

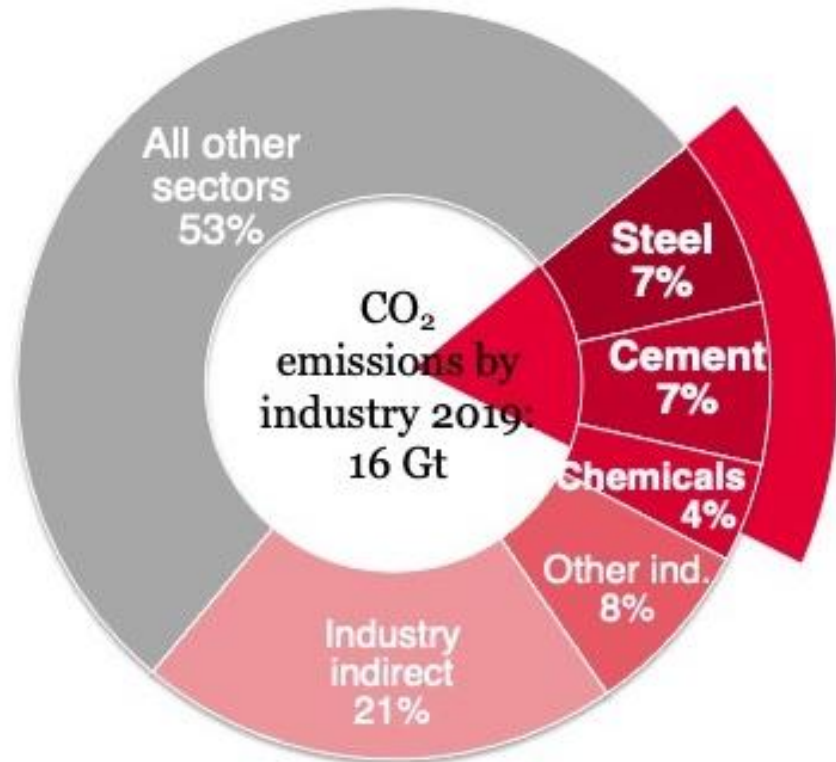
Keynote: European perspective on industrial decarbonization

The role of natural gas, technical solutions and policy
tools

Taiyuan Energy Low Carbon (TELC) Development Forum
12 September 2023, Berlin

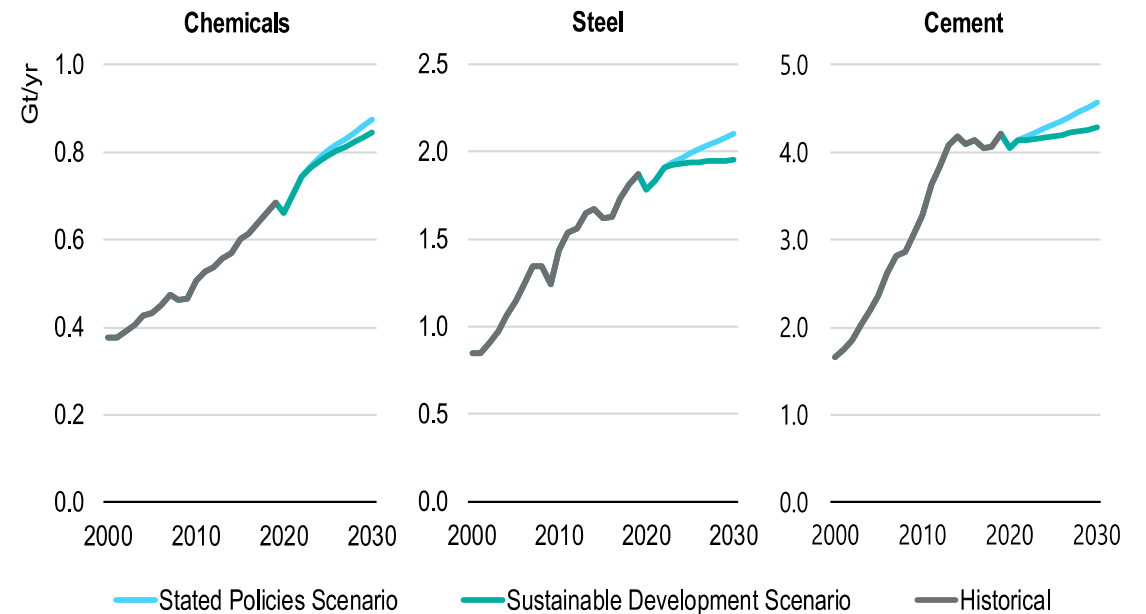
Industrial decarbonisation is needed on a global scale

3 basic industries directly emit 19% of global energy related CO₂ emissions...



Source: own figure based on IEA ETP 2020 (4), data for 2019 (includes process emissions)

... and the demand for basic materials is expected to rise further (scenarios for 2030 by IEA)

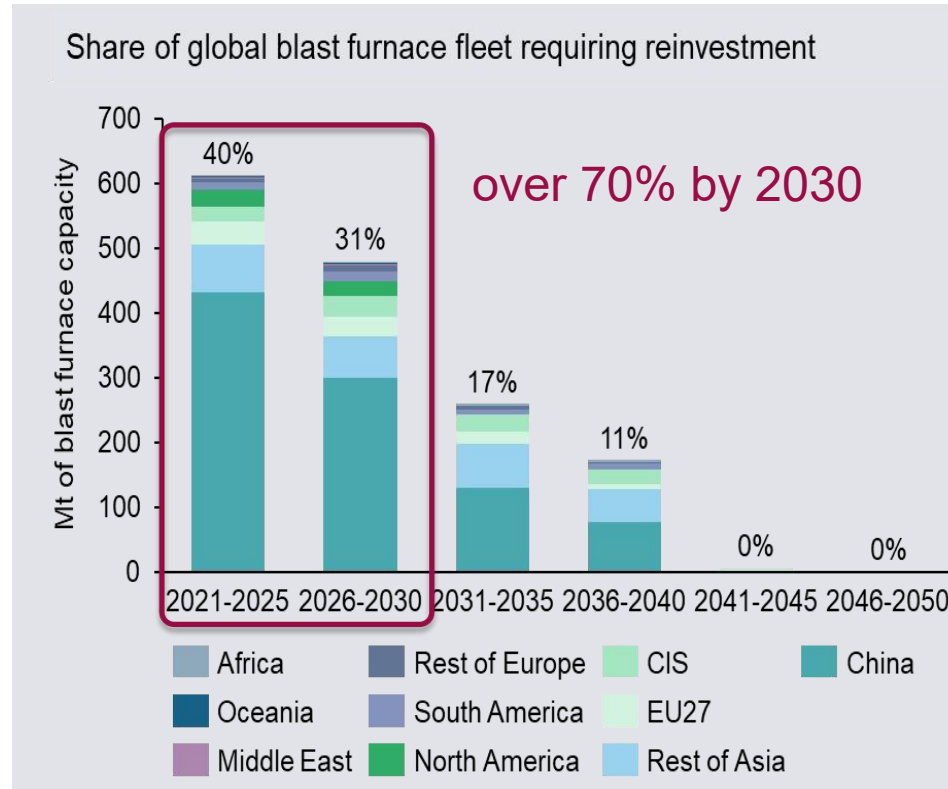
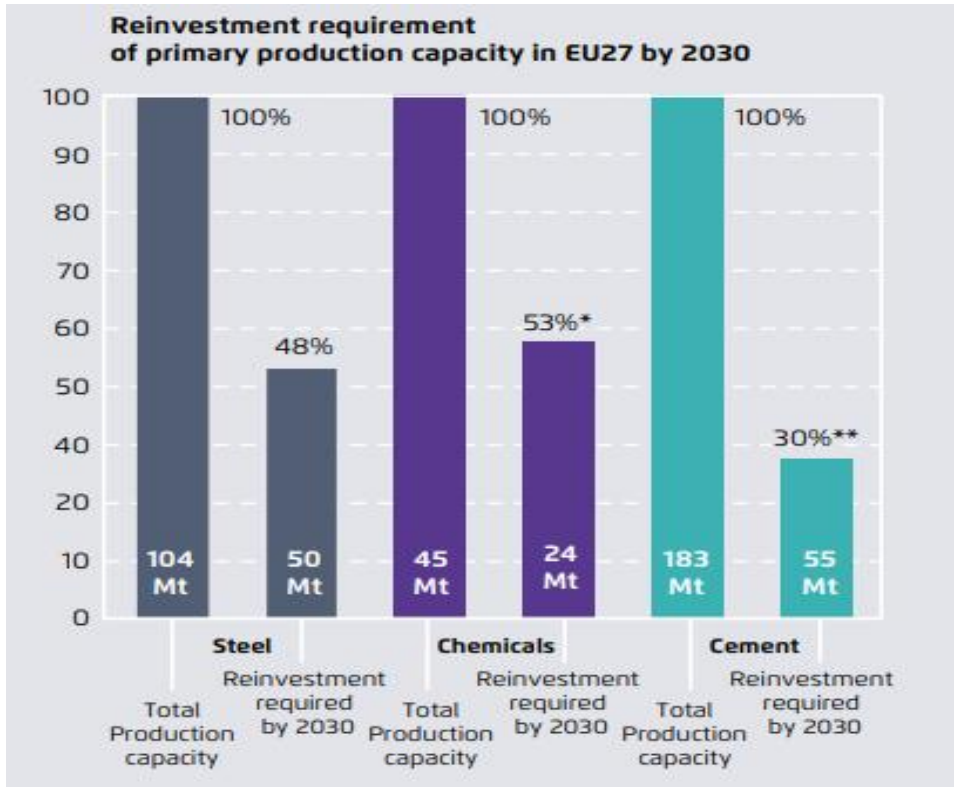


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Note: Chemicals includes the primary chemicals ethylene, propylene, and benzene, toluene, mixed xylenes, ammonia and methanol as an aggregate proxy for sector activity growth.

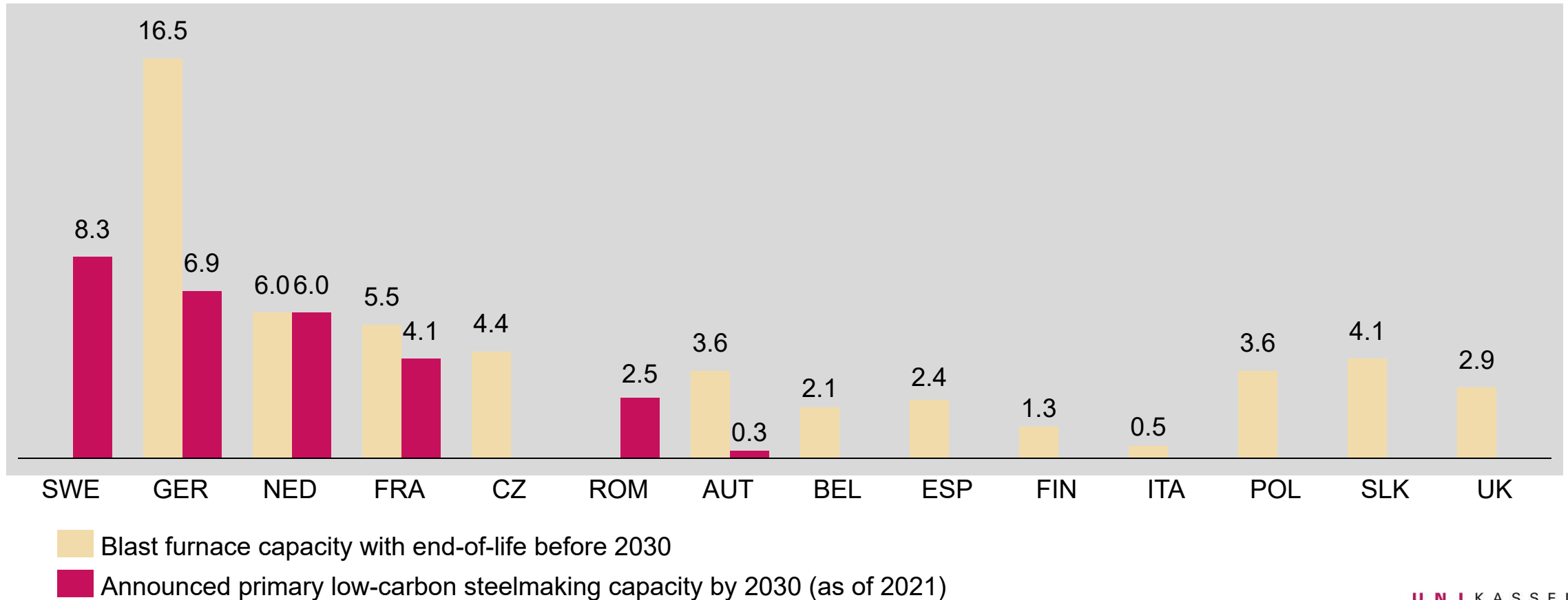
Industrial transition is urgent

Climate neutrality 2050 is only one investment cycle away



European (steel) industry plans to live up to the challenge

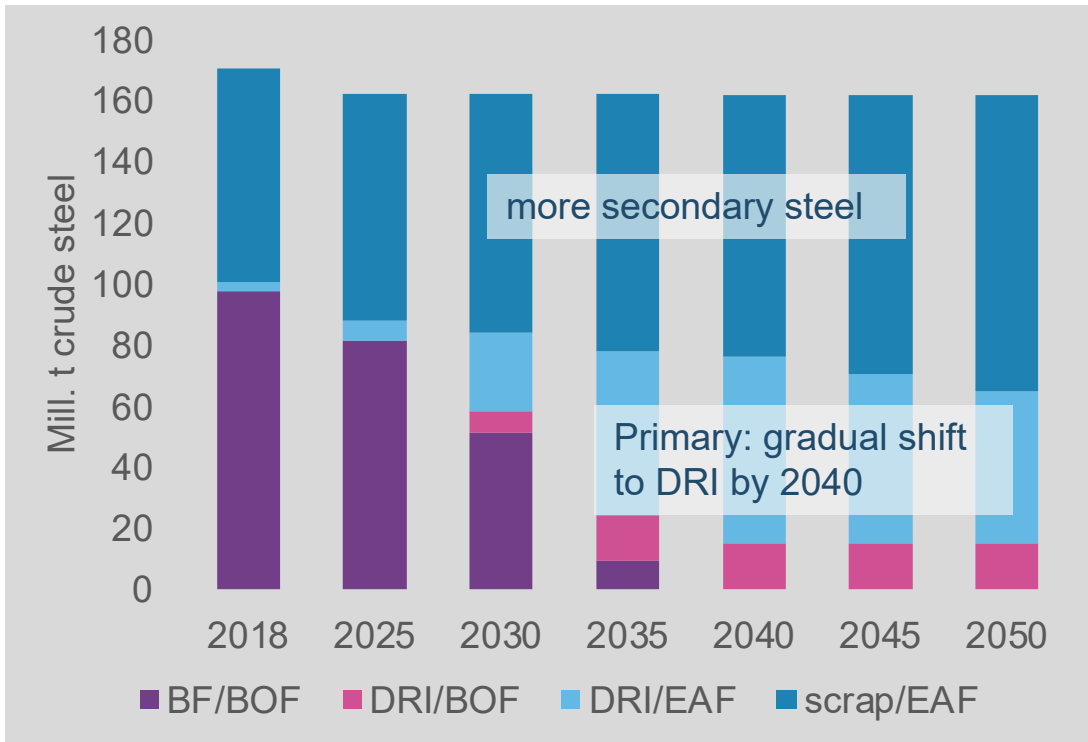
Announced low carbon steel making investments vs. blast furnace lifetime (in Mt / year)



Transformation scenario of EU iron & steel making to net zero by 2050

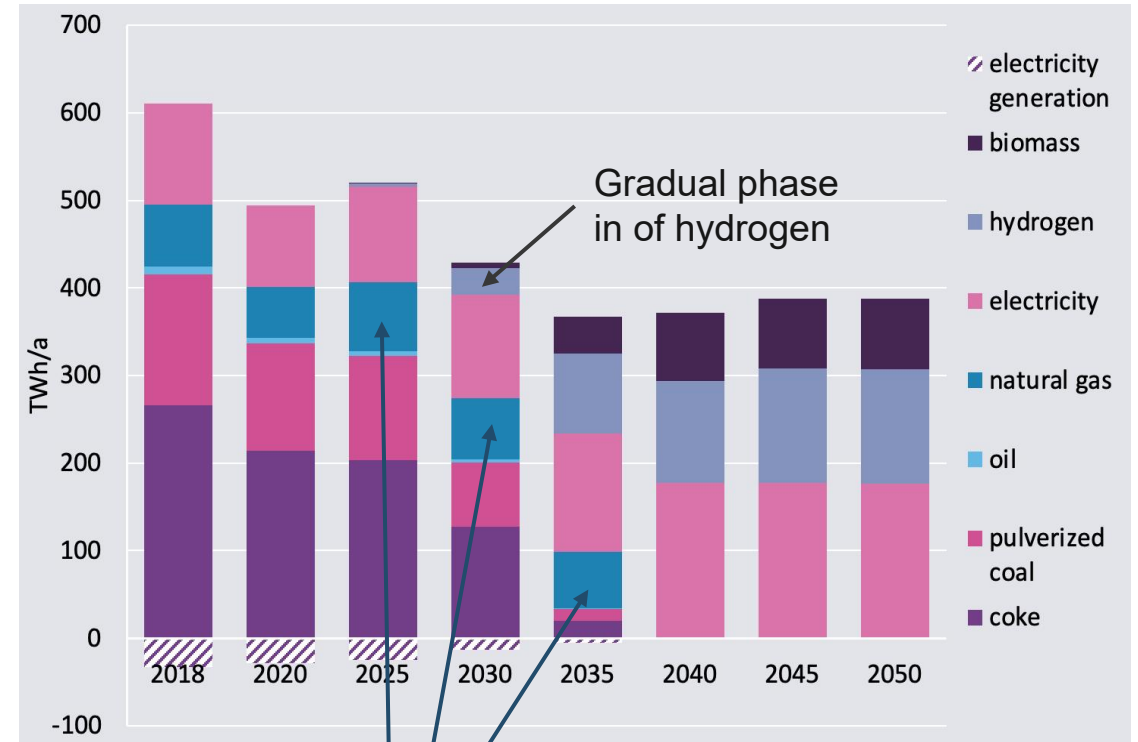
Many DRI-plants will initially use natural gas and gradually shift – other industries overcompensate additional NG

Crude steel production by process



Source: Wuppertal Institute (2023)

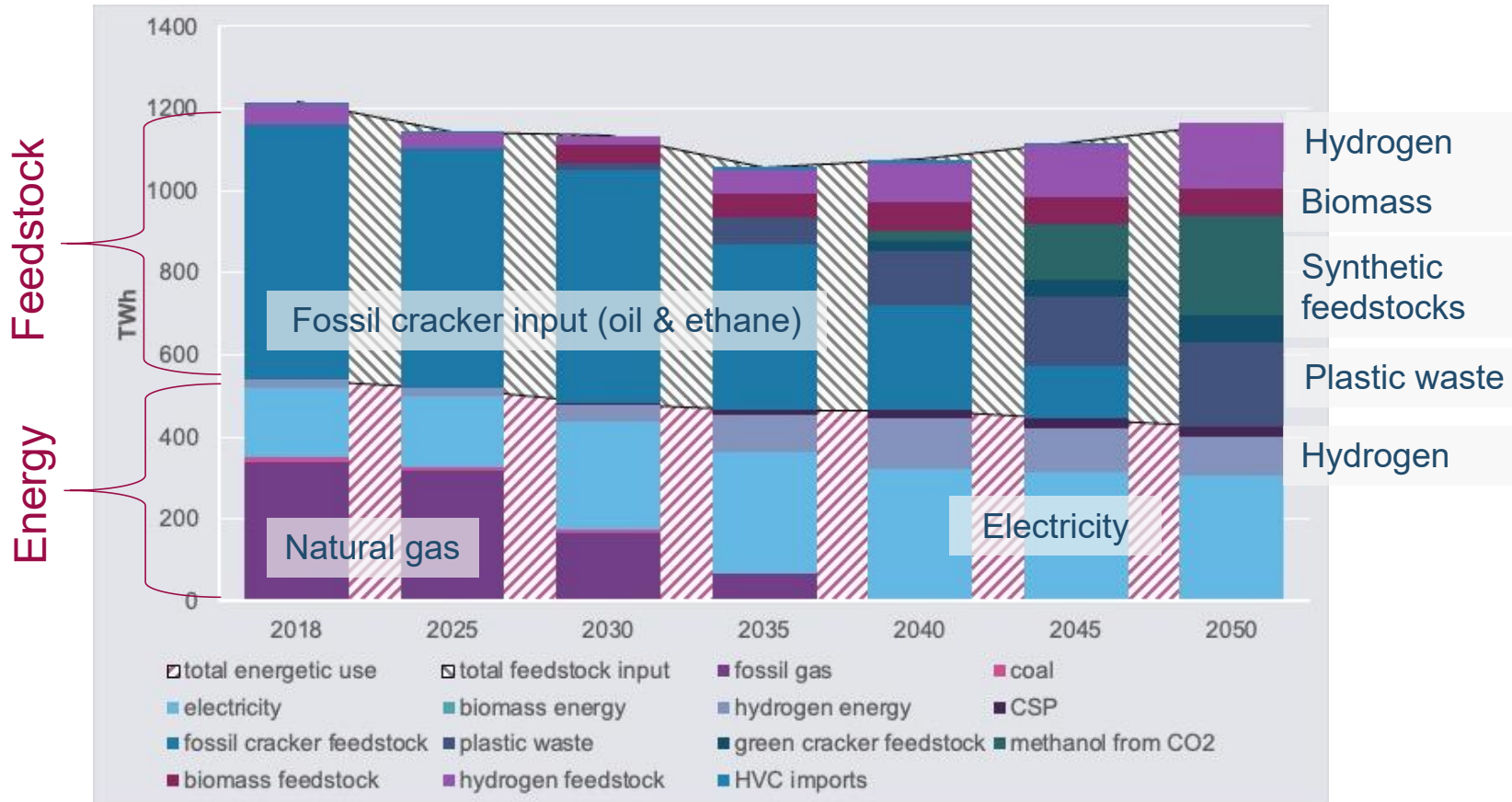
Primary energy use of the steel industry in the EU-27



Increasing use of NG for a transitional period

Defossilisation scenario of chemical industry (EU 27)

Final energy use and feedstock input in the chemical industry in the EU-27

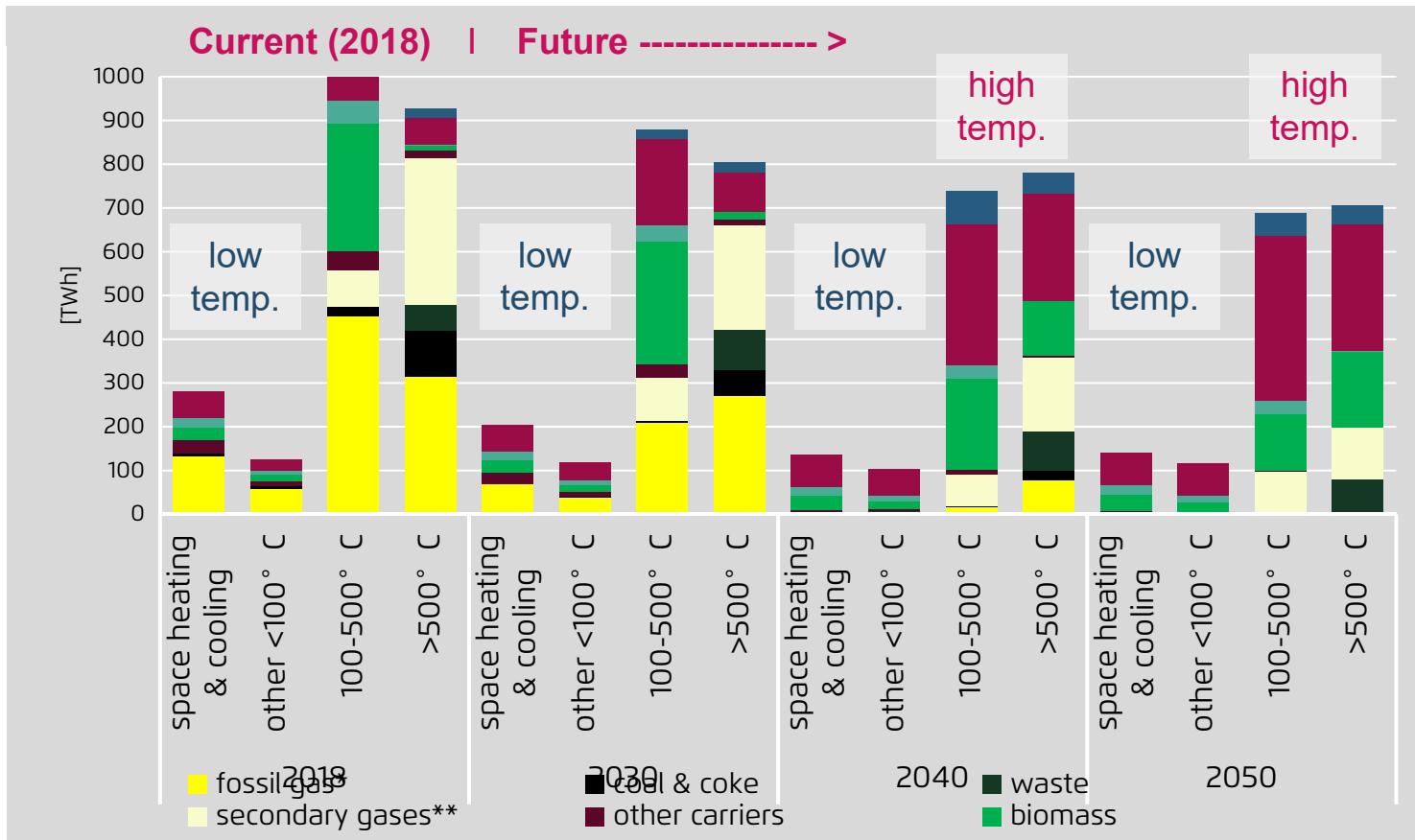


- Energy supply **non fossil by 2040**, feedstock by 2050
- Green feedstock for plastics enables **negative emissions**
- **Massive investments** in waste treatment plants and in methanol based production routes are needed.

Wuppertal Institute (2023)

Phase out of natural gas in industry (EU 27)

Final energy use for heat in the industry sector per temperature level

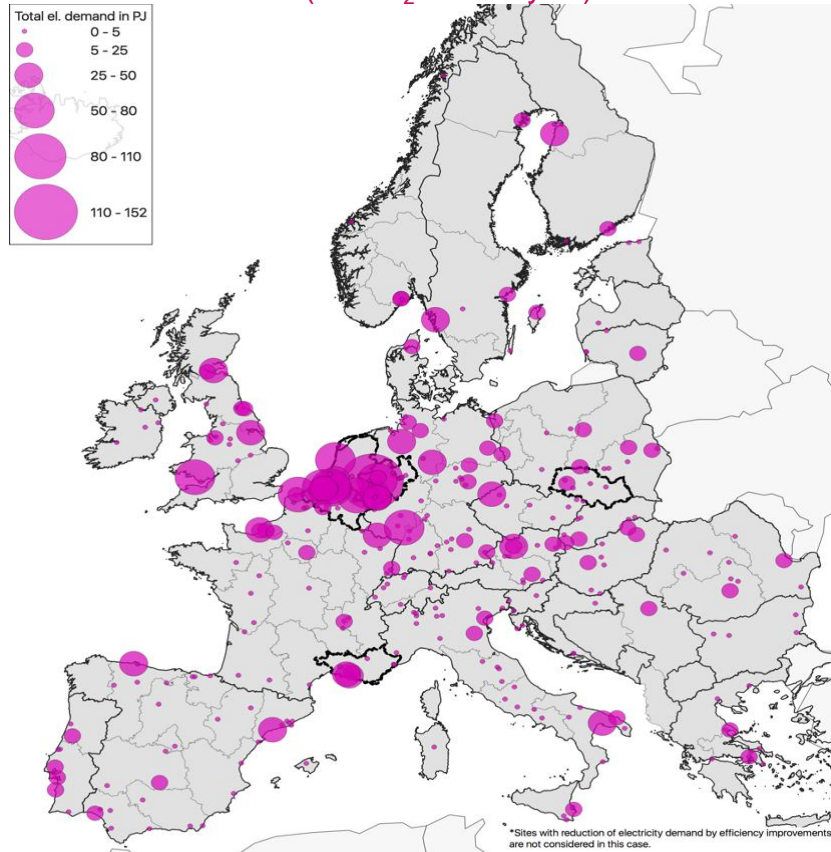


- **Rapid gas demand reduction** already by 2030, almost complete by 2040.
- **Electrification** plays a significant role in all temperature levels.
- **Biomass** shifts from medium to very high temperatures.
- **Hydrogen** remains limited.

Wuppertal Institute (2023) * "fossil gas" includes fossil gas, refinery gas and LPG; **"secondary gases" include coke oven gas, blast furnace gas, basic oxygen furnace gas and steam cracker by-products

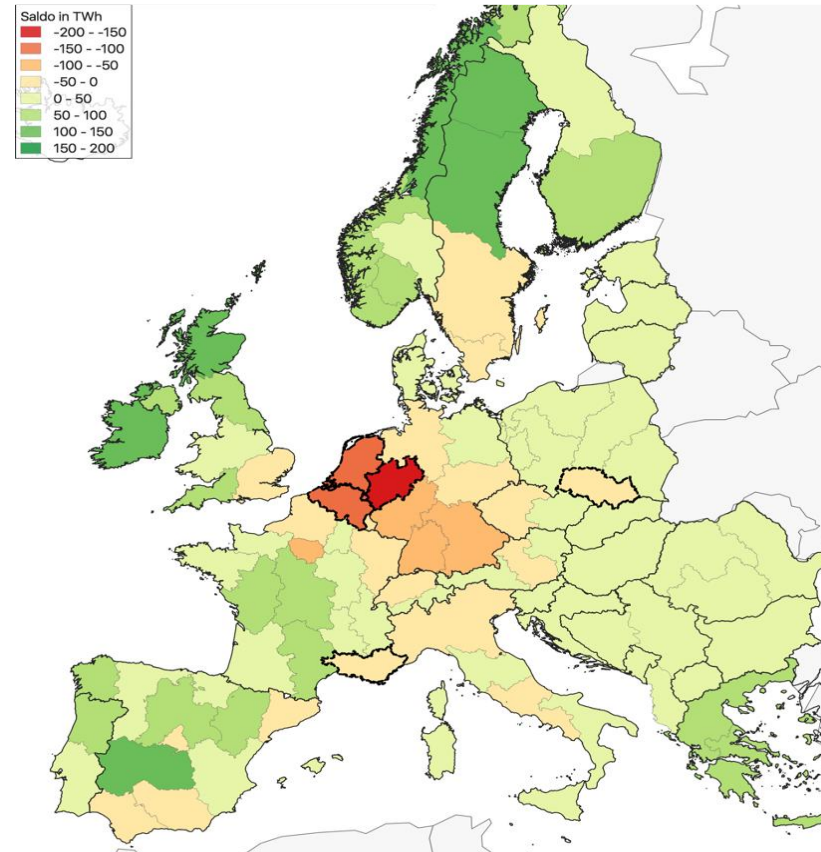
Where will the green energy come from?

Additional electricity demand for climate neutral steel, chemicals & cement (incl. H₂ electrolysis)



Source: Wuppertal Institut

Net-electricity balance of EU-regions (NUTS 1) in a Low-Carbon Scenario including industrial demand



Source: Wuppertal Institut

Relocation of basic materials production towards green energy is part of the strategies

Recent announcements indicate relocation of energy intensive process steps

Industry	Source	Company announcement	Renewables pull relevance
Iron & Steel	ArcelorMittal [57]	ArcelorMittal is planning to transport part of the sponge iron produced at its Hamburg plant via direct reduction to its steel plant in Duisburg for further processing.	It is expected that green hydrogen, which will be used at the Hamburg plant, will be available at lower cost there (with its proximity to offshore wind farms in the North Sea) compared to the inland location of Duisburg. H2 Green Steel stresses that the Swedish region has “access to abundant energy from renewable energy sources”. This includes wind and hydropower resources. Iron ore deposits are also located nearby. Iberdrola stresses that the future location on the Iberian Peninsula will have access to “low-cost renewable energy supplies”. Two significant reasons why Gällivare in Northern Sweden was chosen as the site for the demonstration plant: it has an existing iron ore mine and Northern Sweden possesses very good wind and hydropower conditions.
	H2 Green Steel [58]	Swedish start-up H2 Green Steel aims to build a large-scale greenfield hydrogen-powered direct reduction plant in the northern Swedish region of Norrbotten.	
	Iberdrola [59]	Iberdrola and H2 Green Steel plan to build a large-scale renewable hydrogen plant and a DRI plant on the Iberian Peninsula.	
	SSAB [60]	SSAB, LKAB and Vattenfall plan to build a demonstration plant for the hydrogen-based production of sponge iron in the Northern Swedish town of Gällivare.	
	ArcelorMittal [61]	ArcelorMittal signed an MoU with SNIM to evaluate the opportunity to jointly develop a pelletisation plant and a DRI plant in Mauritania.	Mauritania has both excellent solar and wind conditions and large iron ore deposits.
	Zawya [62]	Jindal Shadeed intends to set up an integrated steel mill in Duqm (Oman) to produce green steel using renewable energy sources.	The new steel mill will be powered predominantly by green energy and will be connected to a 600 MW solar plant in a country with excellent solar energy potential.
Ammonia	NEOM [63]	Air Products, ACWA Power and NEOM signed an agreement for a large-scale green ammonia production facility in Saudi Arabia for export to global markets.	The project partners aim to harness the “unique profile” of Saudi Arabia’s sun and wind resources.
	AustriaEnergy [64]	AustriaEnergy and Ökowind formed a joint venture in 2020 to develop a green ammonia plant in southern Chile’s Magallanes region.	AustriaEnergy points out that the production site’s excellent renewable energy conditions give it a “superior competitive advantage”.
	Yara [65]	Yara, Aker Clean Hydrogen and Statkraft launched the company HEGRA, which is planning to build a new green ammonia plant in Norway.	Yara states that Norway has “a competitive advantage within renewable energy and hydrogen” and possesses “renewable energy in abundance”.

Inside EU

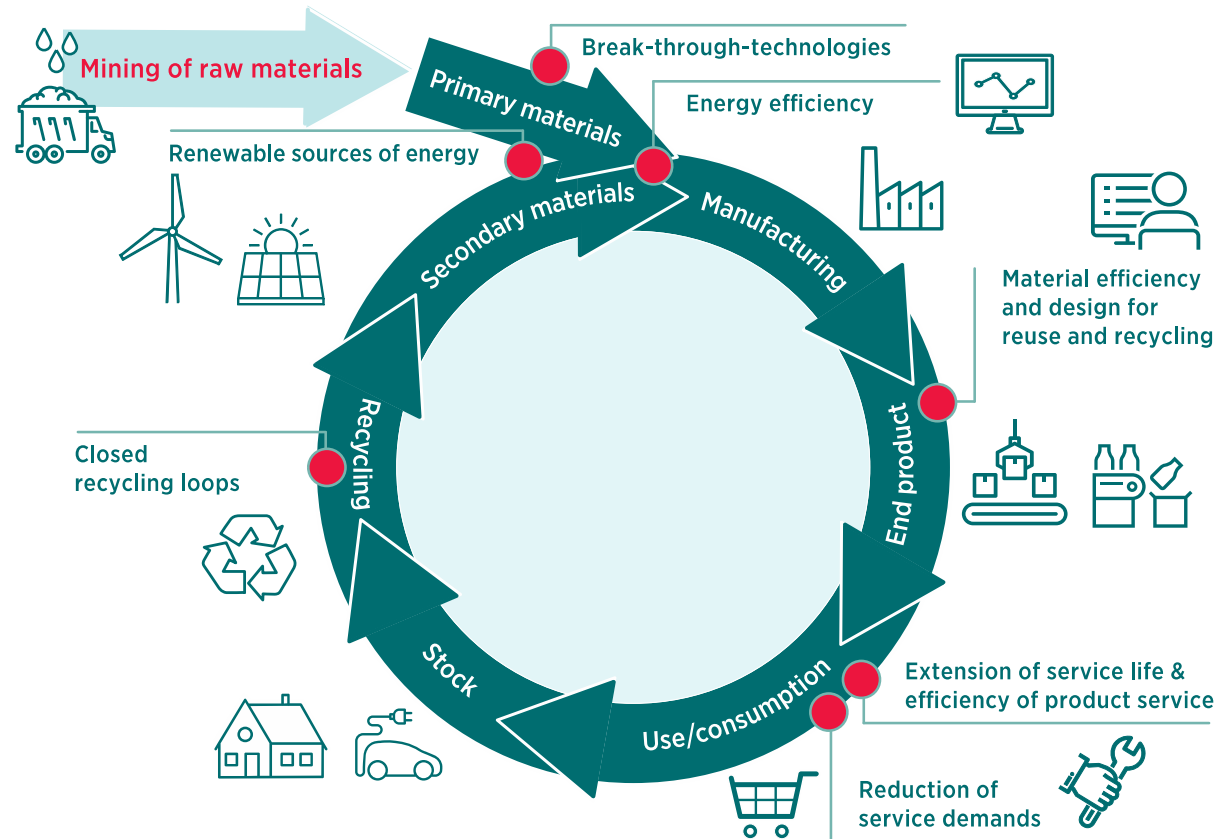
outside EU

Inside EU

Creating strategic bundles of instruments for climate-neutral products across value chains

Green energy and materials supply

- Clean industry act
- ETS with CBAM
- RED directive
- TEEN regulation & H2-IPCEI
- Critical raw materials act
- ...



R&D and investment incentives

- Carbon contracts for difference
- ETS with CBAM
- Innovations funds
- IPCEI / State aid rules
- ...

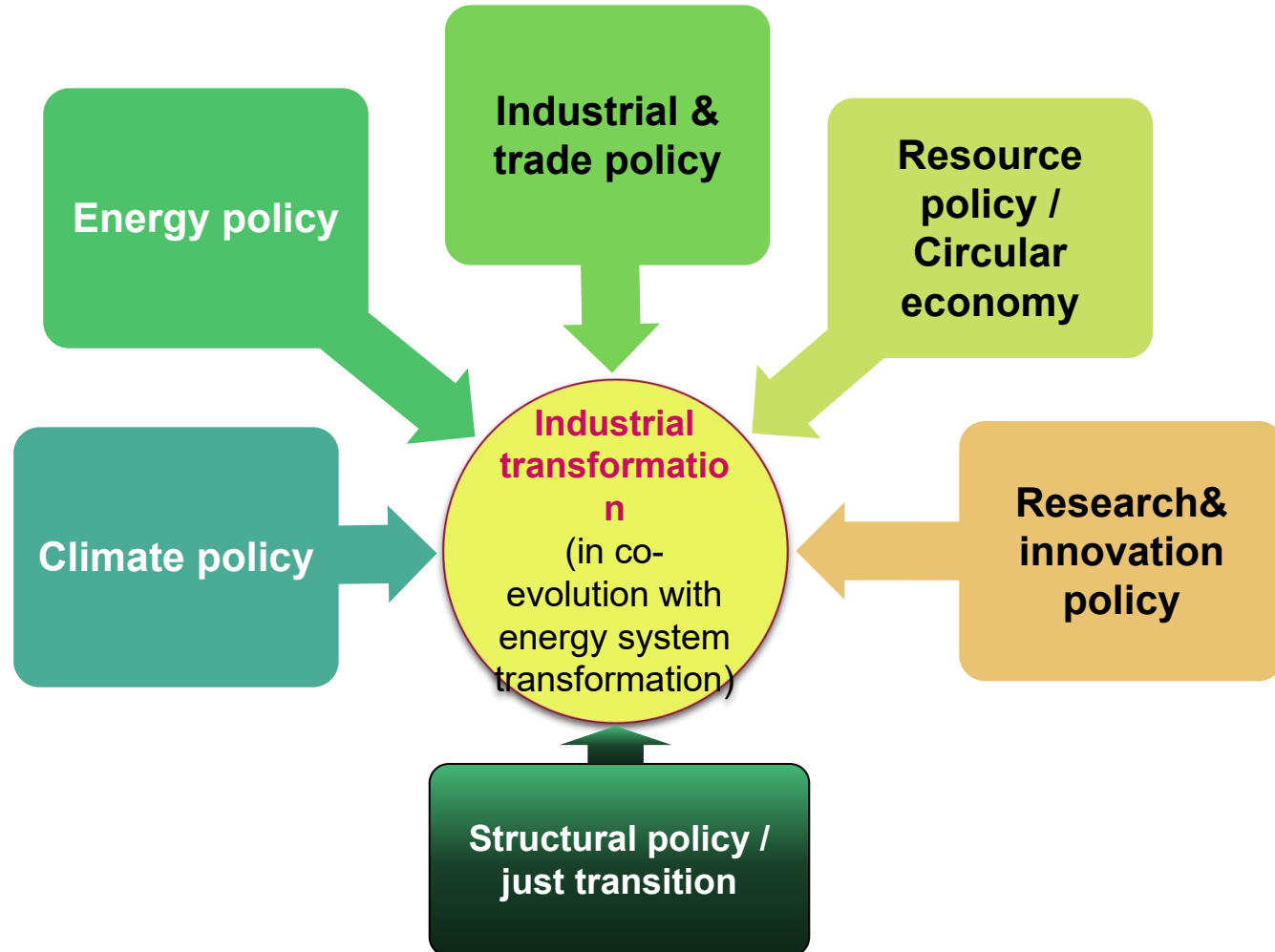
Supporting a circular economy

- Circular economy action plan
- Ecodesign regulation
- Critical raw materials act
- ...

Creation of demand/green markets

- Green lead markets/sustainable products initiative
- Public purchasing and quotas
- ...

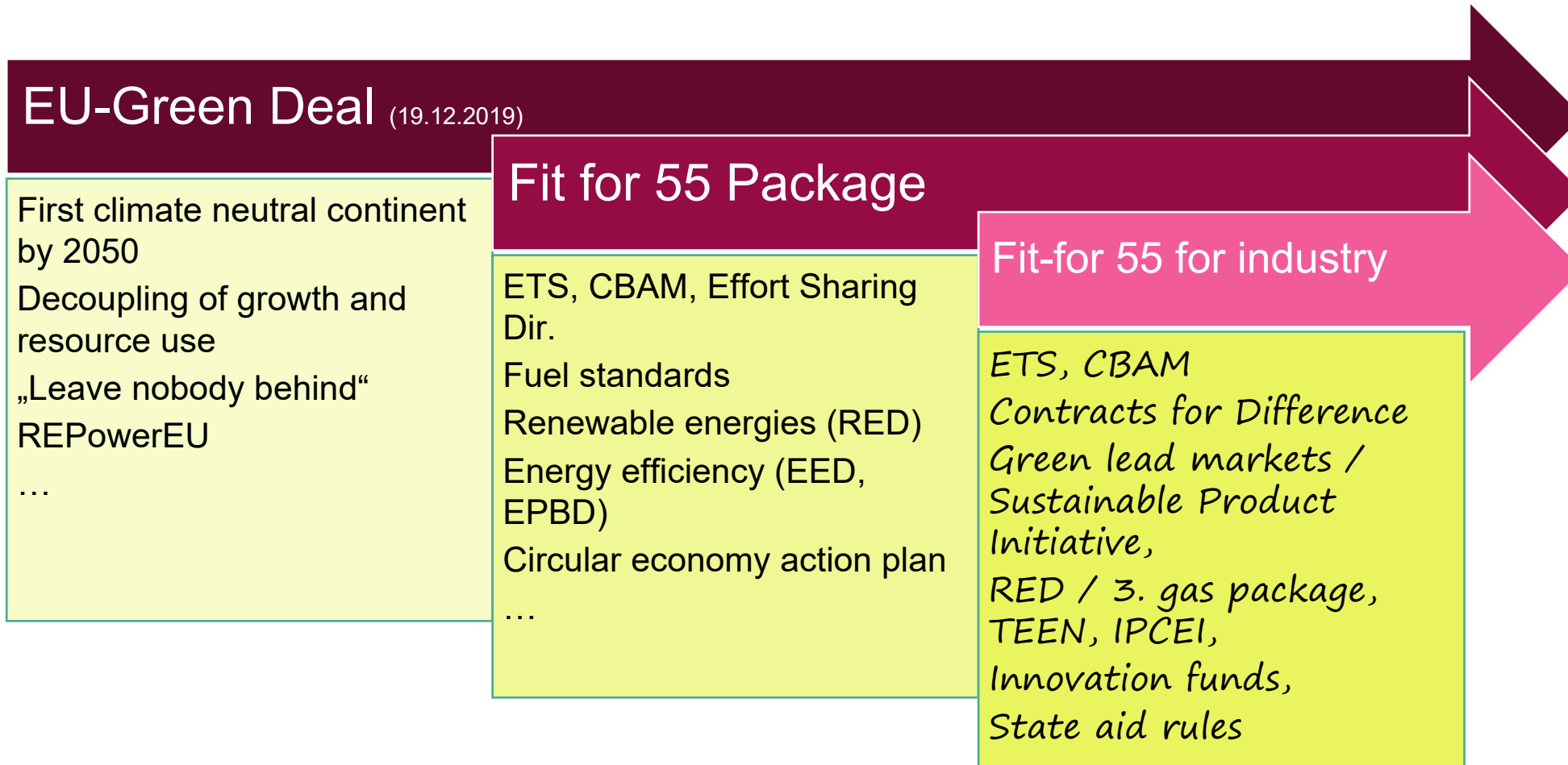
An integrated climate and industrial policy is needed



A new paradigm of a climate and industrial policy would best be

- *Clearly target oriented* towards sustainability and climate neutrality as core long term targets
- *Integrating* policies for climate, energy, innovation and resource efficiency with trade, growth and structural policies
- And *creating a new mode of societal cooperation* of all societal stakeholders

The EU's Green Deal already has most of the elements needed for an integrated climate and industrial policy.





Thank you for your attention!

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