

CLEAN AIR TASK FORCE

Building Blocks

EU Nitrogen Fertilisers: Foundations and Pressures

SEPTEMBER 2026

Key Takeaways

- **The EU fertiliser industry is dominated by nitrogen.** Nitrogen is 72% of EU fertiliser production and the only primary nutrient the EU can manufacture domestically at scale. Ammonia is the industry's chokepoint – urea, ammonium nitrate, calcium ammonium nitrate and urea ammonium nitrate all depend on ammonia as the common upstream intermediate, concentrating much of the sector's cost and carbon intensity at a single production step.

- **The EU's fertiliser security is structurally import-dependent.** Phosphate and potash are overwhelmingly imported with almost no domestic manufacturing capacity. Even nitrogen production depends heavily on imported natural gas, leaving the sector exposed to external supply and price shocks.

- **The EU nitrogen production base is ageing, gas-exposed and energy-intensive.** The EU ammonia fleet is the oldest in the world and runs well below capacity (~70% utilisation), with production concentrated in a handful of countries and a widening cost gap versus gas-advantaged regions.

- **Nitrate production is decoupling from EU ammonia.** Producers increasingly import ammonia to keep downstream CAN, AN and UAN plants running. As a result, ammonia-plant closures overstate the loss of fertiliser capacity while understating a deepening dependence on imports.

- **Europe is the world's largest nitrate producer and consumer.** Its structural preference for AN and CAN makes it a nitrate heartland, even as the ammonia feedstock beneath that output is progressively sourced from abroad.



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Context

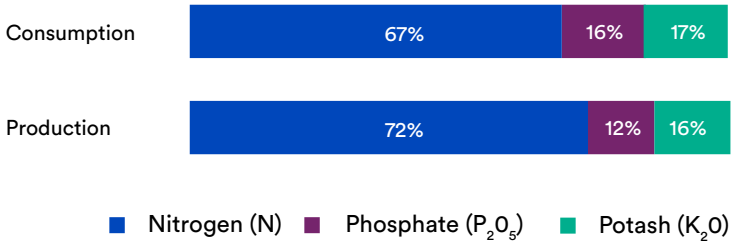
Global leadership to structural pressure

Introduction

This report provides a primer on the EU nitrogen fertiliser industry: its key molecules and value chain, production landscape, and site infrastructure. Nitrogen fertilisers are a foundational aspect of the EU chemical industry and underpin EU manufacturing, agriculture, and food security[1]. Primary nutrients include nitrogen (N), phosphorus (P), and potassium (K) and are the three essential macronutrients that plants require in large quantities for growth and development.

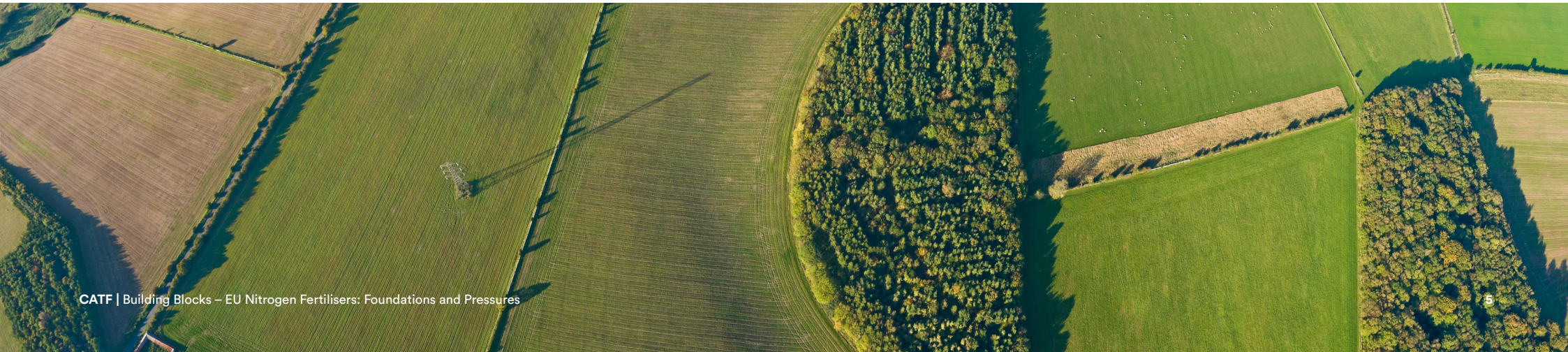
Nitrogen comprised 72% of EU fertiliser production in 2021 and is the only primary nutrient that can be manufactured domestically at scale. The report is designed to support policymakers and industry partners with clear data and overview of the sector's challenges to engage effectively on the decisions that will determine how the EU nitrogen fertiliser sector stabilises while remaining competitive and preserving economic security.

EU fertiliser production and consumption profiles – nutrient basis[2]



Source: Fertilizers Europe, CATF analysis. Production data based on 2021; consumption data based on 2024.

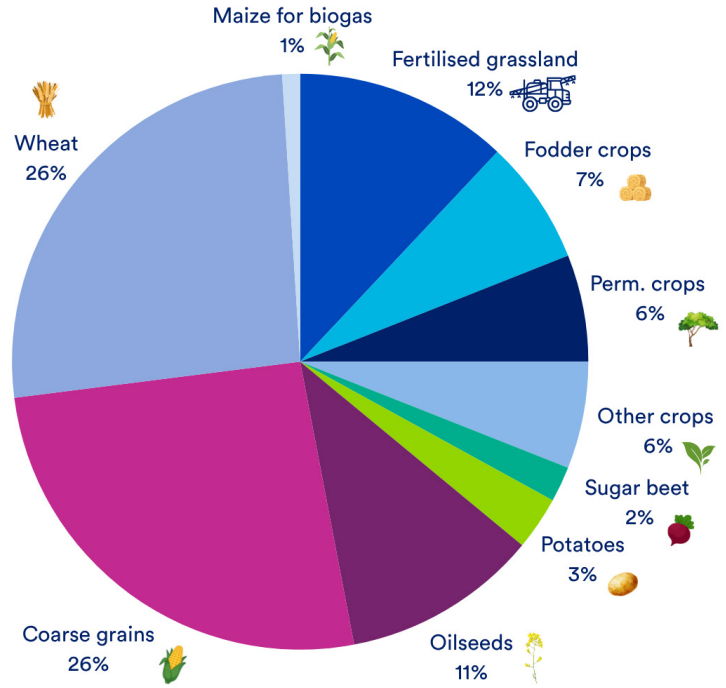
1. Phosphate and potash are briefly introduced but deliberately excluded from further analysis, reflecting the greater relevance of nitrogen fertilisers in terms of consumption volumes, energy intensity, and emissions exposure.
2. Fertiliser quantities can be reported on either a product basis (tonnes of fertiliser) or a nutrient basis (tonnes of the nutrients contained in the product, typically N, P_2O_5 and K_2O).



The fertiliser industry underpins EU food security, agricultural productivity, and manufacturing capacity

The EU fertiliser market generates €12.3 billion in annual turnover and directly employs an estimated 76,000 workers, with indirect employment across logistics, agriculture, and downstream value chains running to several hundred thousand. European farmers applied 8.7 million tonnes of nitrogen fertiliser in 2023, against just 2 million tonnes of phosphate and 2.2 million tonnes of potash fertiliser. Production is dominated by a small number of large integrated producers, though a longer tail of specialist blenders, distributors, and specialty product manufacturers serves niche segments. The industry produces the three primary plant macronutrients, nitrogen (N), phosphorus (P), and potassium (K), in forms bioavailable for agricultural application. Without adequate and affordable fertiliser, EU agricultural productivity would decline materially, food prices would rise, and the EU's position as a significant net food exporter would be eroded.

Fertiliser consumption by crop in the European Union 2021/2022



Source: Fertilizers Europe

The EU fertiliser industry has shifted from global technological leadership to structural competitiveness challenges driven by energy costs and global competition

The EU fertiliser industry traces its origins to one of the most consequential scientific developments of the 20th century: the Haber-Bosch process, developed by Fritz Haber and Carl Bosch at BASF in Germany between 1909 and 1913. This invention allowed the fixation of atmospheric nitrogen into ammonia at industrial scales. Agricultural yields skyrocketed and produced enough crops to sustain an exploding population. The EU's competitive advantage rested on integrated production infrastructure large ammonia complexes co-located with downstream fertiliser plants, pipelines connecting gas supply to production sites, and port infrastructure linking producers to agricultural demand. Given that natural gas accounts for 70-80% of ammonia's cost of production, European ammonia producers and nitrogen fertiliser producers became uncompetitive with the rise in natural gas prices. This was most evident in 2022 at the onset of the Russia / Ukraine war when Russian pipeline gas supplies to Europe fell sharply. The spike in natural gas prices led to substantial ammonia production curtailment. The EU market also faces stiff competition from overseas nitrogen fertiliser producers, most notably urea imports from Russia, Egypt, and Algeria.

1909 - 1913: BASF commercialises the Haber-Bosch process and Europe secures a foundational advantage in synthetic nitrogen.

1920s - 1940s: European producers establish global leadership in synthetic nitrogen production. World War II temporarily redirects ammonia production from fertilisers to munitions.

1950s - 1960s: Post-war agricultural intensification and the Green Revolution drive rapid expansion of ammonia and fertiliser production.

1970s: The oil crises expose Europe's structural energy vulnerability.

1980s: Increasing environmental regulation drives efficiency improvements and modernisation of European ammonia plants.

1990s: Post-Soviet restructuring reshapes fertiliser production across Eastern Europe. EU natural gas market liberalisation and growing dependence on imported gas.

2000s: Russia, Middle East, and North Africa producers expand share using subsidised gas.

2010 - 2022: Low-cost imports steadily increase while investment in new European ammonia capacity remains limited.

2022 - Present

- Russia-Ukraine war triggers energy repricing and substantial ammonia production curtailed.
- Decarbonisation becomes the industry's next major transition; CBAM for fertilisers enters implementation.
- Middle East war tightens global fertiliser markets and EU member states push for carbon tax exemption for fertilisers.

Source: CATF compilation

Fundamentals

Fertilisers, nutrients, and feedstocks

Fertilisers supply three elemental macronutrients required for plant growth

Nitrogen (N)

Ammonia, Urea, AN, CAN, UAN[1] – all derived from atmospheric nitrogen fixed via the energy-intensive Haber-Bosch process and an important component of proteins.

The only primary nutrient that can be manufactured domestically at scale, but at an energy cost that makes EU producers structurally disadvantaged versus gas-advantaged regions. All downstream nitrogen products flow from a single chokepoint: ammonia production.

Phosphorus (P)

MAP, DAP, SSP, TSP, Phosphoric Acid[2] – all derived from phosphate rock treated with acid.

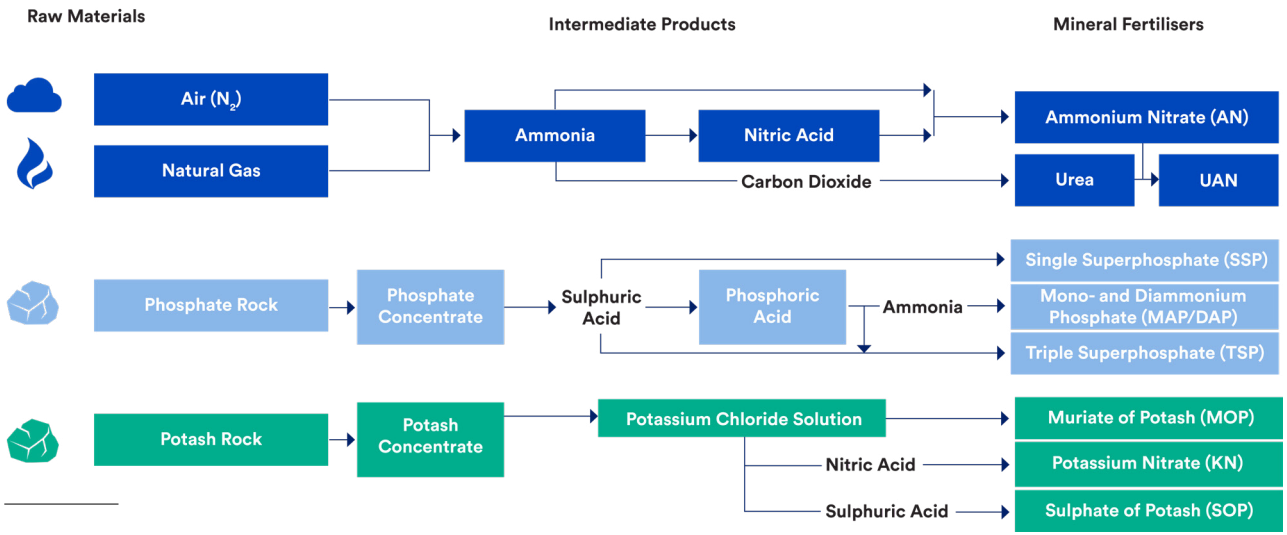
The EU has negligible domestic phosphate rock reserves and has designated phosphate rock as a critical raw material. Virtually all EU phosphate fertiliser manufacturing depends on imported rock primarily from Morocco, Russia, Egypt and Senegal. Morocco controls an estimated 70% of the world's economically viable reserve base. There is no synthetic substitute for phosphorus in plant nutrition.

Potassium (K)

Muriate of Potash (MOP) and Sulphate of Potash (SOP) – derived from underground potash mineral deposits via mining.

The EU has very limited domestic potash reserves. Approximately 40% of EU potassium fertiliser demand is met by imports primarily from Canada, Russia, Jordan and Israel. There is no synthetic substitute for potassium in plant nutrition.

Production of main fertiliser products



Source: Fertilizers Europe

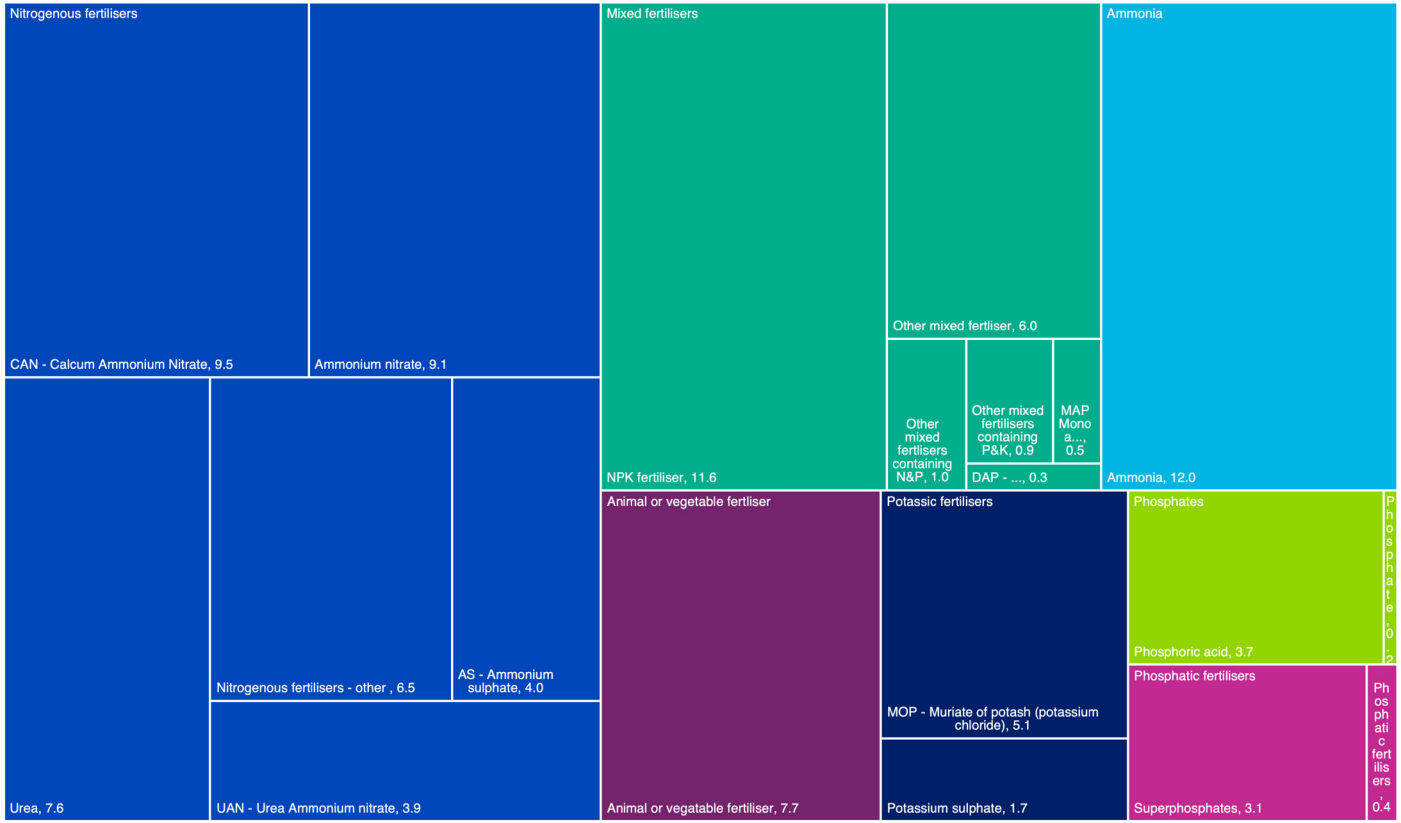
1. AN: Ammonium Nitrate, CAN: Calcium Ammonium Nitrate, UAN: Urea Ammonium Nitrate
2. MAP: Mono-Ammonium Phosphate, DAP: Di-Ammonium Phosphate, SSP: Single superphosphate, TSP: Triple superphosphate

EU fertiliser production is built on the nitrogen chain

EU fertiliser production is dominated by nitrogen. Ammonia, synthesised from natural gas, anchors the system underpinning urea, ammonium nitrate (AN), calcium ammonium nitrate (CAN), urea ammonium nitrate (UAN) and the nitrogen share of the compound NPK grades that together make up the largest block on the chart. This concentration reflects where the EU retains genuine manufacturing capacity and explains why the fertiliser sector's competitiveness is so tightly coupled to gas prices.

Indigenous output for phosphate and potash, on the other hand, is marginal because the EU has almost no domestic rock or potash resource base. These nutrients are met overwhelmingly through imports of raw material and finished product, leaving P and K directly dependent on imported mineral resources, whereas nitrogen's import exposure arises primarily through natural gas and, increasingly, ammonia.

2024 EU gross production of fertilisers and key intermediates, Mt product[1]



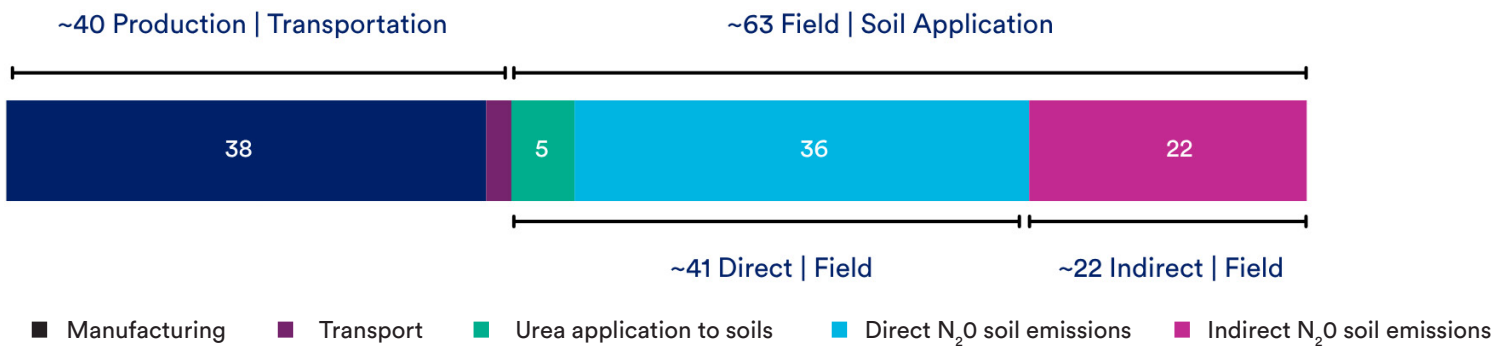
Source[2]: Directorate-General for Agriculture and Rural Development, CATF analysis

1. Product mass, not nutrient content. Figures represent gross production by product and are not additive across the value chain: intermediate products such as ammonia and urea are subsequently consumed in the manufacture of downstream fertilisers shown elsewhere in the chart.
2. All fertiliser production shown is mineral or synthetic except for animal and vegetable fertiliser that are organic. A large share of organic fertiliser use in the EU is not captured in PRODCOM because it consists of livestock manure that is generated on farms and applied directly to agricultural land rather than manufactured and marketed as a fertiliser product.
3. MOP production volumes are based on Eurostat and public company filings as German potash production is withheld from Eurostat databases

Nitrogen's climate footprint is larger in the field than at the factory

In the EU, the production of synthetic nitrogen fertilisers alone accounts for approximately 1% of total greenhouse gas emissions. Soil emissions from nitrogen application release nitrous oxide, a greenhouse gas 273 times more potent than CO_2 (AR6 GWP-100) and contribute an additional 2% (considering synthetic N alone) or 4% when organic nitrogen fertilisers from other sources like manure and crop residues are included. So, nitrogen fertilisers are responsible for approximately 3-5% of EU GHG emissions.

Industry emissions from synthetic nitrogen production and soil emissions from application of synthetic nitrogen in agriculture in the EU (Mt CO_2e)[1]

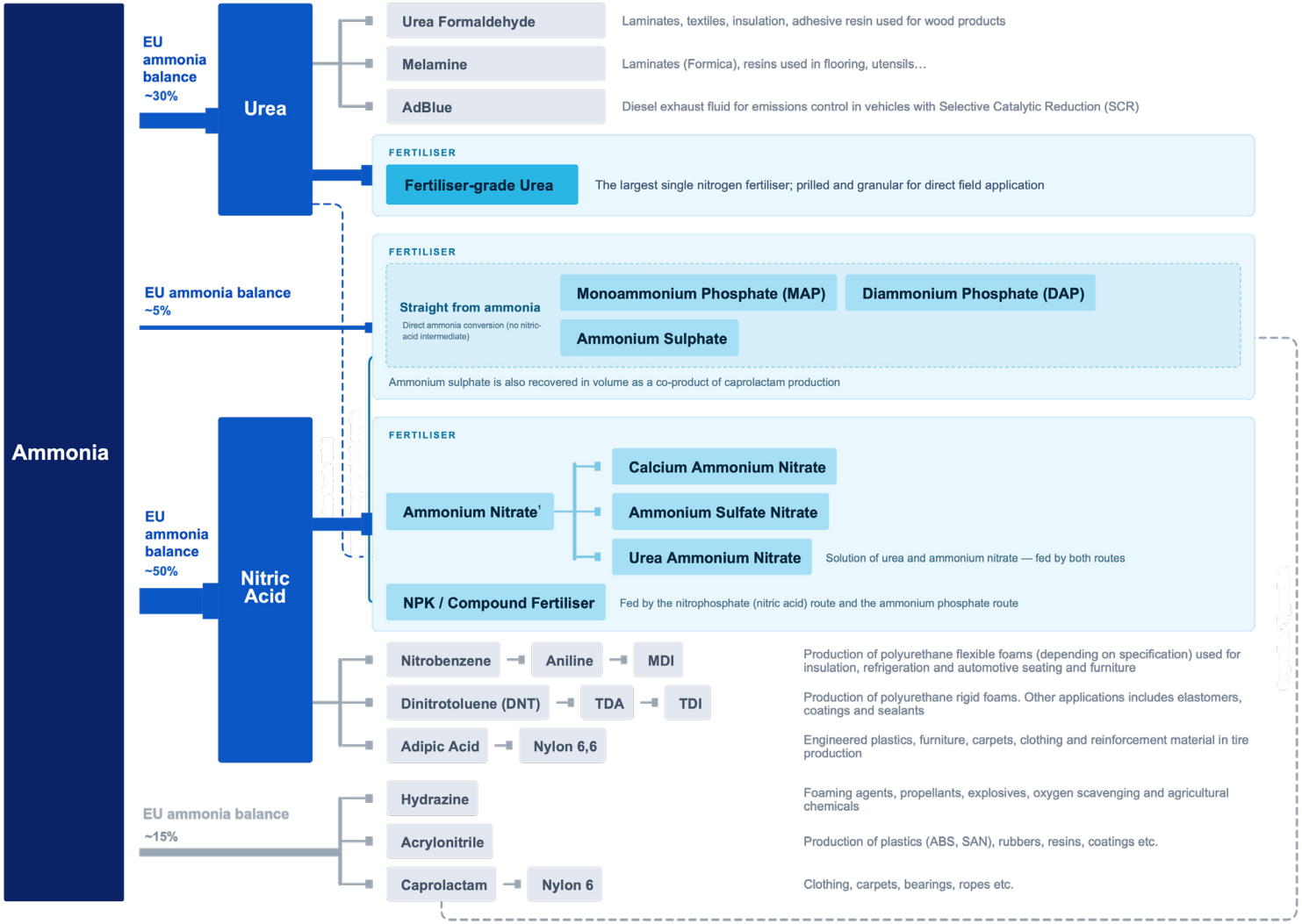


Source: CATF analysis based on Menegat et al. (2022)

1. EU estimates are for the EU28 (including the UK), reflecting the study's use of 2018 FAO nitrogen consumption data.

Europe's ammonia value chain is dominated by fertilisers, particularly the nitrate route

Around half of EU ammonia is converted to nitric acid and ~30% to urea, with most ultimately serving fertiliser production



[1] Also used as explosives with Fuel Oil (ANFO)

Shares represent estimated ammonia feedstock allocation in the EU, on an NH_3-equivalent basis; downstream flows are illustrative and not necessarily proportional.

Source: CATF

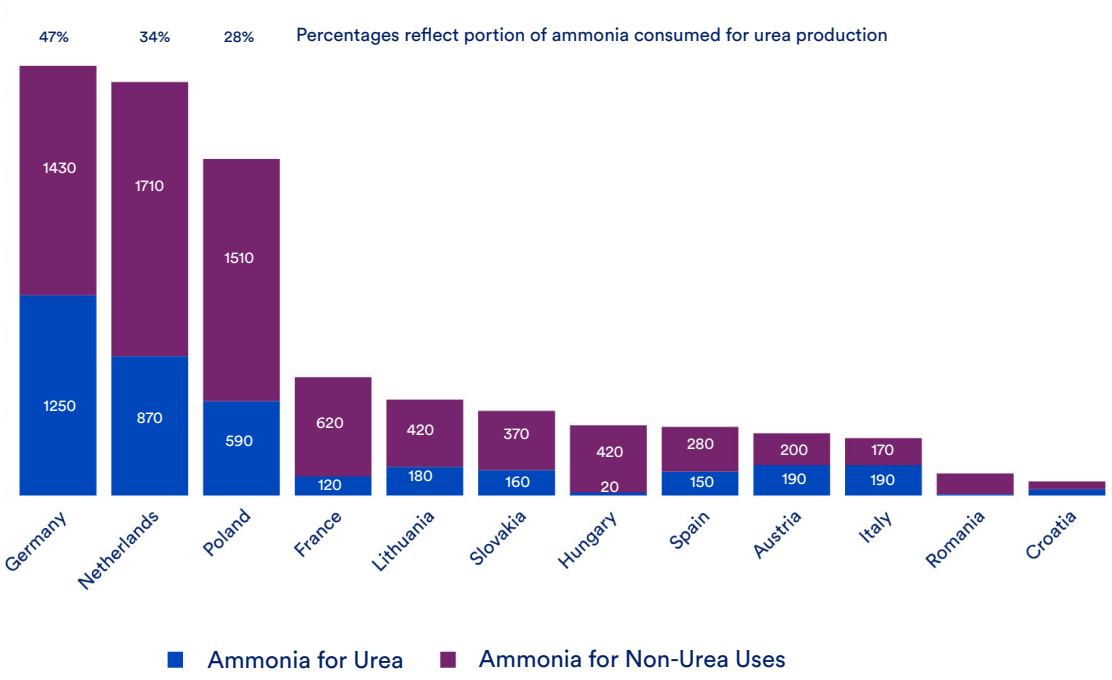
Europe directs far less ammonia to urea than the global average, reflecting a distinct fertiliser culture

Approximately 30% of the ammonia produced (~25% once ammonia imports are included) in the EU is consumed in the production of urea, a rate that is substantially lower than the global average of 55%[1] reflecting Europe's structural preference for ammonium nitrate and CAN-based fertilisers over urea.

The country-level picture reveals significant variation. Croatia's urea production consumes 60% of the ammonia it produces whereas in Germany, Austria, and Italy, urea production consumes almost half of the ammonia produced. At the other end of the spectrum, Hungary and Romania direct almost all their ammonia production to non-urea uses.

Europe historically invested in nitric acid-based fertiliser production, including integrated AN/CAN and the Odda process, reinforcing a production system centred on nitrate fertilisers. Gas-advantaged export regions specialised in urea, whose high nitrogen content and ease of transport make it well-suited to global trade. Europe's nitrate preference was also influenced by agronomic conditions on the continent: nitrate is immediately plant-available and performs reliably in the relatively cool, often acidic soils common across much of Europe.

2024 EU ammonia consumption for urea production and other uses ('000 tonnes)



Source: International Fertilizer Association, CATF analysis

1. The EU imported 2.4 million tonnes of ammonia in 2024 (minimal exports). As such, urea production accounts for 25% of total EU ammonia consumption.

Key nitrogen fertiliser products

EU production, consumption, and applications

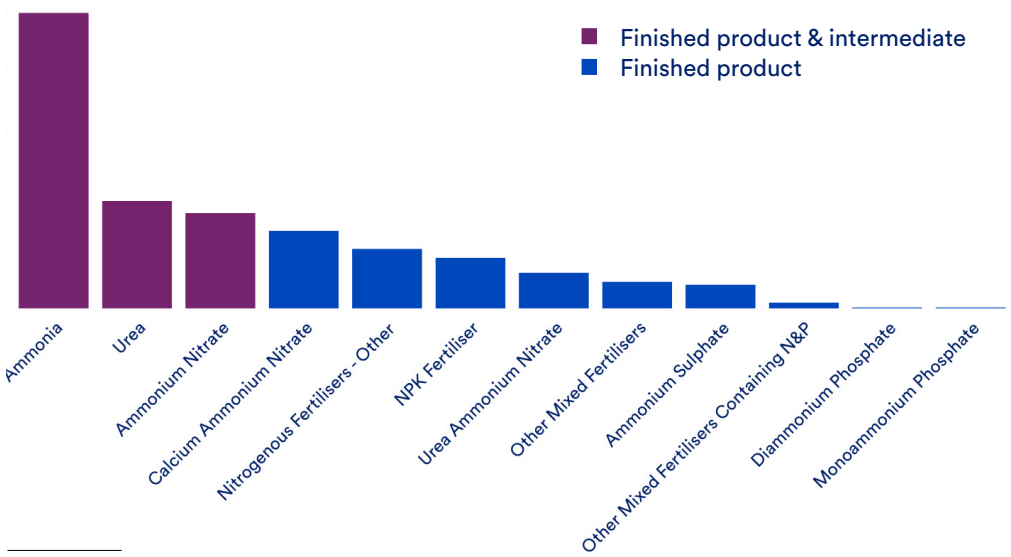
EU production of nitrogen fertilisers is heavily concentrated in a small number of core products

EU nitrogen fertiliser production, measured as nitrogen content, is dominated by ammonia, the upstream molecule from which every other product on this chart is made.

The main nitrogen-containing products are urea, ammonium nitrate and calcium ammonium nitrate. Urea and ammonium nitrate function both as finished fertilisers and as intermediates. Significant volumes of urea are further processed into urea-ammonium nitrate (UAN) solutions or used in industrial applications, while ammonium nitrate is routinely converted into calcium ammonium nitrate (CAN), UAN or other downstream products, as well as serving industrial markets.

Phosphate products such as DAP and MAP barely register in their contribution to EU nitrogen production due to their low nitrogen content, but more importantly, this reflects how little ammonium phosphate the EU produces domestically, importing finished phosphates instead.

2024 EU nitrogen fertiliser production (Nutrient basis – million tonnes)



Source: Directorate-General for Agriculture and Rural Development, CATF analysis

A note on ammonium sulphate production

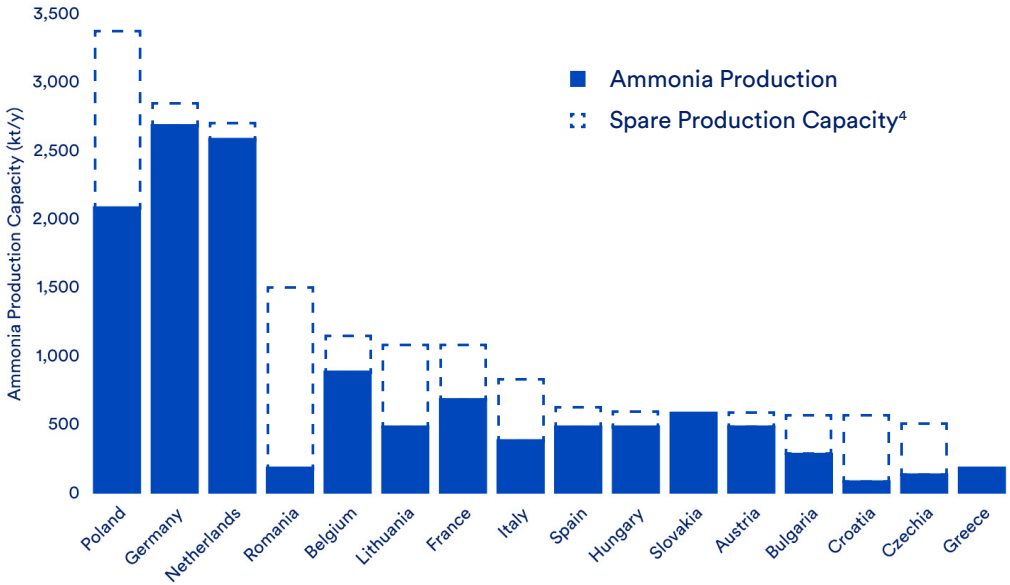
In the EU, ammonium sulphate is predominantly generated as a caprolactam by-product, notably by producers like Domo (Leuna), Fibrant (Geleen), and Envalior (Antwerp), and supports a wide array of industrial applications beyond crop nutrition including pulp and paper, leather processing and the insulation materials industry. Other producers include Terrafame, a battery chemical producer, where ammonium sulphate is produced as a by-product of nickel sulphate production.

1. Gross Production figures: Total volume manufactured at the plant gate, including material that is immediately converted into other products. Bars are not additive.

EU ammonia production capacity masks structural fragility

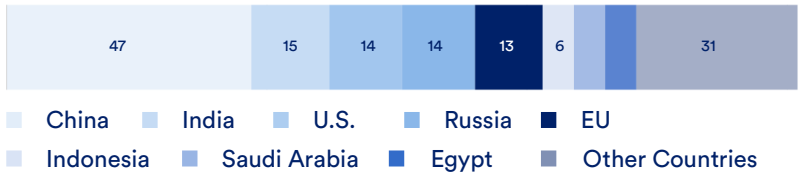
- The EU boasts an ammonia production capacity of approximately 17 million tonnes per year across 29 plants. Ammonia plant capacity factors in the EU stood at 70%[1], reflecting significant spare capacity. Ammonia production in the EU amounted to 12.5 million tonnes per year in 2024.
- Poland has the largest capacity for ammonia production, followed by the Netherlands and Germany. The three countries account for approximately half of the EU's ammonia production capacity.
- Poland shows the largest absolute spare capacity of any EU member state, with an actual output of approximately 2,100 kt/y and a nameplate capacity of roughly 3,300 kt/y, leaving 1,200 kt/y idle in 2024.
- Romania's bar is the most striking proportionally. Production is approximately 140 kt/y against a nameplate capacity of ~1,450 kt/y. This figure includes long-idled units (Chemgas and SC Donau) alongside Azomureș, currently the country's only active producer.
- Ammonia production in the EU largely relies on natural gas as a feedstock, which is responsible for 70-80% of the ammonia production cost[2]. High gas prices have led to low utilisation rates of existing plants and a series of recent closures of ammonia plants in the EU[3].

EU 2024 ammonia output and production capacity (kt/y)



Source: International Fertilizer Association, CATF analysis

2024 global ammonia production (million tonnes product)



Source: U.S. Geological Survey (USGS) National Minerals Information Center

1. Based on IFA production and capacity figures.
2. This figure refers to the cash or variable production cost [excludes capital recovery, depreciation and return on capital] as the EU ammonia fleet is old and largely depreciated.
3. The most recent ammonia plant closure was Yara's 400 kt/y ammonia plant in Tertre, Belgium. Ammonia plant closures do not necessarily mean the cessation of fertiliser production, as is the case across some sites in the UK and the EU where downstream facilities producing nitrogen-based fertilisers, such as ammonium nitrate and calcium ammonium nitrate, continue production using imported ammonia.
4. Spare ammonia production capacity as calculated by CATF

Ammonia

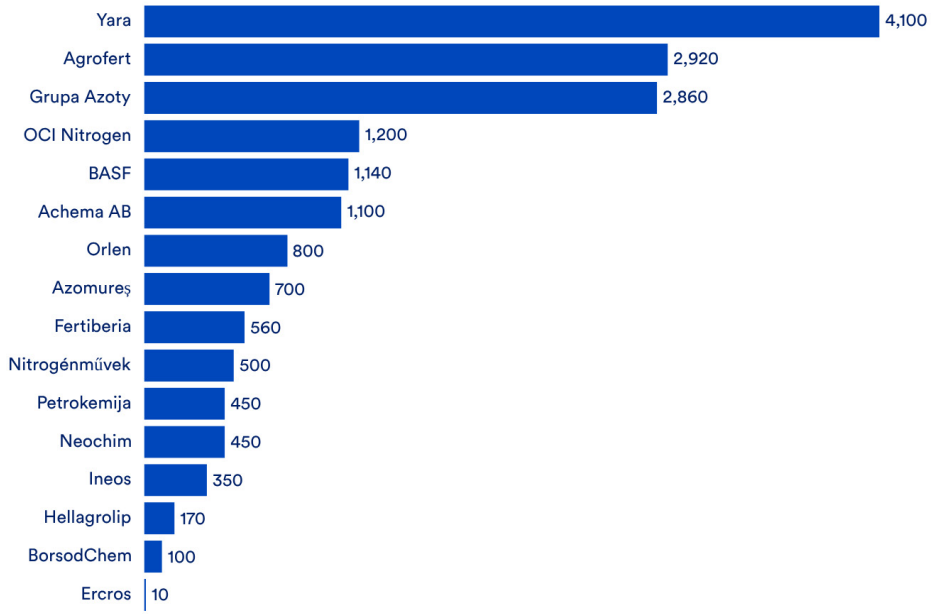
- **Formula & N**: NH_3 82% N highest concentration of any nitrogen fertiliser
- **Form**: Pressurised liquid/gas
- **Made from**: natural gas (hydrogen) + nitrogen via Haber-Bosch
- **Application**: mostly consumed on site to make every other nitrogen product but also injected directly into soil as anhydrous ammonia (common in North America, marginal in Europe)
- **Watch out**: toxic and hazardous to transport; EU increasingly reliant on merchant-ammonia imports

EU ammonia production capacity is concentrated among a few large producers. The three dominant producers, Yara, Agrofert, and Grupa Azoty, together account for approximately 60% of total EU nameplate capacity. Yara's position is particularly commanding, representing nearly 25% of total EU ammonia capacity on its own

OCI Nitrogen, BASF, Achema AB, and Orlen operate at roughly one quarter to one third of the scale of the market leaders but still represent significant national or regional production anchors. Achema AB in Lithuania is notable as the dominant industrial employer in its region, making its continued operation a matter of both economic and social policy significance.

Central and Eastern European producers such as Azomureș (Romania) have been effectively non-operational at scale. Petrokemija (Croatia) has faced insolvency proceedings, and Neochim (Bulgaria) operates in a market heavily exposed to Russian import competition.

EU ammonia production capacity by company, kt/y[1]



Source: CATF analysis

1. All figures represent nameplate ammonia production capacity in thousand tonnes per year (kt/y) and do not reflect actual production, which varies with natural gas prices, plant utilisation rates and maintenance schedules.

EU urea production is dominated by three producers and underutilised across the board

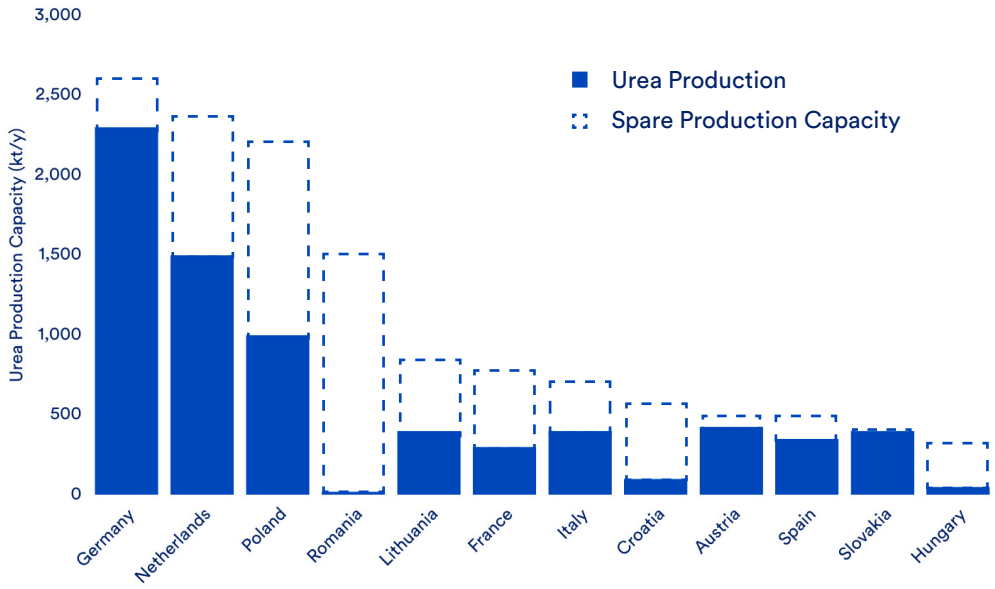
The EU boasts a urea production capacity of approximately 12 million tonnes per year across 20 plants. Urea plant capacity factors in the EU stood at 55%[1], reflecting significant spare capacity. Urea production in the EU amounted to 6.7 million tonnes per year in 2024.

Germany has the largest capacity for urea production, followed by the Netherlands and Poland. The three countries account for approximately 55% of the EU's urea production capacity.

Germany operates closest to capacity of the major producers, with output of approximately 2,200 kt/y against a nameplate of 2,550 kt/y a utilisation rate of around 85%. The Netherlands, despite having the second largest nameplate capacity at 2,300 kt/y, produced only 1,550 kt/y: a utilisation rate of approximately 67%. Poland presents a similar picture, with roughly 1,050 kt/y produced against 2,000 kt/y of capacity.

The most striking case is Romania, where production has effectively collapsed to near zero against a nameplate capacity of approximately 1,400 kt/y. Azomureș is the only current manufacturer and the capacity total also carries the idled Chemgas and SC Donau units.

EU 2024 Urea Output and Production Capacity (kt/y)[2]



Source: International Fertilizer Association, CATF analysis

1. Based on IFA production and capacity figures.
2. France urea production capacity was 711kt/y before the shutdown of the Agrofert Grandpuits plant in 2025. As of 2026, France only has one urea plant operational at Gonfreville (Yara).

Urea

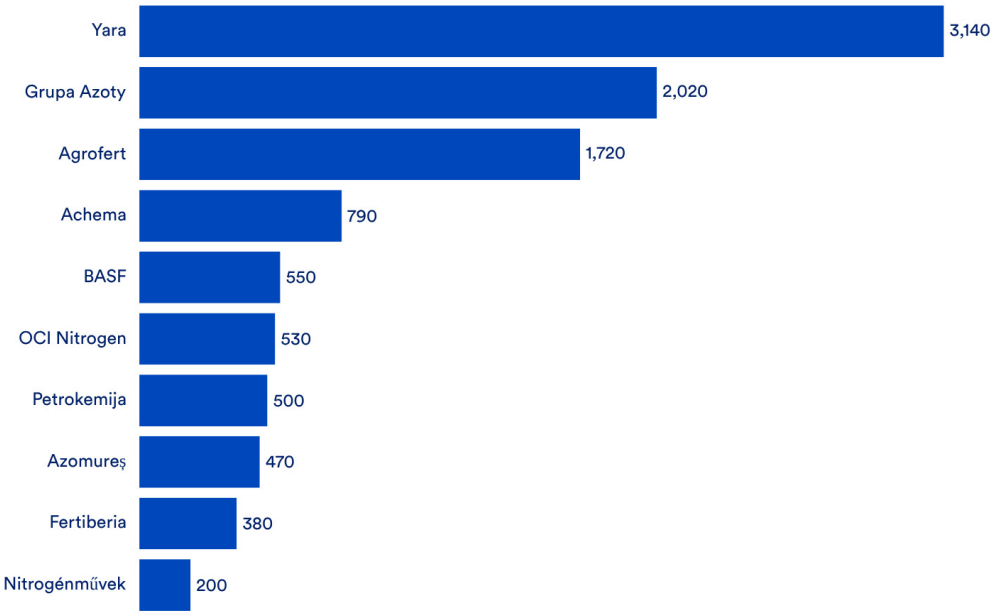
- **Formula & N**: $CO(NH_2)_2$ 46% N - highest-analysis solid
- **Form**: prilled or granular solid, cheapest to ship per unit N
- **Made from**: ammonia + CO_2
- **Application**: direct field use; also feedstock for UAN
- **Watch out**: prone to ammonia volatilisation loss if left on the surface; often sold with a urease inhibitor

Yara, Grupa Azoty, and Agrofert collectively account for approximately 70% of total EU nameplate capacity, with Yara alone representing more than the combined capacity of the bottom six producers.

Achema, BASF, and OCI Nitrogen benefit from integration into larger chemical and trading networks. Petrokemija (Croatia) and Azomureș (Romania) are the most exposed, having faced severe operational difficulties and near-zero utilisation in recent years due to uncompetitive gas costs.

The total nameplate capacity across all nine producers amounts to approximately 10,300 kt/y.[1] However, actual production falls well short of this figure, with widespread underutilisation reflecting the structural cost disadvantage of European gas-based urea production relative to imports from regions where feedstock costs are a fraction of European levels.

EU urea production capacity by company, kt/y[3]



Source: CATF analysis

1. The CATF estimate of ~10.3 Mt/y excludes approximately 1.0 Mt/y of urea capacity at the idled Chemgas and SC Donau facilities in Romania. Including those units would bring the total to ~11.3 Mt/y, around 5% below IFA's ~11.8 Mt/y estimate, reflecting differences in facility-level capacity assumptions and data sources.
2. All figures represent nameplate urea production capacity in thousand tonnes per year (kt/y) and do not reflect actual production, which varies with natural gas prices, plant utilisation rates and maintenance schedules.

Nitrates are a distinctively European product, with EU producers leading global output

Ammonium Nitrate (AN)

- **Formula & N**: NH_4NO_3, ~33.5% N
- **Form**: prilled or granular solid
- **Made from**: nitric acid neutralised with ammonia
- **Application**: half the N is immediately plant-available as nitrate, half as slower ammonium
- **Watch out**: detonable oxidiser and regulated explosive precursor; straight AN restricted in parts of the EU

Ammonium nitrate production in the EU has traditionally been coupled to domestic ammonia production, but companies such as Yara and Grupa Azoty have increasingly imported ammonia while maintaining downstream nitrate production in Europe. As a result, nitrate production is becoming progressively decoupled from EU ammonia production: ammonia-plant closures may overstate the loss of downstream fertiliser capacity while understating the resulting increase in import dependence.

Poland (Grupa Azoty), France (Agrofert & Yara), Bulgaria (Agropolychim & Neochim), Lithuania (Achema) and the Netherlands (OCI & Yara) lead the EU's production of AN and represent approximately 80% of the total volume produced in 2024.

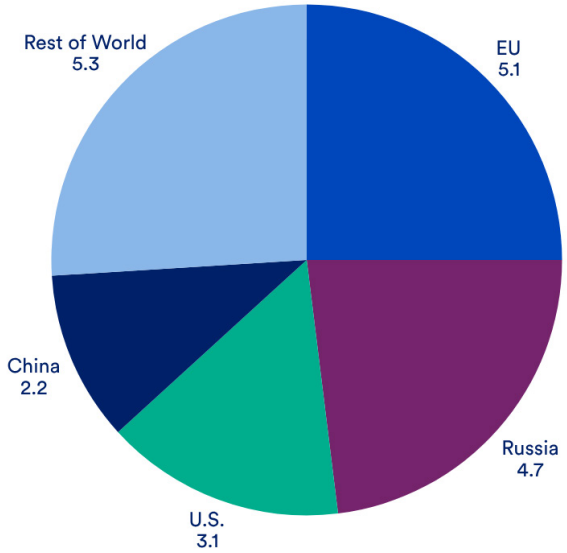
Calcium Ammonium Nitrate (CAN)

- **Formula & N**: NH_4NO_3 + $CaMg(CO_3)_2$ (Dolomite) or CaCO3 (Limestone), 27% N
- **Form**: granular solid
- **Made from**: AN blended with ground calcium carbonate
- **Application**: direct field use, especially on acidic soils
- **Watch out**: ≤28% N threshold (below the 80%-AN line) to reduce detonation hazard

CAN is the signature product of the European nitrogen market, where nitrate-based fertilisers have historically held a far larger share than in any other region. Its combination of nitrate and ammonium nitrogen gives rapid availability while limiting the volatilisation losses associated with urea, and its calcium/dolomite carrier helps manage the acidity of Europe's high-rainfall soils.

Netherlands, Germany, Belgium, Hungary, and Poland lead the EU's production of CAN and represent approximately 70% of the total volume produced in 2024.

The EU is the world's largest nitrate producer: 2024 AN and CAN production, Mt N



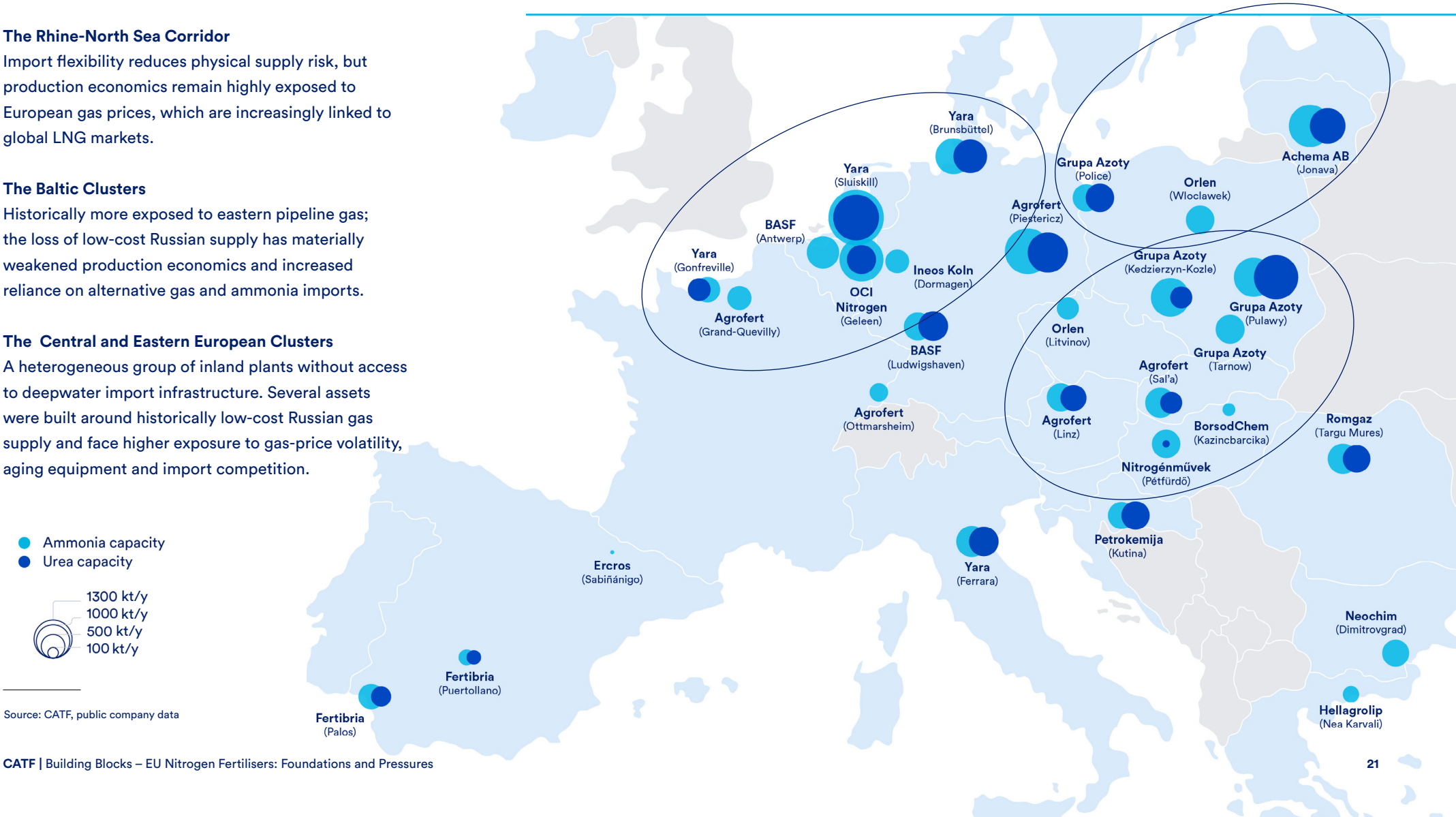
Source: CATF analysis based on IFA data

Location shapes the competitiveness of Europe's nitrogen assets through access to gas, ports and ammonia imports

The Rhine-North Sea Corridor
Import flexibility reduces physical supply risk, but production economics remain highly exposed to European gas prices, which are increasingly linked to global LNG markets.

The Baltic Clusters
Historically more exposed to eastern pipeline gas; the loss of low-cost Russian supply has materially weakened production economics and increased reliance on alternative gas and ammonia imports.

The Central and Eastern European Clusters
A heterogeneous group of inland plants without access to deepwater import infrastructure. Several assets were built around historically low-cost Russian gas supply and face higher exposure to gas-price volatility, aging equipment and import competition.



Source: CATF, public company data

Final Remarks



Strengths

The EU nitrogen fertiliser industry is crucial to food production and to European industry. When gas prices made EU ammonia production uneconomical, the cascade from ammonia through nitric acid to CAN and urea production happened rapidly and simultaneously. The EU nitrogen sector retains genuine strengths. Several producers of nitrogen remain world-class operators with deep technical expertise, sophisticated logistics infrastructure, and the institutional knowledge required to operate processes with high efficiency. The EU's established position in nitrates give the sector real assets to build on.



Structural Pressures

The EU's natural gas cost disadvantage relative to Russia, the Middle East, and North Africa is structural. It predates 2022 and will not be resolved by LNG market normalisation. The EU ammonia fleet is comparatively old and, on average, less energy-efficient than newer capacity in several competing regions and higher EU carbon prices add to this disadvantage for unabated production. Permanent capacity losses since 2022 have deepened structural import dependency.



A Coordinated Strategy

Only a coordinated strategy, spanning energy, trade, agricultural, and industrial policy, will enable the EU nitrogen fertiliser sector to stabilise, and continue supporting food security for Europeans. That strategy should secure diversified, increasingly low-carbon ammonia supply, the single feedstock on which the entire nitrogen chain depends, while protecting the downstream nitrate capacity that remains genuinely competitive, rather than subsidising uncompetitive ammonia synthesis wholesale. It should also fix the data blind spots this report has navigated, since policymakers cannot manage a sector whose most strategic capacity is hidden by statistical confidentiality.