The Iran war and petrochemicals:

Implications for building a resilient and fossil fuel-free petrochemicals industry in Europe

Climate Catalyst

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Executive summary

The Iran War has impacted European petrochemicals competitiveness

The shock to international oil and Liquefied Natural Gas (LNG) markets has increased feedstock and energy costs, deepening pre-existing structural disadvantages for European plastic and fertiliser producers, which lack access to low-cost, secure fossil fuels.

However, the conflict has had more severe impacts on competitors in the Middle East and Asia. This has created opportunities for European producers to increase market share, though these tailwinds are likely short-lived.

As the second energy crisis in less than five years, the Iran War underlines the urgency of reducing the industry's fossil fuel dependency.

The petrochemicals industry is the largest industrial energy consumer in Europe and is almost entirely dependent on foreign fossil fuels.

The previous energy crisis in 2022 had severe consequences for the industry, which experienced a collapse in investment that has stalled the industry's low-carbon transition.

Emission reduction strategies that reduce fossil fuel use now benefit from a "security premium" reflecting the co-benefit of enhanced energy security

In the wake of the conflict, energy security and electrification have become top priorities for the EU.

Reducing the petrochemicals industry's dependence on fossil fuels will significantly enhance European energy security and build industrial resilience. Conversely, remaining reliant on fossil fuels will perpetuate the industry's competitive disadvantage in the long run.

Immediately attractive opportunities to reduce fossil fuel dependence also deliver significant emissions reductions

Farmers and businesses are reducing fertiliser and plastic use and switching to alternatives in response to higher prices. Lower demand reduces fossil fuel use and cuts emissions across the entire lifecycle, from extraction of fossil fuels to end-of-life emissions. And it reduces pollution from fertilisers and plastic waste.

Electrotech for low- and medium-temperature heat is cost competitive and easily integrated by industry. In the longer-term, extending electrification to high temperatures could potentially displace almost all fossil fuels for direct heat and reduce direct (Scope 1) emissions by around 50 per cent.

Plastic recycling has benefited from an increase in virgin plastic prices. It already accounts for over 13 per cent of European plastic production with the potential to reach over 60 per cent in ambitious long-term scenarios. By avoiding incineration of plastic waste, recycling tackles end-of-life emissions which can account for up to half of total lifecycle emissions. Using local recyclate instead of imported fossil feedstocks provides significant resilience benefits.

Long-term strategies to develop non-fossil feedstocks have also become more attractive, though significant challenges remain

Biomass can improve feedstock security by diversifying supply across a wider range of feedstock streams and production regions. Meaningful reductions in long-term fossil fuel consumption are possible – transition pathways target around a quarter of feedstock from biomass on average. However, realising this potential requires overcoming significant sustainability and sourcing challenges.

Zero emission synthetic feedstocks and green ammonia are highly attractive from an energy security perspective. Some transition roadmaps target as much as 90 per cent of long-term feedstock supply from these technologies. However high costs and the need for development of extensive networks in renewable power, green hydrogen and CCU (for synthetics) raise questions about whether meaningful shares are feasible in practice.

Some emissions reduction strategies do not provide a "security premium" and have become less attractive

Carbon capture features widely in transition roadmaps for the industry but has become less attractive because of the Iran War. It enables rather than reduces fossil fuel use, perpetuating exposure to fossil fuel volatility and undermining energy security. The Iran War also creates economic headwinds for carbon capture projects through higher energy costs, supply chain disruptions, and increased cost of capital.

The benefits of large capital investments in more efficient ethane crackers now need to be considered in the context of long term energy security. In the short term, these assets offer higher carbon efficiency and lower emissions intensity. But in the long-term, they could undermine resilience by locking in fossil fuel dependency for decades unless alternative feedstocks become available at scale.

Recommendations

Below are five priorities for building a resilient, fossil fuel-free petrochemicals industry. The main report provides specific detail on each.

1. Accelerate electrification

The EU must increase the availability of cheap renewable electricity by accelerating renewable deployment, removing grid bottlenecks, and reducing taxes and charges on electricity use. Companies should invest in low- and medium-temperature electrification technologies and renewable PPAs.

2. Accelerate circularity

The plastic recycling industry should be supported with measures to "close the loop" locally and with lead market policies to increase revenue and offtake security. Industry should focus on developing chemical recycling in waste streams where mechanical recycling is not possible. Farmers should be helped to reduce chemical fertiliser use with support for precision agriculture, regenerative agriculture practices, and increased use of recycled organic fertilisers.

3. Avoid weakening the ETS

The upcoming 2026 review of the Emissions Trading System (ETS) will almost certainly face increased pressure for the extension of free allowances in the wake of the Iran War. However, this would disincentivise investment in solutions to transition away from fossil fuels and result in "double protection" for fertiliser manufacturers which are shielded from high-carbon imports by the Carbon Border Adjustment Mechanism (CBAM). Current plans to phase out free allowances should be maintained.

4. Carefully scale biomass feedstock

A prerequisite for developing sustainable bio-based chemicals is a comprehensive cross-sector biomass governance framework that prioritises scarce biomass appropriately and sets consistent, robust sustainability standards. Only with this in place should policy focus on establishing lead markets for bio-based chemicals and feedstocks.

5. Develop strategic partnerships for green ammonia

The EU should develop green ammonia partnerships with lower cost producer countries. These should ensure green fertiliser supply for both sides and support job and infrastructure development in partner countries.

Introduction

The Iran War has triggered the largest global energy shock in history. At the time of writing (May 2026), the Strait of Hormuz remains effectively closed, with the disruption of 20 million barrels per day (mb/d) of crude and oil product flows and a fifth of global Liquified Natural Gas (LNG) supply.[1]

This has potentially profound implications for Europe's petrochemicals industry, which is almost entirely reliant on foreign oil and gas for feedstocks and energy. These implications are wide ranging; however, this paper is primarily concerned with those for long-term emissions reduction among fertiliser and plastics manufacturers.

The first section begins with a discussion of the overall context, including the War's impacts on the industry's costs and competitive position and how this compares to the last energy crisis in 2022. The second section examines the implications for emissions reductions, with a focus on the medium to long term. It argues in favour of emissions reduction strategies that also provide meaningful resilience benefits in terms of reduced fossil fuel dependency and enhanced feedstock security of supply. The final section provides specific recommendations for how to harness current economic tailwinds and policy momentum to accelerate the transition to a resilient, fossil fuel-free petrochemicals industry.

Context

The Iran War's disruption of global oil and LNG markets creates immediate cost pressures for plastics and fertiliser producers. Plastics manufacturers are heavily dependent on naphtha, most commonly derived from oil, and fertiliser manufacturers are heavily dependent on ammonia, most commonly produced from fossil gas.

Beyond primary energy, various other key commodities, intermediates, and products of the petrochemicals industry have been disrupted, including:

- Fertilisers and key precursors, with the Gulf being a significant exporter of nitrogen-based fertilisers and accounting for around a third of global urea and ammonia exports
- Sulphur, used in the manufacture of phosphate fertilisers
- Various petrochemical feedstocks including methanol, mono-ethylene glycol (MEG), and naphtha

Once the Strait reopens, a return to pre-crisis shipment volumes is likely to take months: infrastructure needs to be repaired, wells need to be restarted, and ships need to be repositioned. Things are likely to take longer for LNG than for oil, due to the damage inflicted on facilities in Qatar and Iran, including the former's huge Ras Laffan complex that "may require years of repair"[2], suggesting that although the initial supply shock has been greatest for oil, it may be longer lived for LNG.

Cost implications for European fertiliser and plastics manufacturers

Precise impacts for fertiliser and plastics producers differ due to the degree of upstream exposure to oil versus gas (which have been impacted differently) and whether there is a direct dependency on the Gulf.

For European fertiliser manufacturers, the primary exposure is to gas (which typically accounts for 60 to 80 per cent of production costs for nitrogen-based fertilisers[3]); however, direct reliance on the Gulf is low. For example, Qatar supplied less than four per cent of the EU's gas in 2025[4], and less than one per cent of Europe's ammonia and diammonium phosphate/monoammonium phosphate (DAP/MAP) imports come from the Middle East.[5] Nevertheless, these commodities are all globally traded, so the industry is still exposed to higher costs even if it doesn't face immediate shortages.

The plastics industry has more direct import dependence on the Gulf, which supplies between 30 and 40 per cent of the crude oil used in European naphtha production alongside 40 to 50 per cent of MEG, a key input for the ubiquitous plastic polyethylene terephthalate (PET).[6] It is notable that oil prices have risen significantly more than gas prices, meaning that naphtha-based plastic manufacturers such as those in Europe and Asia are facing higher cost increases than ethane-based competitors in the USA, which rely on locally produced fossil gas.

In sum, both fertiliser and plastics manufacturers face significant increases in costs for energy and feedstocks. Higher gas prices are a triple threat here: increasing feedstock prices (especially for fertiliser producers), increasing direct energy costs (e.g. for process heat) and increasing electricity costs, which are usually set by gas-fired generators at the margin.

Although European gas prices have risen significantly since the crisis began, these rises are not, so far, on the scale seen in 2022 (see Figure 2 and later discussion on the 2022 crisis).

Table 1: EU petrochemicals industry exposure to the Iran War: selected commodities

Commodity	Use	Early impacts*
Fossil gas	• Ammonia feedstock (fertilisers) • Plastics feedstock (ethane) • Process heat • Electricity generation	• EU gas prices almost doubled by mid-March and are currently around 50 per cent higher than pre-crisis levels • Gas-fired electricity costs increased by over 50 per cent, feeding through to wholesale electricity price rises
Ammonia	• Nitrogen fertiliser feedstock	• Despite ammonia import prices reaching a 3-year high, EU-produced ammonia became uneconomic as gas prices pushed production costs even higher • EU ammonia-based fertiliser prices were up around 20 per cent during the first four weeks of March
Urea	• Nitrogen fertiliser feedstock	• EU urea prices were up over 40 per cent during the first four weeks of March
Crude oil	• Naphtha production	• Crude prices increased by around 50 per cent during the month of March
Naphtha	• Plastics and other petrochemicals feedstock	• Prices for European Naphtha contracts almost doubled in March • EU prices for ethylene and propylene increased €450/tonne and €465/tonne respectively in April as refiners sought to recover March losses

* Selected observed impacts in March and April 2026
Sources: S&P Global, Trading Economics, Platts, EU fertiliser observatory, ICIS

A structural crisis

The War has deepened pre-existing structural cost and supply chain disadvantages of the European petrochemicals industry, stemming from:

- An aging, inefficient asset base: the European cracker fleet is roughly twice as old as the Middle East's and three times as old as China's, with an average age of 45 years.[7]
- High energy costs: gas is two to four times more expensive compared to competitors in the US and Middle East. Electricity, the price of which is usually set by gas generators, typically costs European industry around twice as much as competitors in the US and 50 per cent more than in China.
- The absence of a secure, low-cost feedstock supply: competitors in the US and Middle East benefit from abundant, reliable, and cheap fossil gas for feedstock in plastics and fertilisers.

Combined with significant overcapacity in primary activities, these disadvantages mean that the European petrochemicals industry was in decline before the Iran War began. Chemical plant closures had increased sixfold since the last energy shock in 2022, and investment in new capacity had fallen to almost zero by the end of 2025 as companies shifted their production to lower-cost countries outside Europe.[8]

Revenue implications

The impacts of the crisis are not confined to costs, however. International fertiliser and plastic product markets have also been severely disrupted, presenting new revenue opportunities for European manufacturers.

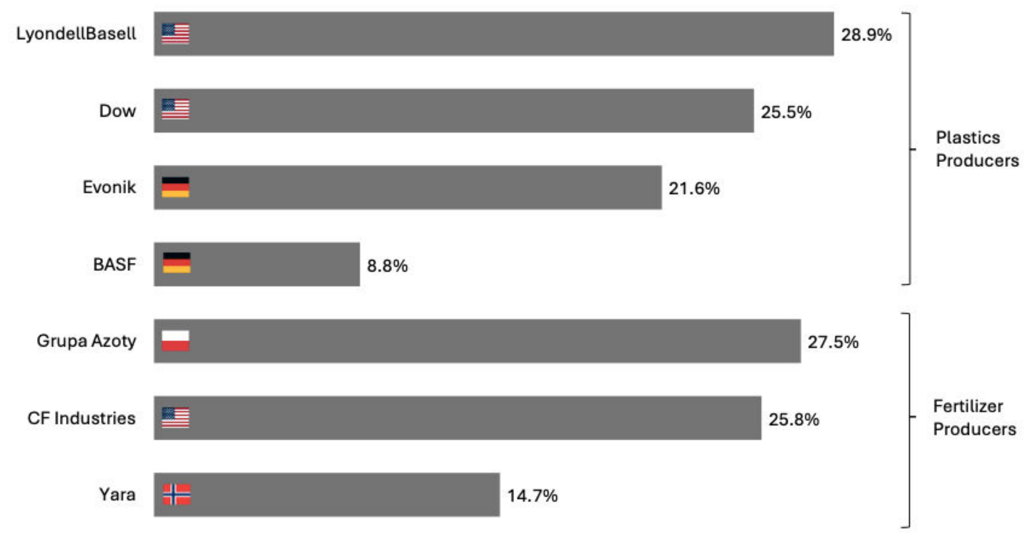
1. Reduced output in competitor regions

The War has disproportionately affected lower-cost competitors in the Middle East and Asia. The closure of Hormuz has effectively shut in exports from Gulf producers, creating opportunities for European manufacturers to fill the gap. For example, the Gulf supplies well over a third of global urea and significant shares of other nitrogen and phosphorous based fertilisers; in plastics, it provides between 20 and 40 per cent of polyethylene exports.

Asian producers have been hit harder than European counterparts due to the region's high direct dependence on the Gulf for energy, feedstocks, and intermediates.[*] The Gulf supplies as much as 60 per cent of Asian naphtha imports for plastics producers, and the sudden supply shortfall has triggered sharp declines in cracker utilisation and output.

US-based producers are best placed to capitalise on reduced output in the Middle East and Asia. Compared to Europe, the US industry benefits from lower energy costs and secure, reliable feedstock supply in the form of abundant shale gas. Nevertheless, some European companies still expect to benefit from the lost output of Asia and the Middle East, and from customers seeking to stockpile products in anticipation of future price rises. As a result, analysts have predicted profit increases for major European chemicals producers for the second quarter of 2026, despite higher costs.[9] Equity markets have responded favourably, with share prices up for listed European and US plastics and fertiliser manufacturers.

Figure 1: Share price gains of selected European and US companies from closure of the Strait of Hormuz to mid-May



Source: NYSE, Frankfurt Stock Exchange, Oslo Stock Exchange, Warsaw Stock Exchange. Price change calculated from 27 February to 18 May 2026.

*See for example: Balci, G. and Surucu-Balci, E. (2026). "Some countries in Asia are rationing energy – here's why they've been hit hardest by the crisis in the Gulf," ABC. Available online at: https://www.abc.net.au/asia/some-countries-in-asia-are-rationing-energy-why-they-ve-been-hit/106562342

2. Demand destruction

Revenue gains are expected to be short-lived, however. Once customer inventories are full, continued high product prices are likely to drive down demand and analysts have started to warn that the industry's recent tailwinds may be fading.[10]

In the case of fertilisers, surging prices have coincided with a period of comparatively low crop prices, making it harder for farmers to absorb the cost increase. This is an important difference compared to the 2022 fertiliser price spike, when crop prices also surged on the back of disrupted Ukrainian grain exports. This time, crop prices are significantly lower – for example wheat prices are about half their 2022 level – resulting in more pressure on farm margins and expectations of a larger reduction in fertiliser use.[11]

In the case of plastics, reports are emerging of increasing substitution (e.g. use of paper packaging) and recycling as businesses adapt to higher virgin plastic costs, initially in Asia where price and availability impacts have been most pronounced. Price differentials between virgin and recycled materials have narrowed, with European packaging industry sources noting higher demand for recycled resins as businesses seek to manage cost volatility.

A key question in the case of both fertilisers and plastics is the extent to which reductions in demand will persist beyond the duration of the crisis. The EU has policy objectives to reduce demand for fertilisers and plastics, so there is a strong justification for opportunistic interventions to enable structural reductions in demand that persist beyond the crisis.

In the case of fertilisers, over-application in the EU results in nutrient pollution and greenhouse gas emissions for negligible yield benefit. The Farm to Fork Strategy includes a target of reducing chemical fertiliser use by 20 per cent by 2030. However, despite strong progress in some member states, overall the EU is off-track and stronger action is required to reduce chemical fertiliser use through practices such as precision farming, regenerative agriculture and greater use of organic and recycled fertilisers.[12] The second spike in fertiliser prices in less than five years provides an important moment for governments to double down on this objective, and sustained demand reduction for chemical fertilisers should be a key success measure for the recently announced EU Fertiliser Action Plan.

For plastics, the key question is whether the EU can use the temporary narrowing of the gap between virgin material prices and recyclate to resuscitate the ailing recycling industry, which reported a 50 per cent increase in facility closures last year.[13] Various policies exist to support the industry. The EU's Packaging and Packaging Waste Regulation (PPWR) targets that 55 per cent of all plastic packaging is recycled by 2030. In addition, the PPWR also requires that all packaging placed on the market must be designed for recycling by 2030, while Extended Producer Responsibility (EPR) mechanisms require product manufacturers to pay for the recycling of their packaging. However, the recycling industry argues that volume mandates do not protect margins and that EPR schemes need to be strengthened. The forthcoming Circular Economy Act could provide an opportunity to help stabilise the industry by addressing key structural economic challenges such as competition from cheap recyclate imports and the need for longer-term contracts and procurement commitments.

Recent history repeating itself? The 2022 energy crisis

As already noted, this is the second energy crisis impacting Europe and the petrochemicals industry in less than five years. The previous one, triggered by Russia's invasion of Ukraine in 2022, provides important lessons and offers insights into the medium- to longer-term implications of the current crisis.

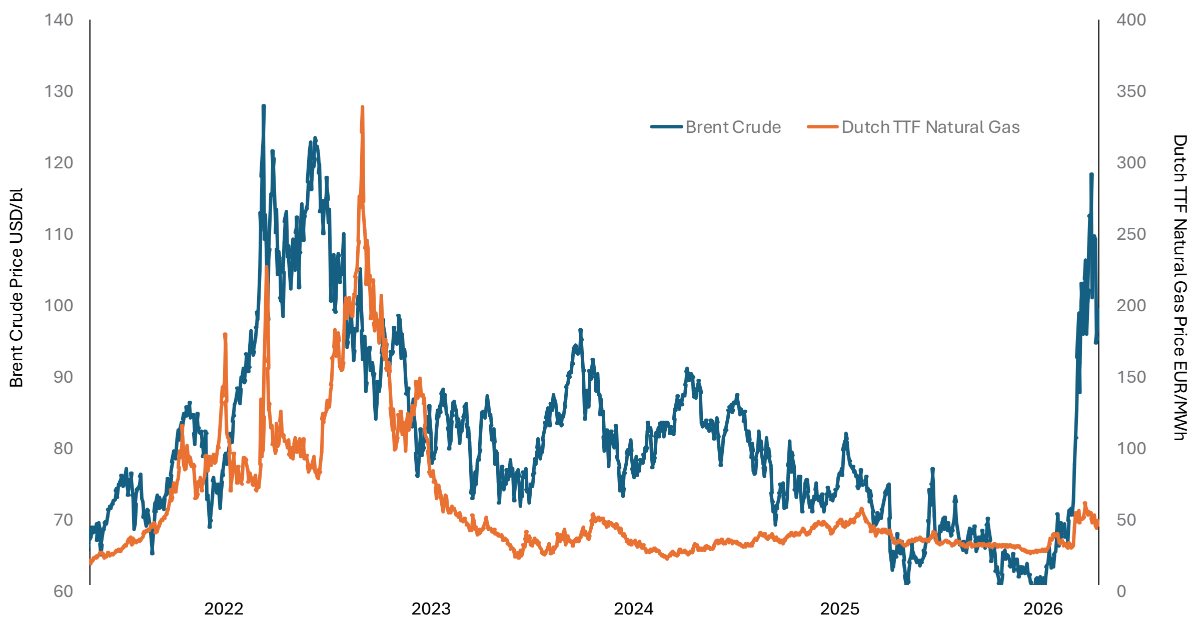
2022 and 2026: key similarities and differences

The previous energy crisis was primarily a gas crisis, triggered by the curtailment of Russian pipeline gas to Europe in the build-up to and invasion of Ukraine. The current crisis is first and foremost an oil supply shock. LNG is significantly affected, but to a lesser extent than oil, and gas price rises have been lower than in 2022.

This is primarily because the 2022 crisis triggered an extreme localised supply shock, with the effective closure of a pipeline supplying around 40 per cent of the EU's gas in the absence of sufficient import infrastructure to close the gap with alternative supplies. This was exacerbated by very low storage levels heading into winter. In contrast, the current crisis has affected about 20 per cent of international seaborne gas – equivalent to around three per cent of global gas demand – creating a more muted impact on LNG import prices (though this could increase if the crisis drags on and Europe finds itself increasingly bidding against Asian countries for flexible LNG cargoes).

So far, oil price rises have been comparable to those experienced in 2022, although if Hormuz remains closed and stocks are depleted, price rises could be considerably higher and the cumulative impact far greater.[14]

Figure 2: Comparison of Ukraine War and Iran War impacts on European energy prices



Source: investing.com

Fertilisers

For European fertiliser producers primarily exposed to fossil gas prices, the impact on costs to date has therefore been more muted than in 2022. In 2022, the consequences were severe, with the industry curtailing around 70 per cent of production capacity at the peak of the crisis[15] and imports of ammonia and nitrogen fertilisers increasing from gas-producing countries, particularly in North Africa. As noted previously, high cereal prices in 2022 supported higher fertiliser prices; however, this benefitted lower-cost producers elsewhere, with the crisis representing a structural weakening of the European industry rather than a windfall.

Plastics

The 2022 spike in energy and electricity prices deepened the cost disadvantage of European manufacturers relative to overseas competitors. Cracker utilisation dropped to around 75 per cent, triggering a wave of facility closures.[16] The damage to the industry was significant: 2023 saw a record contraction and by 2024 turnover had fallen 13 per cent.[17]

In the plastics recycling industry, the crisis led to a painful boom and bust. Initially, recyclers enjoyed a reversal in virgin-recycled spreads, high utilisation, and investment in new capacity. However, the reversal was painful and swift. New capacity came online just as virgin prices receded and imports of recycled plastic surged, leaving recyclers in a parlous state.

The EU's response

The EU's response to the energy crisis was far reaching and in places contradictory. The central pillar was the REPowerEU strategy to pool gas demand, diversify away from Russian energy supplies, boost clean energy investment, and enhance energy efficiency. This included ambitious targets to develop green hydrogen – produced from electrolysis using renewable power and a key resource for a net-zero petrochemicals industry* – and state aid dispensations to accelerate investment in industrial decarbonisation infrastructure including electrolysers and CCUS.

Temporary support measures often created countervailing pressures, however. Member states spent over €500 billion on emergency schemes, largely in the form of untargeted support for households and businesses to suppress energy prices, a consequence of which was increased energy demand and a disincentive to invest in alternatives.[18] Initially, member states were 'invited' to set conditionalities relating to environmental protection, energy efficiency or supply diversification, but in practice, aid to compensate heavy industries for high energy prices typically came without climate-related conditions attached. This remained the case until 2023, from when companies receiving more than €50 million were required to submit plans by the following year for how they would deliver against the EU's requirements on environmental protection, energy efficiency, and supply diversification.[19]

Fertilisers were identified as a strategic priority and farmers received state aid to help them cope with higher prices – supporting demand for chemical fertilisers rather than encouraging demand reduction and alternatives.

The ETS inevitably became the focus of intense lobbying. Calls in some quarters for a temporary suspension were rejected; however, long-term concessions were ultimately made to industry, with the 2023 reform including a less aggressive phase-out of free allowances than originally proposed by the Commission. The planned ETS revision later this year is likely to face similar pressure for further delays to the phase-out of free allowances.

Nevertheless, the EU response had some important successes. Russia's share of gas imports dropped from 45 per cent in 2022 to 12 per cent in 2025, supply diversified, gas demand fell by around 19 per cent compared to the five-year pre-crisis period and renewables deployment reached record speeds.[20]

*By 2030, 10 million tonnes of renewable hydrogen to be produced locally and a further 10 million tonnes to be imported.

Lessons for petrochemicals emissions reduction

Despite the wave of policies to accelerate the energy transition and reduce gas demand, the 2022 energy crisis did not represent a net zero inflection point for the petrochemicals industry. Far from it – the severe impacts on competitiveness and investment hindered transition. The following insights are relevant to the current situation:

1. Migration of upstream capacity (and emissions)

The 2022 crisis was catastrophic for Europe's chemicals industry, which suffered the largest contraction in output of all energy intensive sectors.[21] Closures continued after the crisis abated, with the rate doubling in 2024-25. Losses have been concentrated in energy intensive parts of the value chain where excess capacity is most pronounced and operations are most exposed to volatility in fossil fuel prices: upstream primary petrochemicals and basic inorganics account for 80 per cent of the closures since 2022.[22] This loss of upstream capacity accelerated a long-term trend, reflected by a persistent structural trade deficit in upstream segments (indicating import dependence for raw materials and primary products) and surpluses in specialty and consumer chemicals.[23]

The migration of energy intensive activities overseas effectively displaces the industry's operational emissions (Scope 1 and Scope 2) to the supply chain (Scope 3). It does not mean lower emissions overall; it may even result in higher emissions if the activities relocate to regions with higher energy intensities, less renewable energy, and/or less stringent climate policies.

This raises a key strategic question for the industry and EU: Given the competitive disadvantages the industry faces, and the likelihood of continued fossil fuel price volatility, can the loss of upstream capacity be slowed or stopped? And if so, which upstream activities should be preserved to support higher value downstream activities whilst balancing complex and sometimes competing objectives relating to energy security, emissions reductions, environmental protection, and employment. The EU lacks clear answers to these questions and has yet to articulate a convincing vision for an economically, socially, and environmentally sustainable petrochemicals industry.

2. Investment challenges

Reaching net zero in petrochemicals production is likely to depend on the development of high cost, capital intensive technologies such as green hydrogen and carbon capture, utilisation, and storage (CCUS). The 2022 crisis created significant interest in green hydrogen which was targeted for growth in the RePowerEU strategy. However, an initial surge in project announcements has not translated to output, and many projects lack secure offtake and are struggling to reach final investment decision (FID). The 2022 spike in gas prices made green hydrogen economically viable for a short period, but this was transient in the context of a 20-year project lifetime and insufficient to secure long-term offtake or justify investment.*

The Iran War has made green hydrogen/ammonia temporarily economic again, but the long-run cost challenges remain. Scaling the green hydrogen economy will require a stronger policy effort from the EU, including mechanisms to support long-term procurement at prices able to mobilise investment.

Unlike green hydrogen, CCUS does not offer direct opportunities to displace fossil fuels, so it attracted less attention in the wake of the 2022 energy crisis. However, despite limited progress, the overall picture is also of too few projects reaching FID.[24]

In both green hydrogen and CCUS, activity within European petrochemicals has been limited to a handful of large players. For example, in CCUS, BASF has developed its own proprietary carbon removal technology which it now markets to other companies, and is involved in the large Kairos@C project in Antwerp.[25] BASF is also investing in the major Hy4Chem green hydrogen project at its Ludwigshafen site, while INEOS has made a number of other announcements.

*See, for example: Tengler, M. (2026). "No, Iran War Won't Boost Clean Hydrogen – Except in China," BloombergNEF. Available online at: https://about.bnef.com/insights/clean-energy/no-iran-war-wont-boost-clean-hydrogen-except-in-china/

However, these high profile examples fail to mask a wider clean investment malaise within the industry: total capex has declined by over 80 per cent since the 2002 crisis, to €1.5 billion in 2025, of which just €200 million was for clean technology.[26] This is less than one per cent of the annual investment needed to transition the industry to net-zero emissions by 2050.* The composition of this investment is also concerning: companies reported it comprised mainly green hydrogen with some CCUS and electrification, indicating that a relatively small number of demonstration investments in immature technologies are squeezing out commercially viable investments in electrification with more immediate potential to reduce fossil fuel use. The conclusion that the 2022 energy crisis has stalled the chemicals industry's transition seems inescapable.

3. Lost opportunity to accelerate circularity

The 2022 crisis and its knock-on impacts for the price and availability of final products should have been a moment to increase recycling and reuse rates and switch to alternatives, but that did not happen. Left to market forces, the plastics recycling industry went through a painful boom and bust from which it has not yet recovered. Conversely, chemical fertiliser use was propped up with state aid. This time, policies need to encourage rather than disincentivise switching to alternatives and reductions in use, and lock-in these changes beyond the duration of the crisis.

4. Beyond renewables

Europe's build out of renewables has been a success, but more is needed to realise the full potential of renewable power to lower electricity prices, which is critical for deep electrification within the petrochemicals industry. This lesson has clearly been learned: the AccelerateEU strategy[27], launched in response to the current crisis, emphasises electrification, with proposals to connect renewables more quickly, build interconnectivity and system flexibility and reduce electricity prices by shifting taxation from electricity to fossil fuels.

5. Perverse incentives

As noted above, member states spent significant fiscal resources on short-term measures to shield households and companies from higher energy costs that undermined long-term emissions reductions and energy security. This lesson appears to have been learned as well, at least to some extent: data from Bruegel's 2026 European energy crisis fiscal response tracker indicate that so far, member states have committed around €11bn – around two per cent of what was spent last time.[28] This number may still rise of course, and fiscal space has reduced since 2022, but the scale of the difference indicates that this time more resources could be available for long-term investments to reduce fossil fuel dependence and increase electrification.

*Estimates of the total cumulative investment required for net zero by 2050 range from €1tn to €2tn, representing approximately €30bn to €60bn of annual investment. See: Douma, E., d'Escury, T.C. and Roelofsma, M. and Maarten Roelofsma (2025). "Navigating European chemicals - Part 1." Available online at: https://www.rolandberger.com/en/Insights/Publications/Navigating-European-chemicals-Part-1.html; and Eschenröder, E. et al. (2022). "The chemical industry's road to net zero," Accenture. Available online at: https://www.accenture.com/us-en/insights/chemicals/eu-green-deal

Implications of the Iran war for low-carbon transition in the petrochemicals industry

Taking the 2022 energy crisis as a guide, it is unlikely that the Iran War will significantly accelerate the industry's low-carbon transition through market forces alone. Industry investment is expected to remain low, and aside from the electrification of low- and medium-temperature heat, which was already at or near price competitiveness with fossil fuels, price impacts are unlikely to persist long enough to change expectations of the long-run economics of low-carbon technologies and business models.

However, the European petrochemicals industry is not simply a major emitter. It is also a significant vulnerability in Europe's energy system. It is the largest industrial consumer of final energy, behind only transport and households, in an economy that imports nearly all its fossil fuels. And viewed against the wider geopolitical backdrop of a declining international rules-based order, weaponisation of trade and rising resource nationalism, the second energy crisis in less than five years shines a spotlight on the petrochemicals industry's significant contribution to Europe's fossil fuel insecurity. The risk of future energy crises is non-trivial (see Box 1), so the EU and its petrochemicals industry should be more willing to pay a "security premium" for reduced fossil fuel dependence and improved resilience in the medium to long term. Strategies to do so often go hand in hand with emissions reduction. They key question therefore is which emissions reduction opportunities offer the most material reductions in European fossil fuel dependency.

Emissions reduction levers for the petrochemicals industry can be broadly categorised as follows:

- Feedstock switching: replacing fossil fuel inputs with recycled, biogenic, or synthetic alternatives
- Electrification: replacing fossil fuel combustion with renewable electricity for heat
- Fuel switching: replacing fossil fuel combustion with combustion of alternative fuels
- Energy efficiency: reducing energy consumed per unit of output
- Carbon capture: capturing process and combustion CO_2 from installations
- Demand reduction: reducing the volume of chemicals produced through substitution, efficiency, and circular use models

Box 1: Are energy shocks going to become more likely?

Europe has faced two energy crises in less than five years. Both are symptomatic of broader geopolitical trends that mean the risk of further crises cannot be discounted.

Geopolitical uncertainty has increased significantly. States are increasingly challenging international laws and norms. The US, once the foremost defender of the international rules-based order, has become a prominent challenger to the multilateral system, withdrawing from the Paris Agreement and World Health Organization and launching a flurry of unilateral trade measures. Emboldened governments are pursuing unilateral trade measures and resource nationalism is increasing.

On energy specifically, state-owned enterprises control almost two thirds of global oil and gas reserves, meaning the majority of production is potentially exposed to political interference, the starkest example being Russia's recent weaponisation of gas exports. If existing oil and gas fields decline at natural rates, global production will become increasingly concentrated in geopolitical hotspots in the Middle East and Russia, increasing the risk of further supply shocks. Meanwhile, the current crisis has confirmed both the ease with which Iran can close the Strait of Hormuz and the geopolitical leverage doing so provides. As a result, the threat of future closures is more credible than ever.

Finally, it is important to understand that US incentives on global energy security have changed. The shale revolution means the US is now the largest energy producer and exporter in the world, having once been the largest importer. America's vulnerability to global energy shocks is therefore much reduced. As an importer, its strategy was to keep oil prices low and avoid volatility in the Middle East. This is now less of a priority.

The remainder of this section considers the potential of each to contribute to energy security (through reduced fossil fuel use) alongside emissions reduction, and the implications of the Iran War on the policy and business case. The discussion is summarised in Table 2.

Feedstock switching

About half of the fossil fuels consumed by the petrochemicals industry are used as raw materials, creating a significant supply vulnerability. With respect to climate change, fossil fuel feedstocks result in significant emissions when fossil carbon is released to the atmosphere, for example during steam methane reformation for ammonia production or incineration of plastics at end-of-life.

Opportunities to replace fossil fuels as feedstocks can be broken down into recycled feedstocks (through mechanical or chemical means), biomass (such as crops, lignocellulosic material, agricultural residues, biogenic waste, algae etc) and synthetic feedstocks (from captured CO_2 and green hydrogen). Grey hydrogen (produced by steam methane reformation using fossil gas), which is itself a major chemical feedstock, can also be replaced with green hydrogen, negating the need for gas upstream.

For nitrogen fertilisers, feedstock switching is focused on the production of hydrogen, either through replacing fossil gas with biomethane in steam methane reformers, or avoiding steam methane reformation entirely (and the need for gas) by using green hydrogen to make green ammonia.

Recycling

Estimates for the potential of recycled feedstock to displace fossil fuels vary significantly. A 2024 review[29] of transition pathways for the European chemicals industry found recycled materials ranged from seven to 63 per cent of the final feedstock mix depending on the pathway, with an average of 28 per cent for those applying this lever. The industry is bullish on the potential of recycling: Plastics Europe's Net Zero pathway targets 42 per cent of plastic production to come from recycled feedstock by 2050.[30]

Recycled material can provide a highly secure supply of feedstock if the loop is closed locally, underlining the importance of developing a strong European recycling industry (rather than creating new import dependencies for recyclate) if resilience is an objective. With large quantities of plastic waste ending up in incinerators, recycling is also an important way to avoid end-of-life emissions, which typically make up more than half of total life cycle emissions.[31]

Despite the plastic recycling industry's woes, mechanical recycling is a mature, proven, and scalable technology, and is already estimated to account for 13.5 per cent of European plastics production.[32] Mechanical recycling therefore offers a feasible route to quickly reduce fossil feedstock dependency and emissions. However, mechanical recycling's potential is limited by material degradation and its ability to handle mixed, multi-layered, or contaminated plastics. Maximising recycling's potential requires the scaling of chemical recycling, which overcomes these challenges, but is comparatively immature and expensive and comes with its own set of pollution and toxicity concerns.*

In the short term, the Iran War's impact on feedstock prices has improved the economics of recycled plastics (with a smaller benefit for chemical recycling due to its very high energy costs); however, this will reverse when oil prices recede, creating the risk of another boom-bust cycle. In the medium to long term, the conflict makes recycling more attractive as a means to enhance feedstock security, especially if local recyclate is prioritised. Policies to protect the recycling industry from cheap recyclate imports and establish secure offtake commitments could support growth and build resilience.

*See, for example: Environmental Defense Fund. "Get the real facts about 'advanced recycling.'" Available online at: https://library.edf.org/AssetLink/7su5d6t65153u22s5b3r5b580p6012cq.pdf

Biogenic feedstock

Opinions on the potential of biogenic feedstock vary significantly, depending on assumptions about the scale of sustainable feedstock supply and how this is allocated across competing uses, most notably bioenergy. Feedstocks can include agricultural commodities such as sugar, corn, starchy crops, and vegetable oils as well as agricultural residues, forestry residues, and food waste. A review of transition pathways for the European chemicals industry shows that biomass's share of final feedstock mix varies from one per cent to 42 per cent (average 24 per cent) in pathways applying this lever, though several pathways explicitly exclude it. The principal attraction of biomass feedstock is the potential for a closed carbon cycle, in which atmospheric CO_2 is absorbed during plant growth then embedded in plastic until release at end-of-life i.e. during incineration.

In practice however, climate neutrality is only technically possible under very limited conditions. Agricultural crops create the greatest challenges, as these compete with food production, pushing up food prices and driving expansion of the agricultural frontier, leading to significant indirect land-use change (ILUC) emissions that may negate emissions reductions from feedstock substitution. Waste streams present the lowest risk. Biomethane is typically produced through anaerobic digestion of organic waste such as manure and food waste, so creates less land-use pressure, but is a potent greenhouse gas if it escapes.

Supply chains also require enforced sustainability standards – for example to ensure woody biomass is from forestry residues not clear-felled trees, or that used cooking oil is not in fact virgin refined palm oil. These are challenges that the biofuels and bioenergy industries have been grappling with for years, yet concerns persist about fraud and unsustainable biomass being labelled as sustainable.[*] Importantly, these industries are required to meet strict sustainability criteria under the Renewable Energy Directive (RED), while the petrochemicals industry remains unregulated in this regard. Extending existing sustainability governance to chemical feedstocks could address this.

In the absence of effective regulations, rapid expansion of biomass feedstocks will cause sustainability problems. At current yields, Plastics Europe's 2050 target of 11Mt of bioplastics (out of 65Mt total production) represents a near 10-fold increase from current levels[**] and would require around 32Mt of biomass a year – over 40 per cent more than current EU bioenergy demand for heat and power.[***] This increase in demand would also occur alongside growing biomass demand from the energy, transport, agriculture and materials sectors, potentially resulting in a gap between EU biomass demand and available supply of 40-100 per cent by 2050.[33]

From a climate perspective, the use of biomass as a feedstock should be prioritised over its use as an energy source, whether in chemicals production (see Fuel Switching, below) or in transportation and power generation. This cascading use principle is central to the EU's Carbon Removal and Carbon Farming (CRCF) framework, which establishes a biomass hierarchy that prioritises materials and construction use over re-use and recycling, before bioenergy and disposal.[34]

In very simple terms, using biogenic carbon to make plastics keeps it out of the atmosphere for as long as the plastics remain in use, while burning it for energy releases it immediately. However, current EU policy is the opposite: the RED sets large mandates for the use of biomass in transport and power, while no mandate

*See, for example: Ambrose, J. (2025). "Drax still burning 250-year-old trees sourced from forests in Canada, experts say," Guardian. Available online at: https://www.theguardian.com/business/2025/nov/09/drax-still-burning-250-year-old-trees-sourced-from-forests-in-canada-experts-say; and European Commission (2025). "Commission concludes examination of potential Chinese biofuel imports fraud." Available online at: https://energy.ec.europa.eu/news/commission-concludes-examination-potential-chinese-biofuel-imports-fraud-2025-07-18_en

**Assuming 1.0Mt of plastics from biomass currently. See: Plastics Europe. "The Plastics Transition." Available online at: https://plasticseurope.org/wp-content/uploads/2024/09/2463779_ExecutiveSummaryRoadmapAdjustmentsSep2024_EN_091724.pdf

***Author's calculations, based on biomass to bioplastic conversion factor of 0.34 derived from 2018 data on global bio-based polymer production.

exists for chemical feedstocks. This creates a misalignment between carbon-storage value and current incentives, with policy (under the RED) favouring immediate combustion over longer-lived material use.

For many important products, biomass feedstocks can be incorporated straightforwardly using "drop-in" biochemicals that necessitate no or limited adaptation of existing processes and assets. For example, bio-based ethylene can simply substitute for fossil-based ethylene in PET manufacturing. In fertiliser production, locally produced biomethane could displace significant volumes of fossil gas in fertiliser production without the need to retrofit steam methane reformers. One recent analysis estimated that European fertiliser production could reach net zero with a biomethane blend of 44 per cent alongside carbon capture and storage (CCS), requiring only 11.7 per cent of the EU's biomethane potential. A 100 per cent biomethane blend was found to be technically feasible and could deliver negative emissions if coupled with CCS.[35] However, this would require a massive scaling-up of biomethane production at very significant cost, and the problem of biomethane leakage would need to be addressed.

From an operational standpoint, the principal challenge of biomass feedstocks is one of logistics. Petrochemicals clusters are built around fossil fuel hubs for obvious reasons. But biomass production is highly decentralised, making it complicated and expensive to develop supply chains around existing clusters.

Because they are equivalent at a molecular level, bio-based drop-in chemicals present the same risks to pollution and human health as fossil-based chemicals. Upstream, they avoid pollution associated with fossil fuel extraction and processing, but may create pollution associated with biomass production, e.g. from pesticide and fertiliser use.

Assuming sustainability and sourcing challenges can be overcome, biomass provides an important means to diversify feedstock supply, with near-term benefits available with 'drop-in' biochemicals in both plastics and fertilisers. Although it is not feasible for all biomass to be 'homegrown' and provide the same level of feedstock security as local recycling, it still offers the opportunity to build resilience by diversifying supply across a wider range of feedstocks and regions than is currently possible with fossil fuels. That said, this strategy is not without risk. Were the industry to become overly dependent on biomass (or a particular commodity or sourcing region), resilience benefits would be minimal.

In the medium to long term then, the Iran War increases the attractiveness of biomass as a feedstock diversification strategy. Principal challenges relate to the need to establish and manage extensive and complex supply networks, and the absence of regulations to ensure sustainability and establish an appropriate hierarchy of use. From a policymaking perspective, it will be important to establish robust sustainability governance before implementing policies to develop lead markets for bio-based chemicals.

In the immediate term the picture is more complicated. The War's impact on fossil fuel prices improves the relative economics of biomass feedstock, however the lack of established supply chains means any increase in biomass use will be negligible.

Synthetic feedstock, CCU and green ammonia

Synthetic feedstocks, produced from captured CO_2 and green hydrogen, are highly attractive from both a climate mitigation and an energy security perspective. Using renewable energy can ensure these molecules are "zero emission". And if the feedstocks are manufactured locally using regional CCU and hydrogen networks then supply security is assured. However, mature networks are decades away: CCU and green hydrogen are highly energy intensive, expensive, and limited to demonstration projects.

The extent to which synthetic feedstocks are forecast to displace fossil feedstocks in industry transition pathways varies significantly, from a few percent to over 90 per cent. However, in all cases the technology's contribution is end-loaded.[36] Plastics Europe is cautious – its net-zero pathway, which emphasises recycling and biomass, expects only five per cent synthetic feedstock by 2050.[37] Synthetics may offer the biggest technical potential for emissions reduction and resilience co-benefits, but realising this would require massive investment in technology and infrastructure.

Green hydrogen is likely to be a scarce resource, and so its prioritisation (inside and outside the petrochemicals industry) for applications without feasible mitigation alternatives is key. Green ammonia production is widely regarded as one such use case. There are already several commercial scale green ammonia fertiliser plants operating in Europe* and the IEA's Net Zero pathway estimates that green ammonia should account for over nine per cent of global production by 2030, rising to over 40 per cent by 2050.[38]

From a human health and toxicity perspective, synthetic feedstocks do not present significant additional risks as they are molecularly identical to their fossil alternatives. That said, there are theoretical risks where the carbon is captured from industrial installations, as this could in principle result in trace contaminants from the capture stream entering the synthesis process.

The long-run implications of the Iran War for synthetic feedstocks are not clear cut. Although synthetic feedstocks have a large security premium due to their potential to displace fossil fuels, high costs and reliance on the development of extensive networks for CCU, green hydrogen and renewables raise questions about whether meaningful displacement is feasible in practice. Green ammonia provides the most promising use case for green hydrogen and avoids the need for CCU. However, although the Iran War has improved the short-run economics of green ammonia, this effect will not persist long enough to alter project economics and is not expected to unlock meaningful investment.

*Examples include those operated by Yara and Fertiberia.

Electrification

In addition to feedstock, the petrochemicals industry consumes a comparable amount of fossil fuels for process heat. Electrification of these processes can lead to significant reductions of fossil fuel use and greenhouse gas emissions. A systematic review of EU chemicals industry transition pathways found direct electrification (with renewables) was assumed to cut 12 to 27 per cent of baseline emissions.[39] However, this range may significantly understate the true potential of electrification. One recent analysis found currently available and in-development technologies can electrify 99 per cent of industrial heat demand,[40] which is responsible for around half of total fossil fuel consumption and a similar share of direct (Scope 1) emissions.[41] In addition to direct heat, electrification with renewables also has important indirect benefits for the petrochemicals industry. It underpins green hydrogen and green ammonia production, and wind and solar can displace bioenergy in electricity generation, freeing up biomass for feedstock use.

Electrification's immediate potential is at low and medium temperatures (up to 500°C) with commercially available and proven technologies such as industrial heat pumps and electric boilers. Higher-temperature applications – such as chemical process heaters and electric crackers are also technically feasible and currently at the demonstration stage.

Another important benefit of commercially available electrification technologies is flexibility. Electrotech can be added alongside conventional heat technologies, enabling facilities to switch between gas and electrical heat depending on relative prices. This can help balance electricity grids dealing with increasing variable renewable generation and provide demand flexibility for the gas grid as plants switch to electricity during periods of high gas prices – functioning in effect like a virtual gas reserve. This system flexibility value strengthens the case for early deployment of hybrid electrotech solutions before full electrification is possible.

The key challenge for full electrification is the availability of sufficient renewable electricity at a low enough cost. The industry association CEFIC estimates that total electricity costs need to fall below €50 per MWh for electrification to reach its full potential, with industrial users often paying more than four times this currently. Connectivity can also be a challenge, with industry sources citing examples of attempts to electrify steam crackers being thwarted by permitting problems for high-voltage connections.

Realising electrification's potential is therefore highly dependent on policies to accelerate renewable generation, increase grid connectivity and flexibility and reduce electricity prices. The AccelerateEU strategy contains important elements in this regard, though not all of it is new. For example, benchmarks to accelerate renewable capacity deployment and increase electricity's share in final energy consumption are from the Clean Industrial Deal. And the two-year permitting limit for new renewables projects is from the RED (although the end of 2026 deadline for member state implementation is new).

The most important new elements are planned legislation on energy taxation and network charges and an Electrification Action Plan. The former will seek to structurally reduce electricity costs, improve grid use efficiency, and encourage member states to shift the burden of taxation from electricity to fossil fuels for industrial users. The latter, planned for the second half of 2026, will include a new electrification target, measures to accelerate uptake of electrification technologies and actions to close the price differential between electricity and fossil fuels.

Regardless of whether AccelerateEU's ambitions are new or old, the important question is whether they will be implemented. The EU already faces a significant gap between ambition and delivery, particularly where EU-wide commitments cascade into national policymaking. For example, multiple policy and financing gaps exist in member states' National Energy and Climate Plans (NECPs) that threaten the bloc's emissions and energy targets.[42] Progress on addressing grid bottlenecks has been slow. One recent report found 120 GW of EU renewables projects are now at risk due to grid constraints.[43] Last year's Grids Package[44] should help address this, but the package still needs to be negotiated, adopted, transposed,

and implemented. And regarding electricity taxation, the need for tax directives to receive unanimous approval among member states presents a major obstacle that has hindered previous efforts to revise the Energy Taxation Directive. Although the second energy crisis in less than five years may have sharpened minds in the Council, unanimity still presents a very high bar.

In sum, the Iran War's impact on gas prices means that mature technologies like heat pumps for low and medium temperatures, which were already competitive, have become more attractive, although this impact will be dampened in economies where the linkage between gas and electricity prices is high. Looking to the medium and long term, the Iran War creates a powerful argument for electrification based on enhanced energy security and the potential for lower electricity costs that could result from the EU's broader electrification push under AccelerateEU, the Grids Package and the Clean Industrial Deal. However, significant questions remain about the extent to which these ambitions will be delivered upon.

Fuel switching

Another non-fossil way to generate heat is with renewable fuels, typically from biomass. Some pathways also assume a contribution from solar heat and geothermal heat, but the contribution of these is limited by the number of viable locations. However, where it does appear in transition pathways, biomass is generally prioritised as a feedstock rather than as a fuel source, in line with the cascading use principle. In pathways that do use renewable fuels, emissions reductions of around 10 per cent are typically achieved with this approach.[45]

Given the importance of feedstock switching and the potential of electrification, renewable fuels are typically not assumed to offer significant potential as an emissions reduction lever or energy security strategy. As such, the Iran War is not expected to have any notable impact on the relative attractiveness of this strategy.

Energy efficiency

Structurally high energy costs compounded by recent energy crises place a premium on energy efficiency for European chemicals producers. However, the industry has been steadily improving energy efficiency for decades, with a 40 per cent improvement recorded since 1990.[46] Transition pathways for the industry typically assume energy efficiency to reduce about 10 per cent of baseline greenhouse gas emissions through to 2050, a significant decline in the historical rate of improvement. Most available efficiencies have likely been realised, and future improvements will increasingly depend on direct electrification (which has the potential to reduce process heat demand by a further 15 per cent [47]) or significant capex projects, such as replacing old naphtha-based steam crackers with larger, ethane-based crackers that operate more efficiently but lock in fossil fuel demand for decades.

High energy and feedstock costs arising from the Iran War increase the short-term returns on energy efficiency, although the structural cost disadvantages of European industry mean the business case was there to begin with, and as noted above, there is little low hanging fruit remaining without switching to electrification.

A watchpoint is the disproportionate impact on oil which makes naphtha even less attractive as a plastics feedstock, strengthening the investment case for switching to new, more efficient ethane-based crackers. These assets would reduce emissions intensity and increase feedstock productivity, offering short-term benefits for emission and energy security. However, in the long term, they could create fossil fuel dependencies that undermine resilience.

Carbon capture

Even with ambitious application of all the levers above, in most transition roadmaps for the industry, fossil fuels are still expected to play a role in the long term. Fossil fuel feedstock shares are often over 30 per cent in 2050, making net-zero dependent upon the application of point source carbon capture technology.[48] Important concerns persist about the capture efficiency of current plants and the realistic potential of the technology given cost and energy demands, but most pathways implicitly assume these issues will be overcome.

However, unlike other levers discussed, carbon capture does not offer a means to reduce fossil fuel use or improve the industry's energy security. This distinction is important for prioritisation decisions in the current context: carbon capture may be necessary to deal with residual emissions, but a holistic analysis that considers emissions reductions alongside energy security places it at a disadvantage compared to other levers such as electrification, biomass feedstocks, recycling and demand reduction, which address both.

From a human safety perspective, carbon capture presents particular risks in the event of a large leak from a storage site or pipeline, but these risks are considered manageable and subject to strict regulation under the CCS Directive.

In sum, the Iran War does not strengthen the investment case for carbon capture in the medium to long term because the technology offers no energy security benefit. In the short term, the Iran War weakens the investment case by temporarily pushing up energy and supply chain costs and increasing uncertainty and cost of capital.[49]

Demand reduction

Perhaps unsurprisingly, demand reduction is absent from most industry pathways[50], but this does not mean it is unimportant. Consider nitrogen fertilisers, where the use phase is responsible for upwards of 70 per cent of total lifecycle greenhouse gas emissions.[51] What is more, fertilisers are routinely over applied – in Europe and around the world – leading not only to avoidable greenhouse gas emissions, but enormously damaging pollution with negligible yield improvement. In Europe, the environmental costs of pollution from nitrogen fertilisers are estimated to be between €70 billion and €320 billion a year.[52] More efficient fertiliser use is therefore a priority for energy security, climate change, and ecosystems alike. Opportunities to reduce fertiliser use include precision agriculture, use of organic alternatives and better soil management.

The benefits of demand reduction for plastics are equally important. Developing a circular economy for plastics is critical – one that doesn't simply recycle plastic but replaces it with alternatives and keeps the remainder in use for as long as possible. In addition to recycling, UNEP has estimated that plastic reuse strategies and alternative materials can reduce plastic pollution by 30 per cent and 17 per cent respectively by 2040, indicating very significant demand reduction potential.[*]

Demand reduction directly reduces pollution from fertilisers and plastics. However, substitution with alternatives can create new problems. For example, digested animal manure can be used as an alternative to nitrogen fertiliser but presents very significant water pollution risks. The Fertiliser Action Plan's proposals to support increased use of digestate as an alternative to conventional fertilisers is therefore concerning.

In conclusion, the spike in fertiliser and plastic prices caused by the Iran War is leading to demand reduction, but this is likely to rebound when prices recede. Recalling the lost opportunity to increase circularity in 2022, policy and regulation will need to support and lock in changes among end users before demand rebounds.

*UNEP (2023). "Turning off the Tap: How the world can end plastic pollution and create a circular economy." Available online at: https://www.unep.org/resources/turning-off-tap-end-plastic-pollution-create-circular-economy

Alternative packaging solutions such as lighter packaging are also very important.

Table 2: emissions reduction and resilience potential of different abatement levers

ABATEMENT LEVER	READINESS*	ABATEMENT POTENTIAL**	RESILIENCE BENEFIT***	ECONOMIC IMPACTS OF IRAN WAR
Recycled feedstock	3-4	• Modest operational emissions reduction – typically around 10 per cent due to high energy use • Requires electrification for full benefit • Significant impact on end-of-life emissions	• High – up to 63 per cent of feedstock; mean of 28 per cent • Requires prioritisation of local recyclate	• Temporary improvement in short-run economics but long-run economics remain challenging, especially for chemical • Higher energy costs hit chemical recycling
Biomass feedstock	2-4	• High – typically around 30 per cent of baseline emissions in pathways applying this lever • Significant impact on end-of-life emissions • Assumes sustainable biomass sourcing	• High – up to 42 per cent of feedstock replacement, with mean of 25 per cent	• Temporary improvement in short-run economics mitigated by higher bioenergy demand in mature power and transport markets
Synthetic feedstocks and green ammonia	2-3	• High with large variation - exceeds baseline emissions in most ambitious pathways • Requires very significant renewables electrification for green H_2	• High – up to 92 per cent of feedstock replacement, with mean of 29 per cent, but benefits end-loaded	• Temporary improvement in short-run economics of green H^2 • Economic headwinds for large capital projects like CCUS infrastructure
Electrification	2-5	• Medium to high depending on whether high-temperature heat tech is commercialised • Technology ranges from mature (low temp) to development (high temp)	• Medium to high depending on whether high-temperature tech commercialised • Potential to provide flexibility in electricity and gas markets	• Increase in gas prices makes available low-temp technologies more attractive
Fuel switching	4-5	• Low – very limited potential of solar and geothermal heat; biomass should be prioritised as a feedstock	• Low – as use should be prioritised elsewhere	• Temporary improvement in short-run economics mitigated by higher bioenergy demand in mature power and transport markets
Energy efficiency	5	• Low – existing processes largely optimised; future opportunities depend on electrification (see above)	• Low, with exception of electrification (see above) • Switching to more efficient ethane crackers locks in fossil fuel feedstock dependency	• Increase in energy prices improves economics of efficiency investments
Carbon capture	3	• High with large variation – six to 68 per cent reductions with mean of 27 per cent in pathways applying CCS	• None – does not reduce fossil fuel use	• Increase in energy prices, cost of capital and supply chain disruptions create investment headwinds for CCS
Demand reduction	4-5	• High – significant potential to reduce fertiliser use and plastic use • Impacts production emissions and use phase / end-of-life emissions	• High potential for economies to reduce fossil fuel demand for energy and feedstock • Short-term negative impacts for companies as exacerbates existing overcapacity	• Higher plastics and fertiliser prices feeding through to substitution and reduced demand in end-use markets

Sources: Agora Industry (2023); Agora Industry (2026); Plastics Europe (2024); Kloo et al (2024)
* Readiness scale: 1 research; 2 development; 3 demonstration; 4 available; 5 competitive
** Abatement potential considered in terms of greenhouse gas emissions reductions in 14 analysed roadmaps in Kloo et al (2024), half of which include Scope 3 emissions.
*** Resilience benefit considered in terms of reductions in fossil fuel use in reviewed roadmaps in Kloo et al (2024)

Recommendations

Reducing the petrochemicals industry's dependence on fossil fuels as fast as possible is in the strategic interests of Europe and the industry itself. It will significantly enhance European energy security and increase industrial resilience. In the long run, remaining dependent on fossil fuels will perpetuate the industry's competitive disadvantage.

In general, the Iran War has improved the economics of technologies and business models to reduce fossil fuel use, although these effects may be short-lived once the crisis resolves and fossil fuel prices decline. Arguably more important, and persistent, is the "security premium" these strategies now attract in the context of the second energy crisis in less than five years and a highly uncertain geopolitical outlook.

The Iran War therefore creates a window of opportunity to accelerate the petrochemicals industry's transition away from fossil fuels, enabled by short-run improvements in economics and a heightened policy focus on energy security. Immediate traction is likely to be greatest for quick wins like electrification and recycling, but even here, policy will be vital to maintain momentum. Investment levels within the industry are extremely low and cost pressures are high. Left to market forces alone, transition impacts would likely be limited to expansion of low-temperature electrification and short-lived improvements in recycling and end-use substitution.

The relevant policy landscape is complex and evolving in response to the crisis. Key elements are summarised in Table 3.

Table 3: policy landscape for petrochemicals industry transition

Policy / instrument	Relevance
AccelerateEU; Grids Package; Clean Industrial Deal	• Particularly important for electrification • AccelerateEU includes targets and proposals to reduce electricity costs and shift taxation from electricity, accelerate renewable deployment rates, increase connectivity and ease permitting • New Electrification Plan due and new energy taxation legislation due in 2026 • Grid connectivity bottlenecks (Grids Package) is key constraint to solve
Chemicals Industry Action Plan	• EU response to the industry's long-term competitiveness problem. • Wide ranging agenda includes trade protection, energy costs, emissions reduction, lead market creation • Creates the Critical Chemicals Alliance to ensure security in "critical" molecules; should set a commercially, environmental, and socially sustainable vision for the industry
Fertiliser Action Plan	• Response to the current fertiliser crisis • Mentions increasing use of alternative alongside potential ETS relief for industry • Includes financial support to farmers • Established new EU Fertilisers Value Chain Partnership, analogous to the Critical Chemicals Alliance
Circular Economy Act; PPWR; Single-Use Plastics Directive; Waste Shipment Regulation	• Particularly important for development of viable recycling industry and circular business models • Support local recycling through trade measures to promote a closed loop in Europe • Various targets and requirements to reduce plastic use, ban products without sustainable alternatives and promote recycled content
Bioeconomy Strategy	• Focuses on lead market development for bio-based products, prioritisation of biomass use and sustainability criteria, among other things • Will provide important entry points for legislation to develop sustainable biomass supply in the chemicals industry
ETS and CBAM	• Cost pressures from Iran War likely to play into 2026 review of ETS • Extension of CBAM to wider chemicals (beyond fertilisers)

Below are five recommendations to enhance Europe's energy security and build a resilient petrochemicals industry, with details on the role of policy, industry, and civil society in each.

The first two – on electrification and circularity – are focused on delivering tangible impacts quickly as a foundation for continued improvements, capitalising on the current policymaking window of opportunity and favourable shifts in short-run economics created by the crisis.

The third recognises that the policymaking window of opportunity cuts both ways. It focuses on the need to limit watering down of the ETS, as a strong and stable ETS is critical to the long-term transition of the industry.

The fourth and fifth recommendations are focused on feedstock diversification, which is critical to the long-term resilience of the industry and wider European energy security.

1. Accelerate electrification

This is the largest opportunity at the current moment. Displacing fossil fuels for energy is more straightforward in the short-term than displacing them as feedstock. Electrification up to 500°C is possible with available technologies and is already commercial at the lower end of the temperature range. These technologies can be introduced with minimal disruption in existing plants, often alongside conventional steam technologies, easing adoption and providing flexibility. In the medium-term, very significant displacement of fossil energy is technically feasible. This opportunity is strengthened by the AccelerateEU strategy and wider push on electrification which could create an enabling environment through reduced electricity costs, faster deployment of renewables, easier permitting, and improved grid usage efficiency.

Policy

The key focus for policymakers should be ensuring the success of AccelerateEU's electrification goals – in particular, the development of an Electrification Plan and new legislation on electricity taxation. Ensuring the adoption and implementation of a robust and comprehensive Grids Package to remove grid bottlenecks is also key. Additional opportunities include measures to support adoption of electrification technologies by industry, such as a Zero Carbon Standard for new investments in sub-500°C heat where available electrotech exists, and subsidies for electrotech capex and new grid connections.[53]

Policy also needs to avoid undermining investments in electrification through contradictory, short-term policy responses to insulate industry from fossil fuel price rises, such as tax cuts on energy. So far, the data suggest that government spending on these types of measures has been significantly less than in 2022/23, potentially conserving more resources to support electrification this time around.

Industry

As a starting point, companies should invest in cost-effective, mature technologies, starting with low-temperature heat, integrating these alongside existing technologies to build flexibility. Looking to the medium- and longer-term, companies should also invest in R&D for high temperature technologies. To secure renewable power supply and hedge electricity price volatility, businesses should invest in renewable Power Purchase Agreements (PPAs). Electrification metrics and targets (e.g. for share of electricity in heat generation and share of renewables in electricity consumption) should be introduced into corporate transition plans as standard.

Civil society

Civil society organisations should advocate against short-term policy responses that undermine transition and advocate for a robust Electrification Plan and electricity taxation reform under AccelerateEU. Negotiation of the Grids Package should also be a key focus.

2. Accelerate circularity

Circularity is another area where the Iran War creates immediate momentum. Higher final product prices improve the economics of recycling and strengthen incentives for efficiency, substitution, and prolonged use among end-users. Whilst standalone policies to explicitly "reduce demand" for end products are likely to be unpalatable during a time of crisis for the industry, these can and should form part of broader strategies to increase circularity.

Policy

An important objective for policymakers is to support growth of the plastics recycling industry. Specific opportunities include measures to favour European recyclate over imported recyclate, for example through local content requirements in recycling mandates and 'Recycled In Europe' labelling schemes. Recognising that the recycling industry struggles with high margin volatility and short-term contracts, contracts for difference (CfDs) could provide greater revenue and offtake security and help the market develop. RD&D subsidies for chemical recycling pilots would also help bring forward the market's next phase of development.

In fertilisers, the immediate opportunity is to support farmers with more efficient use of chemical fertilisers and adoption of alternatives including precision agriculture, regenerative agriculture practices, and increased use of organic fertilisers. Entry points include the Fertiliser Action Plan and member state CAP Strategic Plans.

Industry

The plastics industry should focus on developing chemical recycling in waste streams where mechanical recycling is not possible, ensuring it uses renewable energy and avoids harmful impacts on people and the environment.

Civil society

Civil society can focus on end-users of plastic products, for example by pushing retailers and packaging manufacturers to increase use of alternative materials, reduction policies, and recycling schemes.

In fertilisers, advocacy should focus on holding member states to account for delivering reductions in fertiliser use in line with the Farm to Fork strategy's target of a 20 per cent reduction by 2030, and campaigns to promote regenerative agriculture practices. Implementation of the Fertiliser Action Plan is an important opportunity to advocate for the good elements (increasing nutrient circularity and use of organic fertilisers; supporting farmers to reduce chemical fertiliser use and adopt regenerative practices) while pushing against short-term measures to suppress the costs of chemical fertilisers. The proposed EU Fertilisers Value Chain Partnership, which will convene farmers, fertiliser producers, and governments to develop a pathway for affordable and secure fertilisers, is likely to be an important focus for advocacy.

3. Avoid weakening the ETS

As was the case during the 2022 energy crisis, calls to water down or even suspend the ETS have increased because of the Iran War. This would be a mistake for the following reasons:

- It would undermine de-coupling of gas and electricity prices, which, as argued above, is critical to incentivising electrification of heat. In merit-order electricity markets, the only way to decouple gas and electricity prices is to reduce the number of hours in which gas sets the marginal price. This requires increasing renewable generation, as Spain is currently demonstrating. Maintaining a strong ETS is critical to this.
- It would penalise leadership and reward laggards. Watering down the ETS will reduce and delay the returns on low carbon investments that ambitious companies have made, disincentivising low carbon investment in the future.
- It creates a 'reverse ratchet' in which the ETS is loosened whenever a crisis hits, for example by incrementally delaying the phase out of free allocations each time. This means the cumulative impact of crises is to slow transition when it should be the opposite. It also weakens the credibility of the ETS's long-term scarcity signal, undermining the case for low-carbon investment.

The recent Fertiliser Action Plan is a case in point. This will assess options for "additional flexibility" under the ETS, conditional on "increased decarbonised homegrown production…and production of bio-based (organic) and circular fertilisers." Linking a slower phase out of free allowances for fertiliser producers to increased production of more sustainable fertilisers would be a mistake. Delaying phase-out of free allowances would unfairly penalise ambitious companies, undermine confidence in low-carbon investment and result in 'double protection' for fertiliser producers, which are now also shielded from competition with higher carbon imports by the Carbon Border Adjustment Mechanism (CBAM). The objective to scale alternative fertilisers and circularity is a good one in principle, but it is best served by maintaining the ETS alongside additional policies to create lead markets for these products.

Policy

The 2026 review of the ETS will be a key test, as it comes during a period of intensified calls for the ETS to be weakened due to the impacts of the Iran War on energy costs. The Commission has indicated that it will revise the post-2030 emissions cap trajectory to align it with the 2040 climate neutrality target, however this should not extend to weakening the ETS in other areas, particularly by further delaying the phase out of free allowances (as happened after the 2022 crisis). CBAM was designed to limit carbon leakage by shielding industry from high carbon imports, and the EU should hold the course on the phase out of free allowances and extension of CBAM to the wider chemicals industry. The Fertiliser Action Plan should keep its focus on developing lead markets for bio-based, circular, and low-carbon fertilisers and avoid seeking to incentivise these products with the offer of free allowances and a weakened ETS.

Industry

Corporate transition planning benefits from a clear, predictable trajectory for the ETS in terms of the emissions cap and phase out of free allowances. Investment decisions depend on a credible long-term scarcity signal against which a 20- or 30-year capex project can be evaluated. It is in the interests of companies seeking a smooth transition to advocate for maintaining the ETS's current plans to phase out free allowances.

Civil society

Civil society should advocate against attempts to weaken the ETS during the 2026 consultations e.g. through delays in the phase out of free allowances.

4. Carefully scale biomass feedstocks

Compared to electrification and circularity, the Iran War creates less immediate momentum for switching to biomass feedstock. Bioplastics currently account for only around one per cent of European production, so any increase in bio-based feedstocks will require significant investment. Despite its large technical potential, biomethane production is a long way behind growth targets, unevenly distributed and hampered by decentralised production and high costs, making it hard to scale quickly. Regulations to prioritise biomass for long-lived products and materials rather than energy use, and ensure robust sustainability standards, are also absent. For these reasons biomass feedstocks offer meaningful diversification benefits in the medium-term, but the immediate opportunity relates to the development of robust enabling policy and regulation.

Policy

Policy and regulation are critical to developing sustainable supply chains for biomass feedstock and ensuring its use is limited to where it can provide the greatest emissions benefits. Priorities include:

- Developing a holistic EU biomass strategy spanning key sectors such as transport, power, materials, and chemicals that i) prioritises biomass based on the cascading use principle; and ii) sets consistent, robust sustainability standards (e.g. in line with the RED)
- Translating the REPowerEU 2030 35bcm per year biomethane production target from a political commitment to a legally binding obligation within the Renewable Energy Directive (or whatever cross-sector bioeconomy legislation replaces it) and translating this into NECPs
- Establishing lead markets using instruments such as feedstock mandates and CfDs e.g. for bio-based chemicals and biomethane, only once robust sustainability standards are in place

Industry

Where sustainable biomass is available, corporate transition plans should prioritise it as feedstock rather than as energy. In the absence of comprehensive and robust sustainability regulations applicable to the chemicals industry, companies developing bio-based chemicals should only use waste streams for feedstocks.

Civil Society

Given the sustainability risks from unchecked biomass demand growth, civil society organisations will have a vital role to play developing a sustainable bioeconomy, including:

- Advocating for robust sustainability criteria (including for ILUC) and appropriate prioritisation of biomass according to the cascading use principle, within and across sectors. Note that this implies either dismantling the RED or significantly reducing its mandates so biomass can be redirected to higher priority uses outside energy.
- Holding companies to account on sustainable sourcing and practices in their supply chains.

5. Develop strategic partnerships for green ammonia

The Iran War has unleashed a global fertiliser crisis, shutting in production in the Middle East and increasing the cost of fertiliser production elsewhere. Governments are increasingly treating fertilisers as a strategic resource. The renewed focus on strategic autonomy in fertilisers creates an opportunity for the EU to develop green ammonia partnerships with lower cost producers such as India and near abroad countries such as Tunisia, Morocco, Algeria, and Egypt.

This could build on existing discussion to establish green hydrogen corridors and take the form of industrial partnerships to build green ammonia plants, creating secure fertiliser supply for both sides with lower costs for Europe, and job and infrastructure development for partner countries. The recent successful H2Global auction to supply Egyptian green ammonia to Europe provides an important proof of concept.

Policy

Building on the H2Global green ammonia test case, the EU should scale up CfD auctions for fertiliser grade green ammonia with dedicated allocations for partner countries. This can be complemented by specific EIB and EBRD lending strategies for green ammonia infrastructure development in partner countries, including support for downstream investments in higher value-addition activities. Partnerships should agree production shares to help ensure regional food security. The Critical Chemicals Alliance, Chemicals Industry Action Plan and Fertilisers Action Plan are likely to be key entry points.

Industry

European fertiliser manufacturers should explore investment opportunities and joint ventures in potential partner countries and regions such as North Africa.

Civil Society

Civil society organisations should carefully scrutinise partnerships to ensure the EU is pursuing a genuine partnership approach with clear local benefits in terms of industrialisation, value addition, job creation, and food security.

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