Non-paper by France, xxx
The alarming situation of the European chemicals industry, a strategic sector that needs a dedicated "EU Critical Chemicals Act"

December 2024

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 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 – 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 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 support schemes dedicated to the chemical plants that require decarbonization and modernization investments; chemical plants whose closures would jeopardize European sovereignty.

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 irrigating 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 falling by 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% pour 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. In 2024 alone, four steam cracker shutdowns have been announced (ExxonMobil in Gravenchon, France; Sabic in Geleen, Netherlands; as well as the two plants owned by Eni/Versalis in Brindisi and Priolo – the last ones standing in Italy); these four combined representing about 10% of the EU assets and thousands of employees. 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 energy transition – decarbonization being a cornerstone of future competitiveness. 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

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

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.

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 decarbonization, modernization and resilience of the existing 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 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 specific 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. For that, it is however of paramount importance for the EU to answer the current crisis and protect the resilience of its key value chains.

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 of the industrial chemical sector, 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.

To this end, in the spirit of the Critical Raw Materials Act, such building block-type molecules, that are upstream to the health, food, automotive, construction, green tech and other major industries, should be labelled as "strategic" for the EU industrial ang global sovereignty. 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, should be deemed "critical" in addition to being "strategic".

The minimal list of "strategic" molecules for the EU is (*see Appendix for methodology details*):

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

- *ammonia* and *methanol*, for agriculture and energy sovereignty 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* should also be considered "critical" to date, others being on the way to becoming considered as "critical".

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

Given the key role of these molecules for the European strategic autonomy, 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 this context, « EU strategic project » labels could be attributed to projects that aim at modernizing and developing capacities on a strategic molecule, 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.

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 strategic autonomy.

It should be pointed out that introducing additional measures regarding the harmonization of permitting procedures across industrial sectors is not desirable, as it would create unwanted legal complexity and may lead to less comprehensive environmental impact assessments.

The signatories instead call for a wider and more systematic use of the existing trade defense mechanisms (anti-dumping, anti-subsidies, safeguard) to prevent unfair competition destabilizing the EU production of strategic molecules, specifically for those that are “critical”.

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 heavy industries or the chemical sector.

An ambitious *EU Clean Industrial Deal* would enable to accelerate decarbonization and guarantee competitive energy prices of the European heavy industry. 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.

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, non-EU imported chemicals should abide by high level standards in place in the EU 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 strategic autonomy in all key industrial sectors.

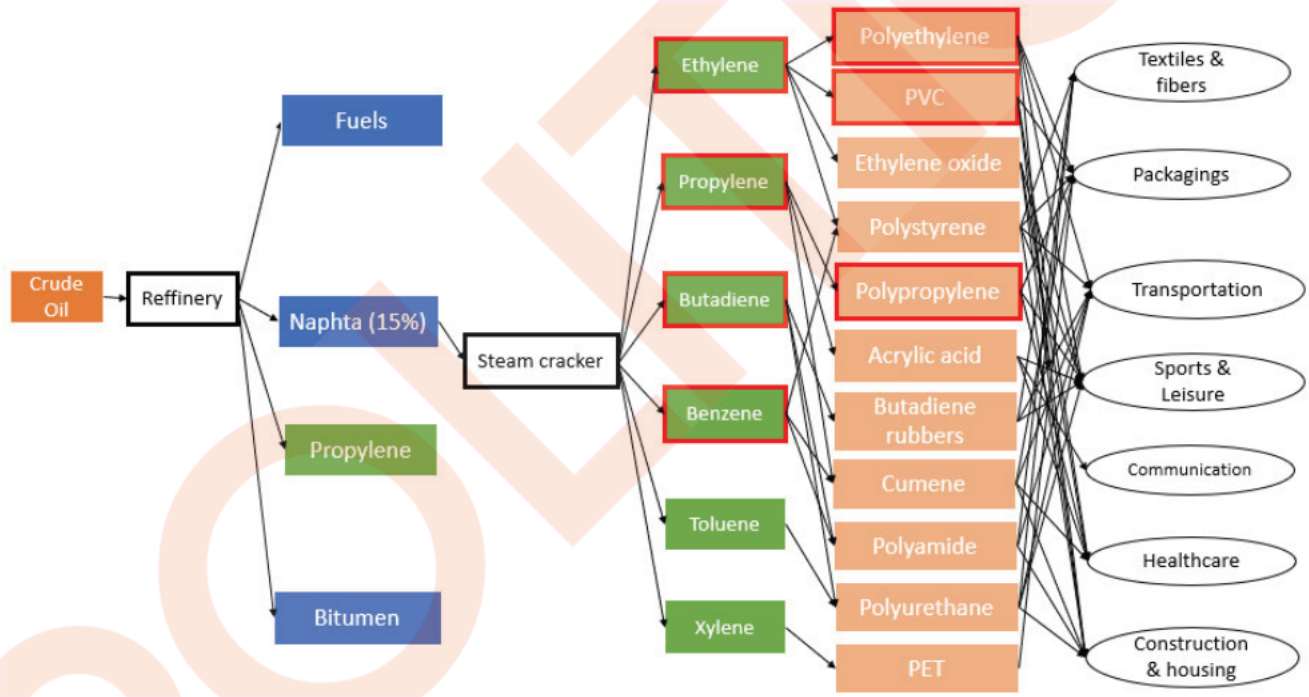
Appendix : methodological details on the identification of strategic and critical molecules

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

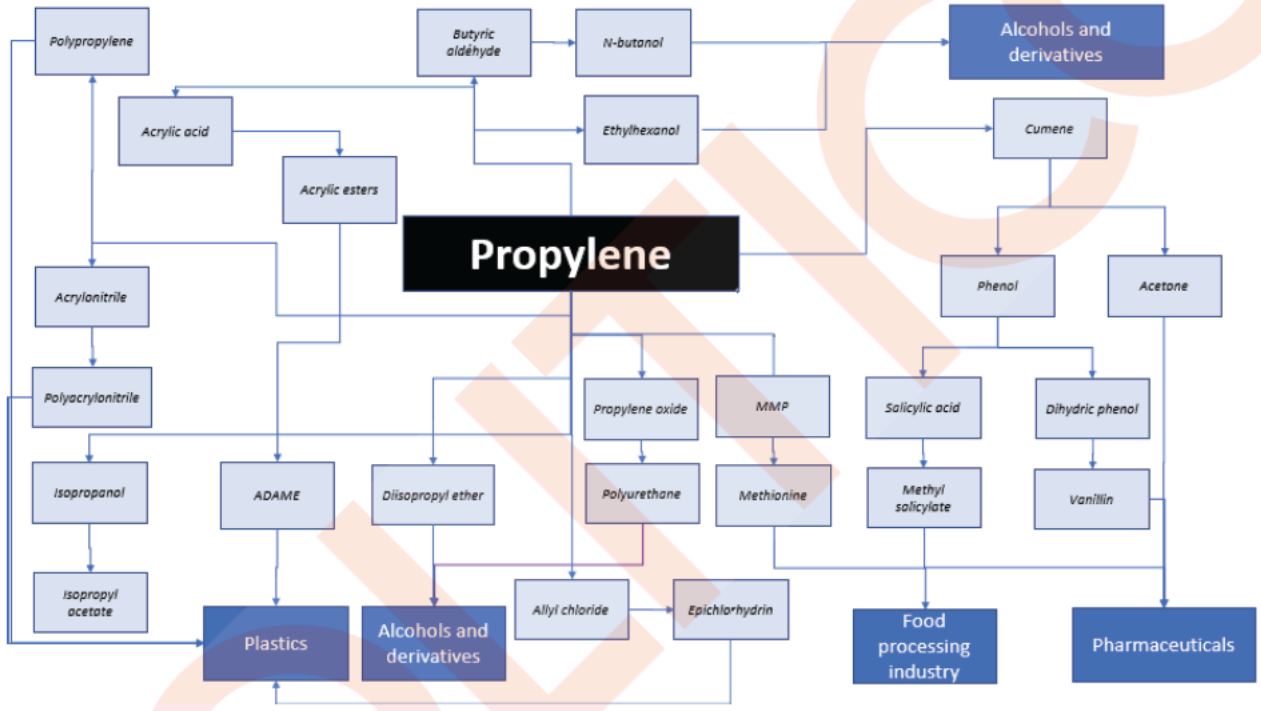
Four molecules upstream from most of the organic and polymer chemistry have been identified as "strategic" : ***ethylene***, ***propylene***, ***butadiene*** and ***benzene***. Currently, these molecules are mainly obtained via petrochemistry, in steam crackers.

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.

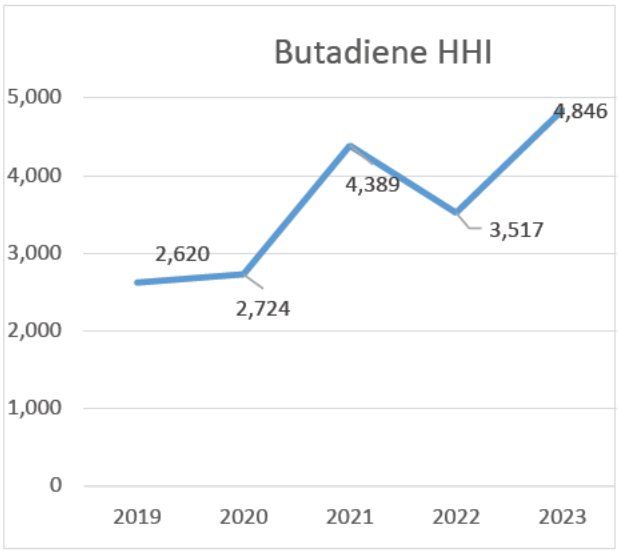
Butadiene is used to produce rubbers but also several molecules and specialty polymers (such as polyamides). *Benzene* is used to produce polymers (PET, PS…) but also many small organic molecules, in particular entering into the health (e.g. aspirin, paracetamol) and agro-industries.

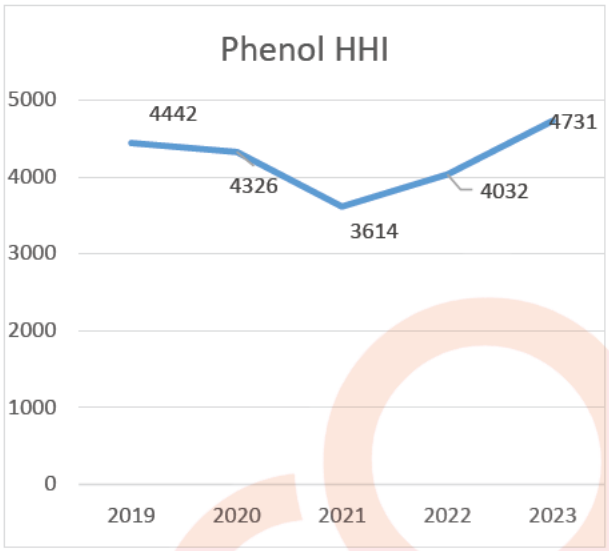


An example of the diversity of molecules and value chains stemming from propylene

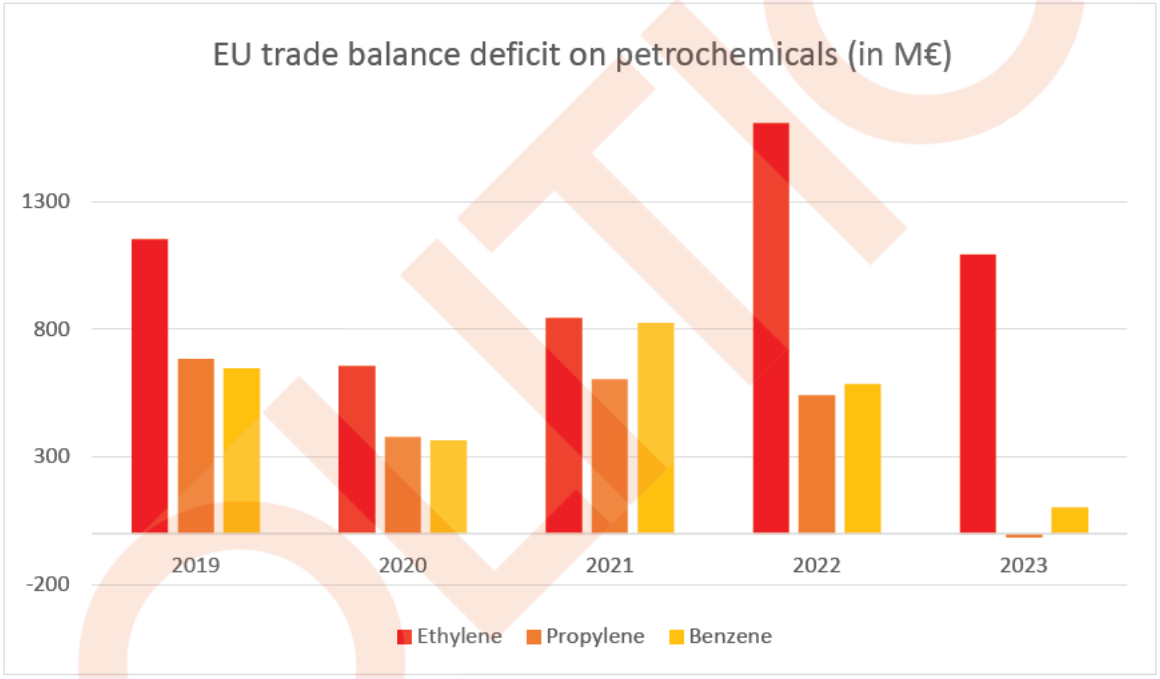
Source : Directorate General for Enterprises, French Ministry of Economy, Finance and Industry

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 can be considered to have very significant trade balance deficits and/or highly concentrated imports : *ethylene*, *butadiene* and *benzene* (encompassing phenol) are deemed "critical".

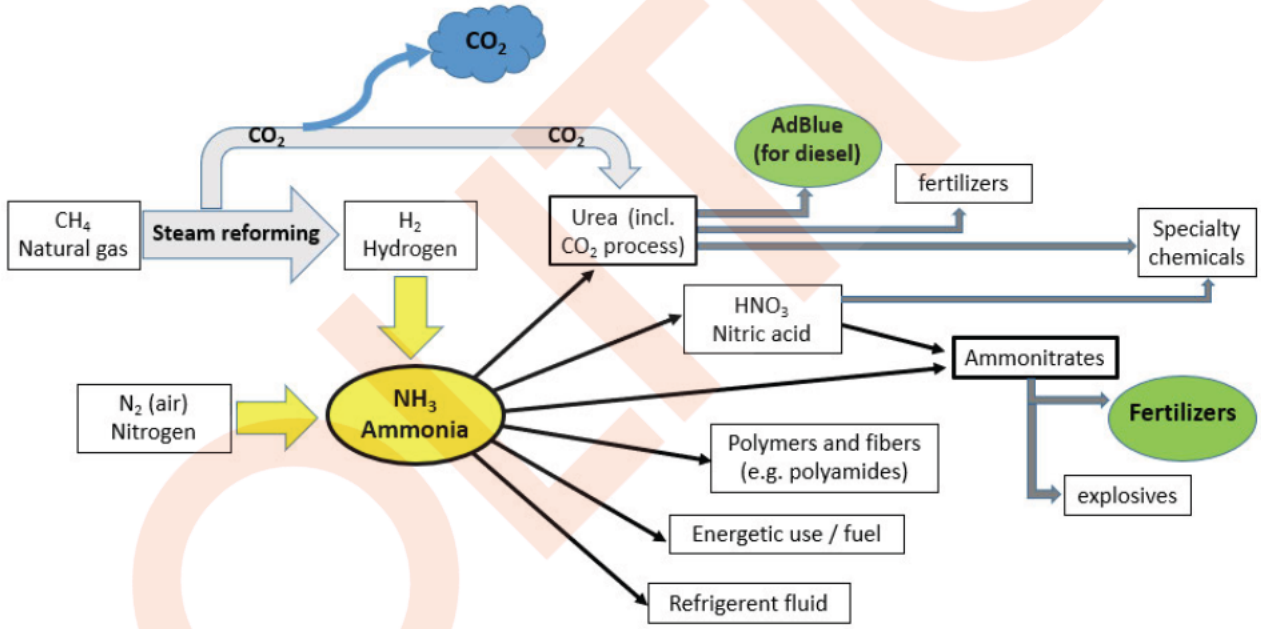
Molecules derived from natural gas

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.

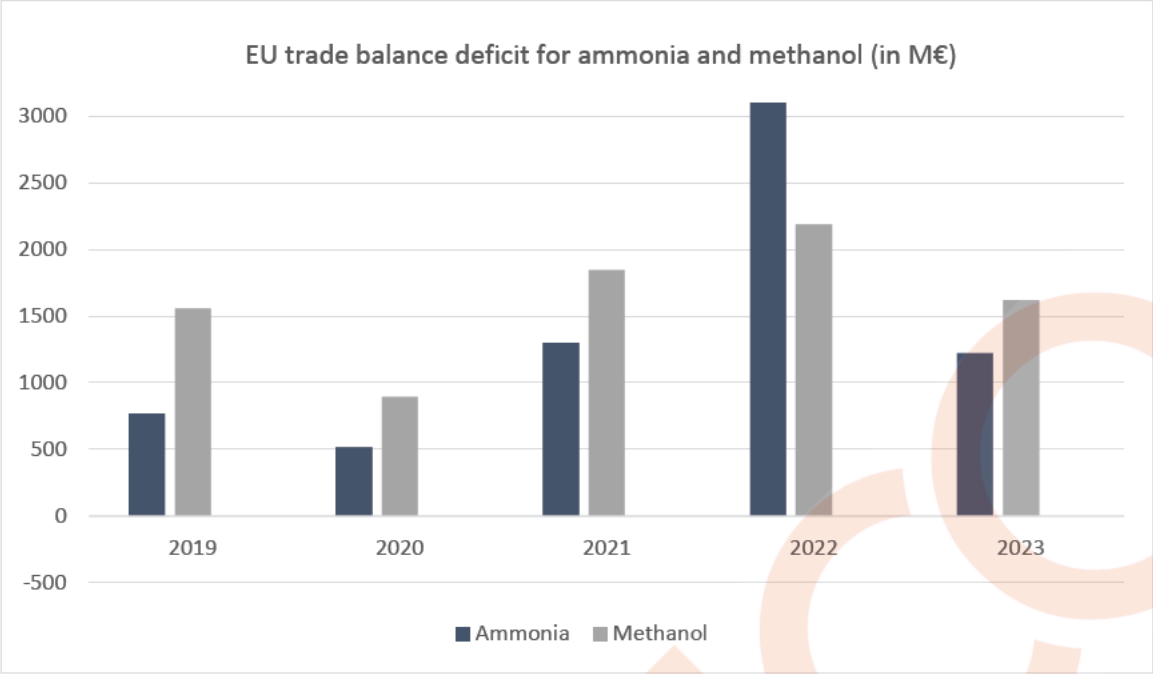
Ammonia is mainly devoted to fertilizers (ammonium nitrates, urea), hence is key for EU agricultural sovereignty. It is also necessary to introduce nitrogen in organic molecules and produce a variety of compounds, all the way to high performance polymers and synthetic fibers such as polyamides (used 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).

The two molecules have a very unfavorable trade balance, as illustrated below. Given that and the key role it plays in EU agricultural autonomy, *ammonia* is therefore deemed "critical".



Simplified scheme of ammonia value chain and usage

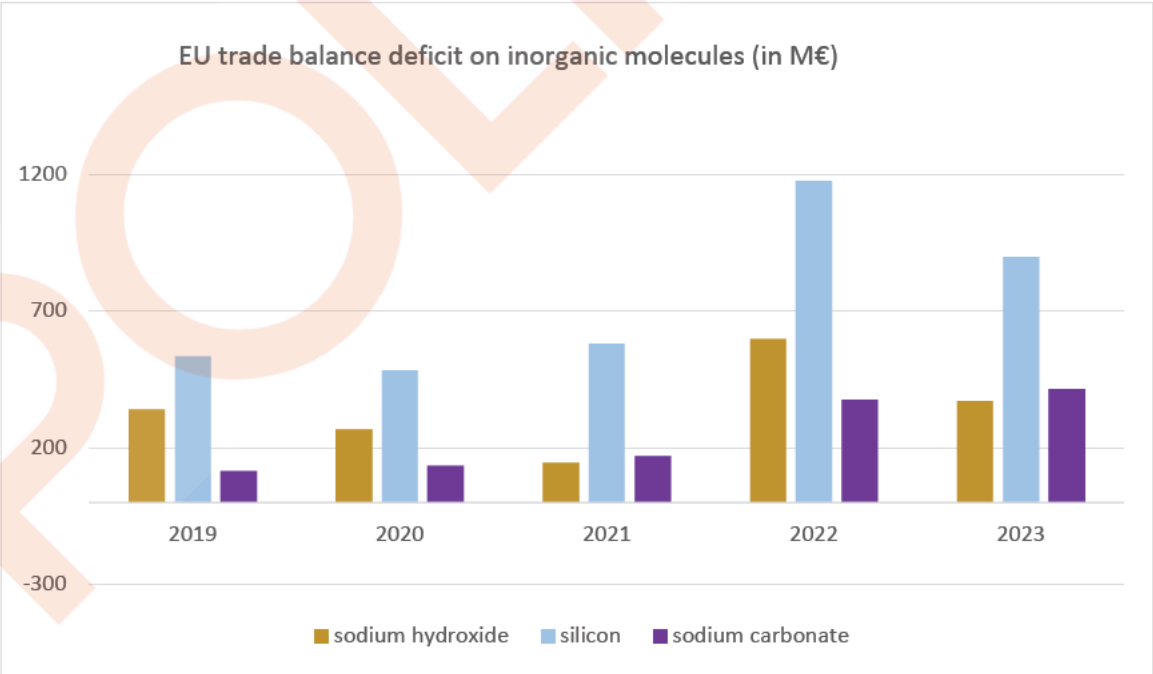
Source : Directorate General for Enterprises, French Ministry of Economy, Finance and Industry



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. Use of gaseous *chlorine* is rather local, and therefore this molecule is less subject to imports (unlike some of its downstream derivatives). *Sodium hydroxide*, however, has a large trade balance deficit at the EU scale.



Source : Eurostat data

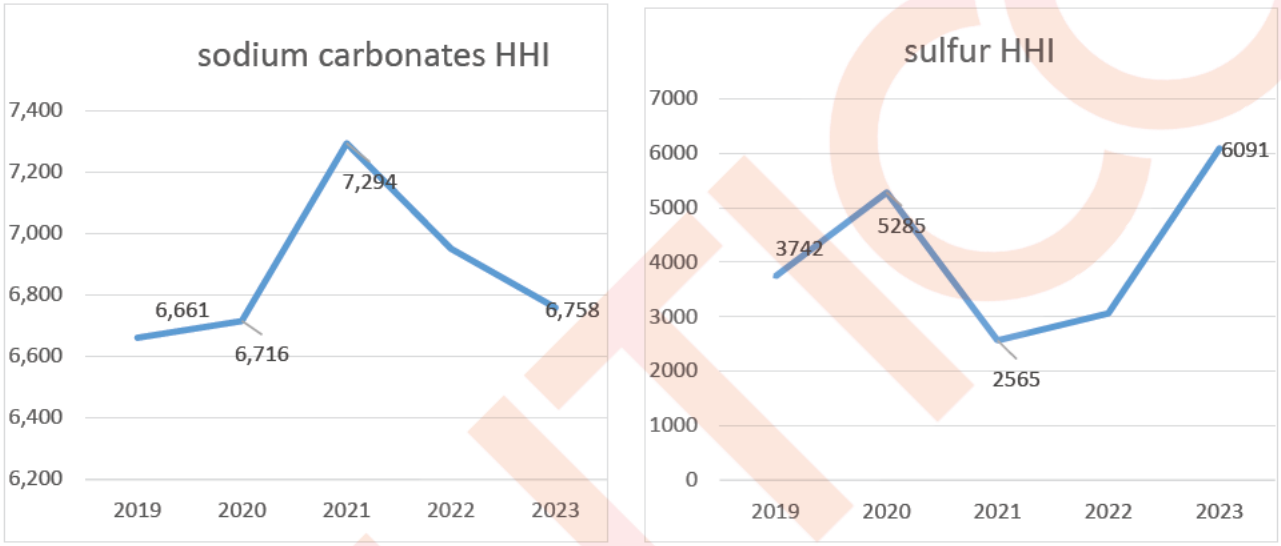
Sulfur, ***silicon*** and ***sodium carbonates*** are three strategic compounds irrigating several value chains. *Sulfur* enables fuel treatments and is found in several agrochemical molecules ; *silicon*, apart from its key role in semi-conductors and wafers, is used in a variety of silicone polymers 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 can 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.



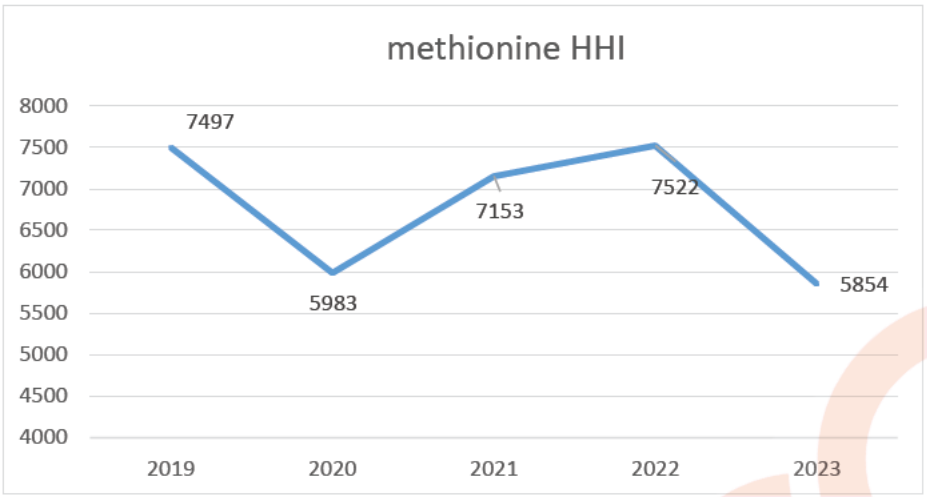
Source : Eurostat data

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.

Strategic amino-acids

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