

The European chemical industry on the path to climate neutrality

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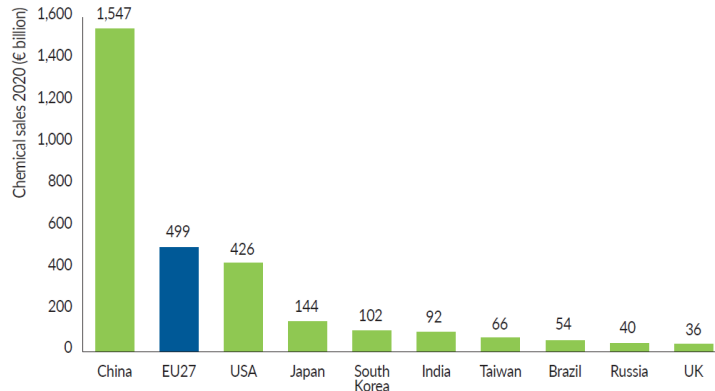
Cefic – European chemical industry

At the Heart of European Industry

Providing the essentials

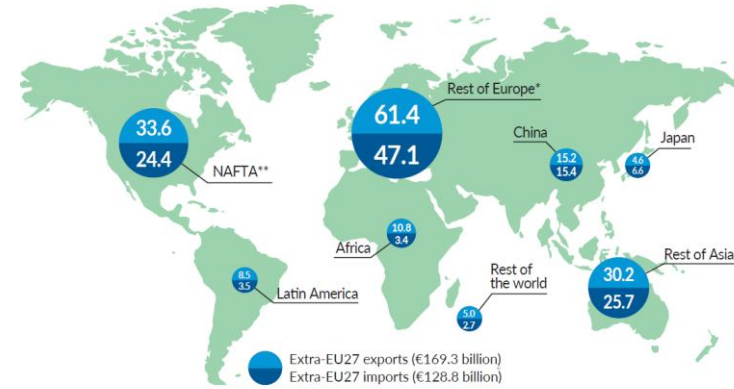
EU27 is the 2nd largest chemicals producer in the world

Chemical sales by country: top 10



Source: Cefic Chemdata International

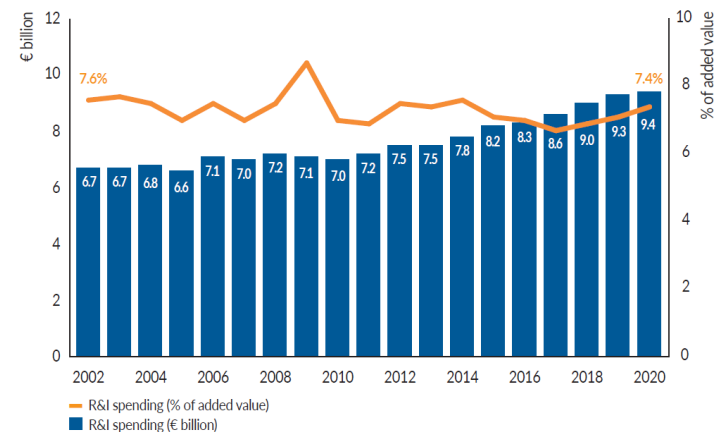
EU27 chemicals trade flows with major geographic blocs (2020)



Source: Cefic Chemdata International
 * Rest of Europe covers UK, Switzerland, Norway, Turkey, Russia and Ukraine
 ** North American Free Trade Agreement
 *** Asia excluding China and Japan

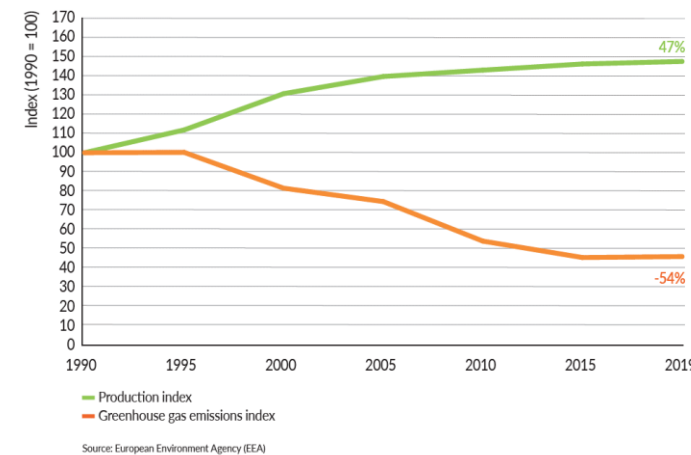
EU27 holds trade surplus with top competing markets

R&I spending by the EU27 chemical industry



Source: OECD and Cefic Chemdata International

GHG emission and production by the EU27 chemical industry



Source: European Environment Agency (EEA)

EU27 chemical production and GHG emissions decoupled

Cefic overall views on the 'Fit for 55' package

- For the chemical industry, the EU Green Deal is not a just a twin transition, but a **double twin transition**
- The European Chemical industry:
 - Supports the **Green Deal**
 - Has the ambition to become **climate neutral by 2050**
 - Welcomes the **'Fit for 55' package**
 - Welcomes the Commission ambition to increase the **use of renewable energies by 2030**

The chemical industry's double twin transition



On the path to climate neutrality: the Cefic iC2050 model

The iC2050 project: a model representing the EU27 chemical industry to identify potential pathways to climate neutrality. It focuses on 18 key chemical products.

#1 - Understand the current industry

- Baseline capacity & production (2019 EU-27 aggregated data)
- Energy & feedstock demand
- Total GHG emissions

#2 - Create a model to identify optimised abatement pathways to reach climate neutrality by 2050

- Model of the EU27 chemical industry
- Based on 2050 climate neutrality objective, chemical production technologies & processes and future disruptive abatement technologies

#3 - Communicate initial results

- Develop four scenarios to illustrate the functioning of the model
- Regional case studies

Detailed model scope			
	Products	Model	
Key Products	Organics	Olefins (Ethylene, Propylene)	Detailed quantitative analysis (emissions, production, technology evolution, etc.)
		Aromatics (BTX)	
		Methanol	
	Inorganics	Ammonia	
		Hydrogen	
		Chlorine	
	Intermediates	Styrene	
		Ethylene Oxide (EO)	
		Mono-Ethylene Glycol (MEG)	
		Purified Terephthalic Acid (PTA)	
		Polyethylene (PE)	
	Polymers	Polypropylene (PP)	
		Polystyrene (PS)	
		Polyvinyl Chloride (PVC)	
		Polyethylene Terephthalate (PET)	
		Other chemicals	

Upstream emissions*

(Scope 3)



Direct and electricity related emission

(Scope 1 and 2 respectively)







Downstream

(scope 3)



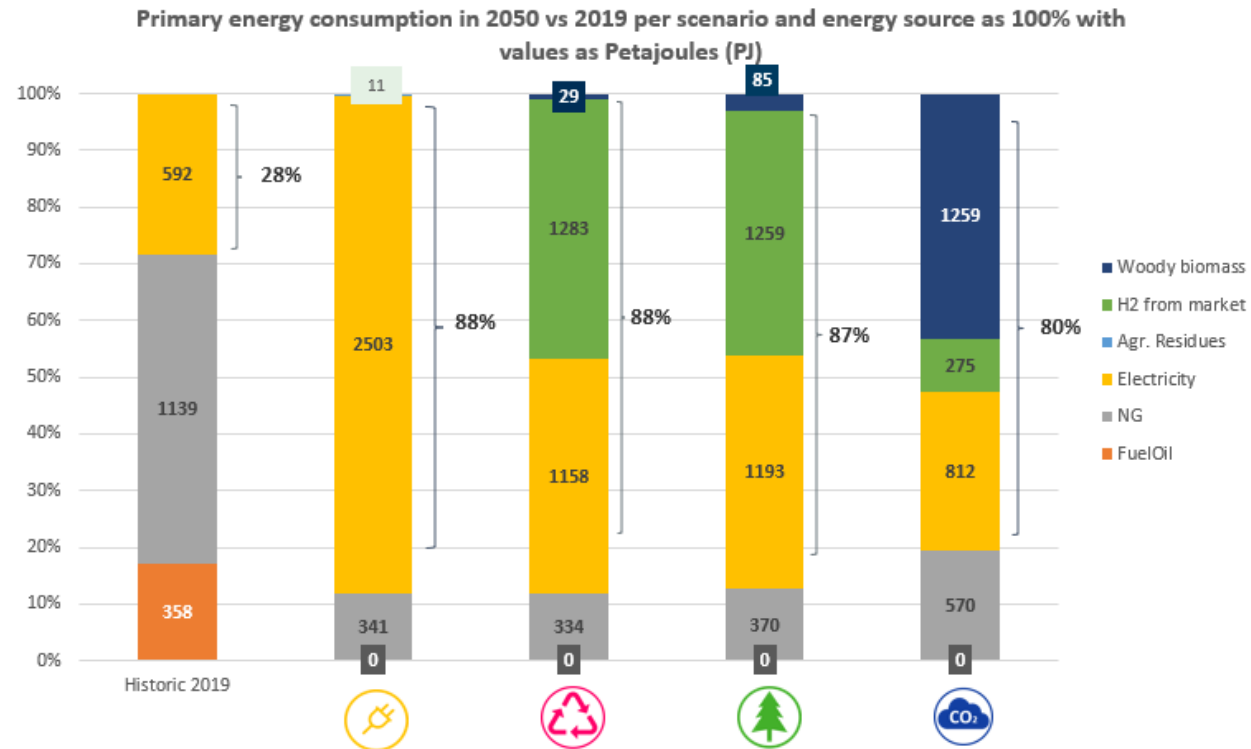
Four illustrative scenarios were explored to start testing the model

The selected scenarios do not represent extreme cases but “middle-of-the-road” approaches with key differentiators

	 High electrification	 Fostering circularity	 Sustainable biomass	 CO2 Capture
Description	<p>This scenario provides the conditions for process electrification, with a fully decarbonised European electricity mix by 2050 and a lower cost of electricity. The ability to use CCS is assumed to be in the low range.</p>	<p>This scenario focuses on promoting a strong circular policy agenda with an increase in circular plastic feedstocks availability and circular carbon use by the chemical sector.</p>	<p>In this scenario, policy has encouraged bio-based resources ensuring greater availability for the chemical industry and other sectors.</p>	<p>This scenario focuses on the rapid and wide-spread deployment of carbon capture and storage (CCS) technologies and capacities, reflected by lower costs and a favorable regulatory environment.</p>
Main objective	<p>Show the impact of <u>decarbonised and cheap electricity.</u></p>	<p>Show the impact of an <u>ambitious circularity policy.</u></p>	<p>Show the impact of significant use of <u>biomass as a feedstock.</u></p>	<p>Show the impact of high <u>CCS availability.</u></p>

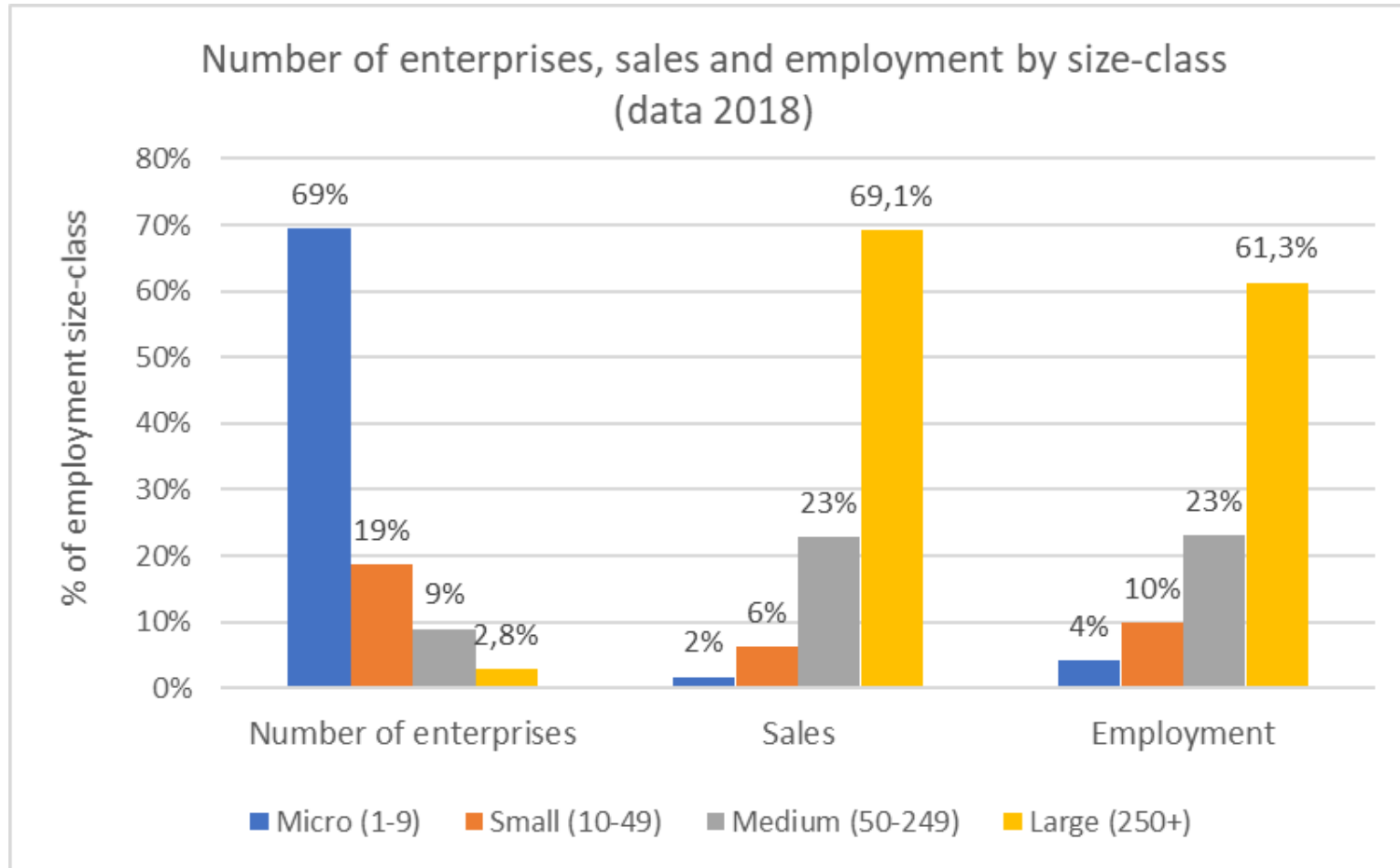
➤ Note: The model is choosing how to reach climate neutrality. Although we change some inputs and parameters from one scenario to another within reasonable ranges (e.g. availability of resources, CAPEX trajectories, etc.), there is no direct decision to favour or impede the deployment of any technology or pathway.

Use of electricity is expected to increase



- No clear energy vector for heat emerges. Electricity is favoured when the electricity mix is fully decarbonised and available at low cost (high electrification)
- Biomass is used as a source of energy only if its direct CO₂ can be captured, stored or used (BECCS)
- In 2050, H₂** contributes to between 10 and 47% of primary energy demand
- In 2050, fuel oil is no longer a source of energy

Industry structure and production (& energy) concentration



Few concluding remarks

- The chemical industry is expected to substantially increase the need for electricity on its path towards climate neutrality by 2050
- The chemical industry is exposed to international competition: carbon-free electricity needs to be cost-competitive
- A small number of sites will be responsible for most of electricity consumption
- 2050 is one investment cycle away: solutions need to be available at the 2030 horizon
- Questions to the nuclear industry:
 - How can nuclear energy be part of the chemical industry transition?
 - Are Small Nuclear Reactors an option we can really rely upon by 2030?

Thank you.

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About Cefic

Cefic, the European Chemical Industry Council, founded in 1972, is the voice of large, medium and small chemical companies across Europe, which provide 1.1 million jobs and account for 15% of world chemicals production. Cefic members form one of the most active networks of the business community, complemented by partnerships with industry associations representing various sectors in the value chain. A full list of our members is available on the Cefic website. Cefic is an active member of the International Council of Chemical Associations (ICCA), which represents chemical manufacturers and producers all over the world and seeks to strengthen existing cooperation with global organisations such as UNEP and the OECD to improve chemicals management worldwide



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