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Joint statement of Czech Republic, Hungary, Italy, Netherlands, Romania, Slovakia, Spain and France about the European chemicals industry

The alarming situation of the European chemicals industry, a strategic sector that needs a dedicated "EU Critical Chemicals Act"

The signatories underline that Europe's chemical industry faces a major crisis, with a 12% drop in production between 2019 and 2023 – mainly due to energy costs (or related to the cost of energy-intensive feedstocks) and fierce or even unfair competition from non-EU countries. Regarding petrochemistry alone, by 2035, about 20 steam crackers may be shut down, affecting 50 000 jobs, if no collective action is taken to restore competitiveness and to work towards more sustainable productions – despite a context of improving plastics circularity. France, the Netherlands, Ireland, the Czech Republic, Slovakia, Spain and Romania alerted the European Commission in April 2024[1] on the need to foster decarbonization, modernization and resilience of the existing chemical industry. The recent announcement of a « Chemical Industry package » is therefore welcomed and will provide the chemical industry with a clearer view on regulatory evolutions.

While the forthcoming « Clean Industrial Deal » should integrate strong measures to facilitate decarbonization for heavy industries, this non-paper presents the rationale for a « Critical Chemicals Act » by the European Commission, acknowledging a list of about fifteen strategic molecules that are key for preserving the resilience of Europe – without compromising the high levels of environmental and health standards in the EU as well as the existing REACH framework.

A Critical Chemicals Act would in particular enable appropriate support schemes dedicated to the chemical plants that require decarbonization and modernization investments; chemical plants whose closures would jeopardize European sovereignty, while preserving the level playing field in the internal market. This initiative also aims to support chemical industry to engage in a deep transformation and to encourage disruptive innovation, particularly in the development of low-carbon molecules

[1] Competitiveness Council of 24 May 2024 - AOB-item on a European Sustainable Carbon Policy Package for the Chemical Industry

I. Europe's chemical industry faces a major crisis, mostly regarding upstream plants, which threatens the European resilience

The chemical industry is an essential component of most of the industrial value chains as it produces the upstream molecules that are needed for the health, food, automotive, construction, green tech (and so on) sectors. However, the European chemical industry as a whole, which was already suffering from structural weaknesses, is currently undergoing a massive competitiveness crisis, with a production index decrease of 12% between 2019 and 2023. This is mainly explained by the gap in energy and feedstock costs between the EU and the other industrial regions (price of natural gas three times higher than in the US for example), as well as by a fierce and sometimes unfair competition from producers originating in third-party countries (price gaps on the EU market reaching 70 to 100% for PVC or 80% for glyoxylic acid for instance). Furthermore, downstream markets for chemical products (such as construction or automotive) are also experiencing a contraction in their activity, thus further emphasizing the downward outlook.

The most energy-intensive plants are the most affected (ammonia production, steam cracking). In the case of ethylene, main product of steam crackers, margin gaps with the US or Middle East reach up to 300 $/t, while the market prices in Europe are about 1000 $/t. Margin gaps are even higher considering feedstock costs. In 2024 alone, four steam cracker shutdowns have been announced (ExxonMobil in Gravenchon, France; Sabic in Geleen, Netherlands; Eni-Versalis in Italy has announced a transformation plan of the plants of Brindisi and Priolo into other platforms. Several installations belonging to LyondellBasell across Europe are also currently under strategic review. Overall, more than 50 000 jobs depending on these petrochemical plants might disappear after 2035 if no action is taken – in a context where plastics circularity also needs to be improved.

The European chemical industry is fully committed to its transition – as decarbonization is a cornerstone of future competitiveness and should be pursued through technical solutions balancing competitivity aspects. Its ambition, reflected by the « transition pathways », is to commit the best efforts to reduce greenhouse gas emissions and reach carbon neutrality by 2050. This will however require massive capital expenditure investments, as full decarbonization costs for a single steam cracker typically amount to more than a billion euros – to which can be added tens of millions of annual operational costs for low carbon power or hydrogen, or carbon capture and storage, depending on the chosen technological route.

Decarbonization of energy sources as well as the transition to sustainable carbon feedstocks are vital to secure long-term competitiveness, enhance value chain resilience and ensure sustainable growth in the chemical industry. France, The Netherlands, Ireland, Czech Republic, Slovakia, Spain and Romania have already alerted the European Commission through a first co-signed non-paper, presented during the Competitiveness Council in May 2024, on the need to foster market creation for sustainable carbon, a global level playing field, a sustainable carbon availability strategy and consistent and coherent policy frameworks for the chemical industry – while enabling its energy and environmental transitions**.** The recent announcement by the President of the EU Commission regarding a forthcoming "Clean Industrial Deal" and a specific "Chemical Industry package" are therefore welcomed.

While the « Clean Industrial Deal » should bear strong measures to facilitate decarbonization for heavy industries, this paper sheds light on the necessity for ambition measures of industrial policy tailored towards the chemical sector.

II. <u>There is a need for a "Critical Chemicals Act" acknowledging key strategic molecules and offering appropriate support schemes to maintain their production in the EU</u>

1. A specific « EU Critical Chemicals Act » is needed to highlight the key role played by about 15 building-block molecules that are upstream to all the European strategic value chains

The European chemical industry has the opportunity to pave the way internationally in terms of environmental transition, but faces challenges in realizing this potential. This stems, among other things, from strategic dependencies and competitiveness differences with non-EU countries (for example due to market concentrations elsewhere in the world). For that, it is of paramount importance for the EU to further analyze which dependencies can be classified as risk-bearing in order to determine what is needed to protect and strengthen the resilience of its key value chains, and which actions are proportionate to address the current crisis.

In full compliance with European chemical regulations, without prejudice to the control of risks to human health and the environment associated with the manufacture and use of substances, and without prejudice of the application of the existing REACH framework and all existing relevant regulations pertaining to health and environment protection, the European Commission should adopt a specific package dedicated to the preservation and transition of the industrial chemical sector and its competitiveness, acknowledging the key role played by a number of molecules that are the unavoidable building blocks required to feed any of the strategic value chains that Europe wants to foster. This should complement other support packages or measures dedicated to preserving the competitiveness of downstream industries, value chains and more profitable platforms that are key to Europe's resilience.

To this end, in the spirit of the Critical Raw Materials Act, such building block-type molecules, sustainable substitutes thereof and related present or future dependencies, could be labelled as "strategic" for the EU's industrial and global leadership since they form the building-blocks that are essential in the upstream to the defense, health, food, automotive, construction, green tech and other major industries – the absence of which could pose a threat to public and societal interests. The focus is not only on molecules, but also on downstream markets and related value chains vital to Europe's survival. Moreover, part of these molecules, which are produced in a very limited number of sites in Europe and are already subject to sizeable trade balance deficit towards non-EU countries, with potentially concentrated imports, could be deemed "critical", in addition to being "strategic". This should be determined after further analysis and will, in turn, be of importance to consequently determine what the appropriate EU course of action should be.

Thus, the minimal list of "strategic" molecules for the EU could be (*see Appendix for methodology details*):

- *ethylene*, *propylene* and *butadiene*, upstream olefins from the whole petrochemistry and organic chemistry;

- *benzene*, *toluene* and *xylene*, upstream aromatics from the whole petrochemistry and organic chemistry, as well as *phenol and styrene*, particularly key platform for pharmaceuticals, adhesives, construction, automotive, electronics, plastics industries and detergents - *ammonia* and *methanol*, for agriculture and energetic use as well as advanced materials;

- *chlorine* and *sodium hydroxide*, for health, hygiene and construction applications (PVC);

- *sulfur*, *silicon* and *sodium carbonates*, for mobility (fuels and batteries), health, food, electronics and construction (silicones);

- *hydrofluoric acid*, for health, batteries, electronics, advanced and flame retardant materials;

- *methionine* and *lysine*, for the health and food industries.

Among these molecules, *ethylene*, *butadiene*, *benzene*, *ammonia* and *sodium carbonates* could for instance already be considered as "critical" to date

Low carbon footprint molecules, that can characterize sustainable chemicals and substitute any of the above strategic molecules (by being the molecule itself, a precursor or a platform molecule able to be used as a drop-in in these molecules' value chains, or by having the same functionality) should also be considered strategic. These future molecules still being in early stages of research and development, it remains difficult to foresee which ones will be the fossil-free molecules of the future. A tentative list of (non-exhaustive) bio-based molecules is provided in appendix– EU support should not be restricted to specific alternative molecules, as it remains partially unknown which ones have the highest potential to replace fossil molecules.

More generally, innovation shall remain an overarching priority. The identification of future more sustainable chemicals and substitute molecules and their early market access relies on the EU capacity to boost R&D and innovation in chemistry, notably with dedicated resources. Against this background, further advanced research and development could complement the lists considered as strategic and critical.

2. Acknowledging strategic molecules should enable specific support to preserve their production in the EU

Given the key role of these molecules for the European resilience, the signatories call for measures that would help maintaining their production in the EU by developing, modernizing and decarbonizing existing plants, and fostering alternative carbon sources (biomass, recycling, CO_2 usage). The European Commission should propose an ***EU Critical Chemicals Act***, in the line of the *Critical Raw Materials Act* and *Critical Medicines Act*, to deploy specific tools to support the chemical industry at a European level.

In addition, to safeguard the chemical supply chain, it will be also strategic to invest in industrial transformation by developing sustainable production platforms and advanced complementary technologies. These include biofuels, plastic recycling, bioplastics, and downstream chemical chains (also by ensuring competitively priced market access for upstream raw materials), and developing supply chains like batteries.

In this context, « EU strategic project » labels could be attributed to projects that aim at modernizing and developing capacities on a strategic molecule, including the refurbishment and best-in-class upgrade of existing plants, thus contributing to secure its production in Europe. Funding access could in turn be facilitated for such projects.

Funds could also be allocated to first-of-a-kind plants on the EU territory, that offer new state-of-the-art alternative ways of producing strategic molecules in Europe in a competitive and environmentally unharmful way – inspired by the dispositions in the EU Chips Act. The timing and level of support required should be explored and clearly defined to ensure effective implementation and impact.

To date, upstream projects from the chemical industry that would secure the whole value chain leading to strategic objects such as batteries, drugs, automotive components, etc. cannot be fully supported with the existing state aid schemes. Hence, the signatories point out the need for an adaptation of the current framework (temporary or not), or the creation of new temporary instruments tailored towards these strategic chemicals. This would be completed by an agile monitoring of production capacities for strategic molecules at the EU level in order to drive incentivizing policies in a direction that would maximize resilience. An active focus shall be put on the needs of basic chemistry plants that are upstream from strategic pharmaceutical industries (in particular SMEs).

The signatories instead call for a more proactive use, where appropriate, of the existing trade defense mechanisms (anti-dumping, anti-subsidies, safeguard) to prevent unfair trade practices by third countries from destabilizing the internal market and EU production of strategic molecules.

III. In addition to the *EU Critical Chemicals Act*, the signatories welcome favorably the different measures announced or initiated by the European Commission

The signatories support the announcements already made by the European Commission regarding energy-intensive industries or the chemical sector.

An ambitious *EU Clean Industrial Deal* would enable to accelerate decarbonization and work towards competitive energy prices for the European heavy industry – keeping sight of technological neutrality and energy production needs across the EU.

To support the competitiveness of the chemical industry with regards to energy prices, an extension of the indirect cost compensation to certain electro-intensive and strategic molecules should be envisioned, notably those pertaining to organic chemistry.

It is also necessary to articulate this initiative with the ones existing or upcoming on circular economy, in order to create market pulls for recycled products and a common EU market for waste, as well as future initiatives on bioeconomy. Access to materials and sustainable resources: bioeconomy and circularity should be taken into account by European Policies alongside decarbonization. The European Policies should create a supportive framework for investment and R&D, providing an adequate amount of public and private funding to bolster rapid innovation and commercialization of new technologies and products with the aim of pursuing sustainability targets.

Regarding chemical substances, the European Commission has already made announcements mentioning a revision of the REACH framework, as well as clarifications on PFAS regulation. All these evolutions should take into account the competitiveness of the European chemical industry, and avoid leaving room for unfair competition from non-EU countries. In particular, chemicals imported from third countries should abide by the similar standards in place in the EU, notably regarding the protection of the environment and human health. Thus, the combination of cross-sectorial and specific measures tailored towards the chemical industry is paramount to strengthen the EU resilience in all key industrial sectors.

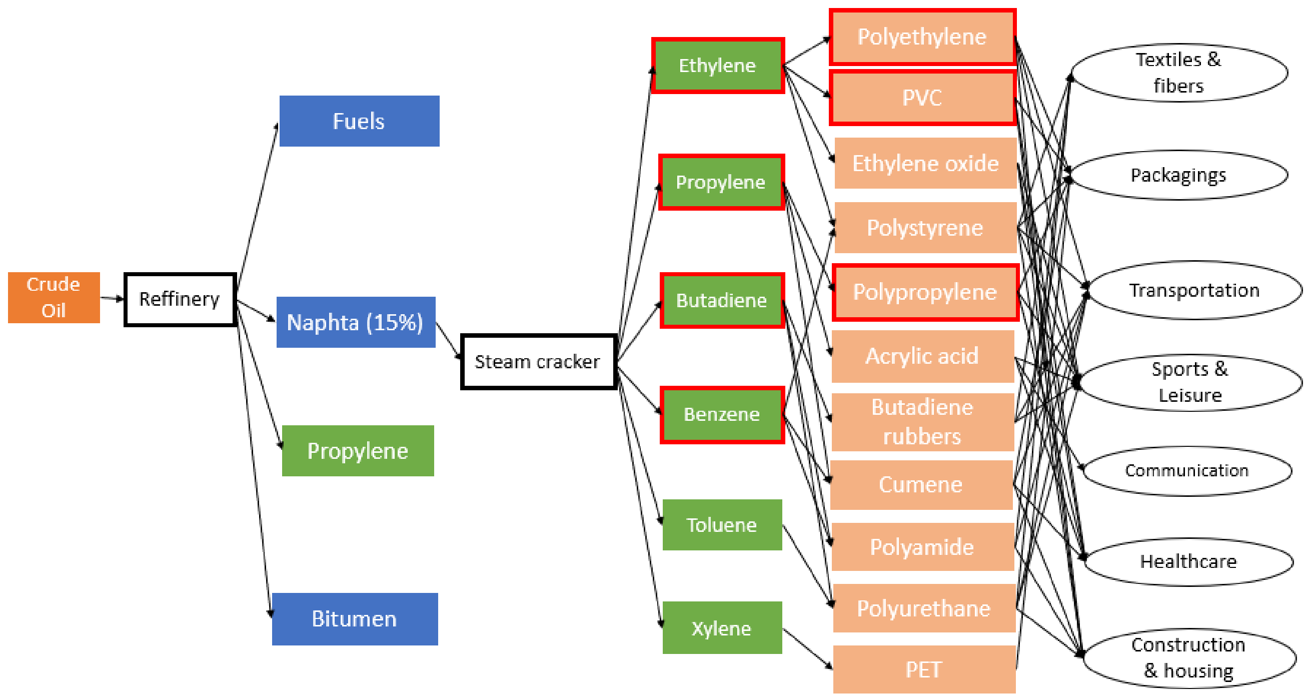
Appendix: methodological details on the identification of strategic and critical molecules

General approach

About 15 strategic molecules have been identified as key to a majority of industrial value chains corresponding to the EU strategic priorities and should be recognized as such at the European level. These molecules are essentially upstream *building blocks* that feed multiple downstream applications and securing them appears to be a requirement for the EU strategic autonomy.

Given the complexity of value chains and the multiple usage of certain chemicals (*e.g.* ethylene can end up in food containers as well as construction materials), the approach to select « strategic » molecules was based on identifying the key upstream nods that are unavoidable in synthetic routes. These molecules are mostly commodities, with limited added value, production processes that are demanding in energy (gas or power) and significant volumes exchanged through international trade, making them overall quite vulnerable to competition with non-EU producers. Consolidating existing European capacities for these molecules would strengthen the overall EU strategic autonomy.

An analysis of the EU trade imbalances (sizeable import dependencies and import concentration) also highlights that some of these strategic molecules are already in tension at the Union level, and can therefore be deemed "critical" in addition to being "strategic".



Petrochemistry: from upstream molecules to downstream applications, simplified

Source: Directorate General for Enterprises, French Ministry of Economy, Finance and Industry

Organic chemistry & petrochemistry

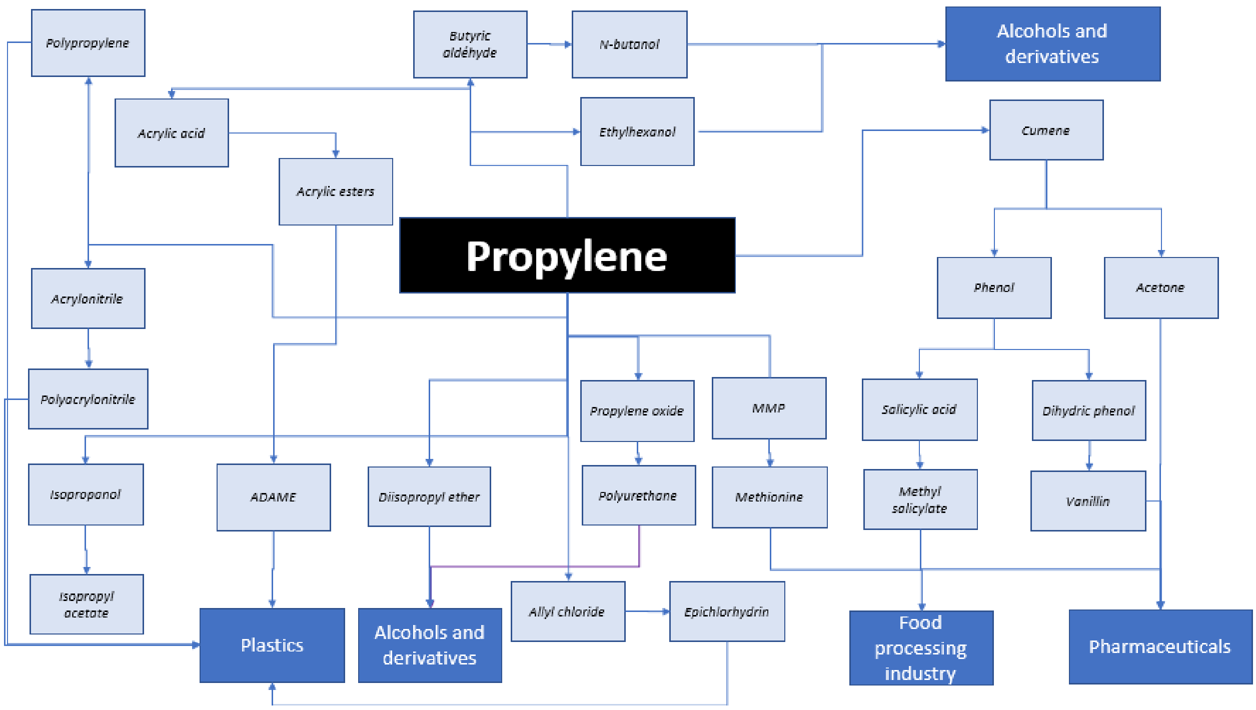
Four molecules upstream from most of the organic and polymer chemistry have been identified as "strategic": ***ethylene, propylene, butadiene*** and ***benzene***. Currently, these molecules are mainly obtained via petrochemistry, in steam crackers.

They are the building blocks for most industrial chemical reactions and may lead to drugs, construction or high-performance materials, including automotive or green tech components, and a variety of other applications, as illustrated above. However, steam crackers in Europe are facing a lack of competitiveness due to energy and naphtha feedstock costs, as well as fierce competition from larger scale non-EU units (using shell gas as a feedstock in the US notably).

Ethylene is used to produce polyethylene (food contact, gas tubing…), PVC (construction, medical equipment…), PET, polystyrene and various chemicals entering into the composition of organic molecules or polymers. It is the main economic driver of a steam cracker.

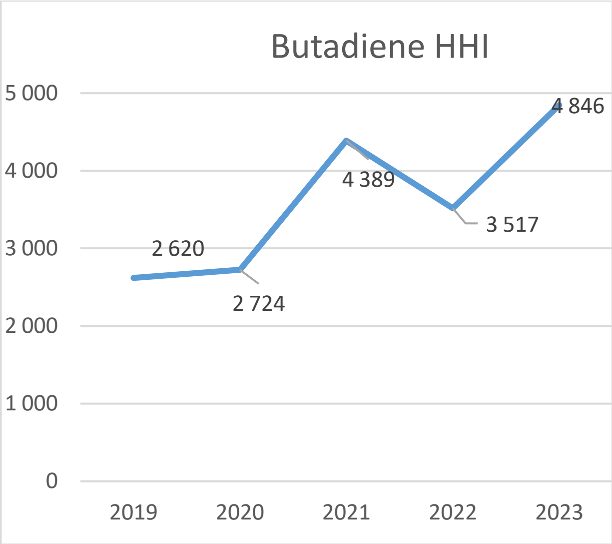
Propylene is used to produce polypropylene (food contact, medical equipment, and mostly automotive parts and battery casing) but also an array of organic molecules including phenol and acetone, at the basis of pharmaceutical chemistry (all the way to aspirin), or synthetic amino-acids. This by product of ethylene faces the same competitiveness challenges, resulting in an average trade deficit for the EU of 383 M€/year. The loss of propylene capacities in the EU could be very detrimental to its automotive and critical medicines industries.

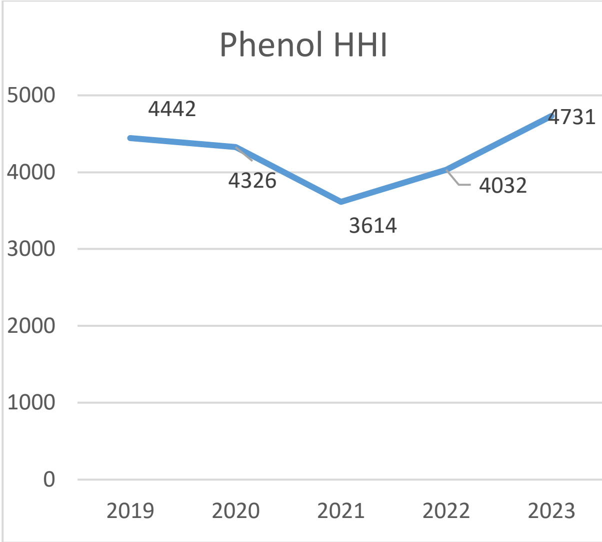
Butadiene is used to produce rubbers but also several molecules and specialty polymers (such as polyamides). *Benzene* is used to produce polymers (PET, PS…) but also many small organic molecules, in particular entering into the health (e.g. aspirin, paracetamol) and agro-industries.



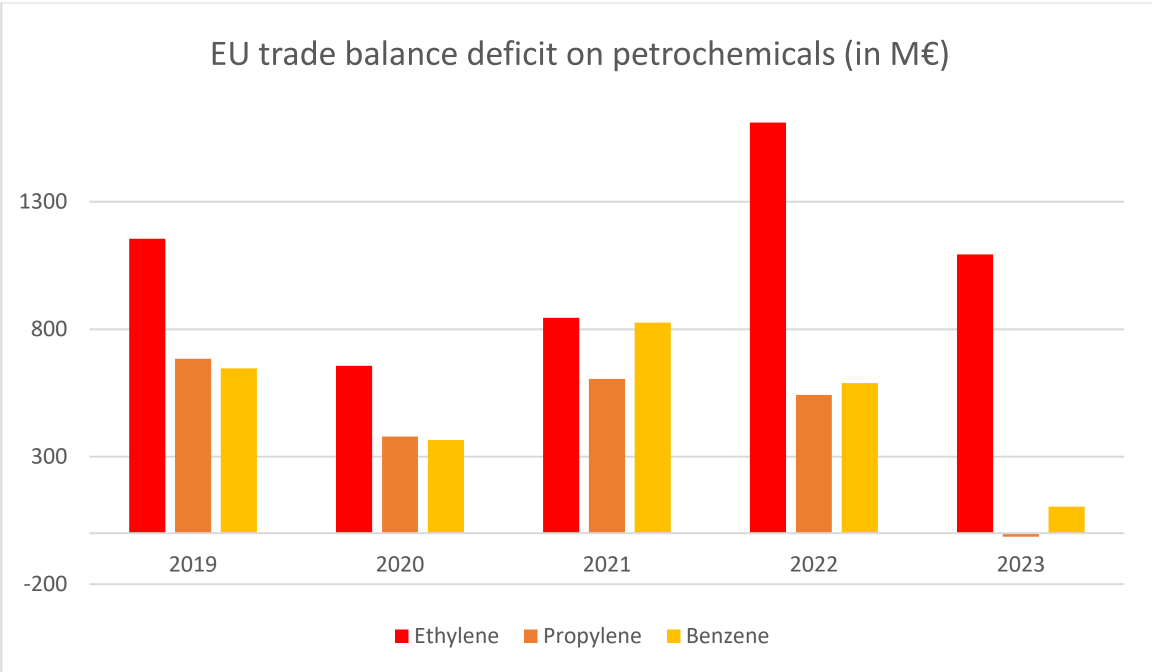
An example of the diversity of molecules and value chains stemming from propylene
Source: Directorate General for Enterprises, French Ministry of Economy, Finance and Industry

An analysis of the import concentration index (HHI) shows that both butadiene and phenol (one of benzene's most important products, in particular for pharmaceutical and agrochemistry) are consistently reaching the vulnerability threshold (HHI > 4000) since 2019. A significant part of butadiene imports in the EU is originating from China & Taiwan, while EU production is decreasing. Phenol, like benzene, has a trade balance deficit –in addition to strongly concentrated imports. While benzene has slightly more diversified sourcing, it stems overall from a region with geopolitical context (Turkey, Middle-East, Israel).





Source: Eurostat data



Source: Eurostat data

Overall, among these four strategic molecules, three of them could be considered to have very significant trade balance deficits and/or highly concentrated imports: *ethylene*, *butadiene* and *benzene* (encompassing phenol) are deemed "critical".

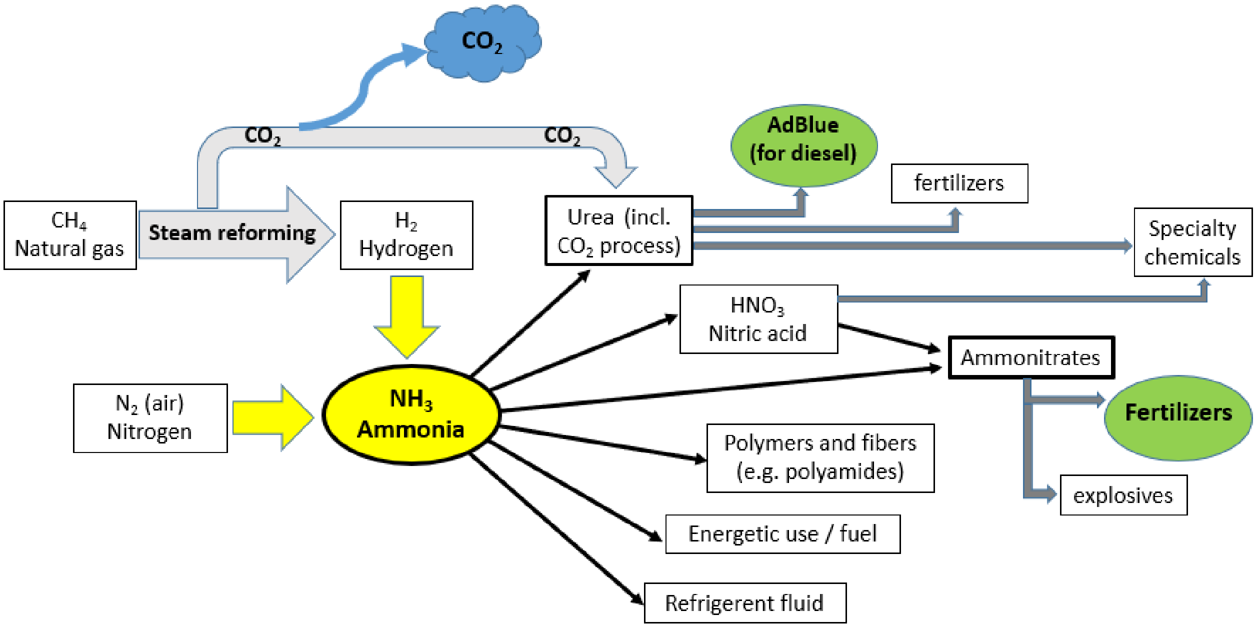
Molecules derived from natural gas

Ammonia and ***methanol***, both obtained via straightforward transformations of natural gas, are two key strategic molecules.

Methanol is upstream from multiple chemical synthesis (formaldehyde, acetic acid, methylamine…) and from fuel additives (MTBE). However, EU production capacities cover less than 50% of its consumption and are under-utilized, with massive imports taking place from Trinidad-and-Tobago or the USA. *Methanol* is also strategic because of its potential use as marine or aviation fuel, and appears to be one of the main target molecules for carbon usage in the future.

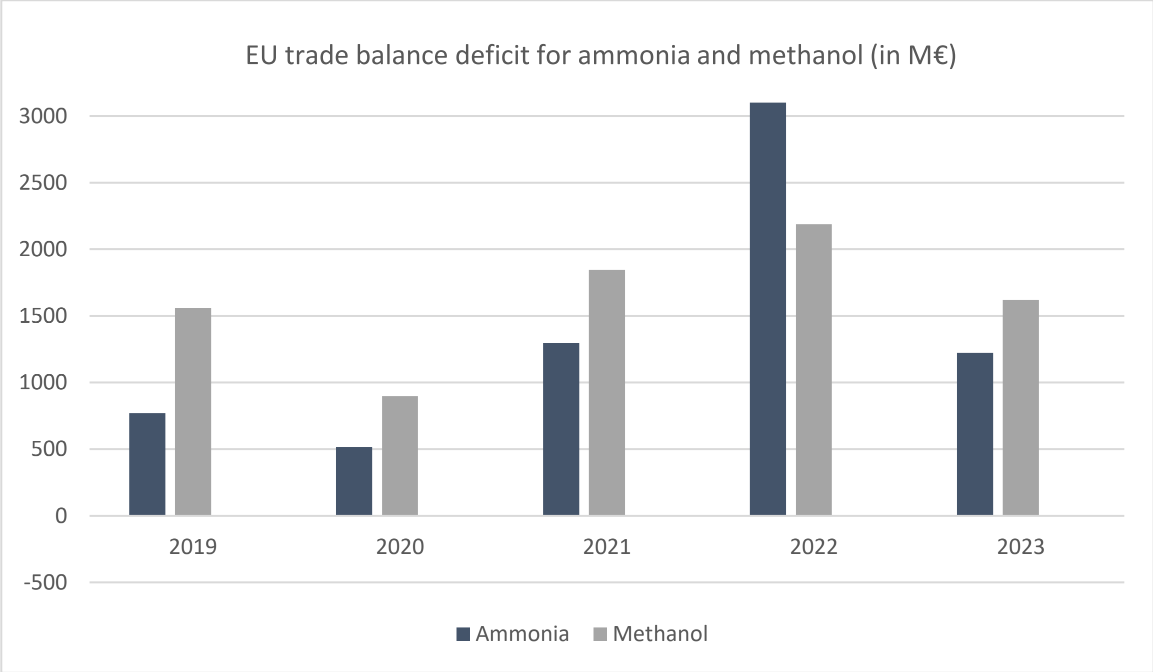
Ammonia is mainly devoted to fertilizers (ammonium nitrates, urea), hence is key for EU agricultural sovereignty. It is also necessary to introduce nitrogen in organic molecules and produce a variety of compounds, all the way to high performance polymers and synthetic fibers such as polyamides (used for parachutes, airbags and structural pieces in cars). *Ammonia* (and its derivatives, mostly fertilizers) face a very aggressive competition from imports from non-EU countries, in particular those where natural gas is abundant and affordable (Trinidad-and-Tobago, USA, Middle-East, Russia).

It should also be pointed out that these two molecules historically have a very unfavorable trade balance, as illustrated below over the 2019-2023 period.



Simplified scheme of ammonia value chain and usage

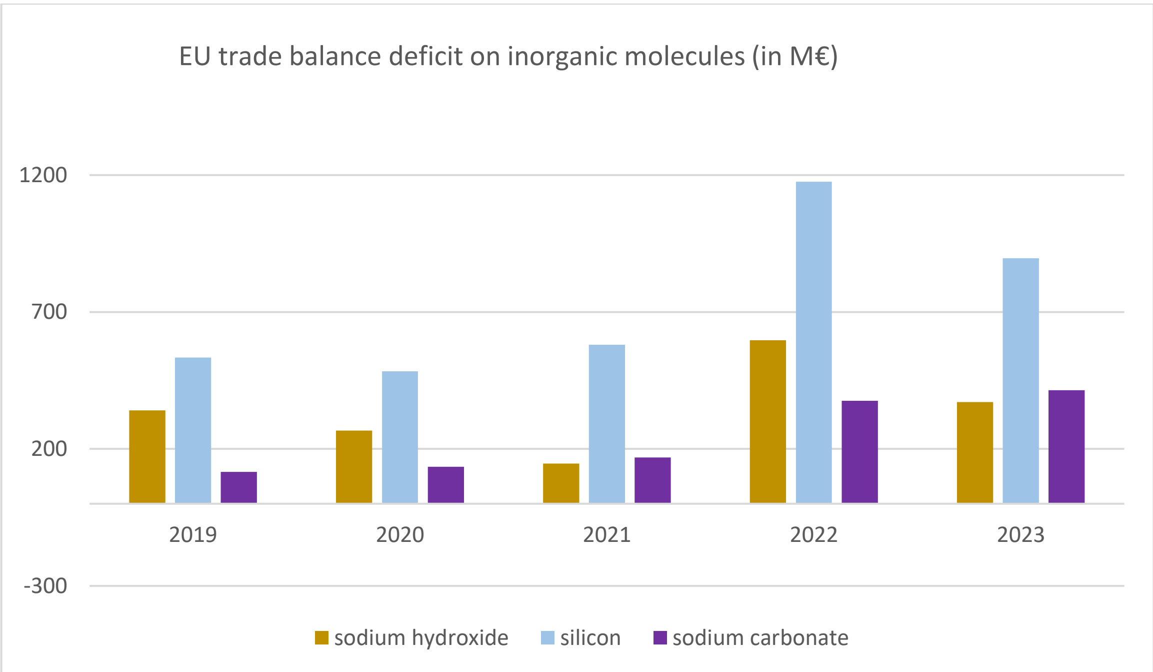
Source: Directorate General for Enterprises, French Ministry of Economy, Finance and Industry



Source: Eurostat data

Other key inorganic molecules

Chlorine and ***sodium hydroxide***, both obtained mainly via electrolysis, are key inorganic commodities as they are used for hygiene and detergent applications, water treatment, and numerous chemical syntheses. *Chlorine*, in combination with *ethylene*, enables the production of PVC, a polymer that is used for construction, sanitation and medical applications. Electrolysis processes are typically hyper electro-intensive, exposing producers to power price fluctuations and to the gap in energy prices with non-EU regions. Gaseous *chlorine* is not possible to import, therefore mainly depending on local production capacities (unlike some of its downstream derivatives). *Sodium hydroxide*, however, has a large trade balance deficit at the EU scale.



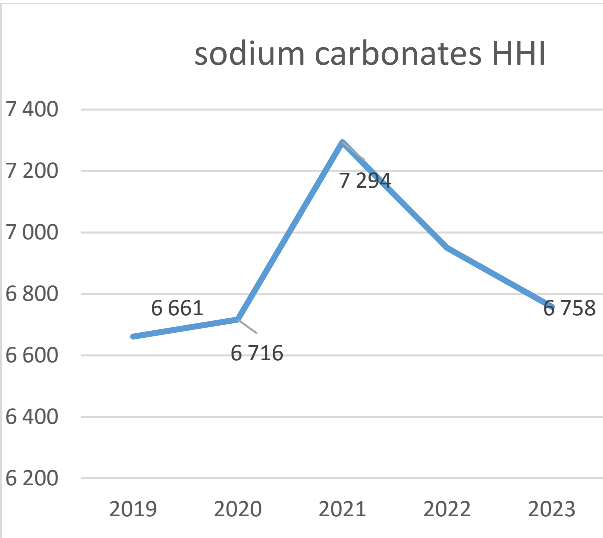
Source: Eurostat data

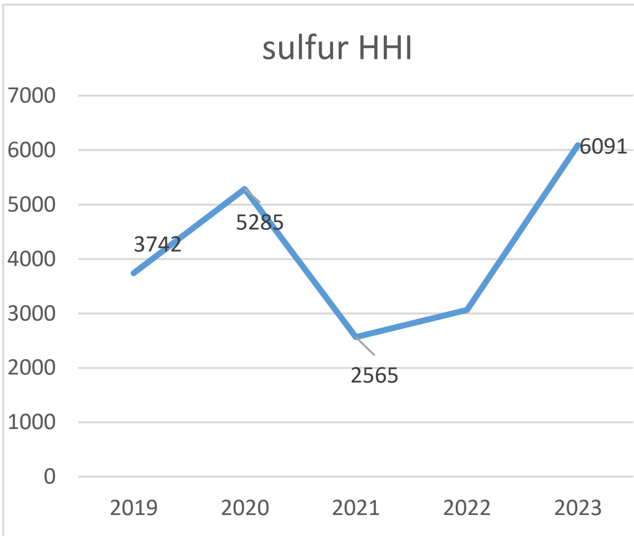
Sulfur, ***silicon*** and ***sodium carbonates*** are three strategic compounds irrigating several value chains. *Sulfur* enables fuel treatments and is found in several agrochemical molecules; *silicon*, apart from its key role in semi-conductors and wafers, is used in a variety of silicone polymers and materials for technical applications; *sodium carbonates* enable glass production as well as hygiene and detergent applications, agrochemical or drug formulations and industrial smoke treatment.

The EU has a large trade balance deficit for *sodium carbonates* and *silicon*, as shown above. It is in particular deepening every year since 2019 for *sodium carbonates*, with non-EU countries such as Turkey massively extracting them geologically and competing fiercely with EU soda ash plants.

Given the rapid and massive growth of imports for *sodium carbonates* and their very high concentration (HHI ranging between 6600 and 7300 since 2019), they could be considered as "critical".

Sulfur import concentration can also be quite fluctuating, and even though its trade balance is near equilibrium to date, it is noteworthy to mention that its principal source is refinery plants, which are structurally declining in Europe due to a switch for electric vehicles, hence a long-term uncertainty for its sourcing.





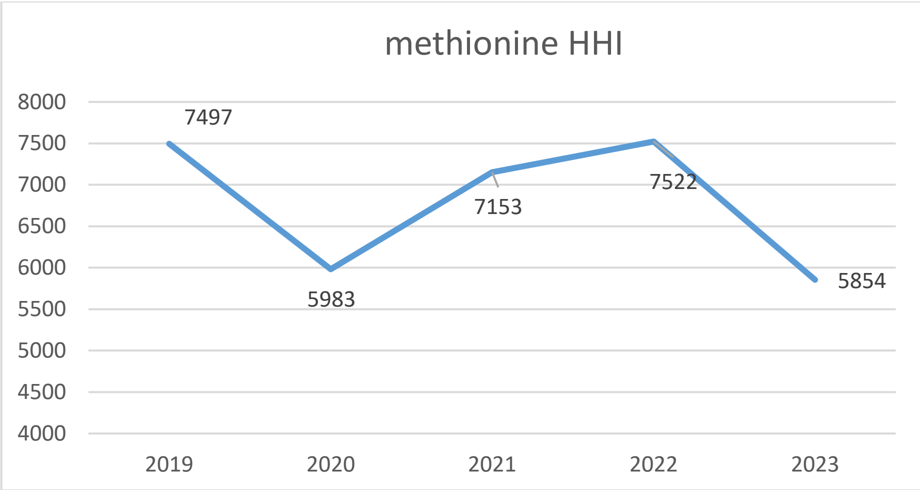
Source: Eurostat data

Hydrofluoric acid is upstream from the whole fluorine chemistry, which irrigates a wide range of strategic molecules ranging from drugs to high performance polymers (PVDF, PTFE…) with chemical and thermal resistance properties required in semi-conductor factories, inside batteries and for surface treatments.

<u>Strategic amino-acids</u>

Although positioned downstream with respect to the previously mentioned organic chemistry building blocks, ***methionine*** and ***lysine*** are two essential amino-acids for human and animal nutrition. They are strategic not only as key molecules but also technologically, since their industrial production can be fossil-based as well as bio-based via fermentation, representing an opportunity to foster alternative carbon sources.

Their production in the EU is however threatened by massive imports from Asia (average trade balance deficit of 379 M€ between 2019 and 2023 for *lysine* at the EU scale). Despite a trade balance that remains positive for *methionine* to date, competing imports are very concentrated (HHI ranging between 5800 and 7500 since 2019) towards China and Malaysia.



Source: Eurostat data

Appendix: A non-exhaustive list of alternative bio-based molecules that could replace fossil-based ones

- **Bio-based Glycerol and bio-based ethanol**: those are probably the bio-based molecules with the largest volumes produced to date, as they have benefitted from the development of biofuels. The current volumes are large and could be progressively made available for the chemistry sector as combustion engines will gradually phase-out. The technologies are largely available and have a final molecule cost close to their fossil-sourced counterparts.

As many alternative bio-based molecules are currently being investigated and a lot of uncertainty remains as to which ones are the most likely to emerge at scale, a non-exhaustive list of molecules of interest that have been identified by the Member States is provided, according to a few of their advantages. Please note that this is far from a complete overview (both in terms of molecules and advantages):

- **Bio-based molecules with no fossil equivalent**: lactic acid, itaconic acid, glutamic acid, pelargonic acid, azelaic acid, 3-hydroxypropionic acid, hydroxybutyrolactone, sorbitol.

- **Bio-based molecules that are very good platforms** (a large number of molecules can be synthetised from them): furan, furfural, hydroxymethylfurfural (HMF), furandicarboxylic acid (FDCA), fumaric acid, malic acid, levulinic acid, xylitol/ arabitol, biobuthandiol.

- **Bio-based molecules that are often cheaper than their fossil-based counterparts**: acetic acid, succinic acid, propanediol.

Additionally, it should be noted that the biochemistry sector faces multiple challenges in order to scale-up and deliver the volumes necessary to replace (part of) the petrochemical sector. Two of them being the availability of primary materials (2G feedstocks are likely insufficient to deliver large scale volumes, meaning that the debate to dedicate cultures for biochemistry – as has been done for biofuels – may need reopening) and the regulatory constraints before entering markets, considerably slowing down the development of some bio-based molecules and products.