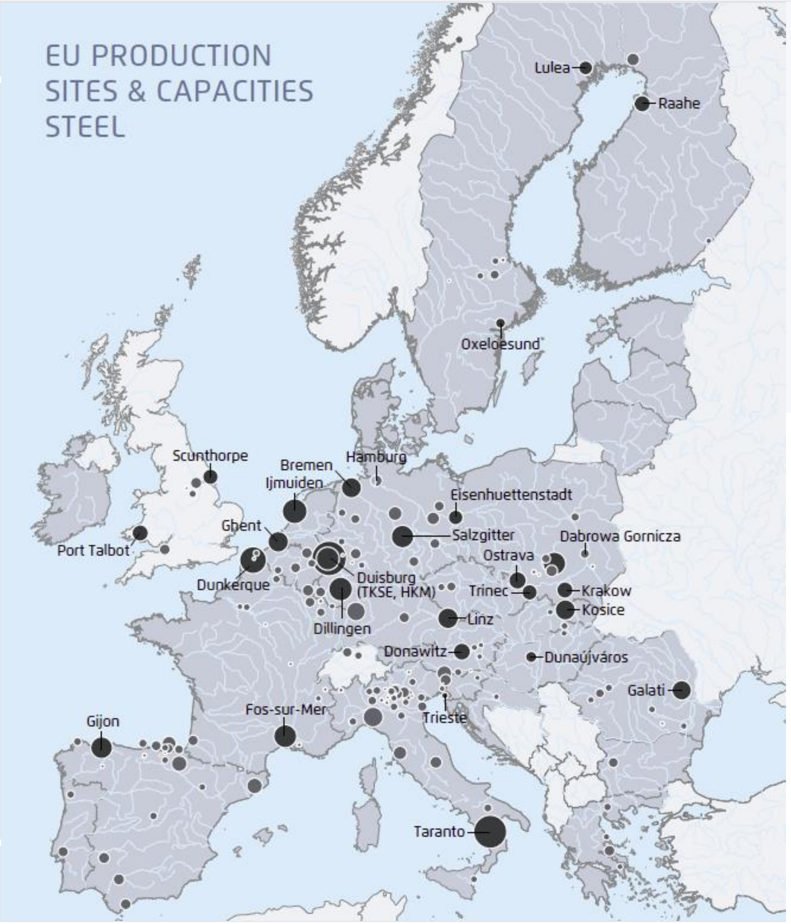
Deep-Dive Steel

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…



Direct CO_2 emissions from the steel industry in the EU27 (+UK) in 2017
188 $MtCO_2$ (+12.6 million t of CO_2 in the UK)

Steel production in the EU27 (+ UK) in 2017
161 million t of crude steel
(+7.5 Mt of crude steel in the UK)

Steel demand in 2017 (EU28)
159 Mt of finished steel

LEGEND

Production capacity crude steel

- Integrated blast furnace route (BF-BOF)
- Direct reduction with natural gas (DRI)
- Electric arc furnace with steel scrap

- 1,000 kt/a
- 2,000 kt/a
- 3,000 kt/a
- 4,000 kt/a

→ 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

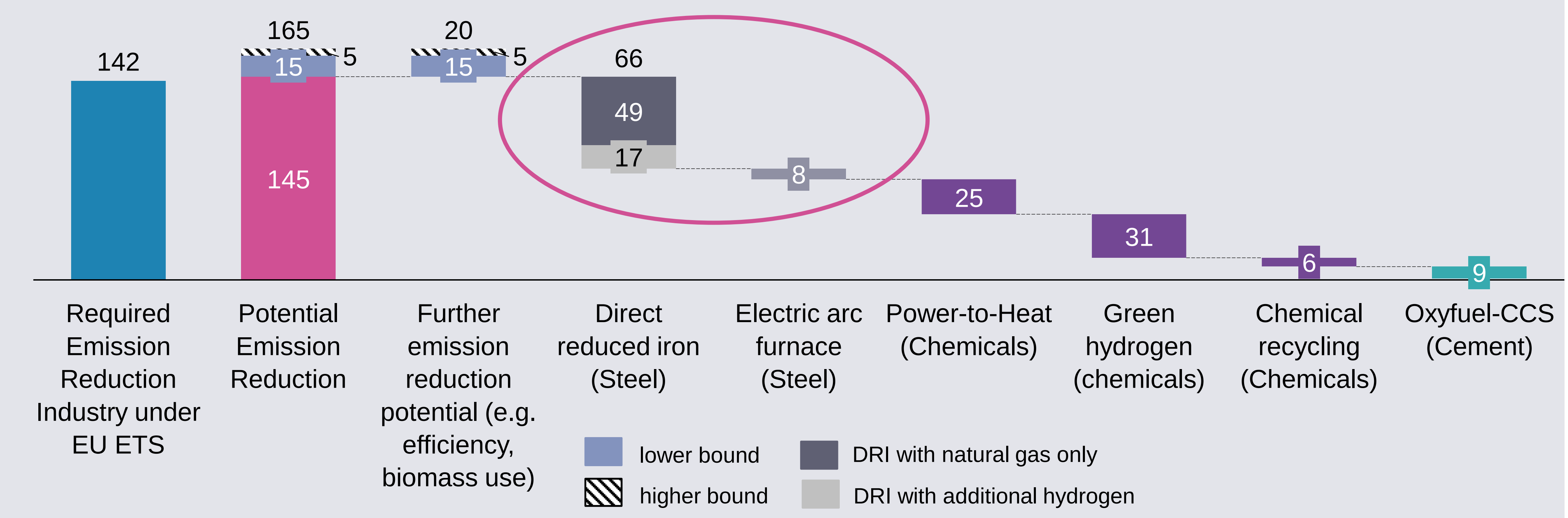
Breakdown of emissions in the steel sector:

→ Integrated blast furnace route: 180 $MtCO_2$ in 2017

→ Secondary steel route (scrap-based): 8 $MtCO_2$ 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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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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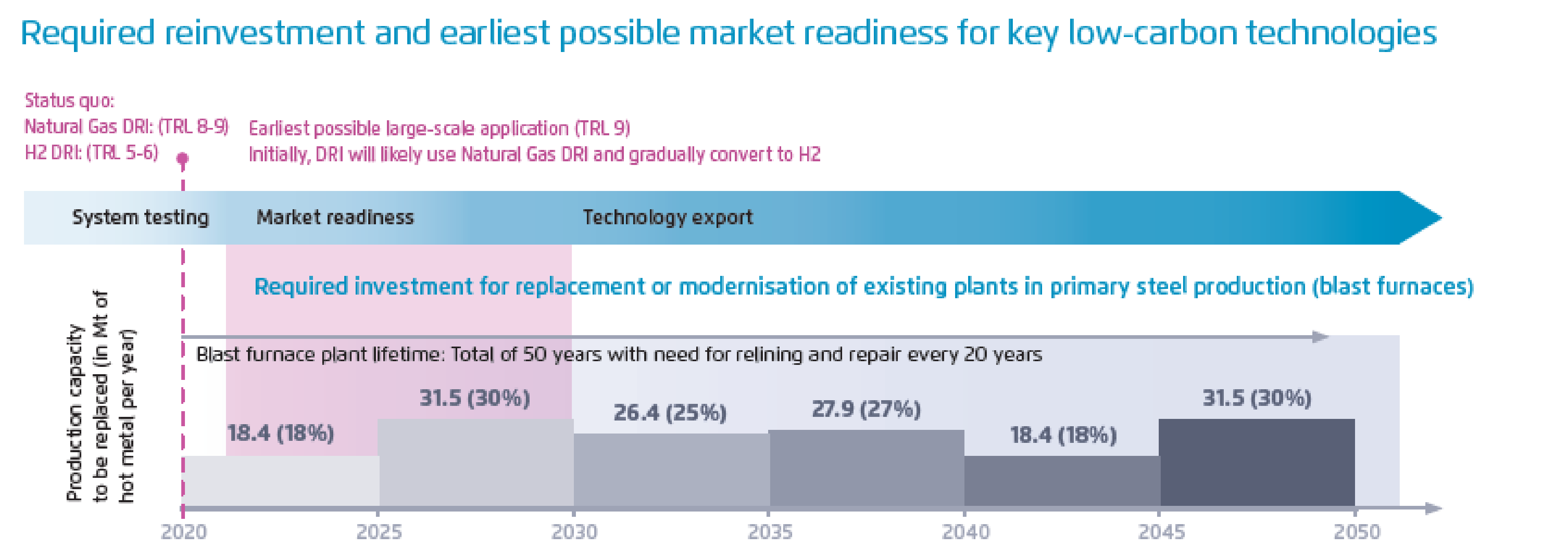
Country	Estimated total emissions 2017 [MtCO₂]	Estimated total emissions of secondary steel making in 2017 [MtCO₂]	Secondary steel production in 2017 [Mt/year]	Estimated total emissions of primary steel making in 2017 [MtCO₂]	Primary steel production in 2017 [Mt/year]	Hot iron production in 2017 [Mt/year]	Primary steel capacity to be reinvested [Mt/year] 2021–2025	2026–2030	2031–2035	2036–2040
Austria	13.1	0.1	0.7	13.0	7.4	6.3	2.9 (40%)	0.7 (9%)	0.7 (9%)	2.9 (41%)
Belgium	10.3	0.3	2.5	10.0	5.4	4.9		2.1 (50%)		2.1 (50%)
Bulgaria	0.1	0.1	0.7	0.0	0.0	0.0				
Czech Republic	7.6	0.0	0.2	7.6	4.3	3.7	2.4 (44%)	2.0 (37%)	1.0 (19%)	
Germany	58.8	1.6	12.4	57.3	31.0	27.8	4.2 (13%)	12.3 (37%)	8.2 (24%)	8.9 (26%)
Spain	10.4	1.2	9.6	9.2	4.8	4.5	2.4 (50%)		2.4 (50%)	
Finland	5.5	0.2	1.3	5.4	2.7	2.6		1.3 (50%)	1.3 (50%)	
France	22.6	0.6	4.8	22.0	10.7	10.7		5.5 (46%)	1.0 (8%)	5.5 (46%)
Greece	0.2	0.2	1.4	0.0	0.0	0.0				
Hungary	2.7	0.0	0.3	2.7	1.6	1.3			0.7 (50%)	0.7 (50%)
Italy	12.8	2.4	19.3	10.4	4.7	5.1	0.5 (5%)		2.0 (23%)	6.2 (72%)

Country	Estimated total emissions 2017 [MtCO₂]	Estimated total emissions of secondary steel making in 2017 [MtCO₂]	Secondary steel production in 2017 [Mt/year]	Estimated total emissions of primary steel making in 2017 [MtCO₂]	Primary steel production in 2017 [Mt/year]	Hot iron production in 2017 [Mt/year]	Primary steel capacity to be reinvested [Mt/year] 2021–2025	2026–2030	2031–2035	2036–2040
Luxembourg	0.3	0.3	2.2	0.0	0.0	0.0				
Netherlands	12.7	0.0	0.0	12.7	6.8	6.1	2.5 (42%)	3.5 (58%)		
Poland	11.2	0.6	4.6	10.6	5.7	5.2	3.6 (47%)		2.5 (33%)	1.5 (20%)
Portugal	0.3	0.3	2.1	0.0	0.0	0.0				
Romania	4.1	0.1	1.0	4.0	2.3	1.9			3.7 (100%)	
Sweden	6.6	0.2	1.6	6.4	3.1	3.1			3.0 (100%)	
Slovakia	8.5	0.0	0.4	8.5	4.6	4.1		4.1 (100%)		
Slovenia	0.1	0.1	0.6	0.0	0.0	0.0				
∑ 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%)**
United Kingdom	12.6	0.2	1.5	12.3	6.0	6.0	2.1 (29%)	0.8 (10%)	4.3 (61%)	
United Kingdom + EU	202.1	10.1	67.3	192.0	101.1	93.2	20.5 (18%)	32.3 (29%)	30.8 (28%)	27.9 (25%)

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



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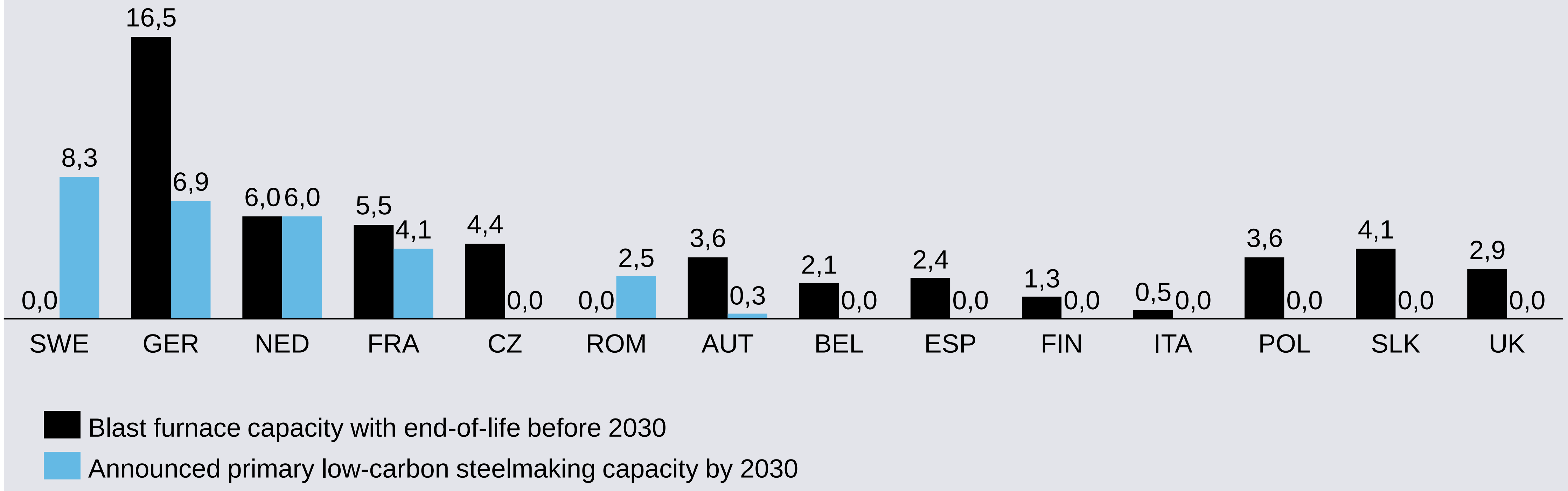
EU steel companies have already announced targets to build 28 Mt of low-carbon steelmaking capacity by 2030. However, there‘s a stark imbalance amongst EU member states…

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



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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)

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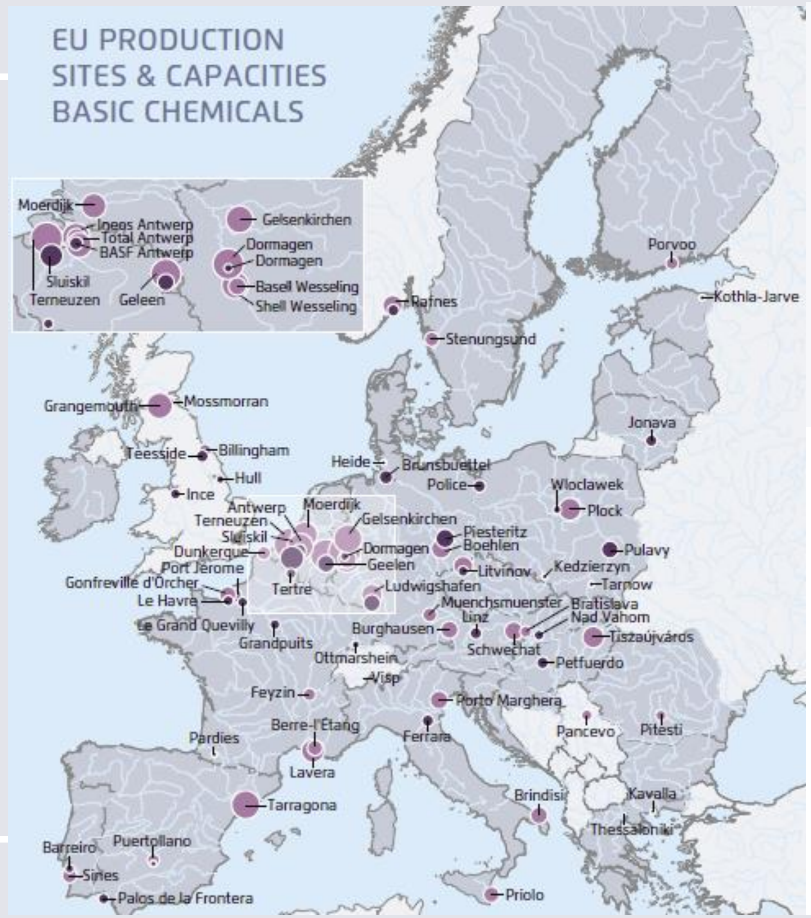
Deep-Dive Chemicals

Dr. Camilla Oliveira, Agora Energiewende

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.



Direct CO_2 emissions from the chemical industry in the EU27 (+UK) in 2017
129 $MtCO_2$ (+11 $MtCO_2$ in the UK)

Chemical production in the EU27 (+UK) in 2017
40.2 Mt of HVC (high value chemicals)
(+5.3 Mt of HVC in the UK)

Chemical demand in 2017 (EU28)
40.7 Mt of HVC

LEGEND

Production capacity basic chemicals

- Ammonia (kt/a)
- steam crackers (kt HVC/a)

- 1,000 kt/a
- 2,000 kt/a
- 3,000 kt/a

→ 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:

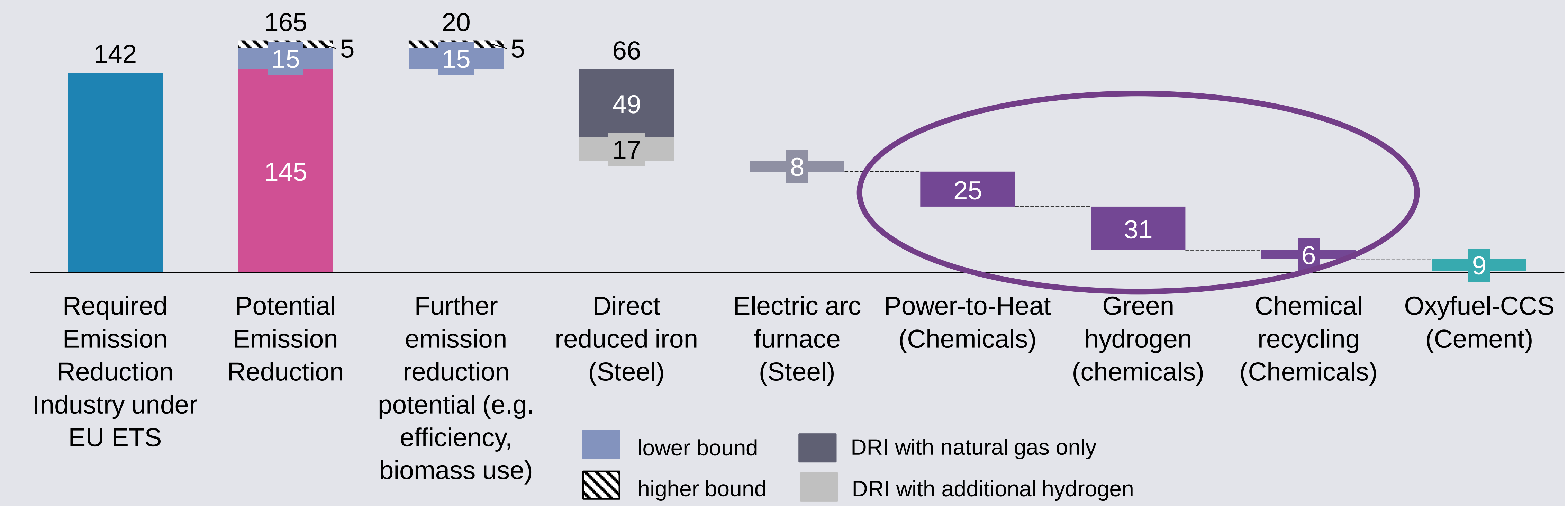
→ Industrial power plants (55 $MtCO_2$ in 2017)

→ Steam crackers (32 $MtCO_2$ in 2017)

→ Grey H2 production for ammonia (24 $MtCO_2$)

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



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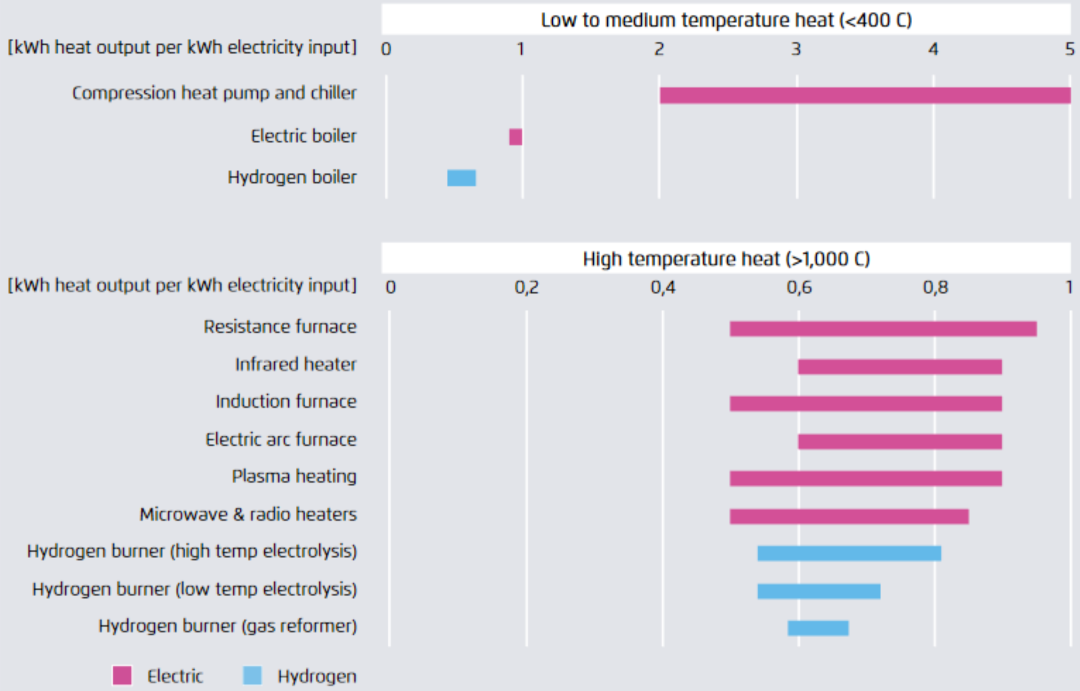
Power-to-Heat: With an accelerated coal phase-out in Europe, PtH can be deployed on a much larger scale

Comparison of heat production technologies: PtH vs. H2



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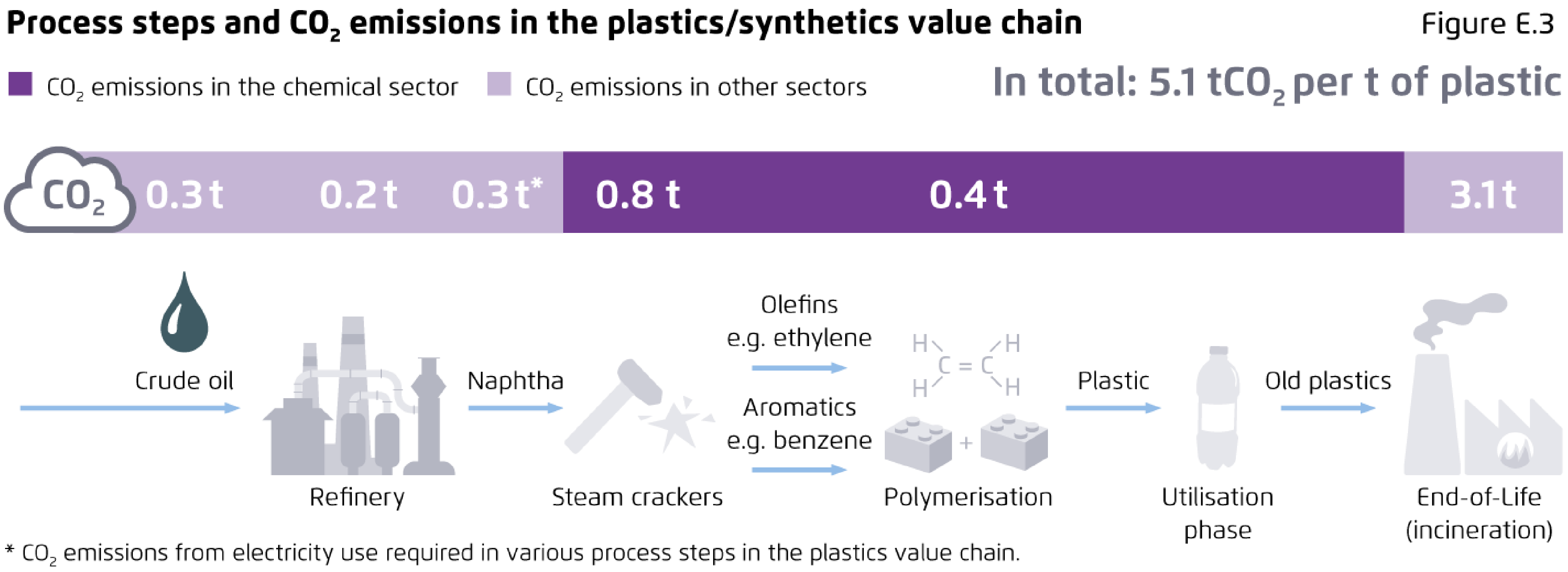
- PtH should be considered first before thinking about producing heat from H2
- The EU COM‘s impact assessment of the EU 2030 climate target of -55% saw only 2% coal in the EU power mix by 2030.
- Low and medium temperature heat in the chemical industry accounts for 1/3 of the total EU industry‘s heat 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 gCO_2/kWh)
- For a business case for PtH, the electricity price has to be competitive (incl. sensible tariffs and surcharges)

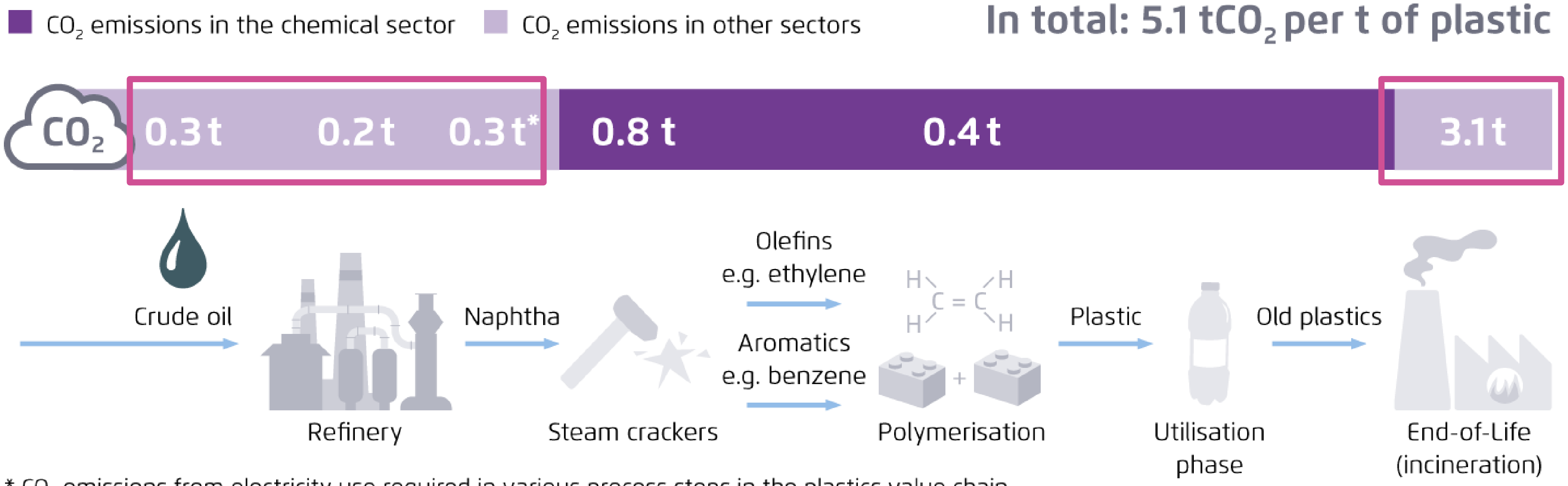
Plastics: The direct emissions along the plastics value chain in the EU account for ~130 MtCO2. A chemical industry based on circular carbon cycles is key to climate-neutral plastics.



Chemical recycling has the potential to reduce the majority of upstream emissions and during the end-of-life.

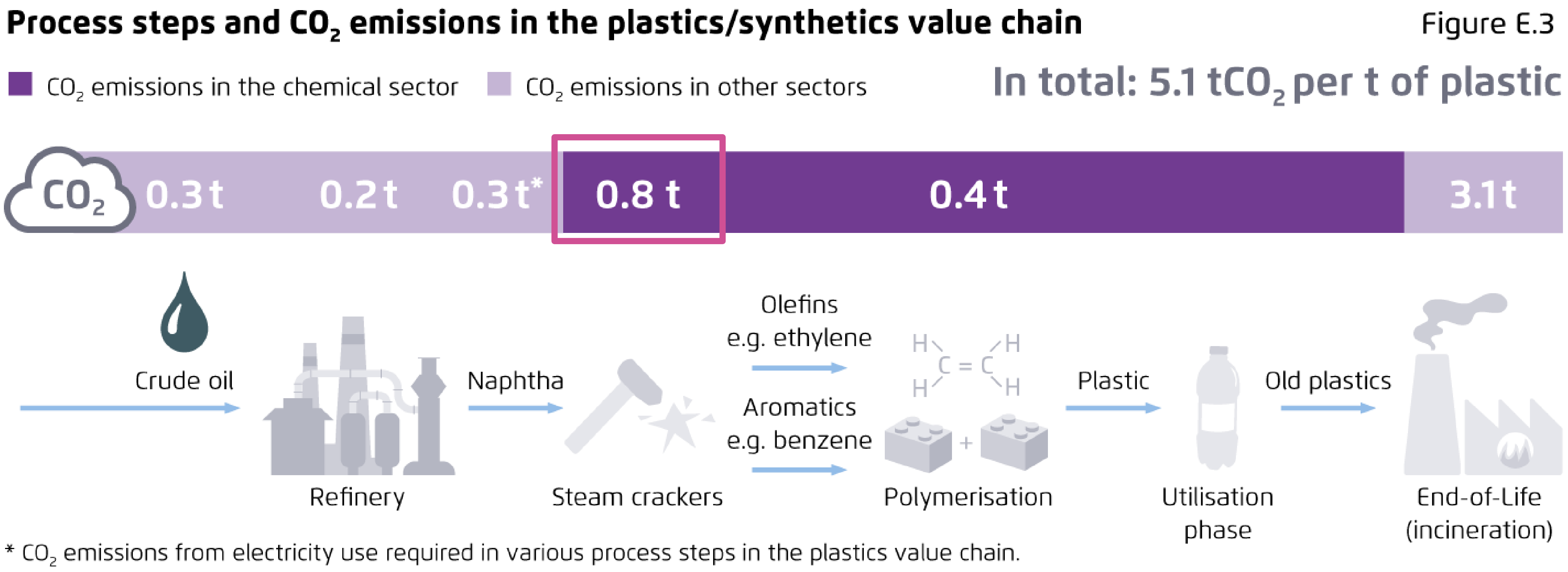
Process steps and CO_2 emissions in the plastics/synthetics value chain

Figure E.3



* CO_2 emissions from electricity use required in various process steps in the plastics value chain.

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

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

Project, Site	Country	Company	Status Quo	Fuel	Timeline
Cleaning of pyrolysis oil, Geleen		Sabic	**Chemical Recycling:** Semi-commercial plant for cleaning 15 kt of pyrolysis oil from chemical recycling per year (TRL 6-7).	Waste plastics	2021: start of production
Waste to Chemicals, Rotterdam		AirLiquide, Enerkem, Nouryon, Shell	**Chemical Recycling:** production of methanol from residual waste. 220,000 t of methanol production capacity/year (TRL 6-7).	Residual waste	2020: planned start of construction
ChemCycling, various locations		BASF, Remondis	**Chemical Recycling:** production of pyrolysis oil from waste plastics in pilot plant (TRL 4-5).	Waste plastics	2019: started pilot operation
PYRECOL, Litvinov		Unipetrol	**Chemical Recycling:** construction of pilot pyrolytic unit to convert waste plastics (TRL 4-5).	Waste plastics	2020: construction of pilot plant
Carbon4PUR project, Marseille Fos		Covestro, ArcelorMittal, Recticel	**CCU in long-lived products:** pilot plant to convert metallurgical gases of steel production to polyurethane (TRL 4-5).	Waste gases	2020: construction of pilot plant
Rheticus project, Marl		Evonik, Siemens	**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).	Solar-driven electro-chemical reduction	2020: pilot plant started operation
E-Cracker, Ludwigshafen		BASF, Sabic, Linde	**Electrified steam cracker:** plan to build multi-megawatt demonstration plant (TRL 6-7)	Electricity	2023: demo plant

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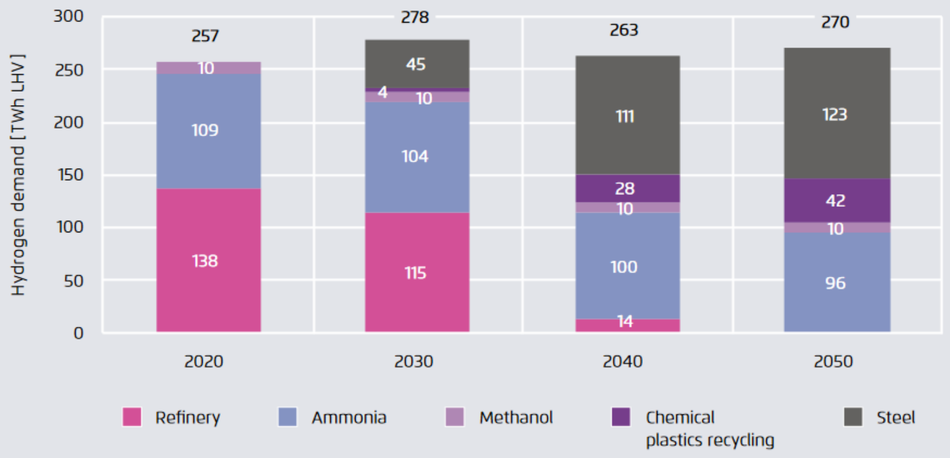
- → Although it is not clear how the future of refinery will impact the chemical industry, it is important to establish alternative climate-neutral production technologies before 2030 to meet the -55% reduction target and to secure the EU chemical industry’s long-term competitiveness
- → Chemical recycling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

Estimated industrial hydrogen demand for the EU steel and chemicals industry



AFRY, 2021

- 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

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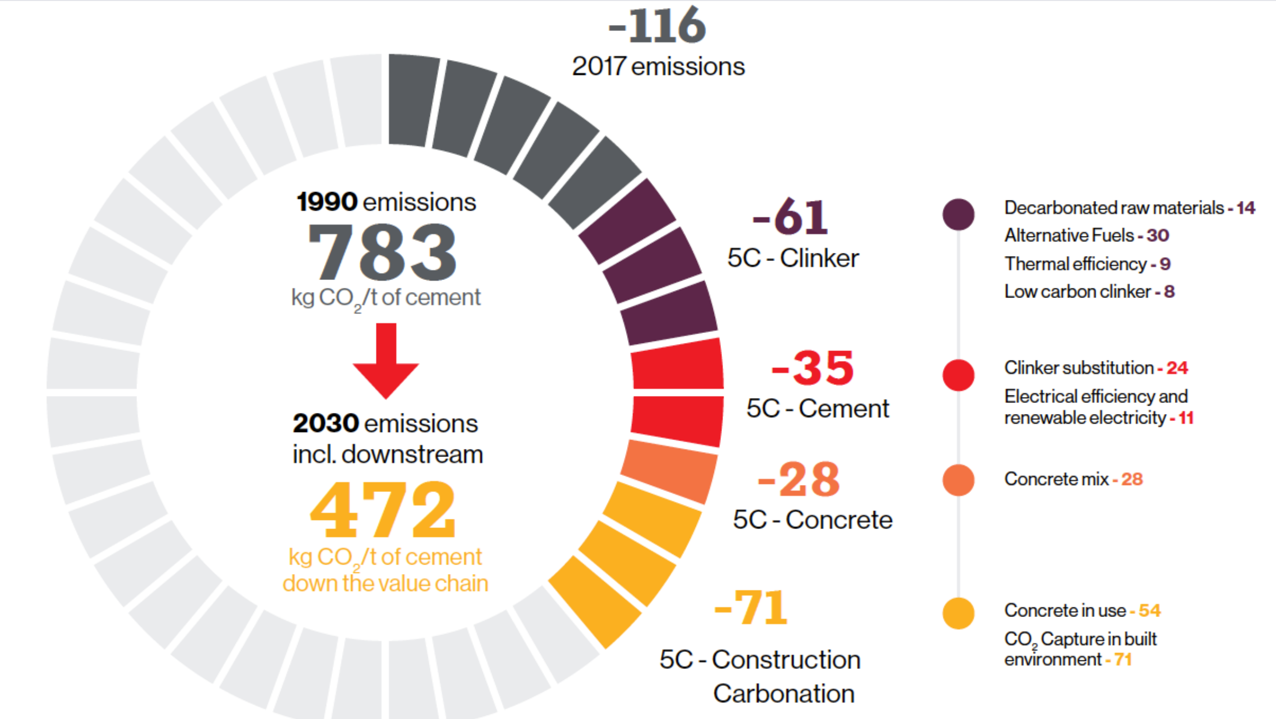
Deep-Dive Cement

Clemens Schneider, Wuppertal Institute

Cement: State-of-play and recent sector roadmapping

CEMBUREAU 2030 Roadmap

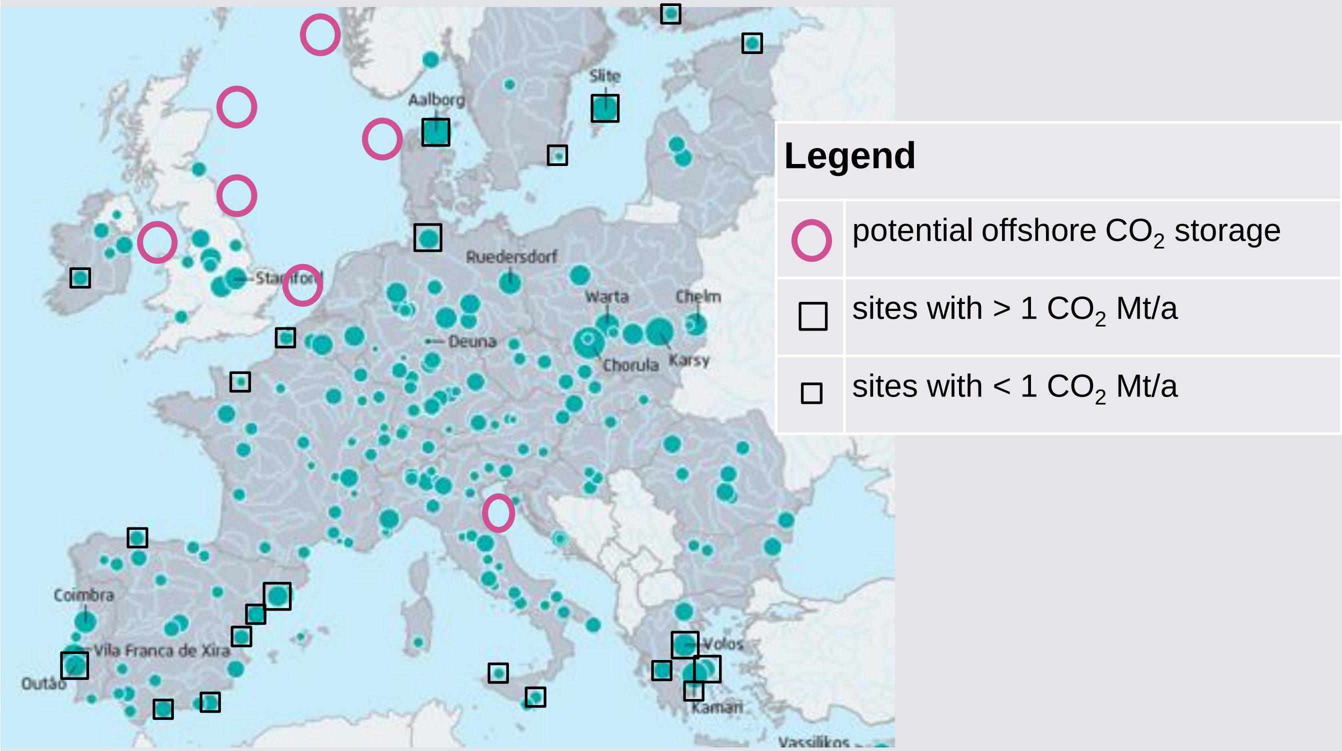


Cembureau, 2020

- → **Relative emission reductions** (about 15%) have been **achieved** since 1990.
- → Several **levers** to **further reduce CO_2** emissions **available** along the value chain cement / concrete.
- → However: clinker still needed in the long term → „unavoidable“ (process) emissions
- → Cement **industry envisions CCU/S** to be the largest mitigation lever (-280 kt CO_2 / 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



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- There are several **offshore CO_2 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 CO_2 storage** sites.
- This would enable a CO_2 **reduction between 9 and 17 Mt CO_2/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

Project, Site	Country	Company	Status Quo	Timeline
Brevik CCS project, Brevik	Norway (flag)	HeidelbergCement	The project foresees to build an industrial-scale plant to capture and store 0.4 $MtCO_2$/year in 2024.	2024: commercial CCS
ECRA-CCS project, various sites	EU (flag)	European Cement Research Academy and various companies	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)	2020–2023: building demonstration plant
Catch4climate, Mergelstetten	Germany (flag)	Buzzi Unicem-Dyckerhoff, Heidelberg Cement, SCHWENK Zement, Vicat	Plans to build demonstration plant for Oxyfuel-capture (TRL 6-7). The captured CO_2 is intended to be used to produce ‚reFuels' such as kerosene.	2021–2024: demo plant
LEILAC II, Hannover	Germany (flag)	HeidelbergCement, Cemex	Planned construction of a CCS demonstration plant that captures 0.1 $MtCO_2$/year (TRL 6-7)	2025: demo plant
LEILAC I, Lixhe	Belgium (flag)	HeidelbergCement	Pilot plant has a production volume 10 t of cement clinker/hour (TRL 4-5)	2019: started pilot operation

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- → **Post-combustion CCS-technology** is most advanced and **ready for implementation** (Brevik). Upscaling the share of captured CO_2 on plant level is feasible.
- → **Oxyfuel-CCS** is energy-efficient and allows capturing both process- and energy related CO_2. Expected full-scale availability: 2025-30.
- → **LEILAC** very efficiently captures process emissions in a pure CO_2-stream. Potential for electrification of calciner. 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 CO_2-infrastructure required to access hinterland cement plants
  → maybe start from local hubs, but dimensioning the pipelines requires a bigger systemic picture

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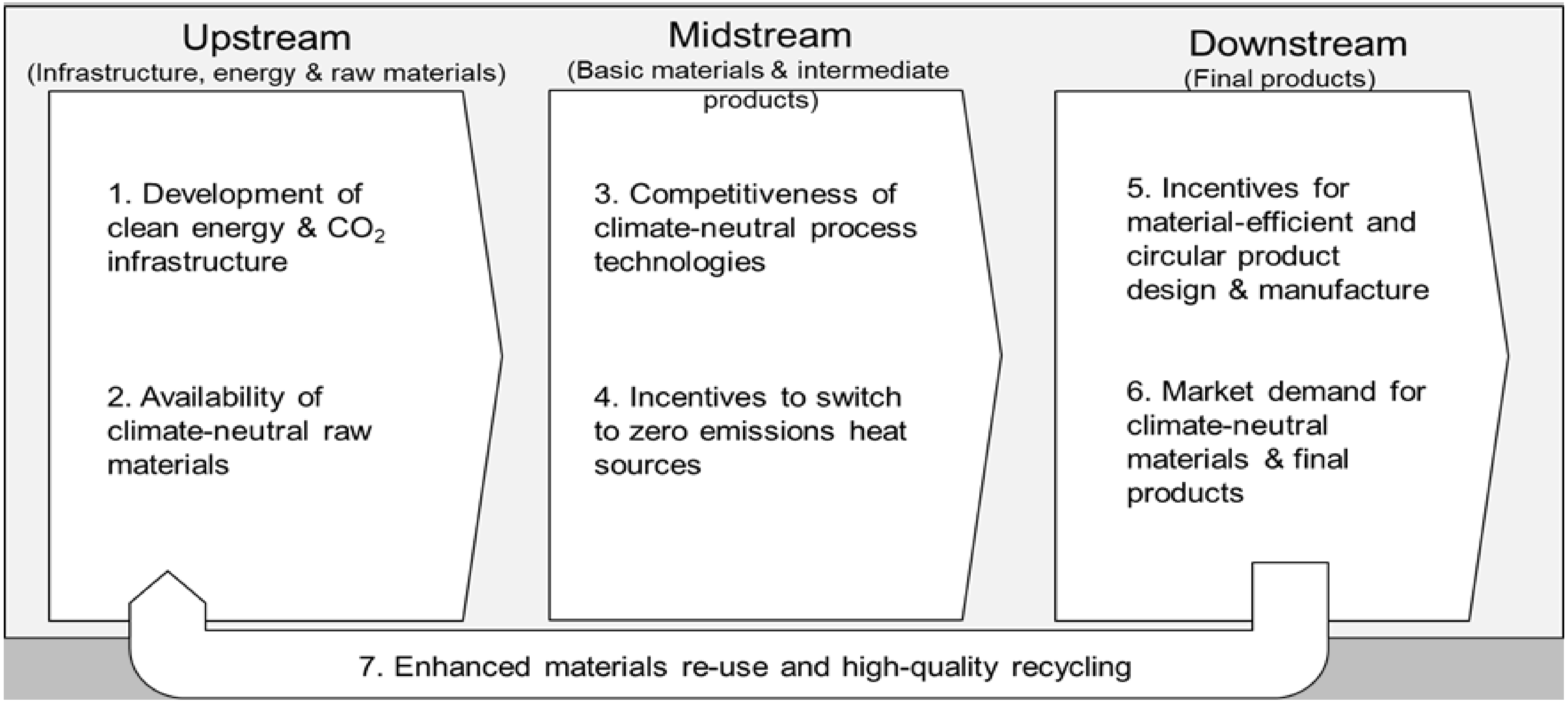
What policy priorities need to be met to kickstart the EU industry transition

Dr. Oliver Sartor, Agora Energiewende

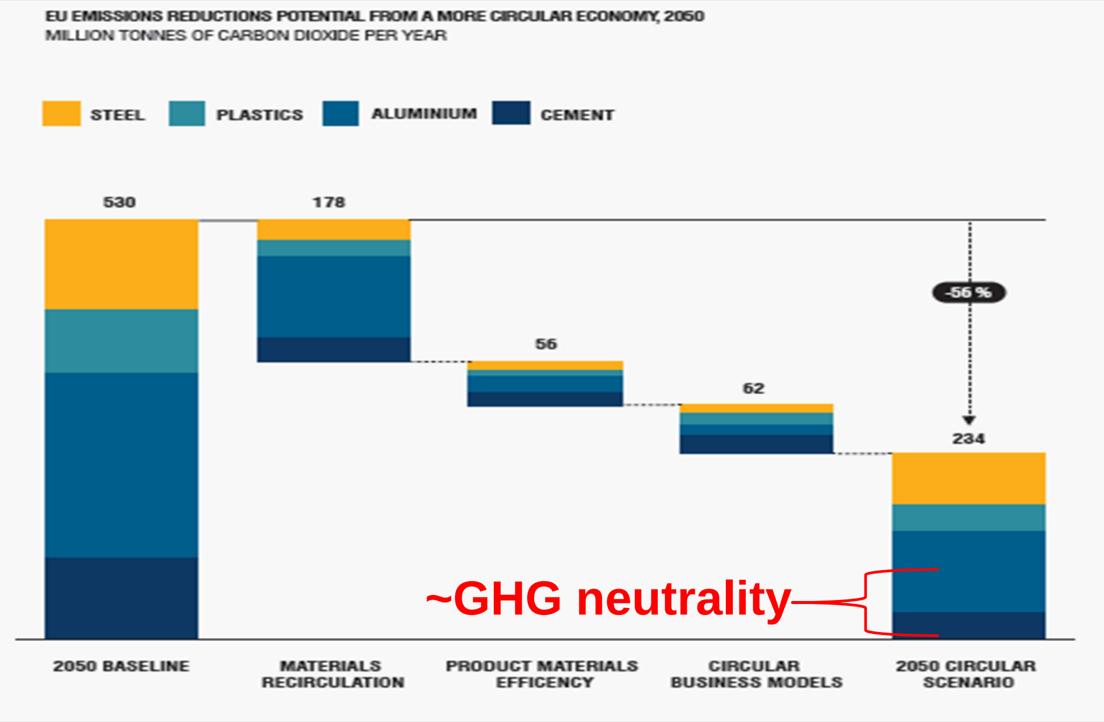
EU is implementing a new « European Green Deal » during this legislative period (2019-2024)

- 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"



Extend and strengthen policies for material efficiency and circularity to most CO2-intensive basic materials



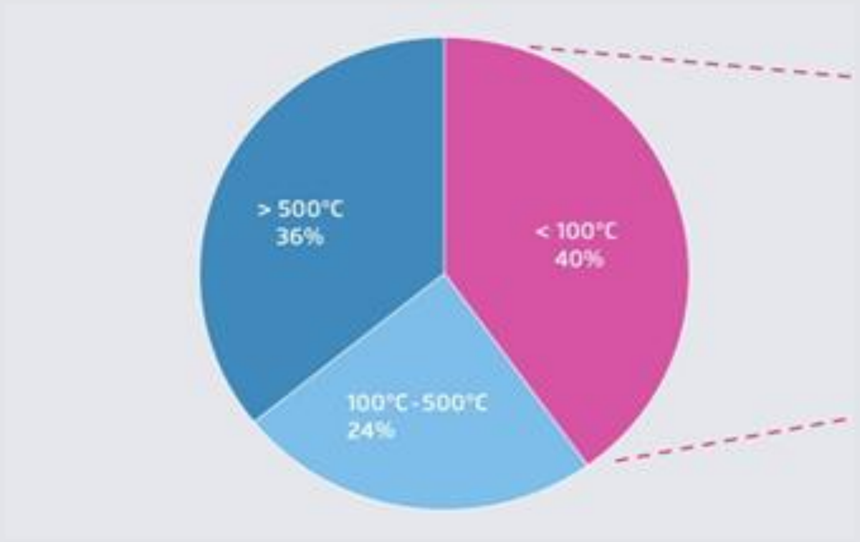
Material Economics, 2018

- 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*

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

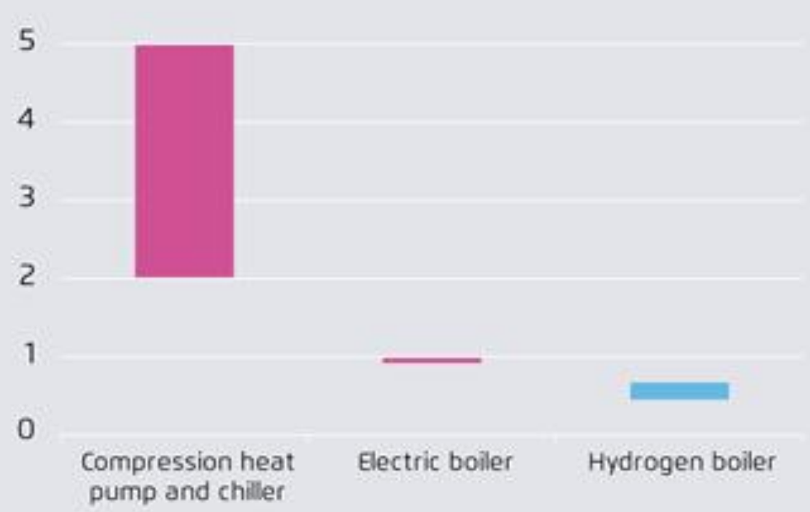
40% of EU industrial nat gas use goes to heat below 100C and can be supplied with heat pumps or other mature solutions

Natural gas final energy consumption 2017 in the EU industry se



FFE (2020). See the publication for distribution by EU member state.

kWh heat output per kWh electricity input



Agora Energiewende (2021)

Infrastructure for industry decarbonisation requires governance, finance and appropriate sustainability rules…

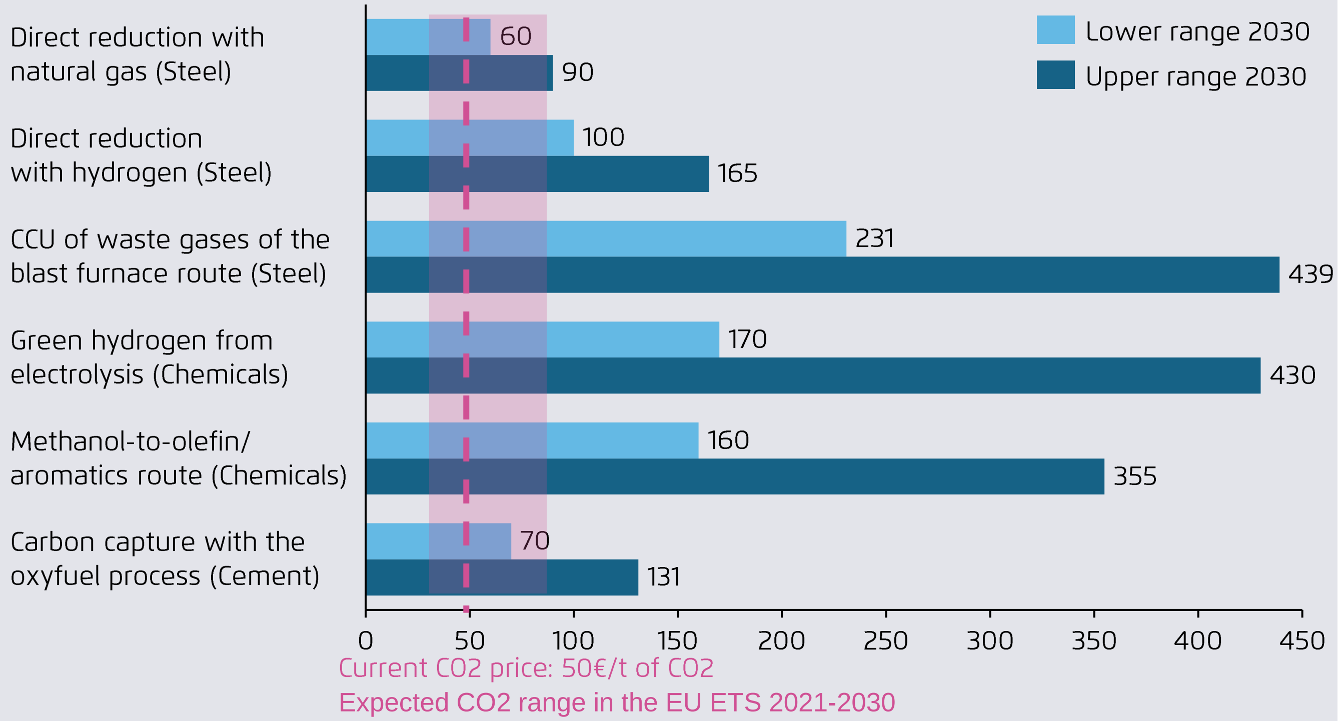
1. Assign responsibility for provision and financing decarbonization infrastructure for industrial transformation (e.g. Clean power, H2, CCS), e.g. via the gas/power network operators

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

CO2 abatement costs of key low-carbon technologies and expected CO2 prices in the EU ETS until 2030



Agora Energiewende / Wuppertal Institute, 2021

- 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

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)

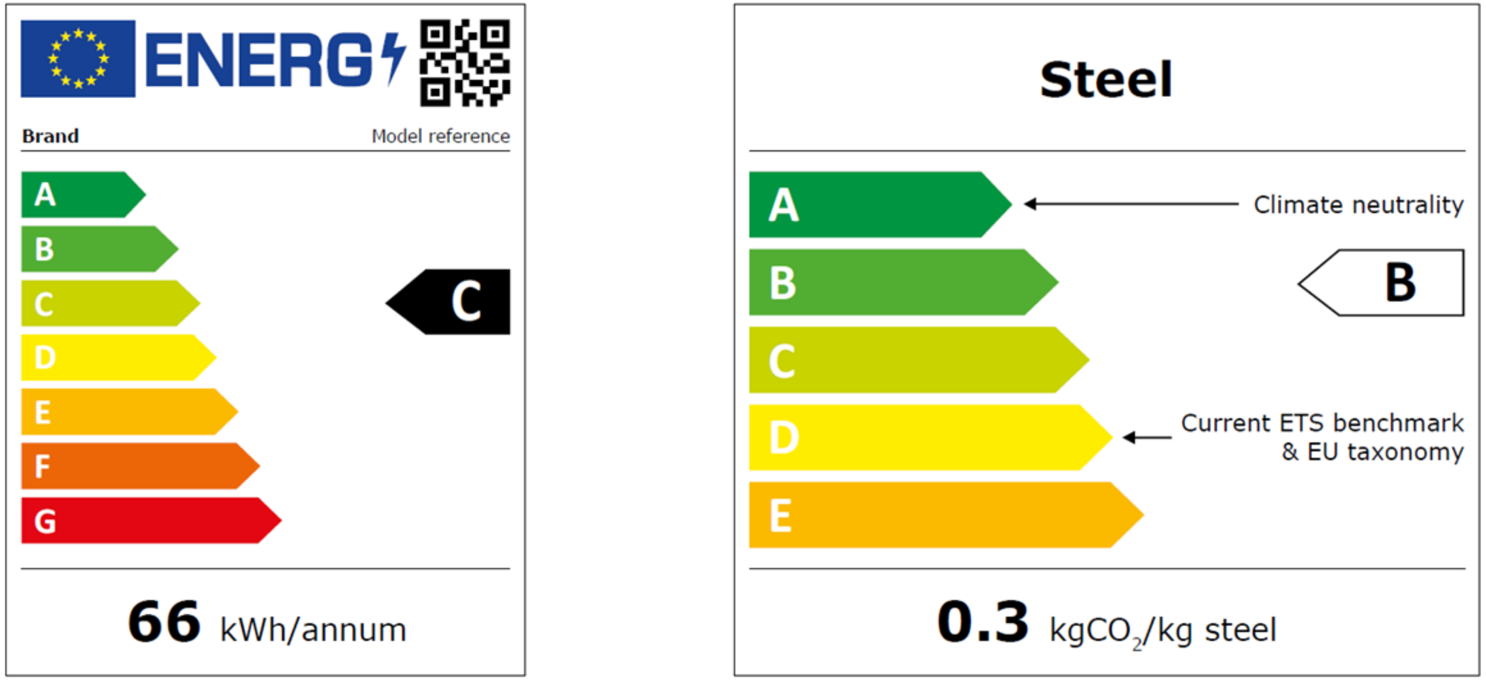
MS Level: 2 main options:

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 ... ver time..
- Justificati ... circular and low-CO2 virgin mat
- Conditio ... have transparent and com

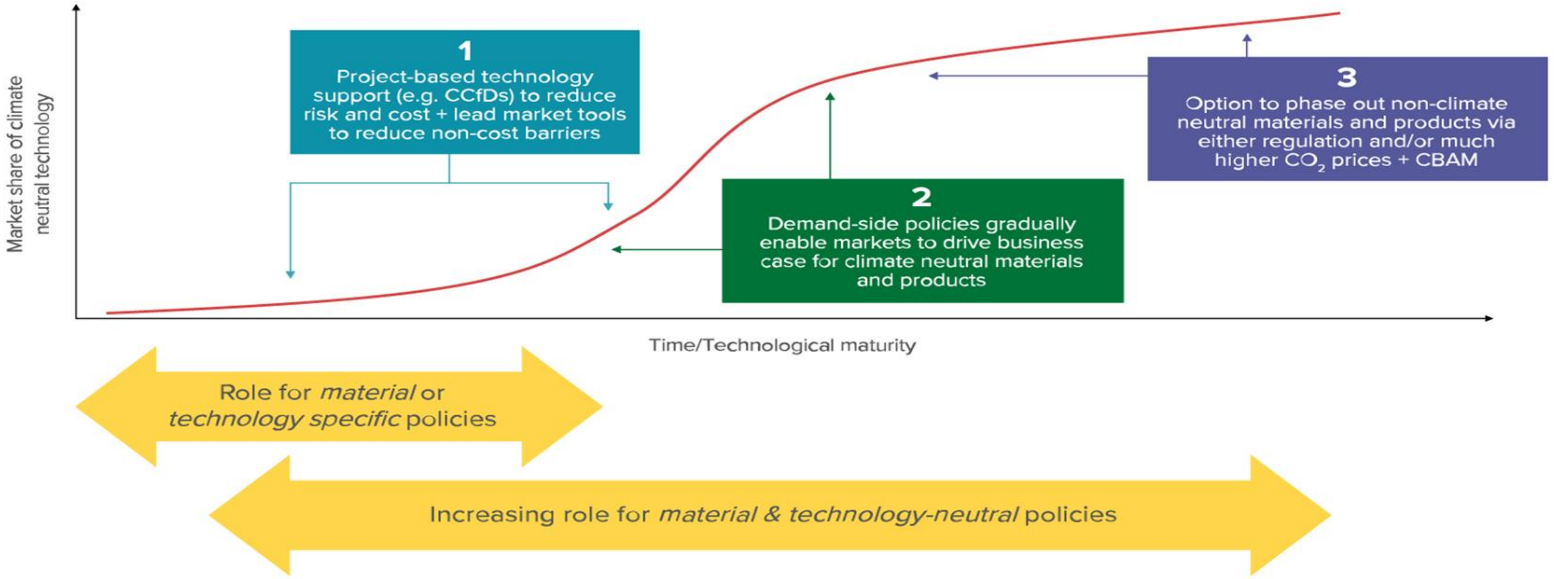
Figure 10: Copying the Energy Performance Rating Labels model (left) to make 'material CO_2 performance rating labels'



Source: European Commission[39] (left), authors' own example (right)

The big picture: How do these supply and demand side measures fit together over time?

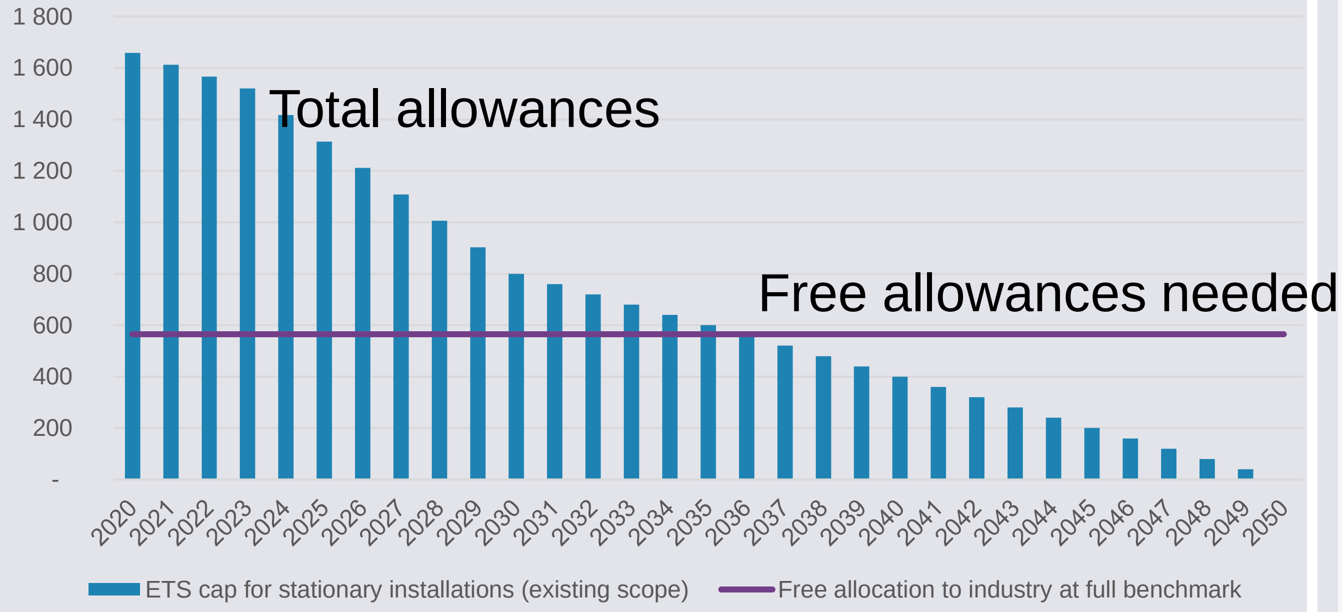
Figure 11: The possible role of material-specific vs material-neutral policy drivers at different stages of the transition



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

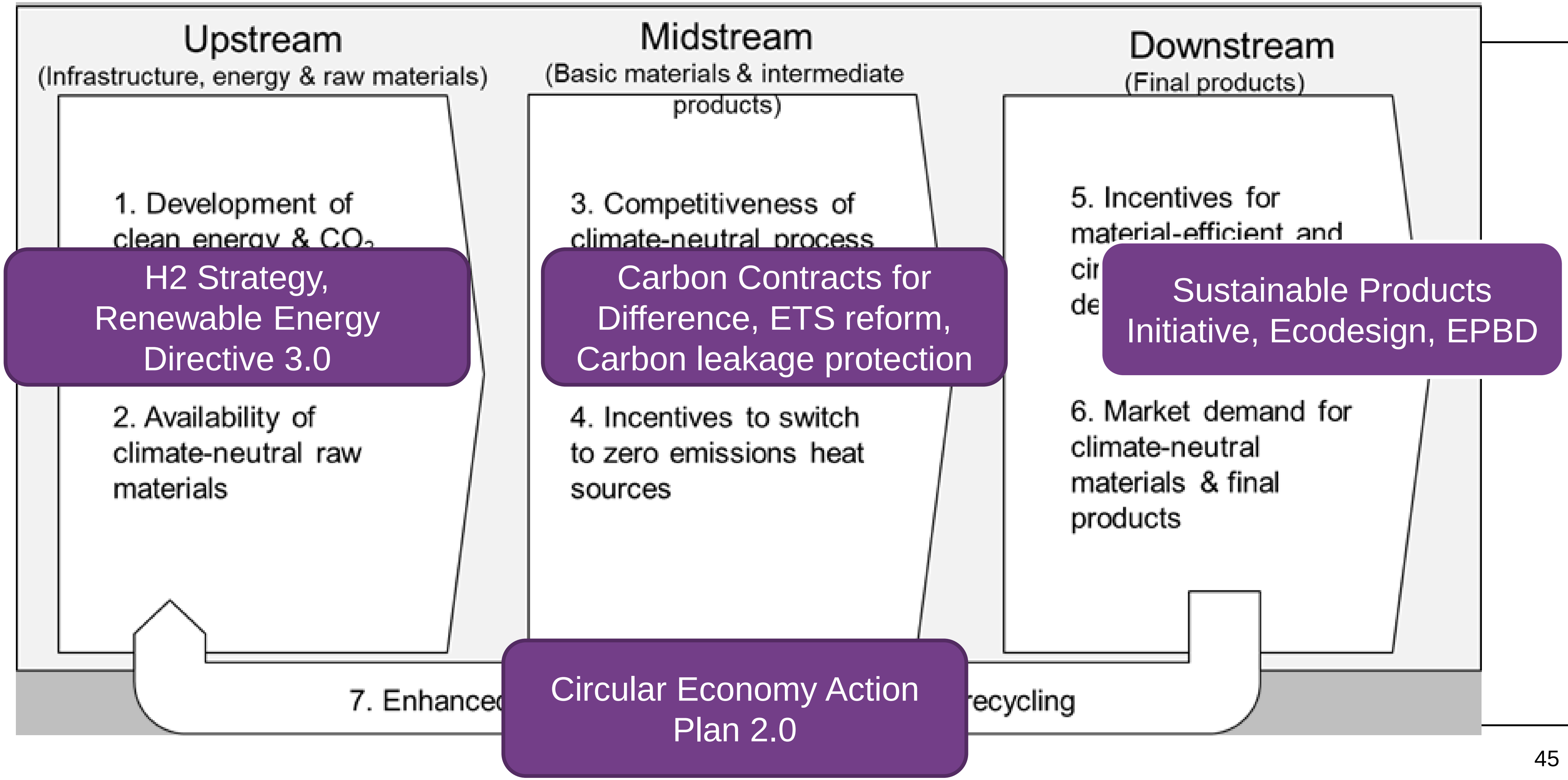
Free allocation and the EU ETS emissions cap with an EU-wide -55% in 2030 and climate neutrality in 2050 target…



Source: Agora Energiewende

- **The EU therefore needs to shift to an alternative system**
- **It also needs to stop creating distorsions 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.**

Key elements of "Clean Industry Package" vs. key EU regulatory files needed to take them forward



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Questions or Comments? Feel free to contact me:

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