# Fertilizer Industry Handbook 2026

October 2026





Knowledge grows

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# Fertilizer demand is structurally supported by food demand, population growth and the need to maintain crop yields

- Fertilizers are essential for global food production
- Fertilizers provide the nutrients required for crop growth, with nitrogen (N) being the most important nutrient for yield improvement.
- Nitrogen must be replenished annually, while phosphorus (P) and potassium (K) can remain in the soil longer.
- Global annual fertilizer consumption is more than 200 million tonnes of nutrients, of which nitrogen accounts for more than half.
- The fertilizer industry underpins production of key crops such as corn, wheat, rice and soybeans that feed the growing global population.

# Nitrogen markets are driven by global agriculture, energy costs and supply additions

Nitrogen fertilizers are the largest segment with ~121 million tonnes of annual nutrient consumption.

Urea is the dominant globally traded nitrogen product and the key reference price for nitrogen markets.

Fertilizer prices are cyclical and driven by:
- Supply-demand balances
- Capacity additions and closures
- Natural gas costs
- Crop prices and farmer profitability

Nitrogen market has different industry structure compared to phosphate and potash:
- Nitrogen - fragmented global industry due to widespread availability of gas.
- Phosphate and Potash - highly concentrated industries due to geographically limited geological reserves.

China, India, Brazil, North America and Europe are the key nitrogen demand centres.




# The Yara brand is one of the most respected and widely recognized brands in agriculture

Yara partners with farmers worldwide to optimize crop yields, reduce environmental impact and improve crop quality and nutritional value.

Our fertilizer products are precisely formulated to provide targeted nutrition to suit each specific situation. We recognize that soils, crops and climates are unique and that different fields and crops have different nutritional requirements.

**Yara's competitive position:**

- Global #1 in nitrates and compound NPKs and the largest ammonia trader worldwide.
- Strong global production footprint, integrated value chain and direct farmer relationships.
- Exposure to both agriculture and industrial nitrogen applications.

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# Fertilizers in a nutshell

Fertilizers are plant nutrients, required for crops to grow.

Mineral fertilizers are produced from natural elements, into a form which makes them easily available for plants.

Among the plant nutrients, nitrogen is most important for higher crop yields.

Nitrogen must be applied every year to maintain yield and biomass.

Phosphorus and potassium are the other primary nutrients.

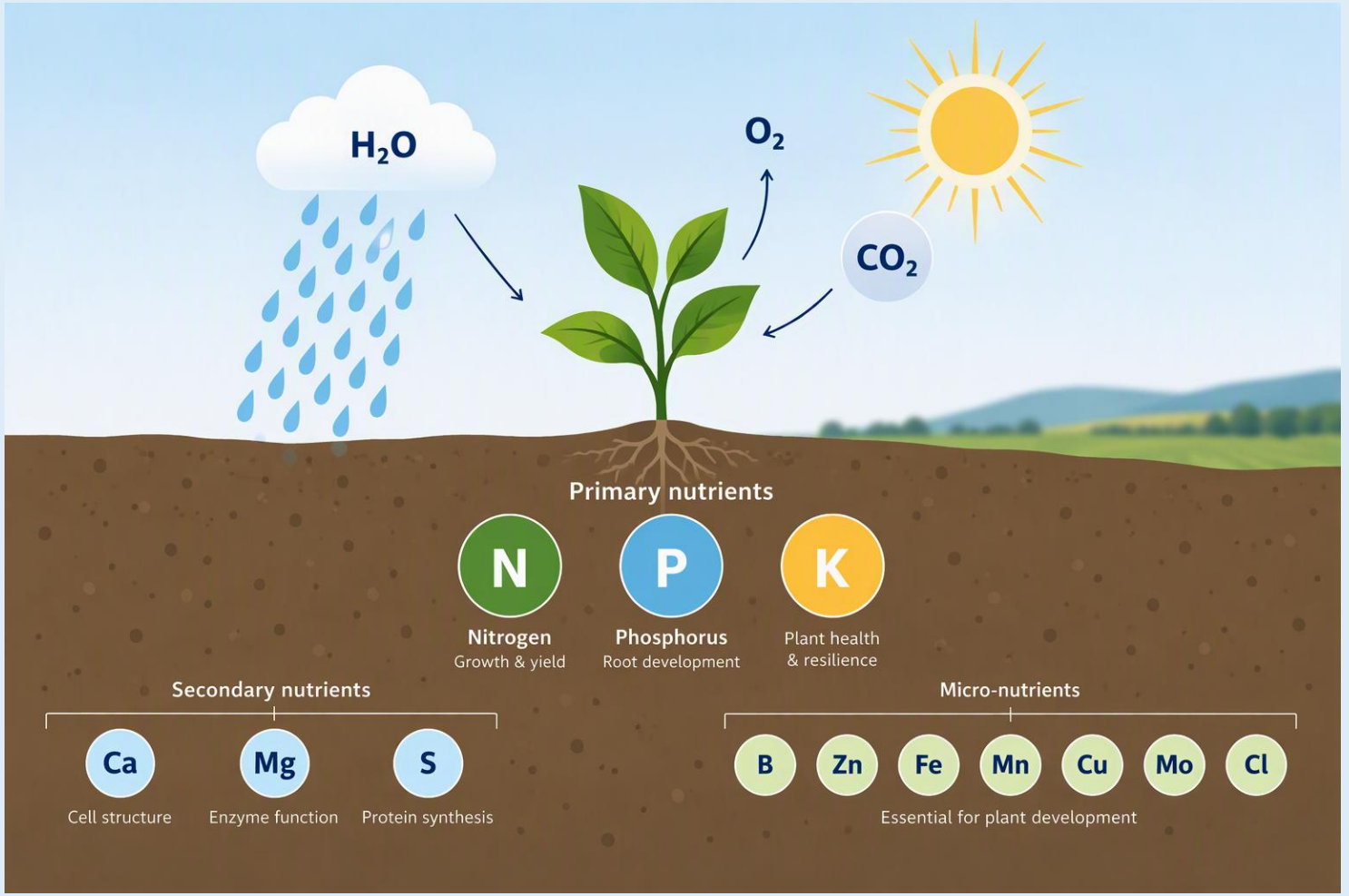
Annual application of these is not necessarily needed: soil stores these two nutrients for a longer period.

# Fertilizers are plant nutrients, required for crops to grow

Crops need energy (light), $CO_2$, water and nutrients to grow

Crops absorb water and plant nutrients from the soil

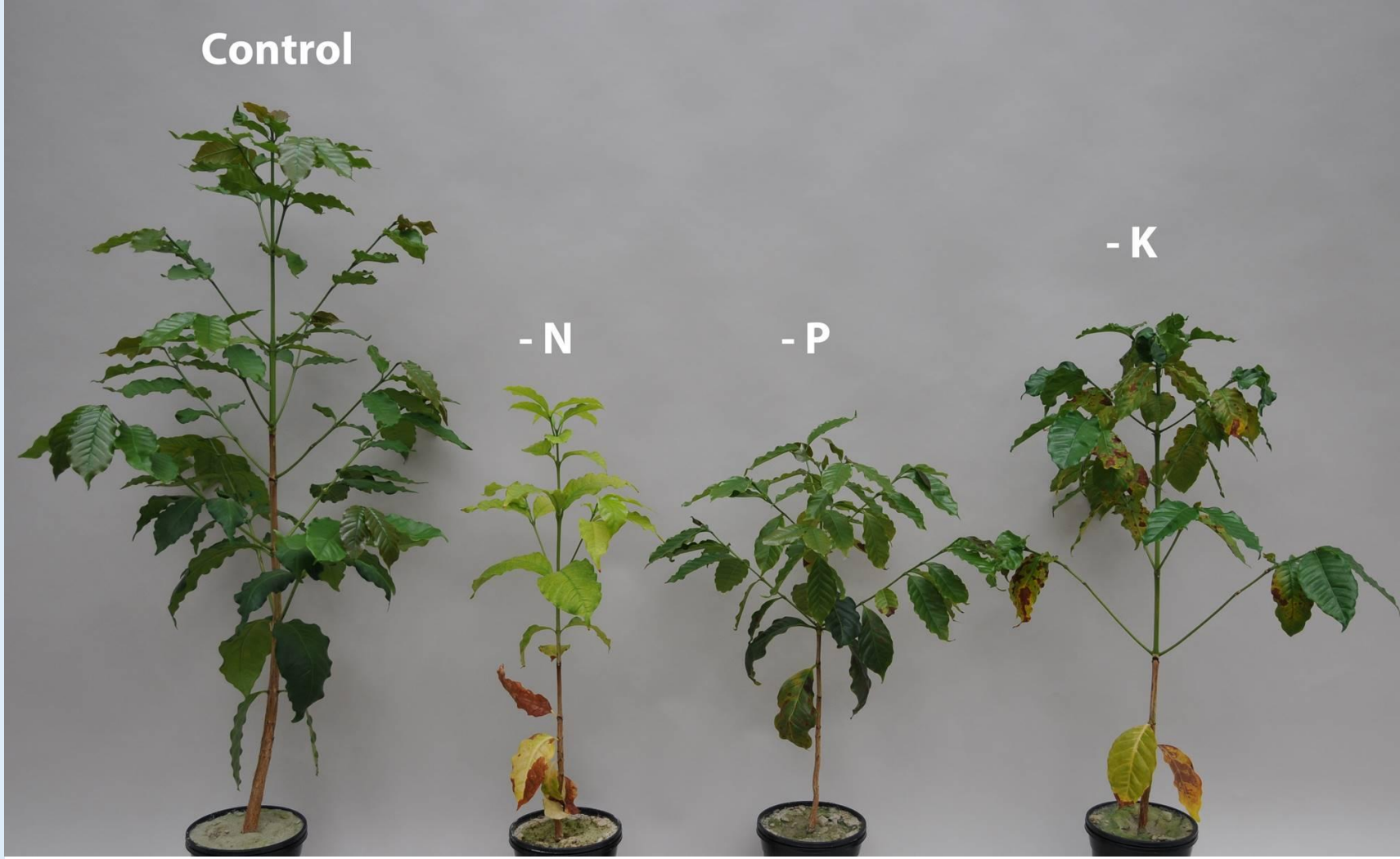
The carbon in crops originates from $CO_2$ absorbed through the leaves




- Plant nutrients are building blocks of crop material.
- Without nutrients, the crops can not grow
- Mineral fertilizers provide plant nutrients for crops
- Three main nutrients: Nitrogen, Phosphorus and Potassium are primary nutrients

# Mineral fertilizers are produced from natural elements, into a form which makes them easily available for plants

Lack of either N, P or K typically leads to plant deficiencies including reduced growth, reduced quality and/or lower resistance to drought and diseases




### Nitrogen (N)

Nitrogen originates from the air. The most common process in nitrogen fertilizer manufacturing is to create ammonia from a mixture of nitrogen from the air and hydrogen from natural gas

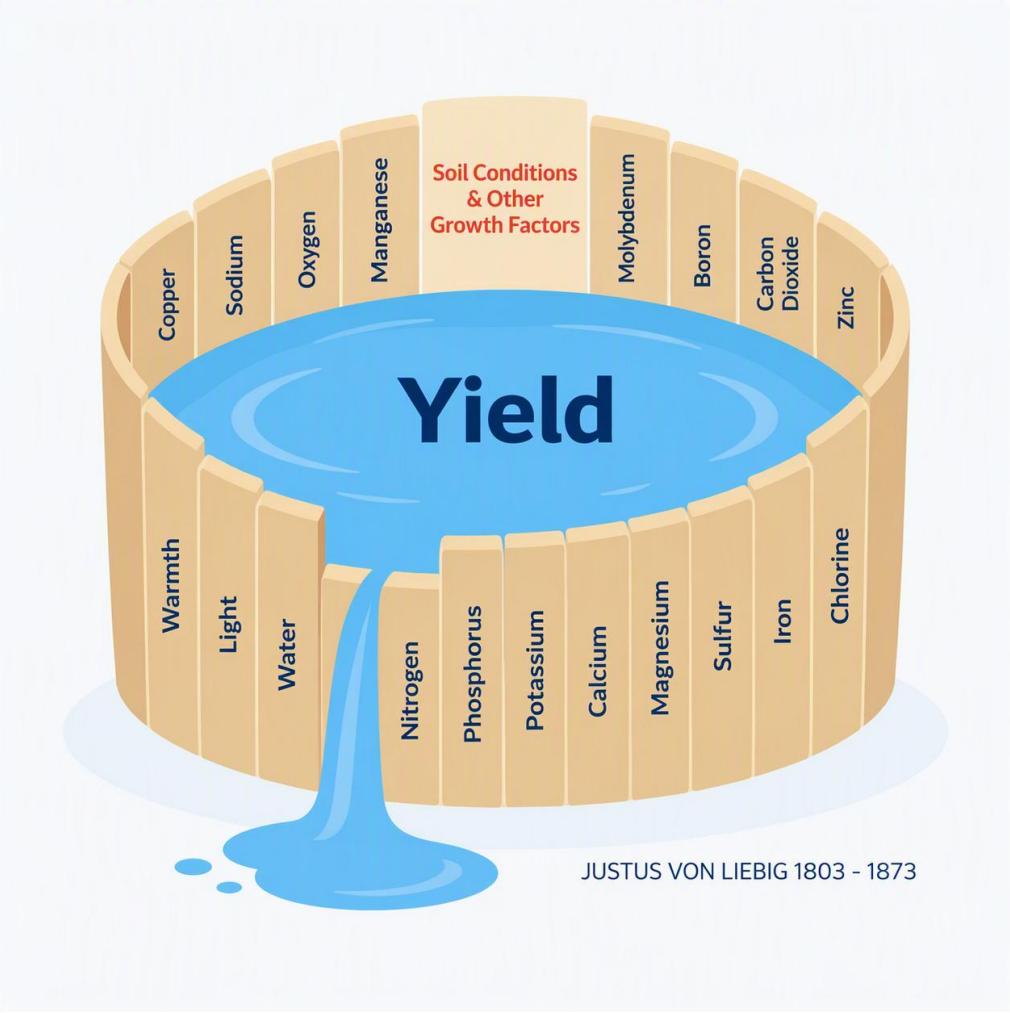
### Phosphate (P)

Phosphate is sourced from insoluble calcium phosphate rocks. Rock phosphate is made available for the plant usually through a chemical process to create plant-friendly fertilizers

### Potash (K)

Potassium is sourced from old sea and lake beds.
Since potassium sources are often located far below the soil surface (1-2km depth), plant roots are unable to reach them naturally

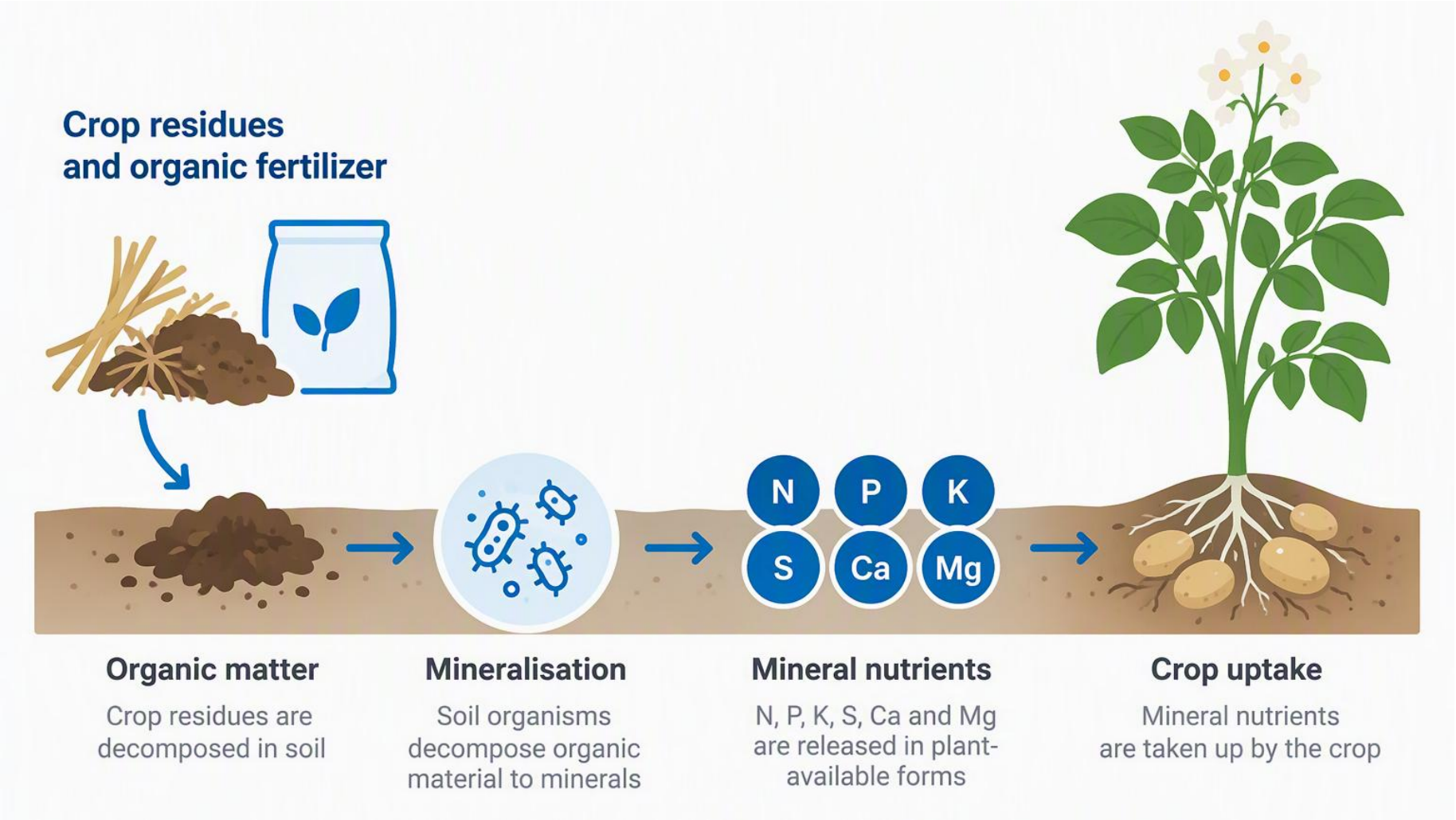
# Principle of crop nutrition: crop growth is limited by the most deficient nutrient




*Law of the Minimum (Liebig, 1843):*
*"Crop yields are proportional to the amount of the most limiting nutrient."*

- Plant nutrients have specific and essential functions in crop metabolisms
- They cannot replace each other, and lack of any nutrient limits crop growth
- It is therefore essential to focus on balanced nutrition of all plant nutrients

# Mineral fertilizers replace nutrients removed from the soil with the harvest



# Mineral and organic fertilizers supply the same inorganic molecules to crops, but have different characteristics

| Characteristics | Mineral fertilizer | Organic fertilizer |
|---|---|---|
| **Nutrient source** | Nitrogen from the air,<br>Phosphate and Potassium from deposits / mines | Crop residues and animal manures, other organic material |
| **Nutrient concentration** | High and precisely defined nutrient content for mineral<br>Low logistical cost | low and highly variable nutrient concentration<br>High logistical cost due to large volumes to transport and store |
| **Nutrient availability** | Immediately available for the crop | Variable, organic material needs to be decomposed to release nutrients |
| **Yield and quality impact** | Strong and predictable | Weaker and less consistent<br>Harder to certify |

- Plant productivity achieved by supplying only organic matter is on average low compared with mineral nutrients supplied in the form of fertilizers.
- Mineral and organic fertilizers are not mutually exclusive. When using the right source, at the right rate and time and in the right place, both can improve farmers' livelihoods, support soil health on the farm and protect the environment.

# Nitrogen – the most important nutrient

## Nitrogen

*Benefits:*

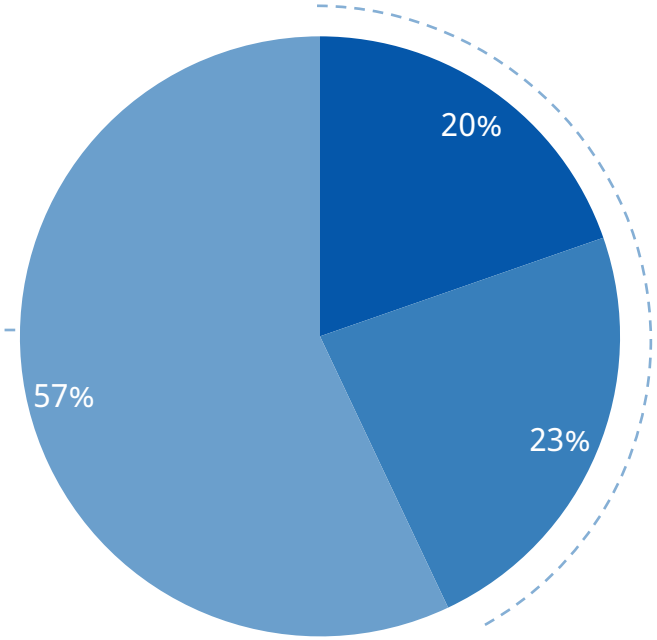
- Increase crop size
- Most important nutrient

*Application:*

- Annual application critical

*Industry Structure:*

- Fragmented industry
- More dynamic prices, but stable volume




*Total ~213 million tons nutrients*[1]

## Potassium and Phosphorus

*Benefits:*

- Improve crop quality

*Application:*

- Application can be varied depending on the need

*Industry Structure:*

- Fewer suppliers

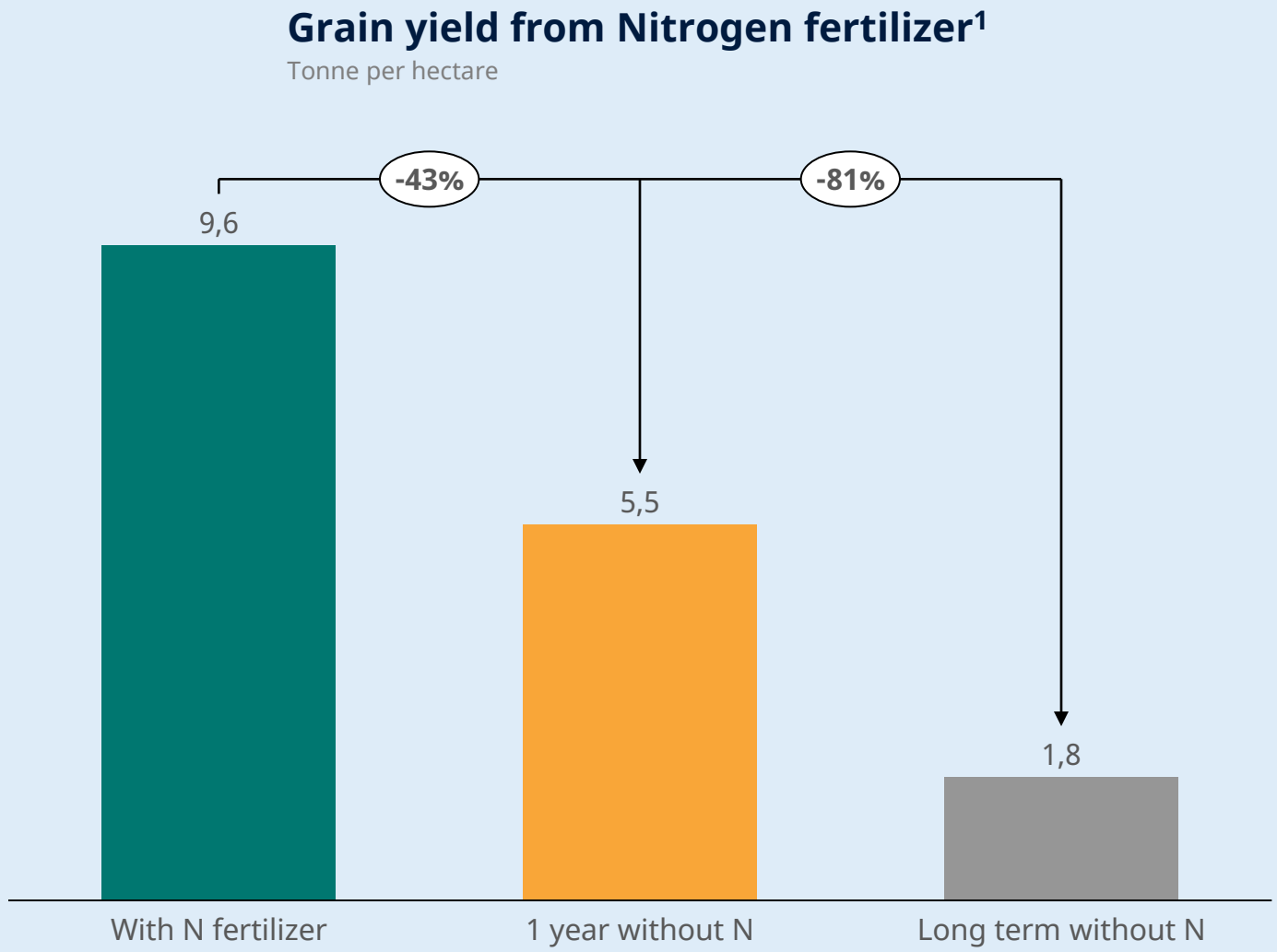


1) Source: IFA 2025, data for 2024, fertilizer consumption

# Regular nitrogen application is required to maintain yields

**Annual N-application is critical for yield:**

Annual application of nitrogen can increase the yield with more than 80% which makes nitrogen demand more inelastic compared to P and K demand.




1) Source: Broadbalk long term trial Rothamsted UK

# There are several types of nitrogen fertilizers, from urea to straight nitrate fertilizers

Nitrates are products containing 50% of the nitrogen in the form of nitrate:

- the most efficient and most reliable nitrogen source available
- have a lower environmental impact than urea-based products

*Nitrates*

| N fertilizer | N content | Nitrate (% of total N) | Other nutrients |
|---|---|---|---|
| CAN (calcium ammonium nitrate) | 27% | 50% | 4% MgO |
| AN (ammonium nitrate) | 33.5 - 34.5% | 50% | |
| NPK | various | about 50% | P & K |
| CN (calcium nitrate) | 15.5% | 93% | 19% Ca |
| Urea | 46% | 0% | |
| UAN (urea ammonium nitrate) | 28% | 25% | |
| ASN (ammonium sulfate nitrate) | 26% | 25% | 13% S |
| AS (ammonium sulfate) | 21% | 0% | 24% S |




# Fertilizer Industry

### Supply

Key factors defining supply are capacity additions, closures and utilization rates.

N industry is more fragmented compared to P and K.

### Demand

Fertilizer consumption is mainly driven by food demand.

Industrial consumption is driven mainly by economic growth.

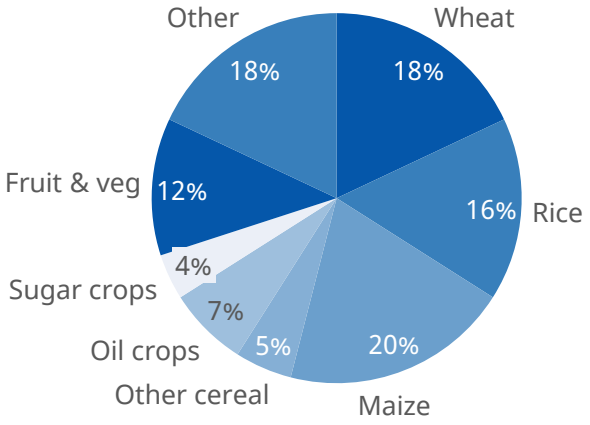
### Crop prices

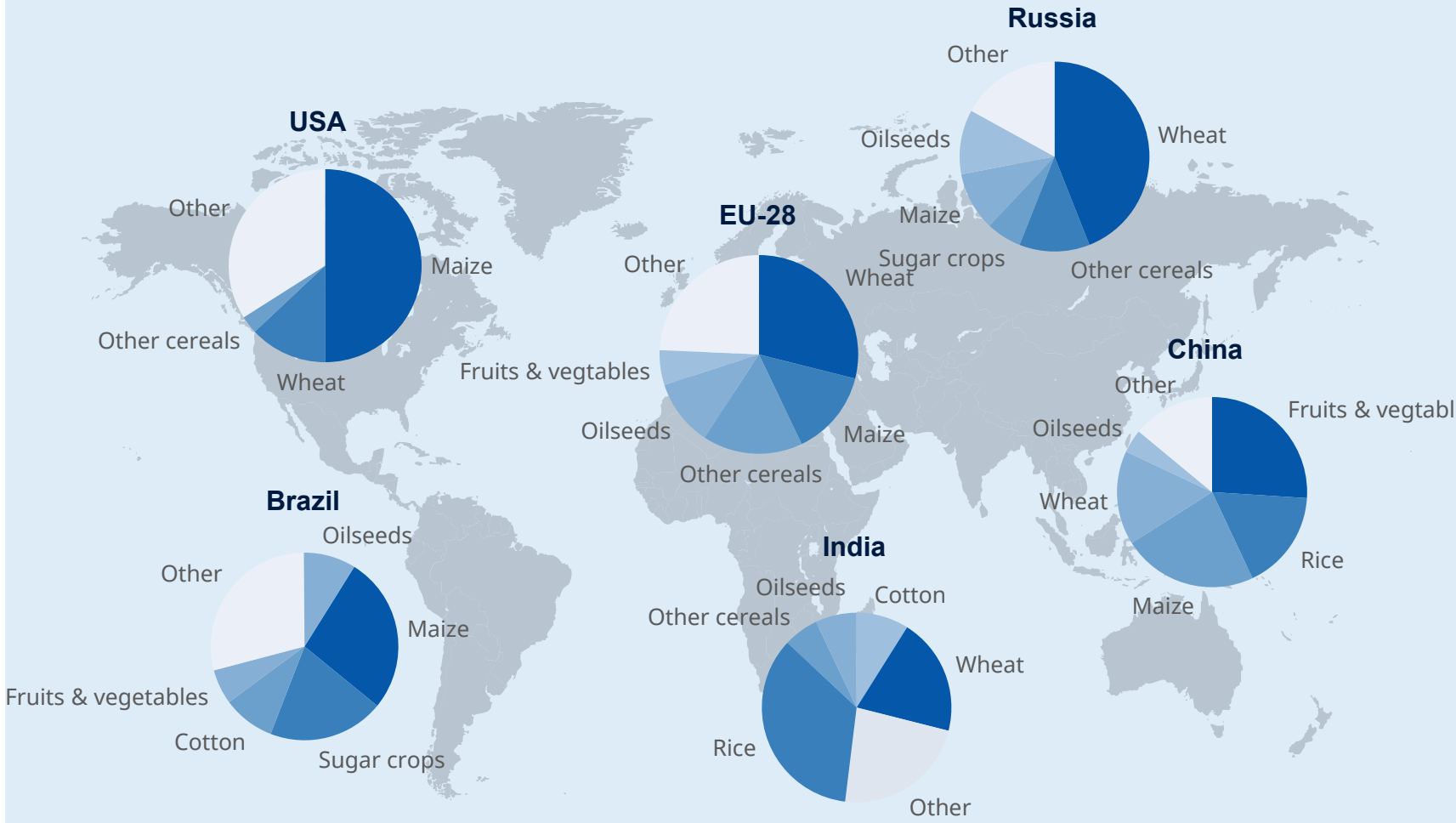
Correct use of fertilizers can yield significant returns on investment.

Higher grain prices allow for increased nitrogen fertilizer values.

# The nitrogen fertilizer market is an essential industry serving global food production

The three main grain crops, wheat, rice and corn (maize), consume more than half of all nitrogen globally[1]



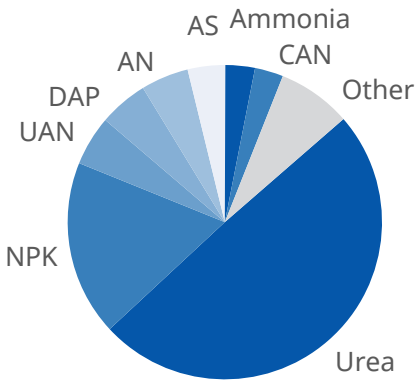

- There are large regional differences also in terms of crop demand for nitrogen fertilizer.
- These regional differences impact regional demand patterns as soft commodity prices develop differently and hence impact farmer economics and farmer incentives to apply fertilizer differently.

1) Source: IFA 2021

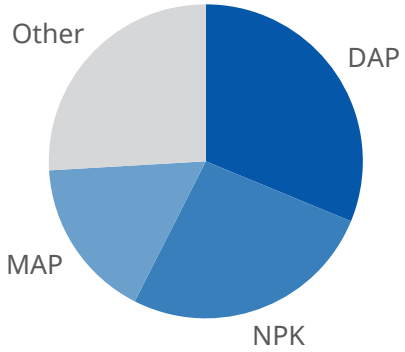
# Nitrogen is the largest nutrient by volumes, and consumption keeps growing[1]

- Urea, DAP and MOP are the key products for respectively nitrogen, phosphorus and potassium fertilizer
- They have a large market share and are widely traded around the world
- Nitrogen is the nutrient with highest consumption

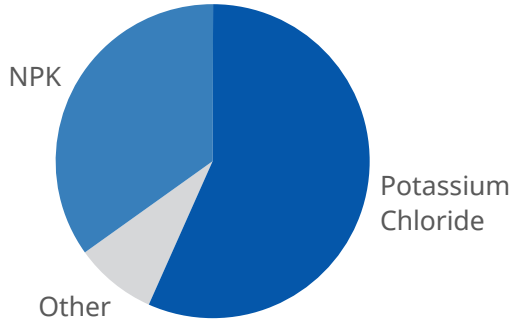
**Nitrogen N**
121 million tonnes[2]



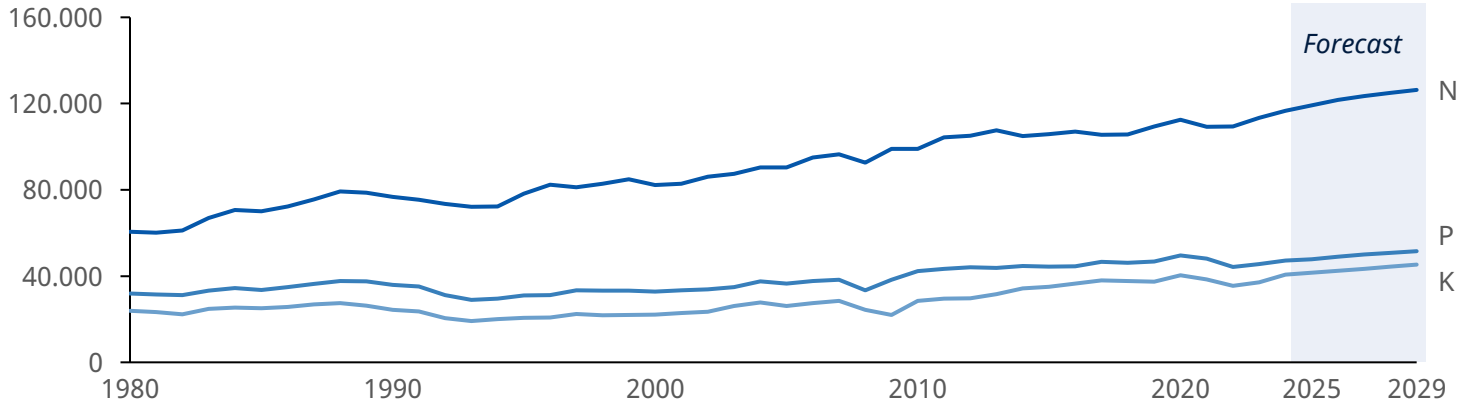

**Phosphate $P_2O_5$**
50 million tonnes




**Potash $K_2O$**
42 million tonnes




**Global consumption trend per nutrient**




1) Source: IFA 2025, data for 2024
2) Does not include industrial nitrogen applications

# The N industry is fragmented, while the P and K industries are more concentrated

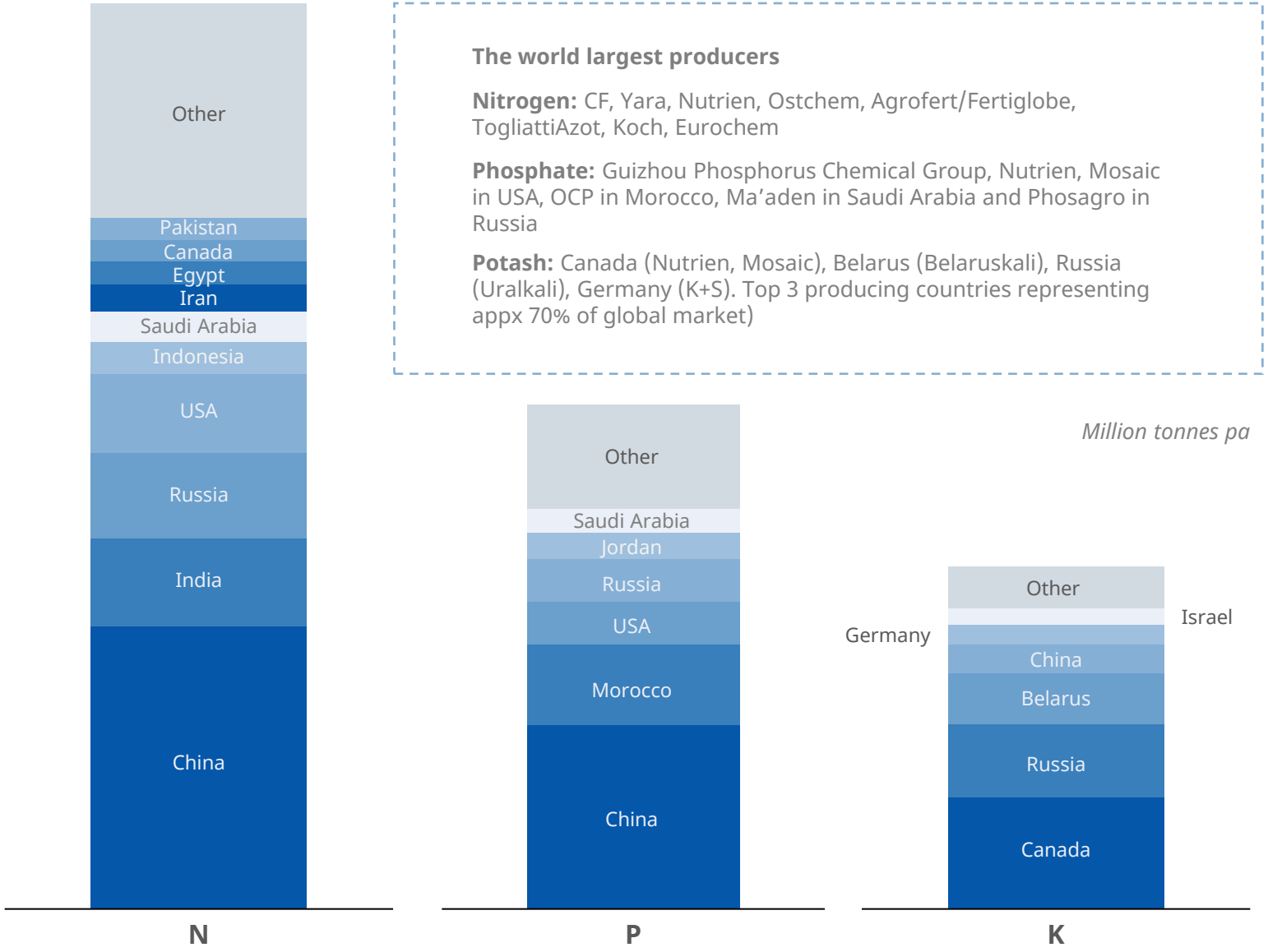
- Nitrogen fertilizers are produced in many countries, reflecting the wide availability of key raw materials (natural gas and air) needed for production.
- There are fewer large suppliers of phosphate and potash fertilizers, as phosphate rock and potash mineral deposits are only available in certain regions of the world.

**The world largest producers**

**Nitrogen:** CF, Yara, Nutrien, Ostchem, Agrofert/Fertiglobe, TogliattiAzot, Koch, Eurochem

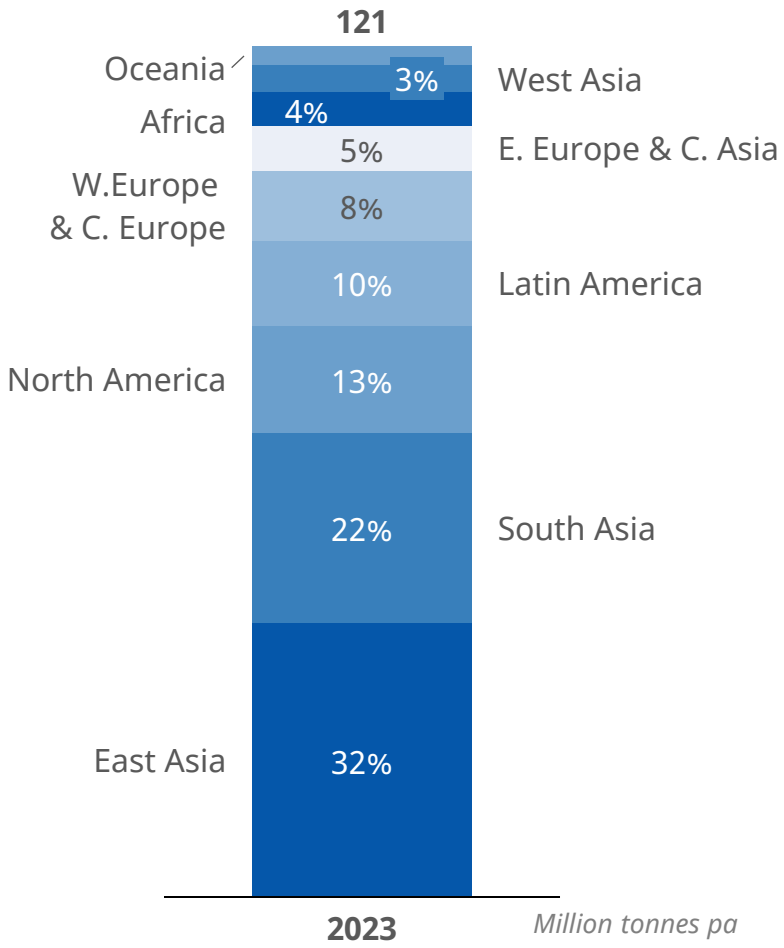
**Phosphate:** Guizhou Phosphorus Chemical Group, Nutrien, Mosaic in USA, OCP in Morocco, Ma'aden in Saudi Arabia and Phosagro in Russia

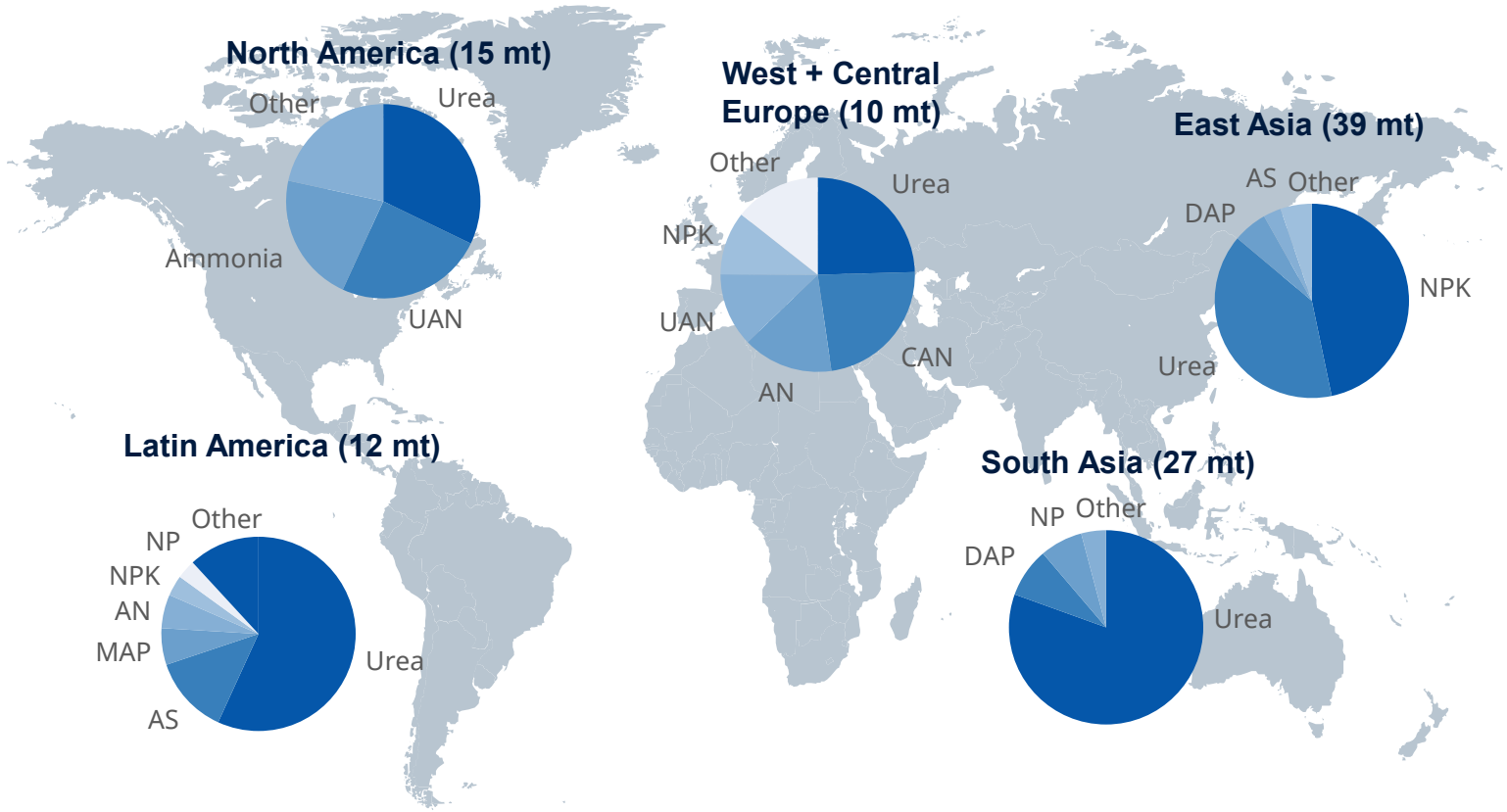
**Potash:** Canada (Nutrien, Mosaic), Belarus (Belaruskali), Russia (Uralkali), Germany (K+S). Top 3 producing countries representing appx 70% of global market)




1) Source: IFA 2025, data for 2024;
N production volumes = total ammonia production
P production volumes = total P rock production

# There are large variations in nitrogen fertilizer consumption in different regions



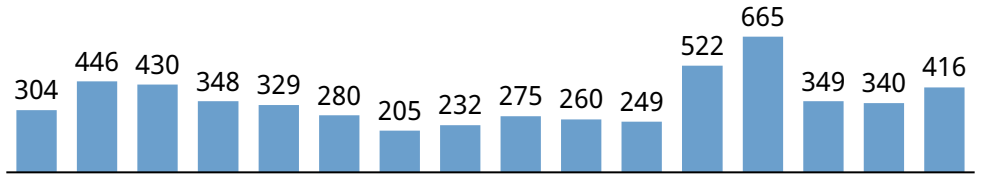




- Urea is popular in warmer climates and for certain crops like rice.
- UAN (liquid fertilizer containing urea and ammonium nitrate) is mainly used in North America
- Nitrates are mainly used in Europe.
- In the US ammonia is also used as a direct source of nitrogen in agriculture, especially for fall application.
- Brazil consumes relatively more phosphate and potash compared with nitrogen, due to a large soybean production and local soil nutrient content.

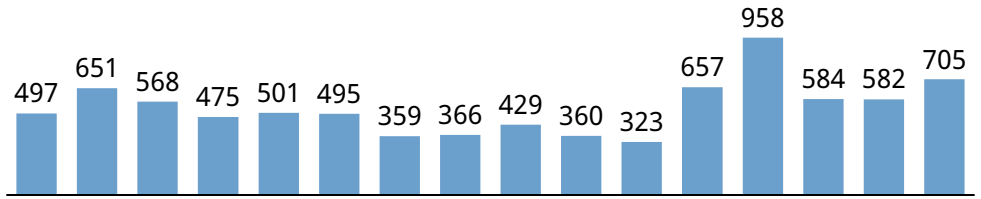
Source: IFA 2025, data for 2024

# Fertilizer prices are cyclical

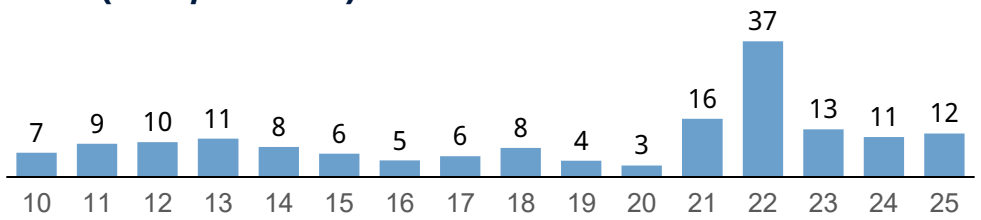
## Urea granular FOB Arab Gulf ex. US (USD/t)



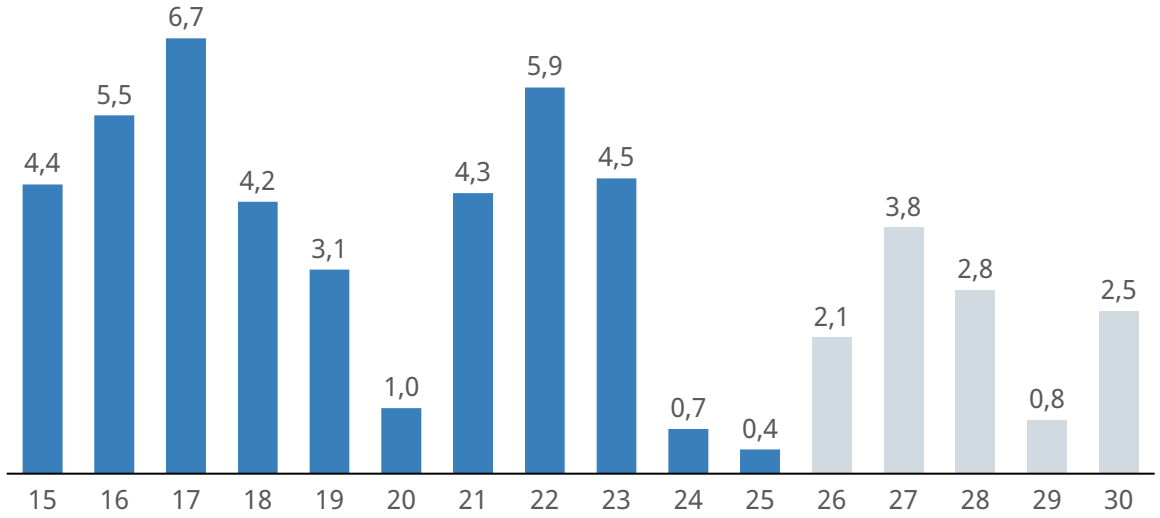

## DAP FOB Morocco (USD/t)




## TTF (USD/MMBtu)




## Capacity additions million tonnes pa (urea example)

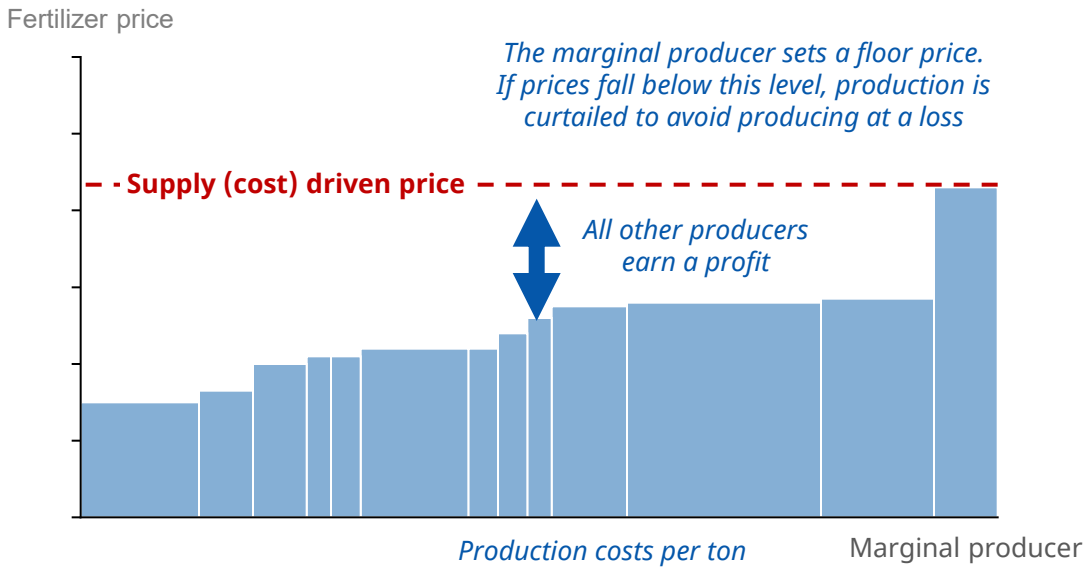



The cyclicality is primarily caused by the “lumpiness” in supply additions resulting in periods of overcapacity and undercapacity.

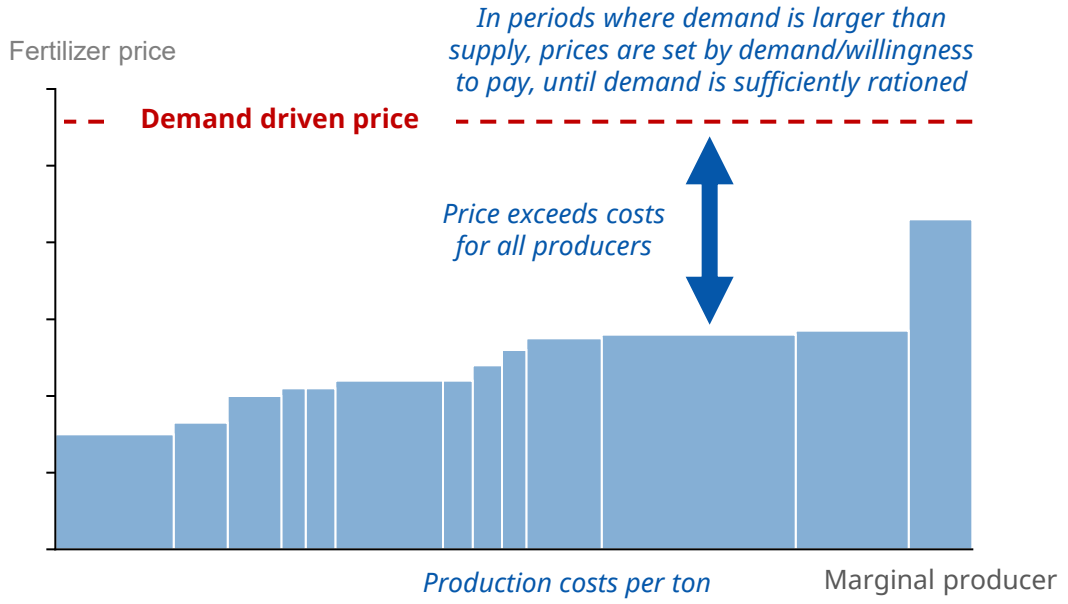
Source: Fertilizer market publications, World Bank

# Medium term pricing logic:
# Prices are set by the balance between supply and demand

## Supply driven market




## Demand driven market




Source: Illustrative – dummy numbers

# Key nitrogen fertilizer value drivers are supply/demand balance, crop prices, changes in production capacities and production costs

## Revenue drivers

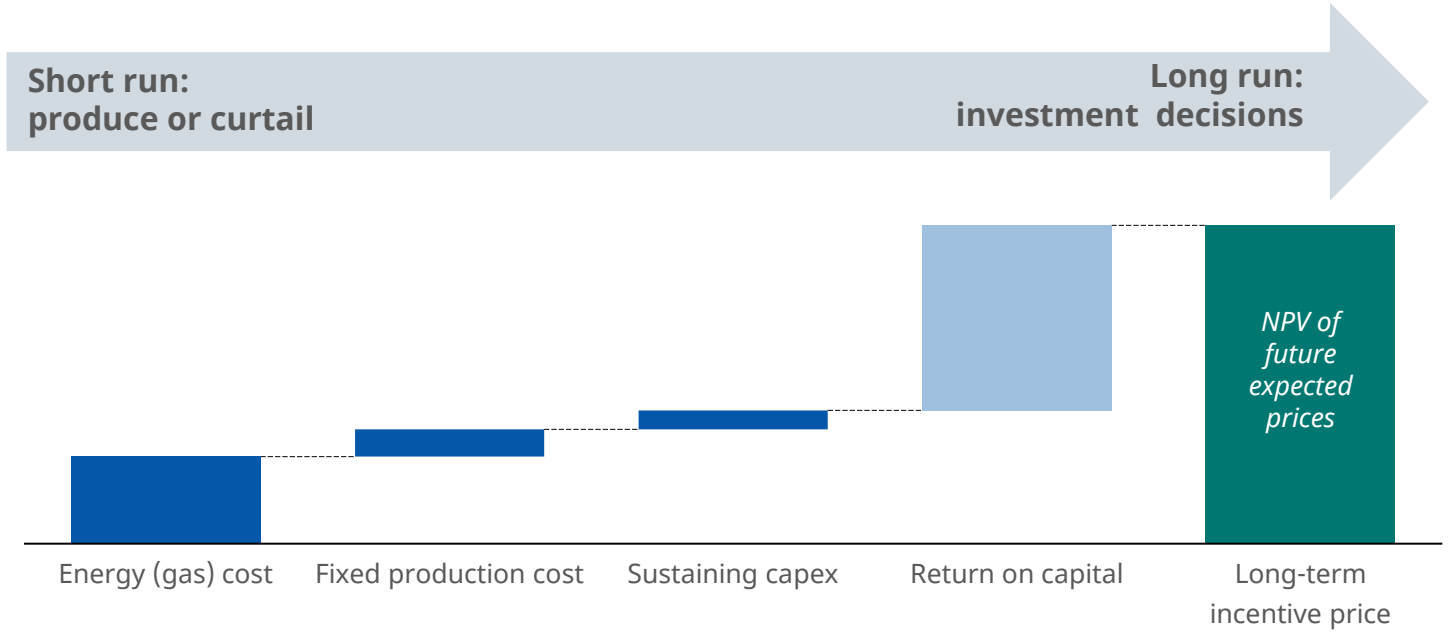
| Drivers | → | Effects on |
|---|---|---|
| Global urea demand vs. supply | | Urea price |
| Marginal producer production costs | | Supply-driven urea price |
| Crop prices/grain inventories | | Urea demand/ demand-driven price |
| New urea capacity vs. closures | | Urea supply |
| Urea price | | Most other nitrogen fertilizer prices |
| Cash crop prices | | Value-added fertilizer premiums |

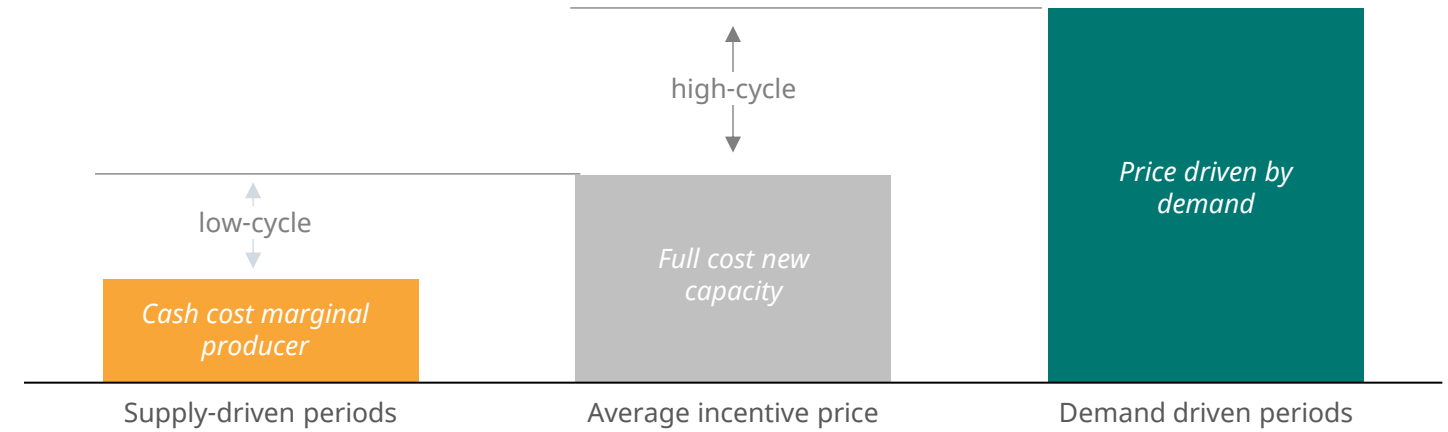
## Cost drivers

| Drivers | → | Effects on |
|---|---|---|
| Gas demand vs. supply | | Gas costs |
| Manning and maintenance | | Fixed costs |
| Productivity and economies of scale | | Unit cost |
| Carbon cost (depending on region) | | Unit cost |

# Long term pricing logic:
# In the long term, capital servicing is a key element in determining prices

- Long term, prices must cover all costs, including capital
- High capital intensity implies that profitability of nitrogen capacity is the present value of future prices through the cycle



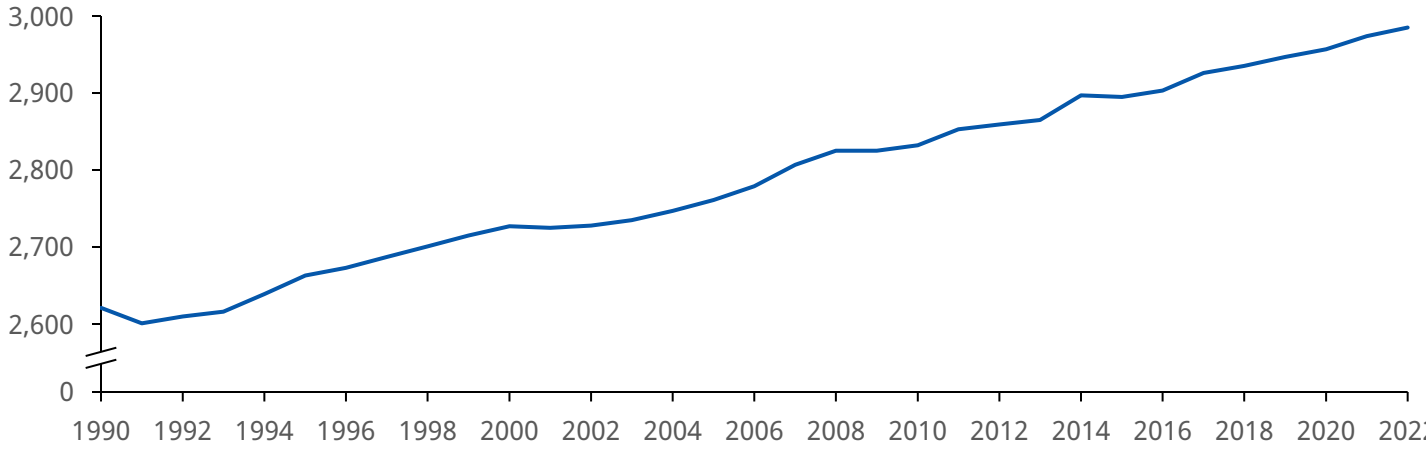




Illustrative – dummy numbers

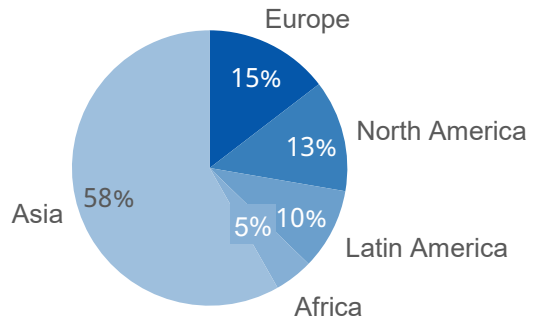
# Drivers for N consumption growth are different for fertilizer and industrial needs

**Food consumption[1]**

kcal/capita/day




**Forecast of nitrogen consumption in key regions [2]**




**Fertilizer consumption is mainly driven by food demand**

- Population growth
- Economic growth and diet changes (more protein-rich diets, more fruit and vegetables, reduced hunger)
- Nutrient use efficiency in farming
- Waste and loss across the food value chain

**Industrial consumption is mainly driven by economic growth**

- Economic growth
- Environmental limits (e.g. reduction of $NO_x$ emissions)

1) Source: FAO, food supply kcal/capita/day
2) IFA 5 year consumption forecast, kt nitrogen

# Correct use of fertilizers can yield huge returns on investment

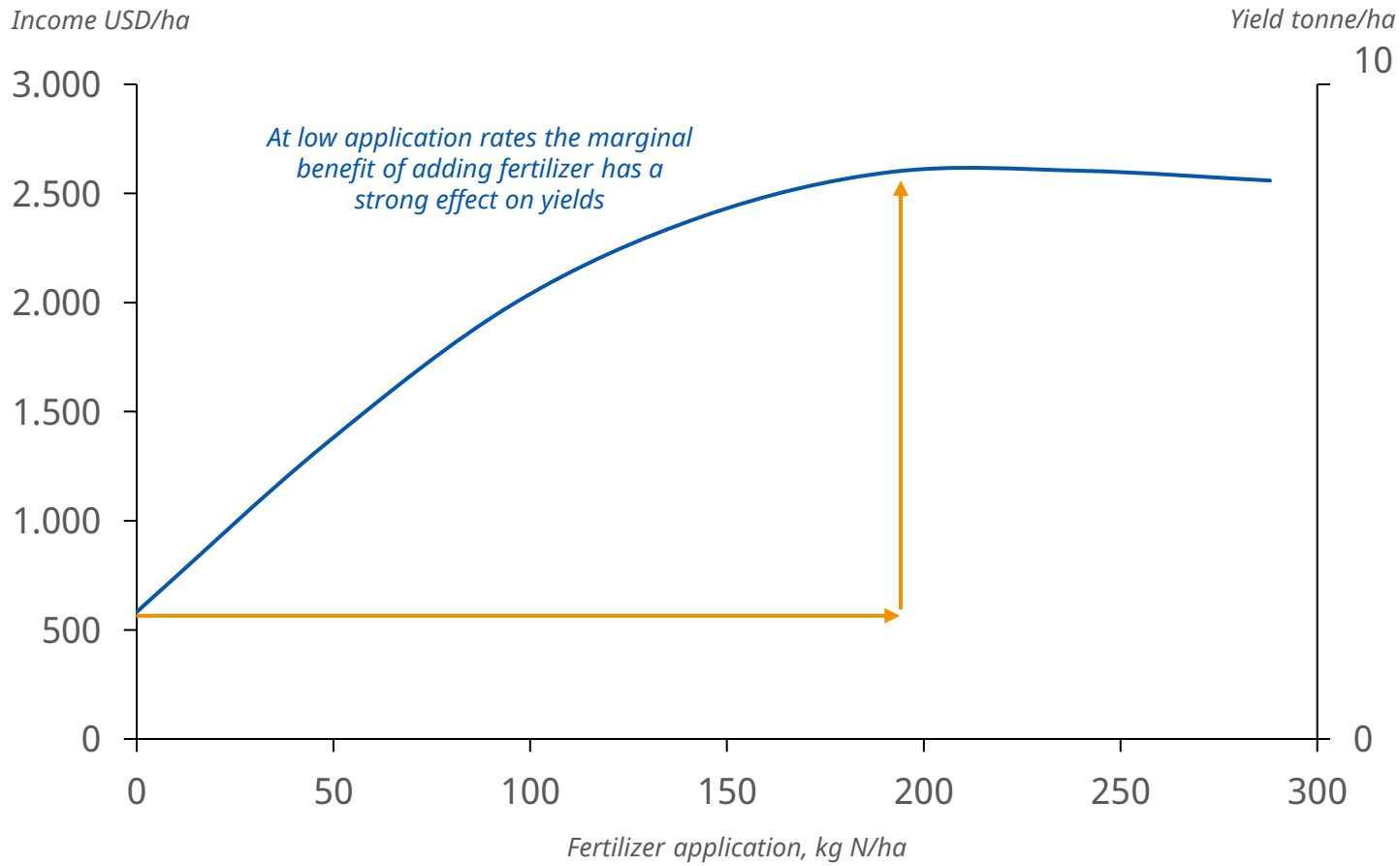
The investment in nitrogen fertilizer is highly profitable for growers

Fertilizer investment: 188 USD/ha

Net return: 1,446 USD/ha

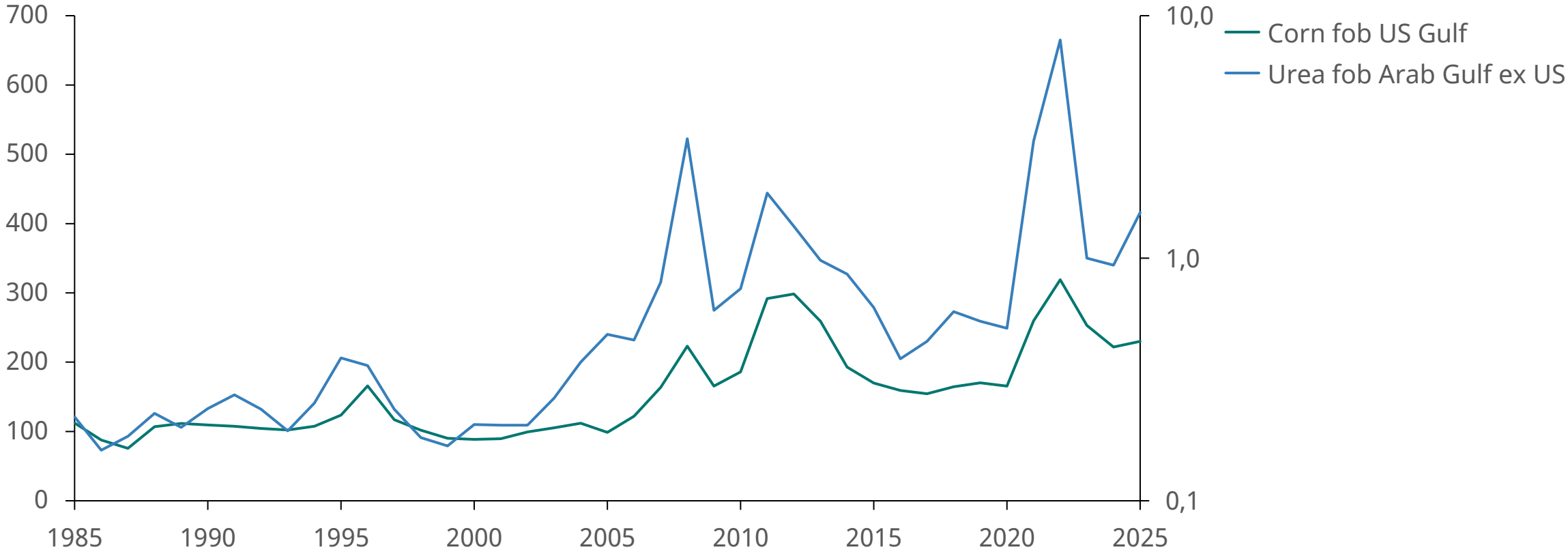
**Net return ~ 7 x investment**

**Yield response (monetary value) to N fertilizer rate[1]**




1) Winter wheat yield data: Long term trial, Broadbalk, Rothamsted (since 1856).

# Grain prices are important for fertilizer demand and pricing long-term

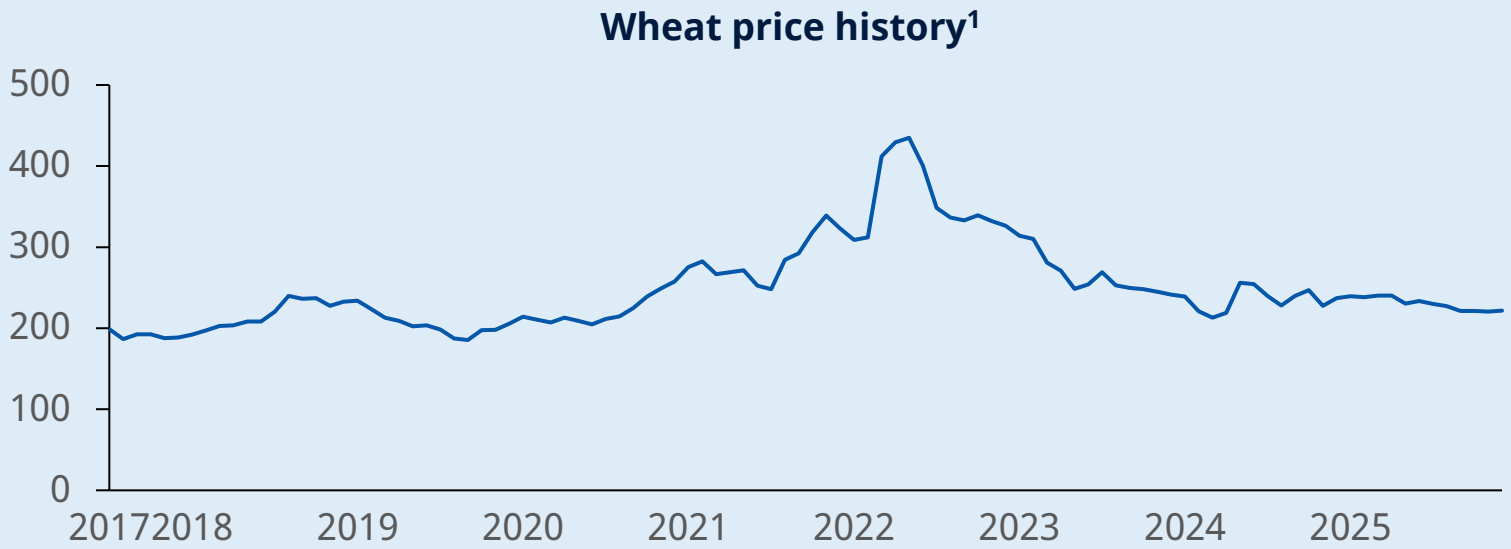


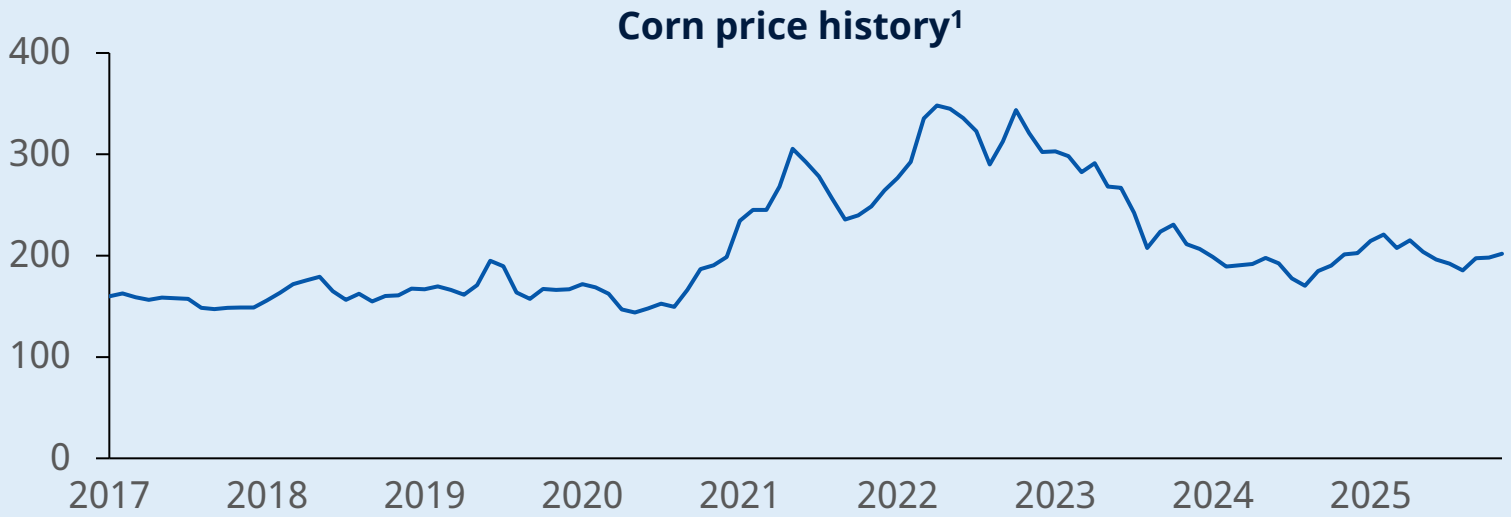

Source: World Bank, Fertilizer publications

# Crop prices are not primarily driven by production costs

They are driven by market equilibrium — supply vs demand:

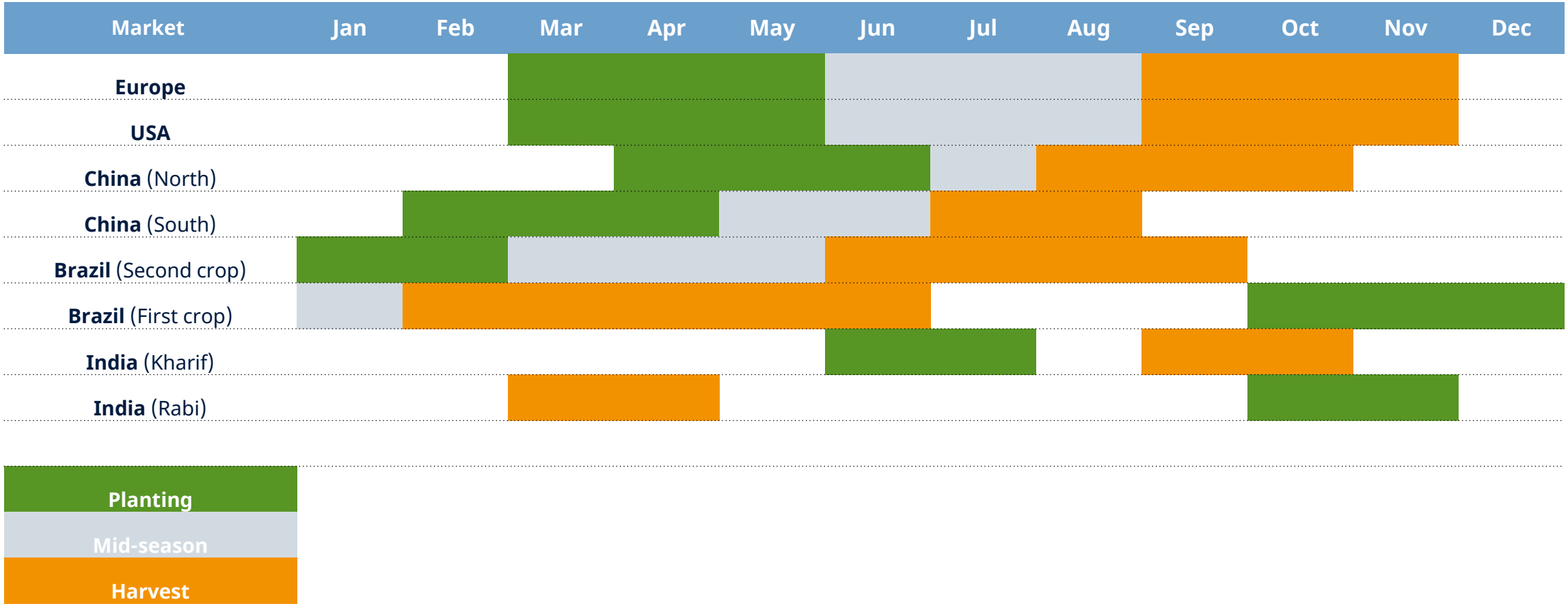
- Yields & weather (droughts, floods, temperature)
- Planted acreage / farmer decisions
- Global production (US, Brazil, EU, Black Sea, etc.)
- Stocks/inventories (“ending stocks”)
- Food consumption (population growth)
- Animal feed demand
- Biofuels (corn, sugar, oilseeds)
- Income growth / macro cycle
- Macro & financial factors
- Policy & geopolitics



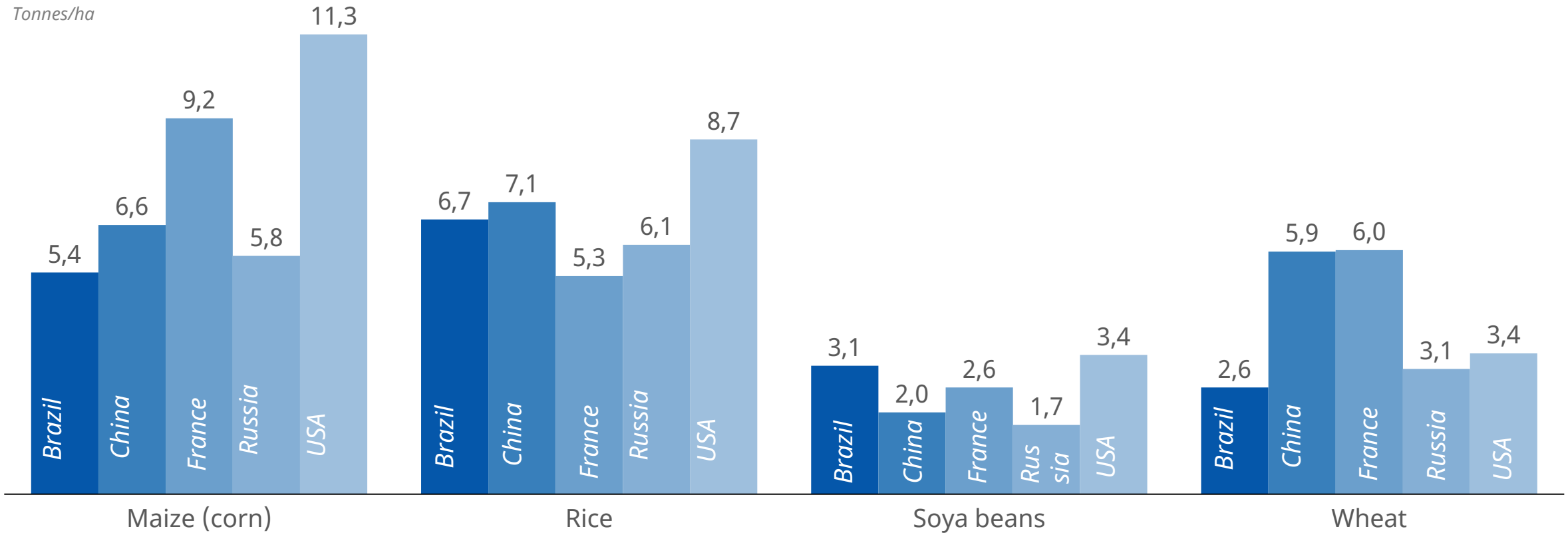

*Source: World Bank pink sheet*

# Fertilizer is a seasonal business, and seasonality is linked to weather



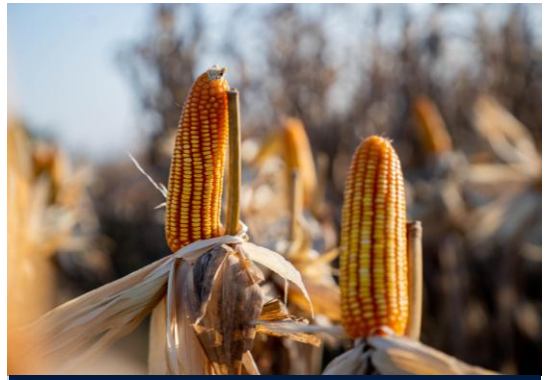

Source: USDA

# Large variations in grain yields across regions

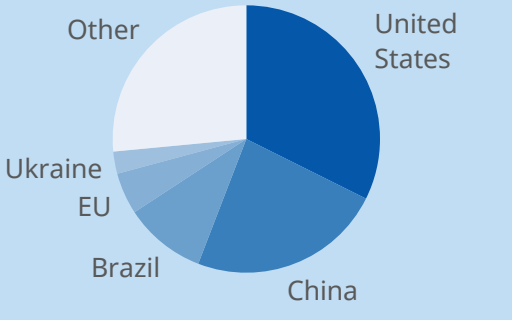



Source: FAOSTAT 2024

# Key crops produced globally are corn, wheat, rice and soybeans

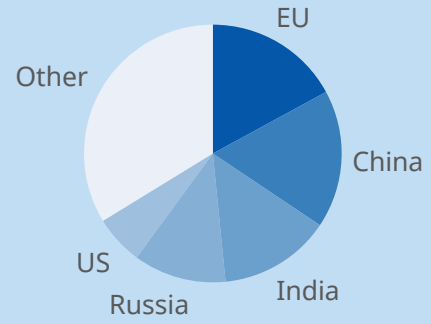


**Corn**
*1,230 mt pa*



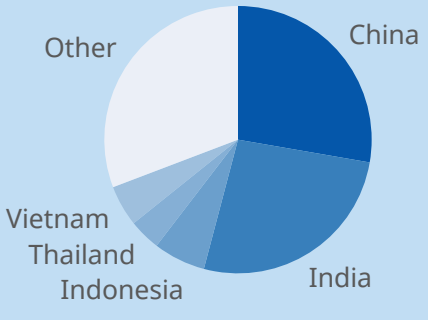



**Wheat**
*791 mt*



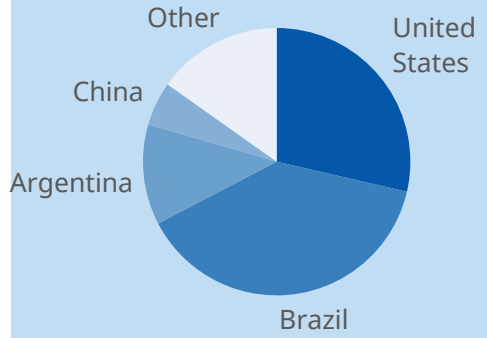



**Rice**
*523 mt*






**Soybeans**
*395 mt*



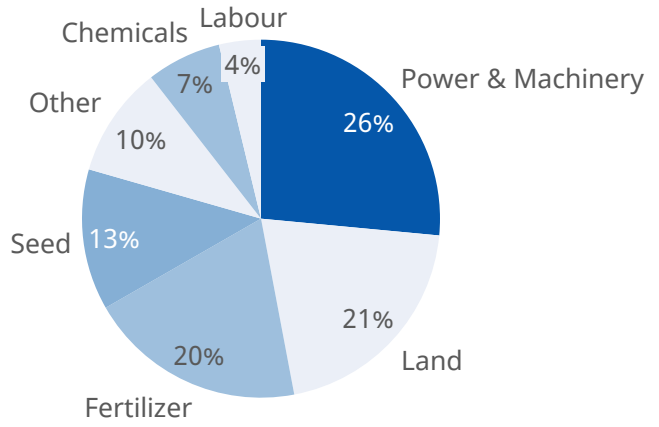

*Total fertilizer need: highest* → *Fertilizer need: lowest*

Source: USDA December 2024, data for 2023/24 season

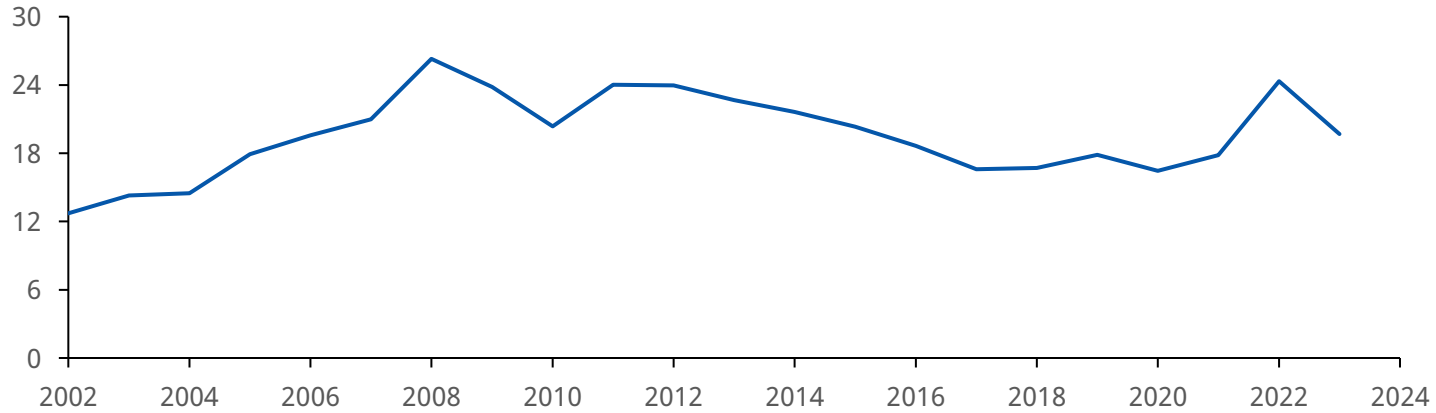
# Fertilizer cost is around 1/5 of total grain production cost

- Fertilizer costs relative to total production costs of corn has declined since 2011 and represent appx 20% in 2023.
- For other major crops, the relative share is smaller varying from 8% for soybeans up to 17% for wheat.

## 2023 average US corn production costs[1]

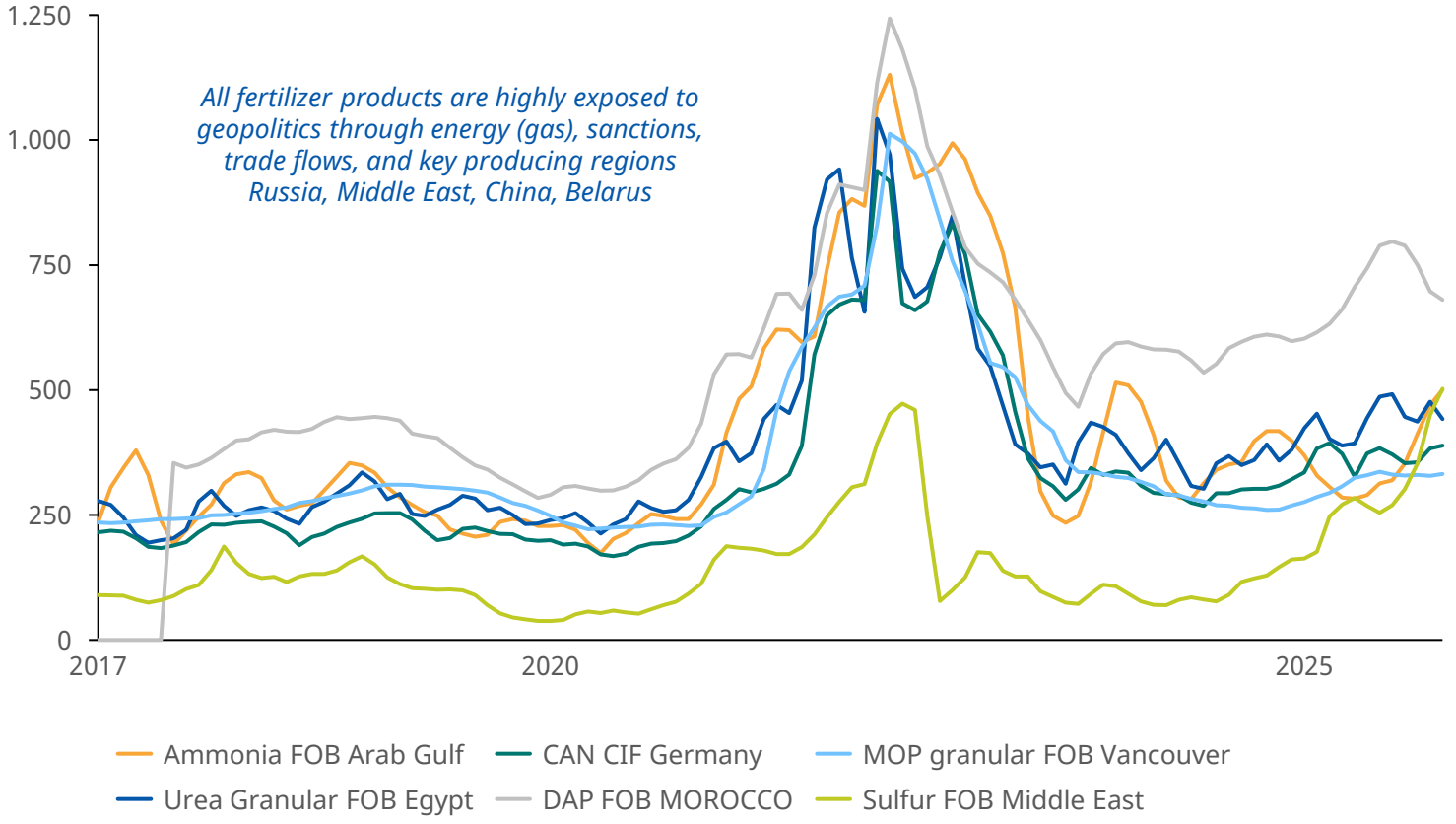



## Fertilizer share of US corn production costs[1]




1) Source: USDA (Commodity costs and returns)

# All fertilizers are geopolitically exposed, but different feedstocks and supply chains drive asynchronous price reactions and complex cross-nutrient linkages




- Energy (gas) converted to ammonia - cascading effect across nitrogen and phosphates
- Ammonia – feedstock for all nitrogen fertilizers (drives urea pricing floors globally)
- Ammonia + sulphur are key cost inputs for DAP
- Sulphur (oil biproduct) vs ammonia (gas-linked): Different energy linkages can create divergent cost pressures within DAP
- Cross-nutrient substitution: some substitution is possible but its typically limited especially in the short term

Source: Market publications




# Urea Markets

Global urea production has grown steadily at ~1.6% CAGR (2014-2024).

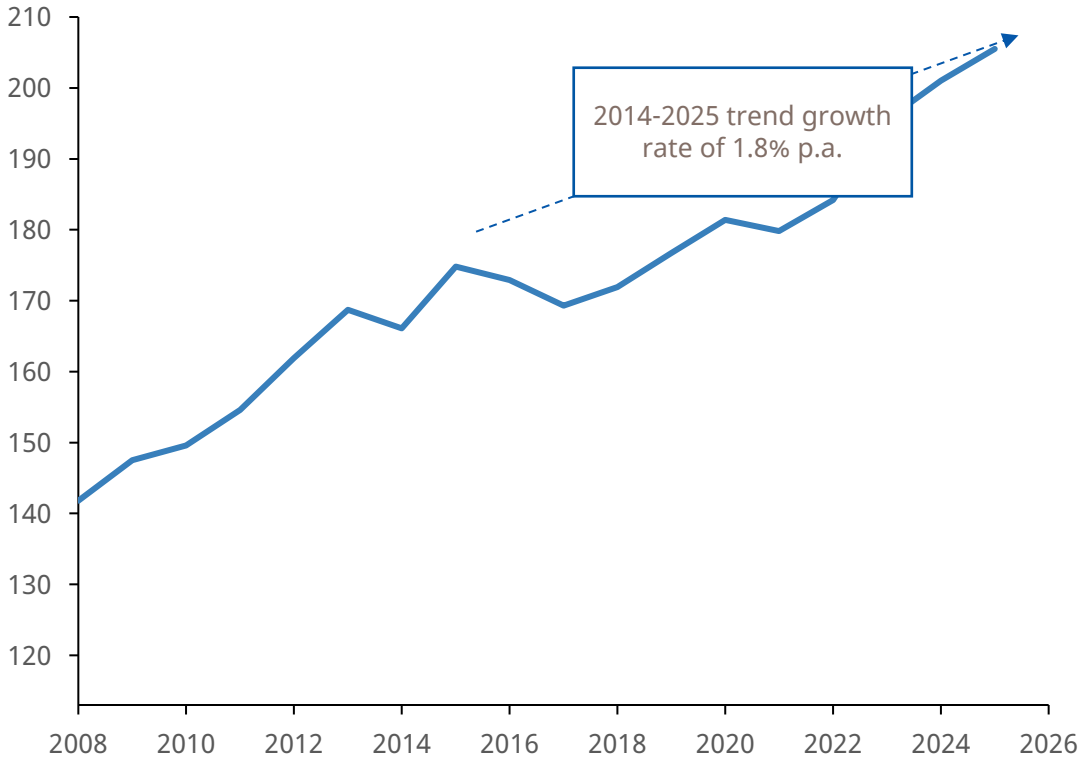
Latest key price spikes were driven by the Russia-Ukraine war, high European gas prices, Chinese export restrictions, and geopolitical disruptions.

China and India account for more than half of global urea consumption.

# Urea market fundamentals

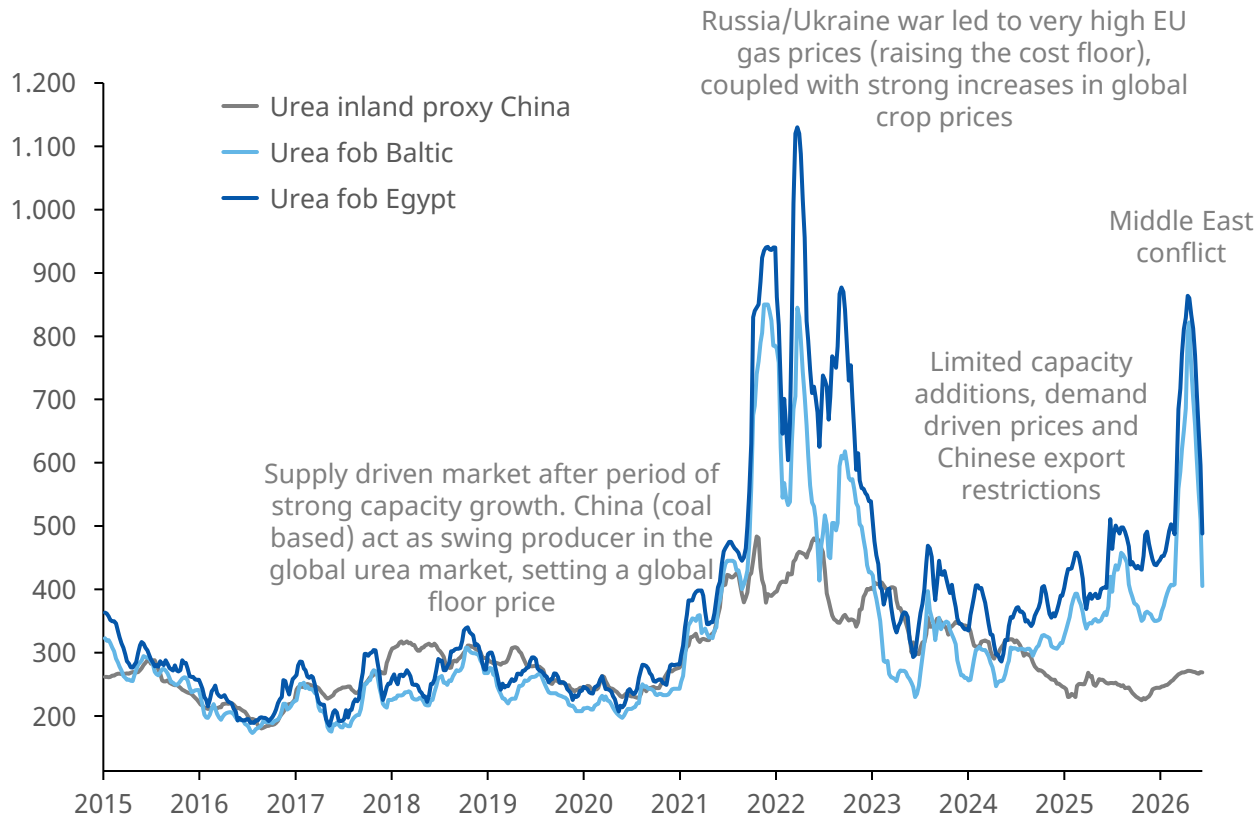
## Total production

mt urea




## Urea price history

USD/t



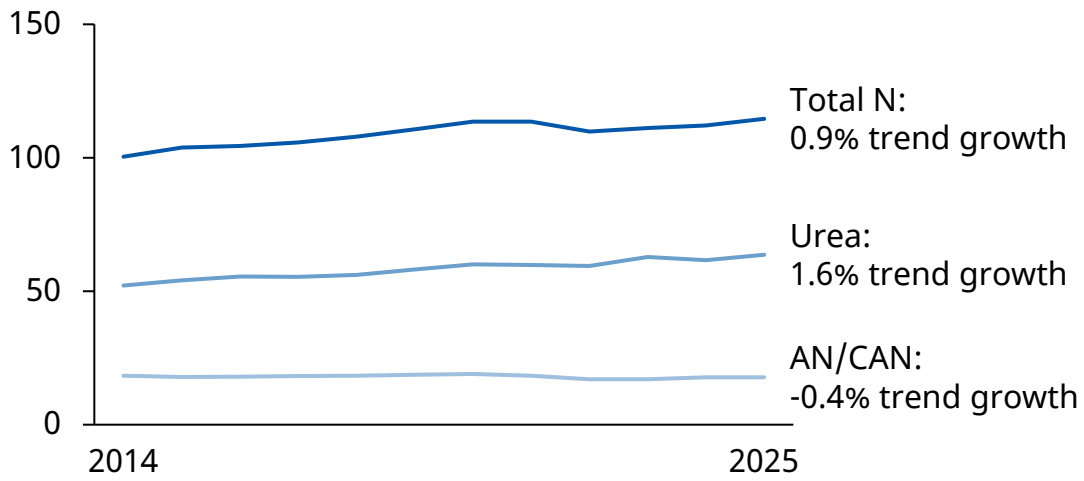

1) IFA, CRU, Yara internal analysis

# Urea demand growth remains consistent

**Underlying nitrogen demand growth** + **Urea share of total N capacity growth** + **Replacement of old urea capacity**

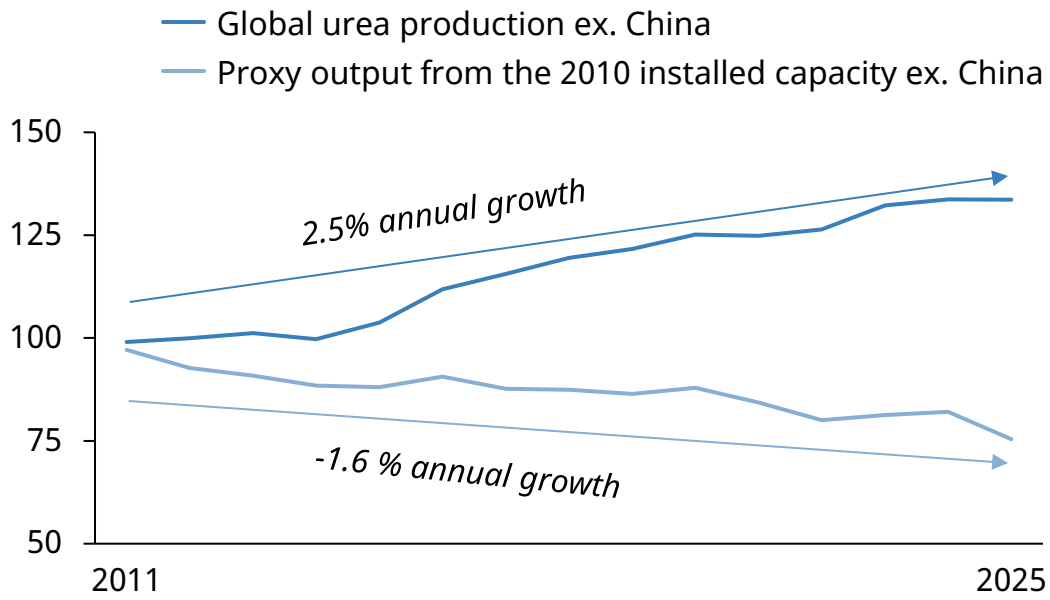
## Apparent consumption growth ex. China[1]

*mt nitrogen*




## Capacity growth total vs. installed capacity[1]

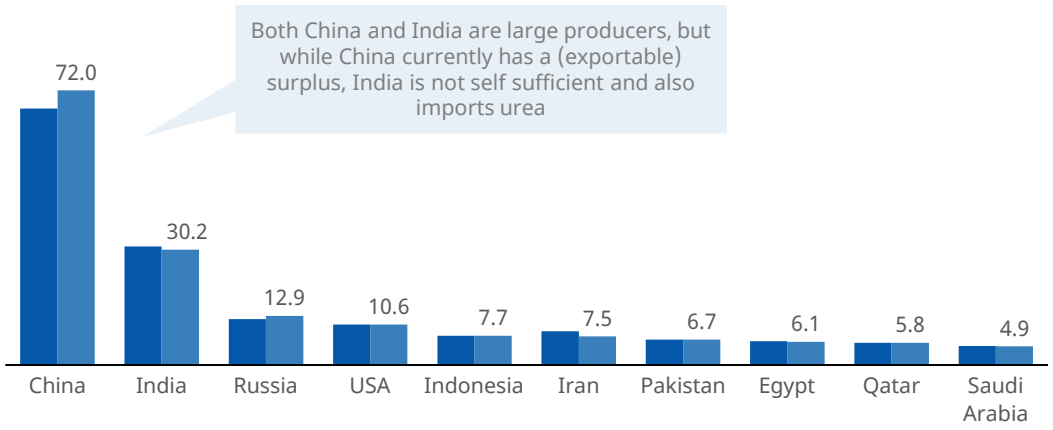
*mt urea*



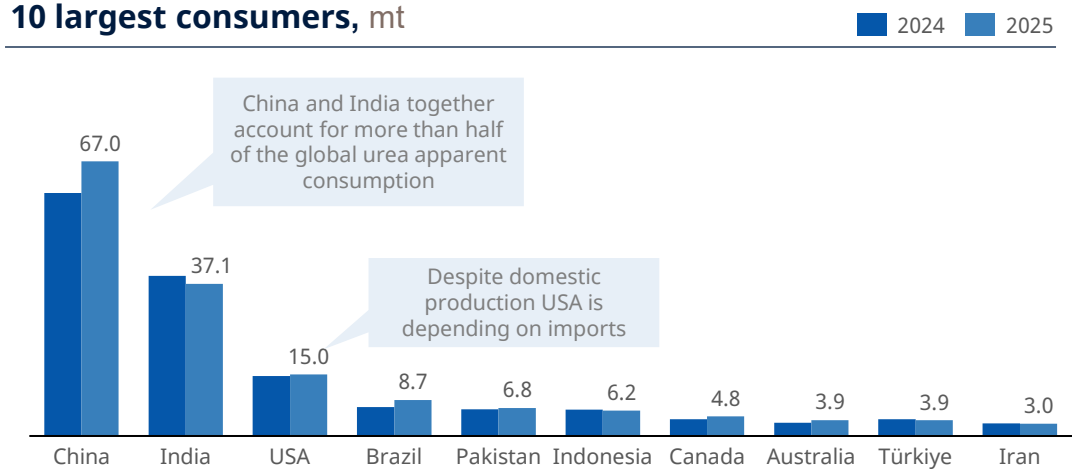

1) IFA, CRU, Yara internal analysis

# Urea production, consumption, exporters and importers

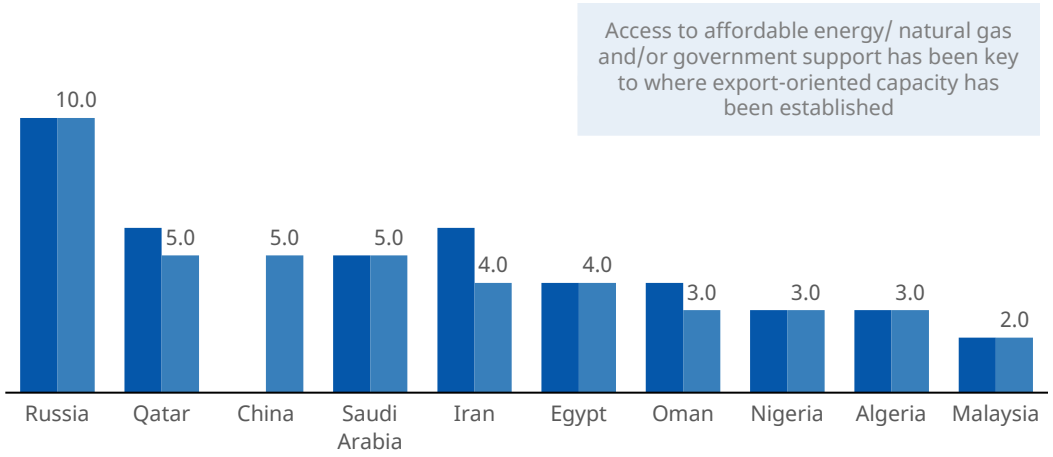
## 10 largest producers, mt



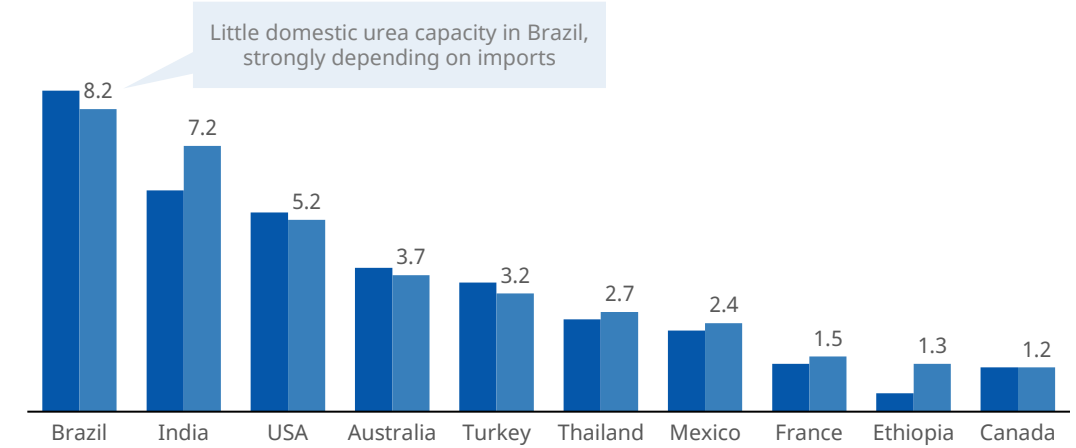

## 10 largest consumers, mt




## 10 largest exporters, mt



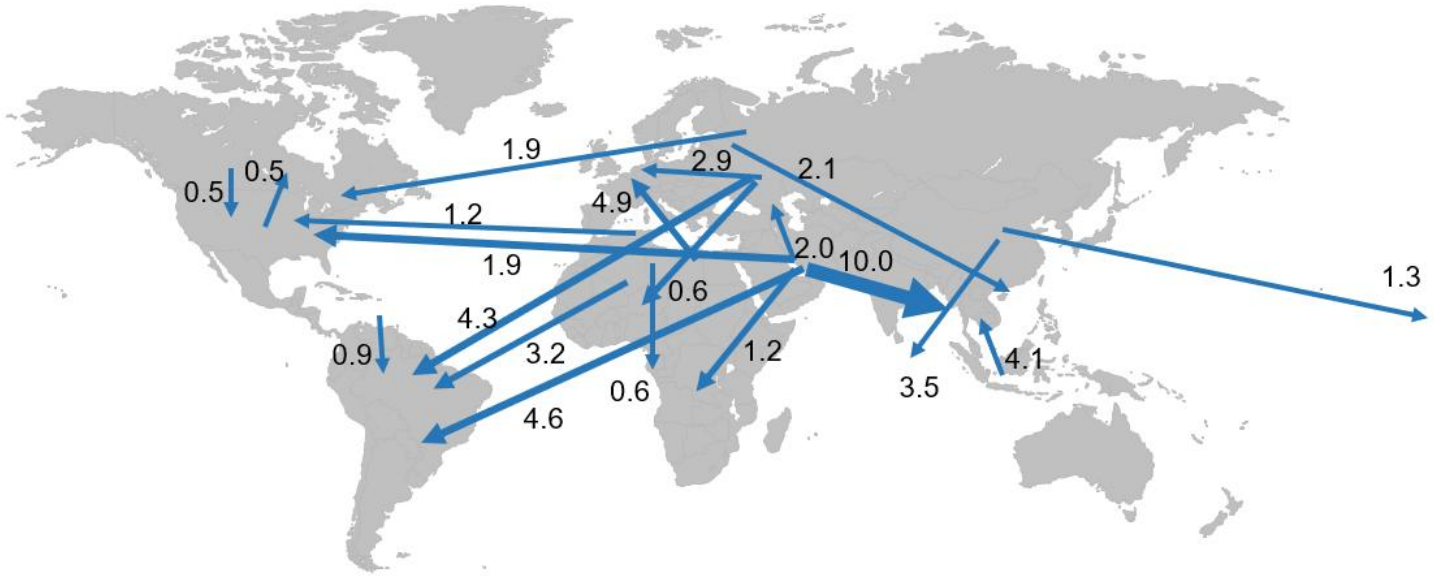

## 10 largest importers, mt




Source: IFA, 2025 data

# Main urea flows 2025

Million tonnes




Main exports from gas rich countries with small domestic markets

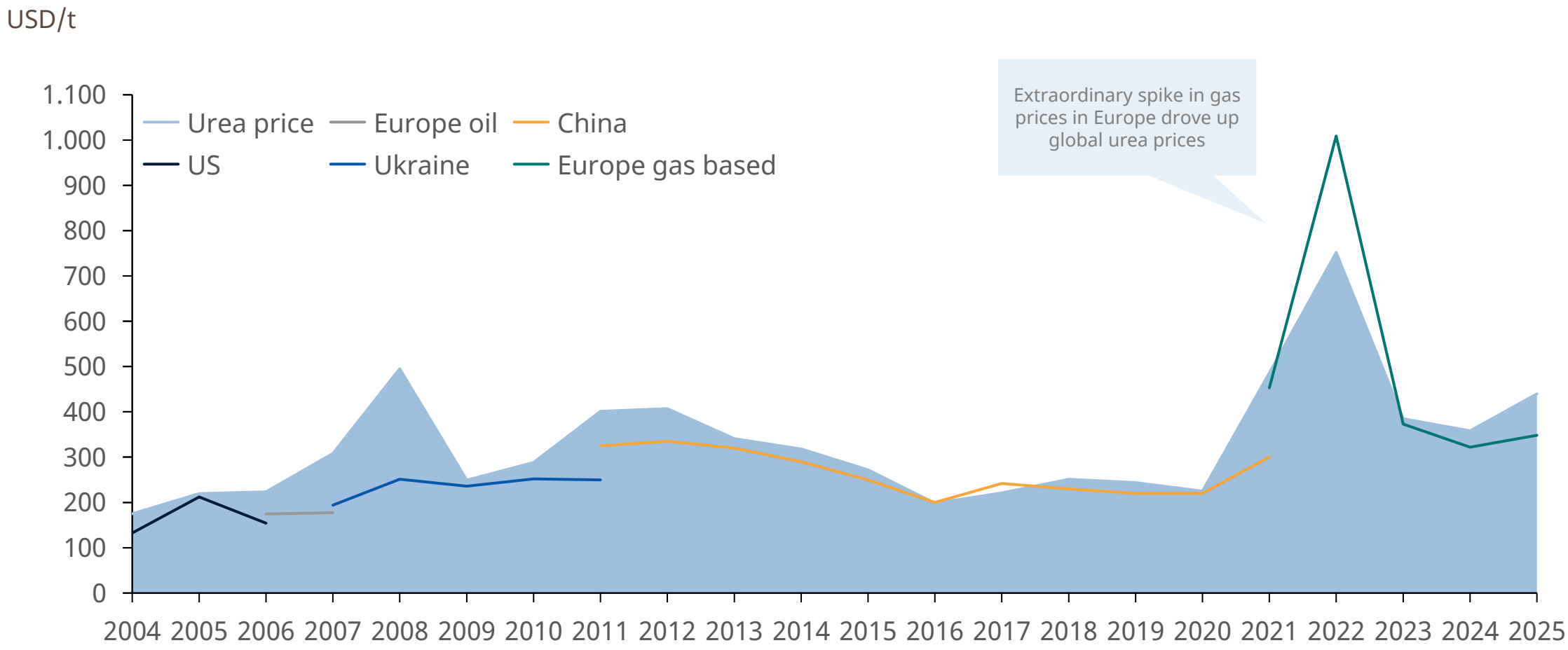
- Russia, Iran, Qatar, Saudi Arabia, Egypt, Oman, Nigeria, Algeria, Malaysia and UAE

Main importers are large agricultural countries

- Brazil, India, US, Australia, Turkey, Thailand, Mexico, France, South Africa and Canada
- Europe is also a significant import market

Source: IFA 2025, 87% of total trade shown

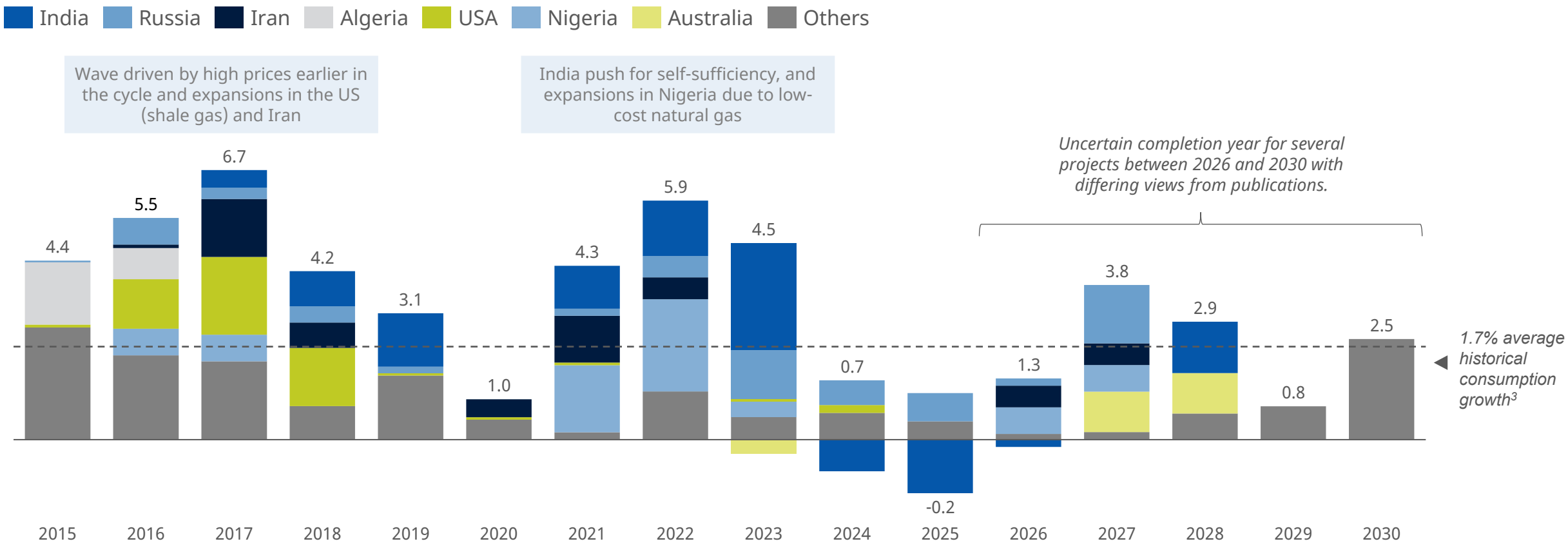
# The urea market has been increasingly demand-driven since 2020




Source: S&P Global Energy/ Fertecon (Ukraine), Yara estimates. The cost lines are drawn for illustration purposes only and not intended as exact cost estimates.

# Good visibility on urea capacity additions for the next 5 years

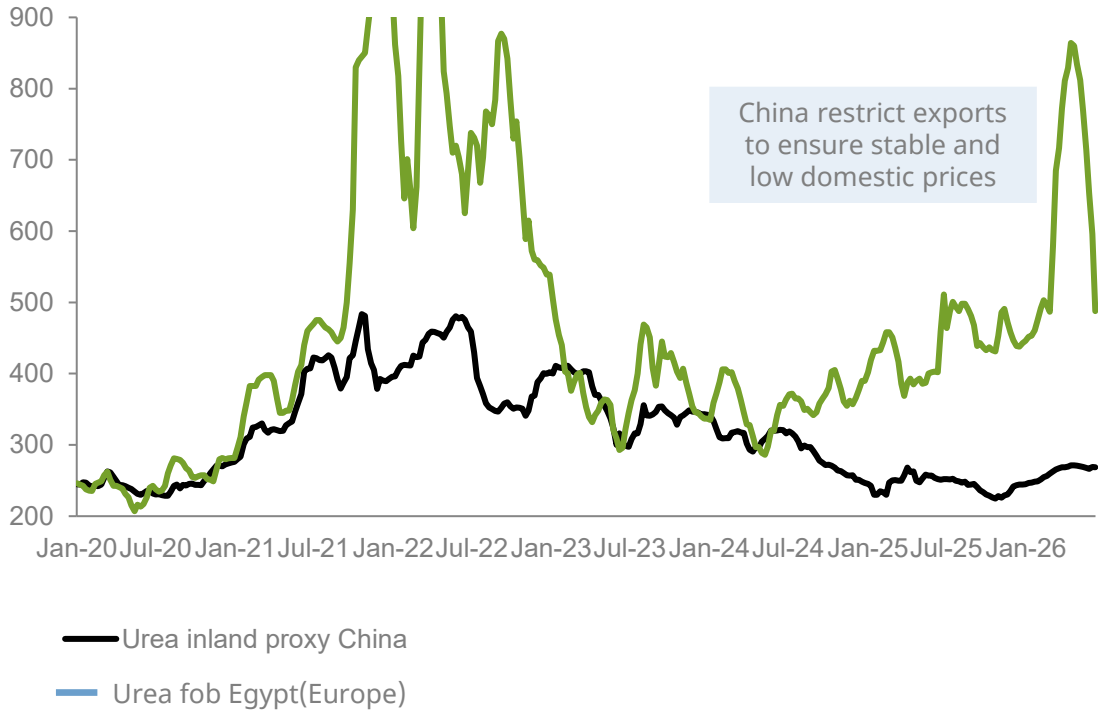
## Global urea capacity additions ex. China[1,2] (million mt)



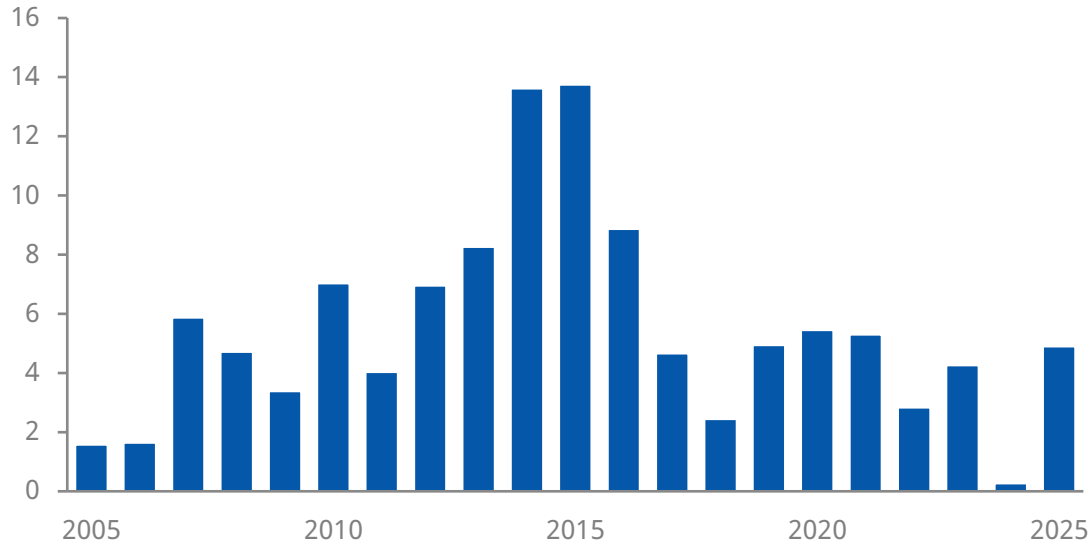

1) Source: CRU June 2026
2) Future urea projects assessed as "probable" or "firm" by CRU.
3) Growth calculated based on last 10 years up to 2024, equal to ~2.3 mn mt/year, from 2024 baseline (IFA) of 134 mn mt (global production + China trade). Trend growth rate held back by supply restrictions in 2021 and 2022.

# China is primarily concerned about domestic prices, but do not mind exporting given full domestic control

## Chinese urea price vs. global (USD/t)




## Chinese exports (million tonnes)




Chinese urea capacity is mainly based on bituminous coal (largest and growing), anthracite coal and natural gas

While there are production increase in China, Chinese export availability is key for global supply demand balance,

Source: Average of publications, trade statistics product code 31021000

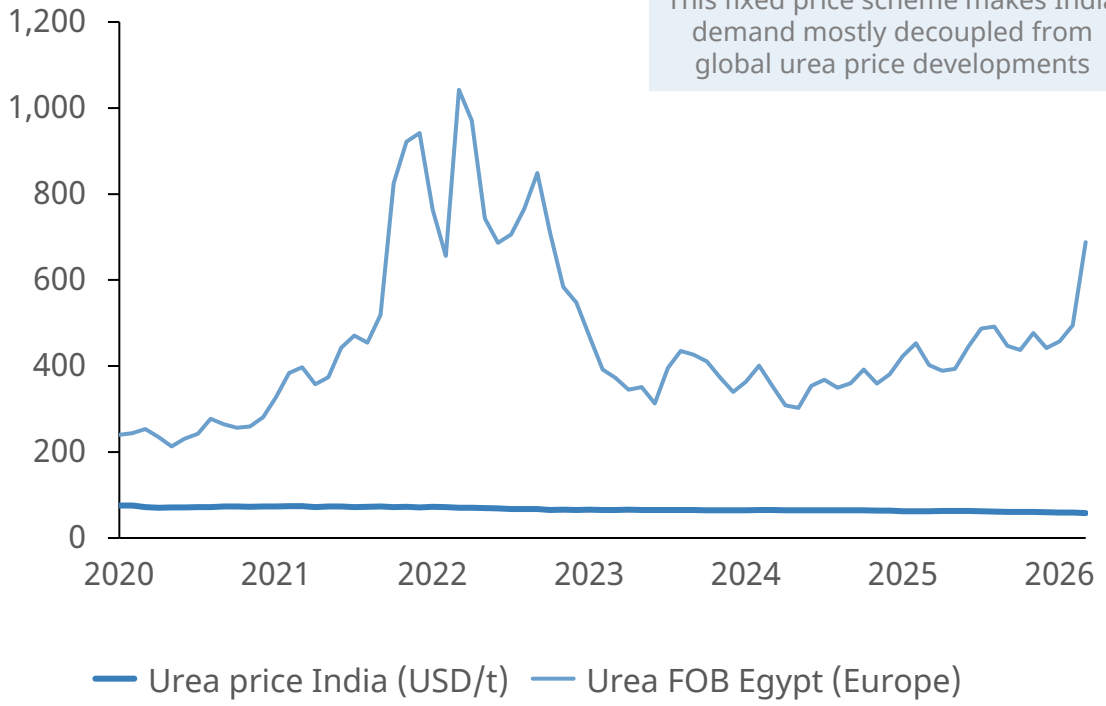
Source: IFA

# India has expanded production capacity in recent years, however remain dependent on imports

India urea capacity is a mix of coal and natural gas based. Producers are offered a subsidized rate for natural gas, so that they earn a relatively fixed margin between energy cost and the subsidized urea price.

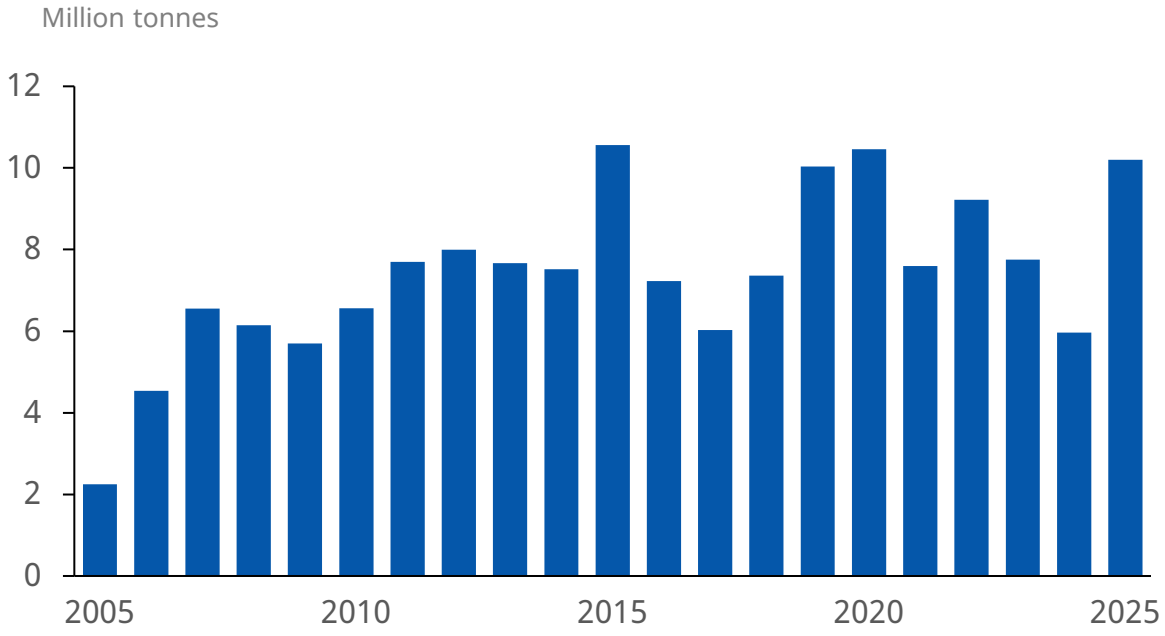
## Urea prices in India are strongly subsidized

This fixed price scheme makes India demand mostly decoupled from global urea price developments




Source: FOB Egypt: average of publications, India: fixed price of 5,380 Indian rupi per ton

## Indian imports




Source: IFA, GTA for 2025

Large swings in India imports recent years (driven by inventories, agricultural conditions and production rates) has been a major driver for global prices




# Ammonia

Ammonia is the key building block for all nitrogen fertilizers, with around 80% of global ammonia production upgraded into urea and other nitrogen products rather than sold directly.

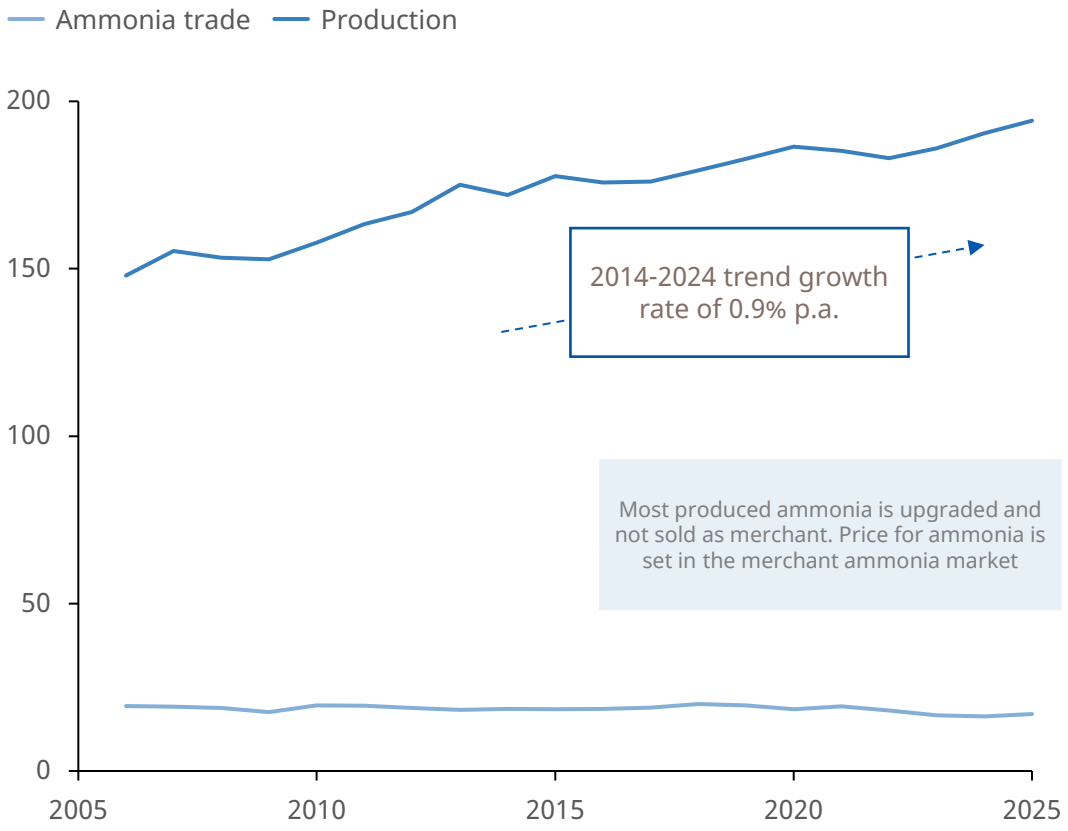
Global ammonia trade is relatively small and concentrated, meaning disruptions in major exporting regions can have a significant impact on market prices and supply availability.

Ammonia production is highly capital intensive and projects take 4–6 years to develop, industry profitability and pricing are ultimately determined by long-term supply-demand balances.

# Ammonia market fundamentals

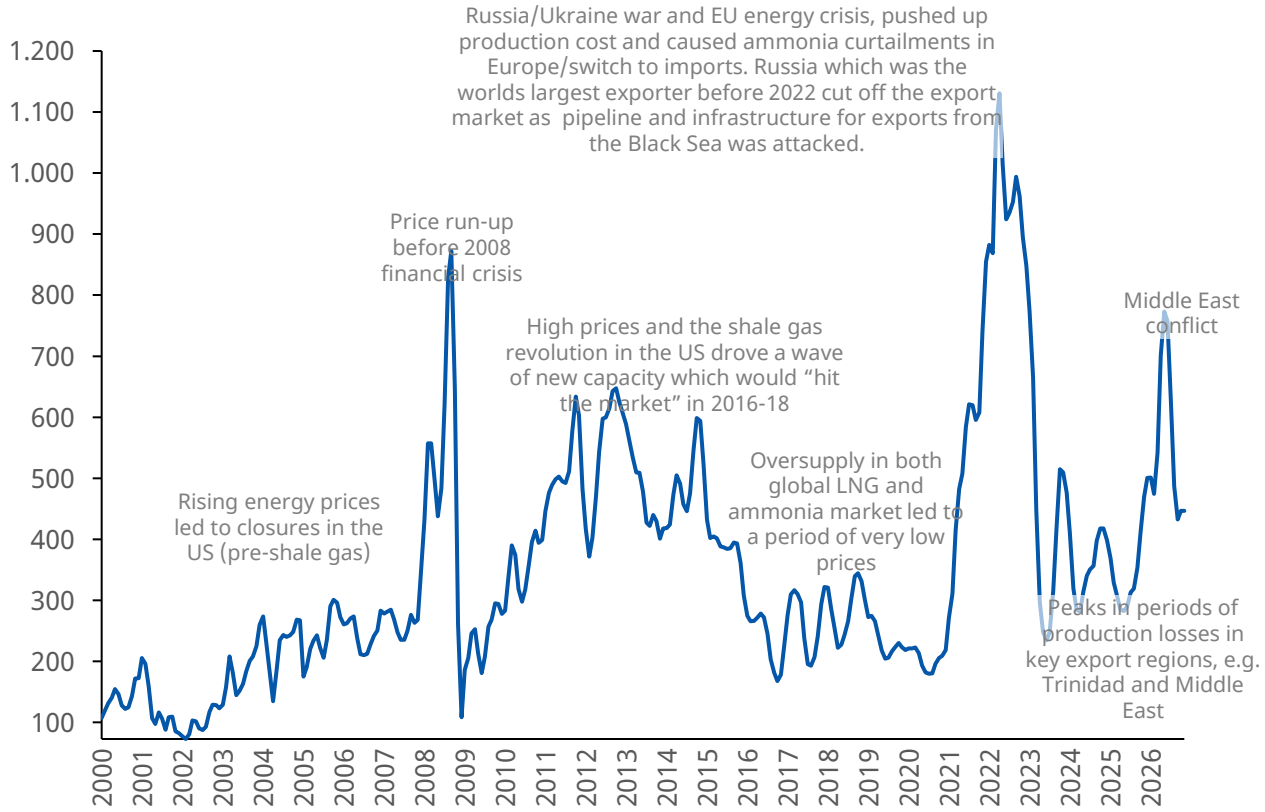
## Total production and trade

mt ammonia



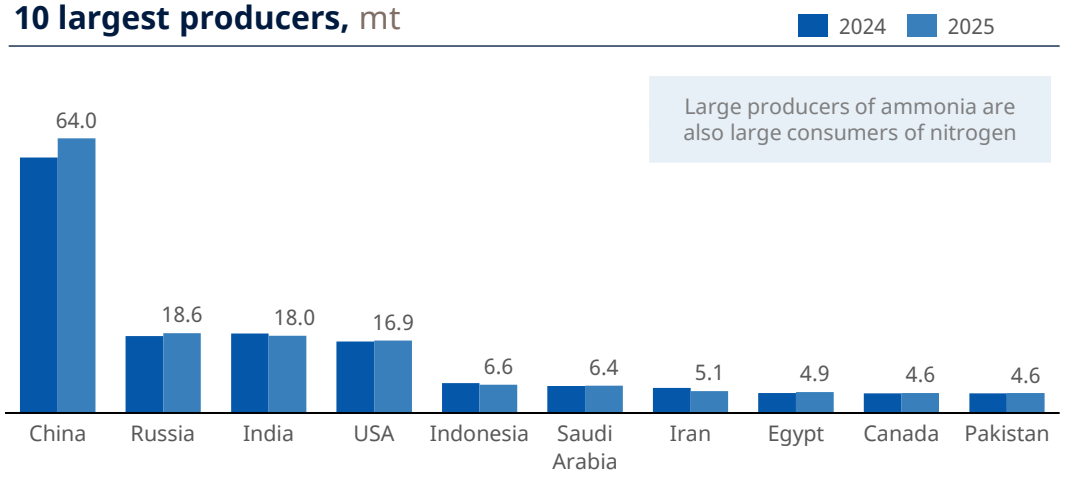

## Ammonia FOB Black Sea/FOB Arab Gulf (from 2021)

USD/t

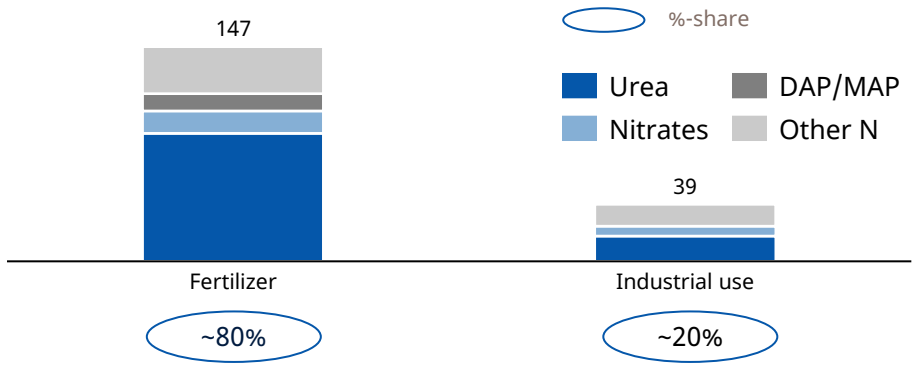


# Ammonia production, exporters, importers and use

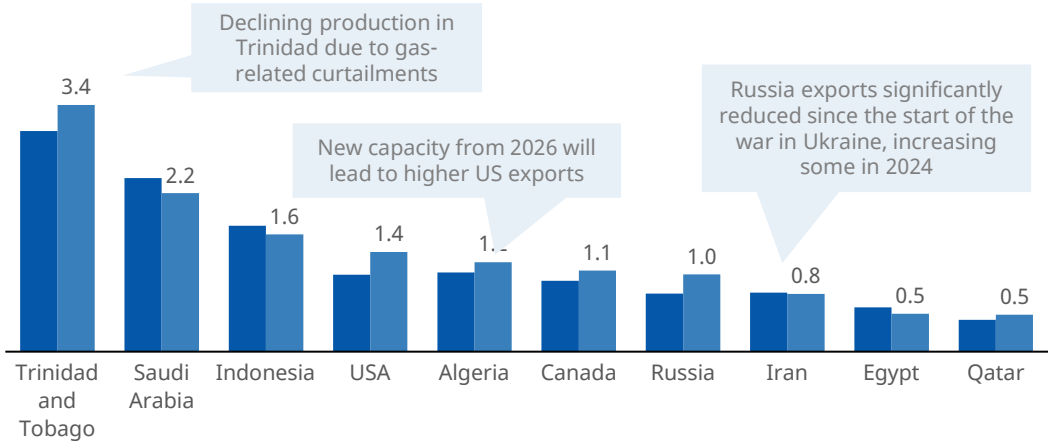
## 10 largest producers, mt



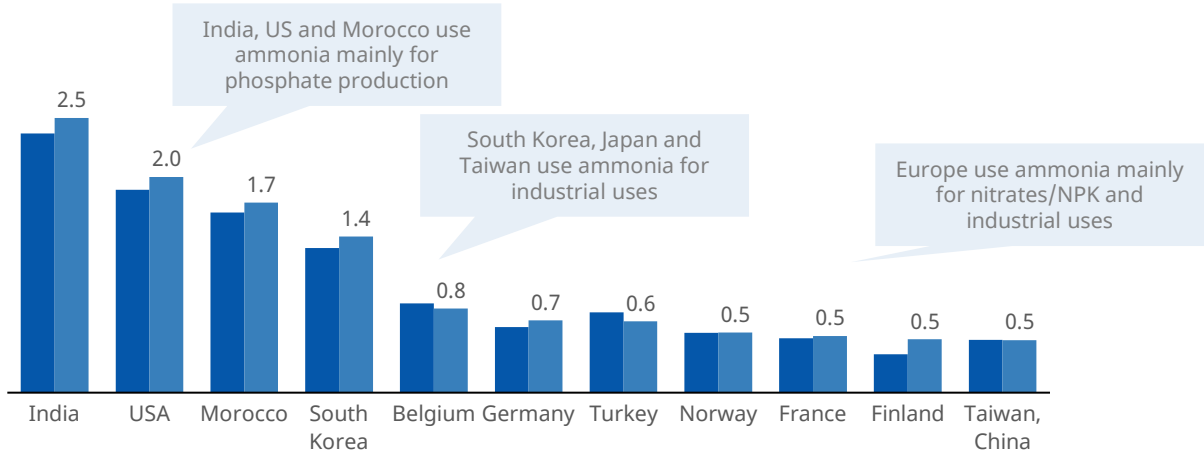

## Ammonia use (2020)




## 10 largest exporters, mt

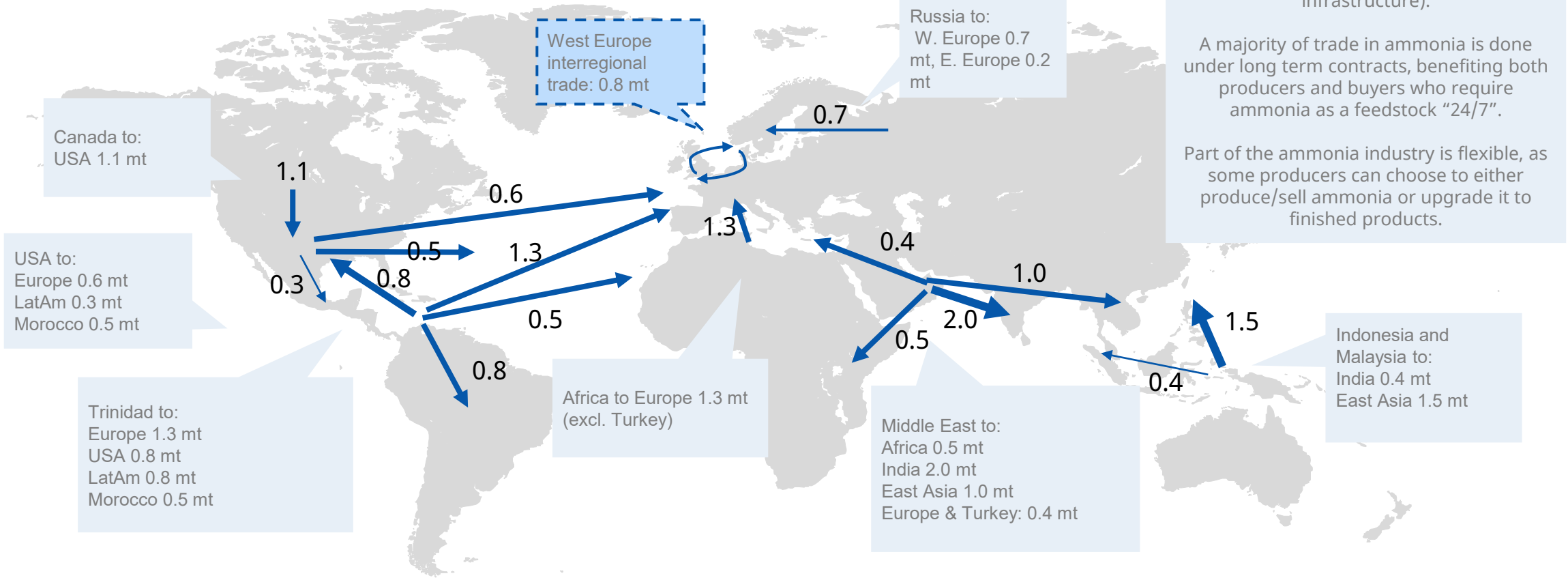



## 10 largest importers, mt




Source: IFA, 2025 data, S&P Global Energy/ Fertecon

# Main ammonia flows 2025




Ammonia is harder to transport than urea (require specialized tanks, ships and infrastructure).

A majority of trade in ammonia is done under long term contracts, benefiting both producers and buyers who require ammonia as a feedstock “24/7”.

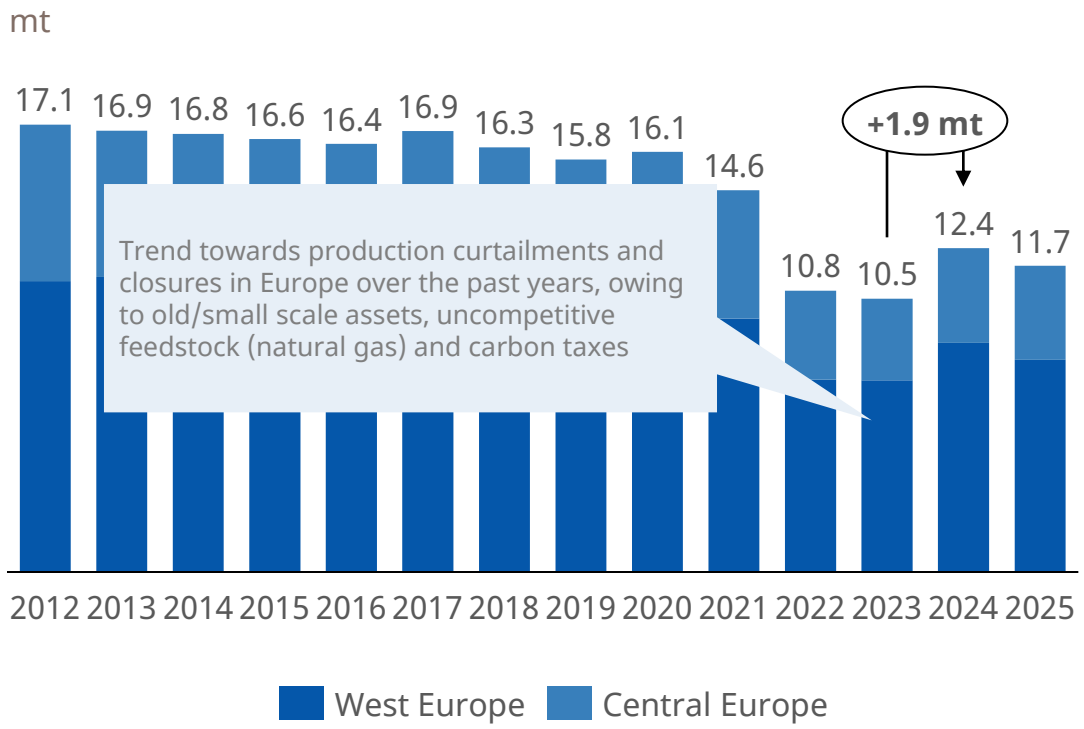
Part of the ammonia industry is flexible, as some producers can choose to either produce/sell ammonia or upgrade it to finished products.

**Balance East – West: Asia net surplus 1.2 million tons, going to West of Suez (Morocco the largest buyer)**

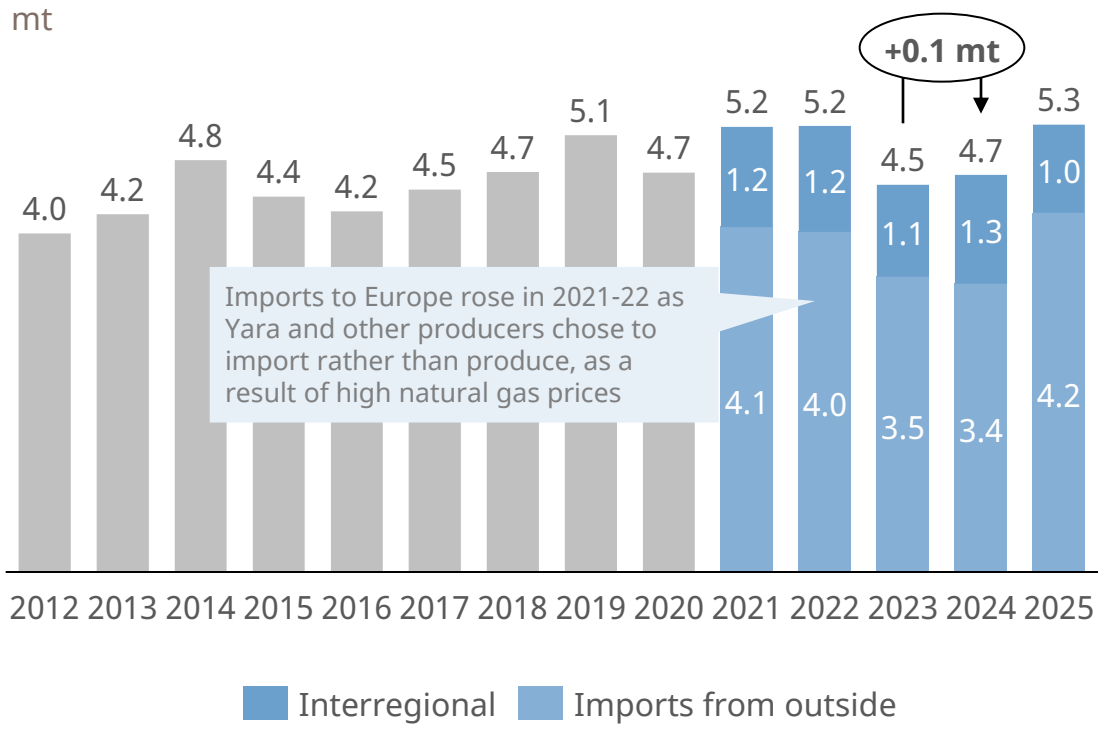
Source: IFA 2025, ~81% of trade shown.

# Europe ammonia production and imports

## Ammonia production: West and Central Europe




## Imports: West and Central Europe

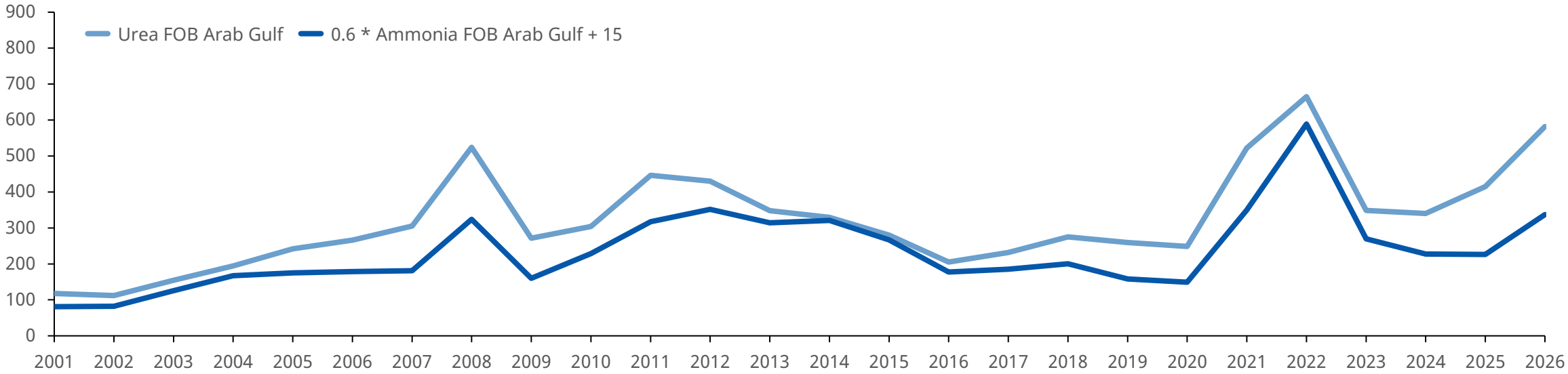



Source: IFA

# Energy prices set the floor price for ammonia, and urea sets the ceiling

## Urea and ammonia price relationship

USD/t




- Energy costs for the ammonia swing producers set a price floor for ammonia, as prices below this level implies that producers are better off curtailing production
- The urea price sets a ceiling for ammonia prices, with deviations typically short-lived. If ammonia prices are above urea, more ammonia will be offered for sale[1], less urea will be sold, and the relationship will be restored.

1) ammonia-urea export plants in the market that can both export ammonia as ammonia or use it to make (and export) urea. These can act as “swing” producers and contribute to ensure positive upgrade margins from ammonia to urea over time

# Nitrogen / ammonia investments are a “long term game”, profitability is mainly determined through the cycle

## Ammonia capacity takes significant time to build

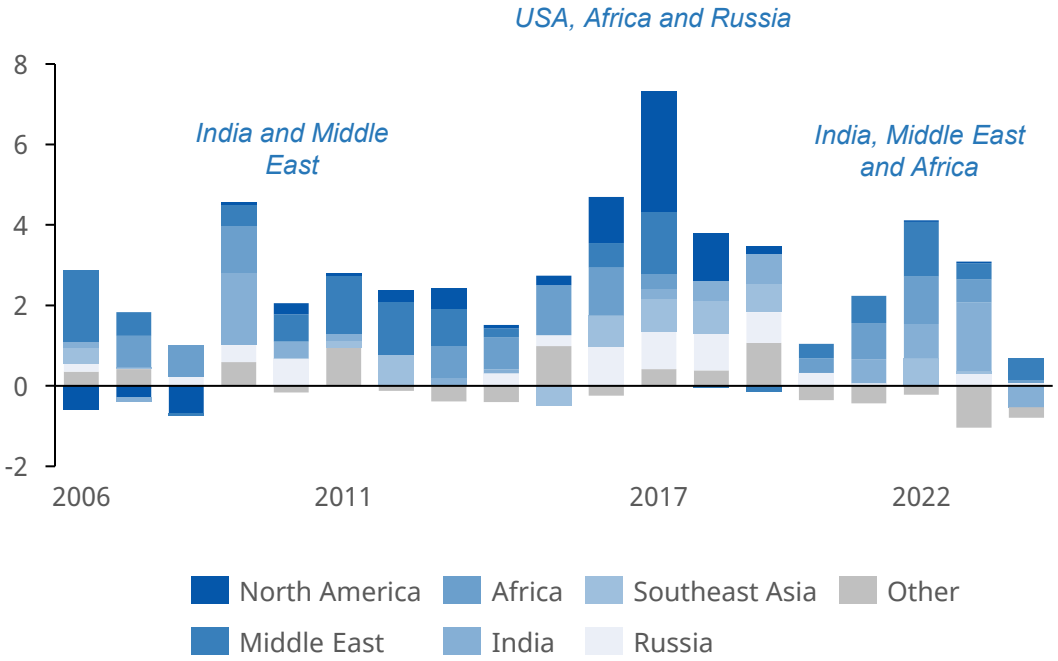
4-6 years
without delays




- Nitrogen capacity (including urea) is capital intensive, with long payback times
- Nitrogen assets can stay in operations for a long time once constructed, especially if properly maintained. Several ammonia assets operating today was built in the 1970’s

## Investments into nitrogen have historically occurred in cycles

Total ammonia capacity growth ex China
**(including and mainly to urea)**, million ton



# Nitrates and NPKs




Nitrates are products containing 50% of the nitrogen in the form of nitrate:

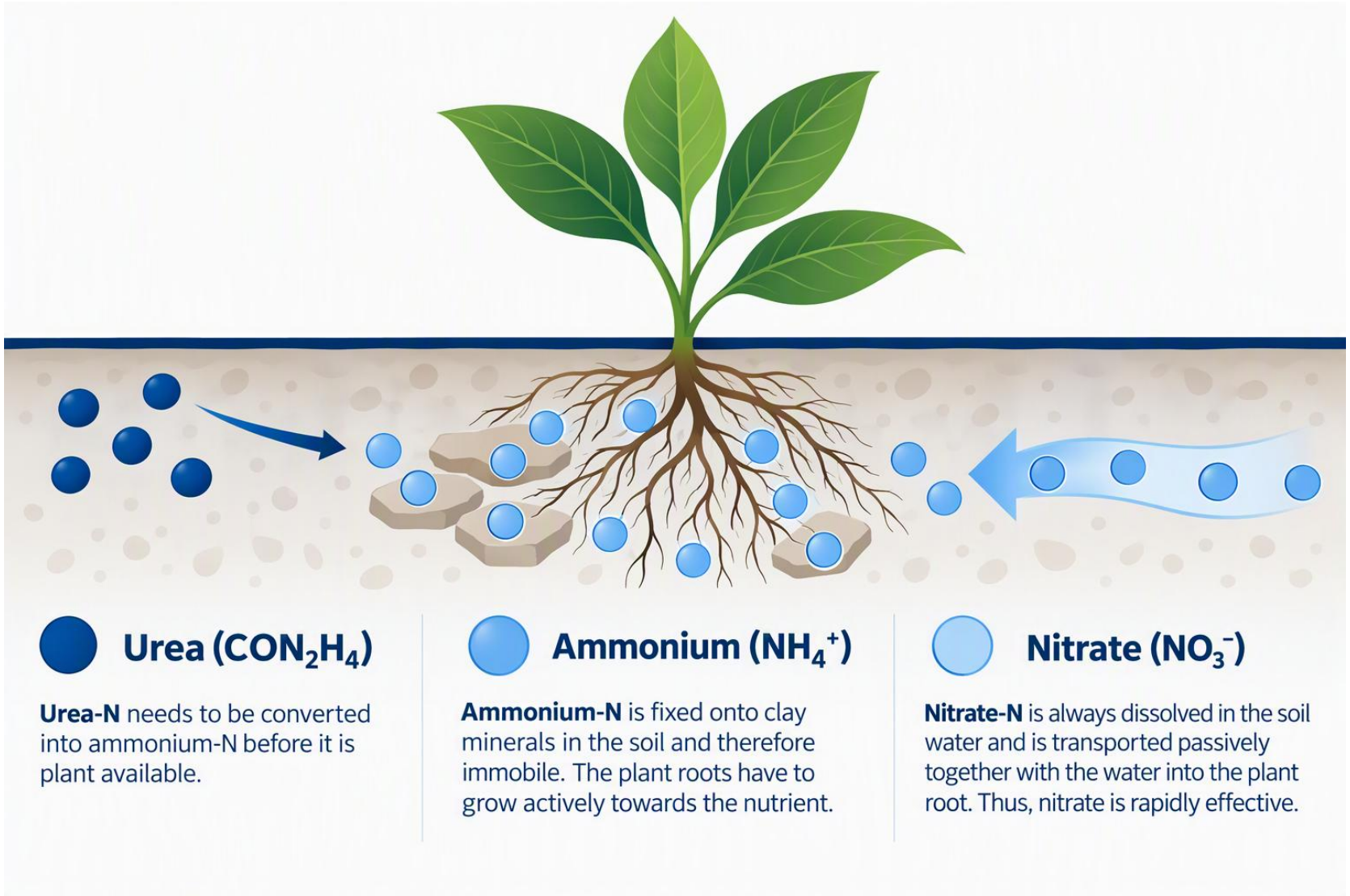
- the most efficient and most reliable nitrogen source available
- have a lower environmental impact than urea-based products

- In compound NPKs, the same mix of all the N, P and K nutrients is present in every particle of product
- in a blended NPK, separate particles of straight fertilizer are blended

- There is a strong correlation between urea and nitrate prices, as they to some extent are substitutes.
- For agronomic reasons farmers are willing to pay a higher price per unit nitrogen from nitrates than from urea.

# Nitrates vs. urea

Nitrate is the most important fertilizer in Europe



# Better spreading with nitrates

The poor spreading patterns with Urea cause striped fields and considerable yield loss:

- Spreading tests have shown the deviation in actual nutrient application rate compared to target nutrient rate can be considerable
- Deviation in nutrient rates will cause a major impact on the quality and yield of grains/fresh fruit and vegetables.
- Nitrates have a better spreadability compared to urea.



*Spreading width (21 m)*

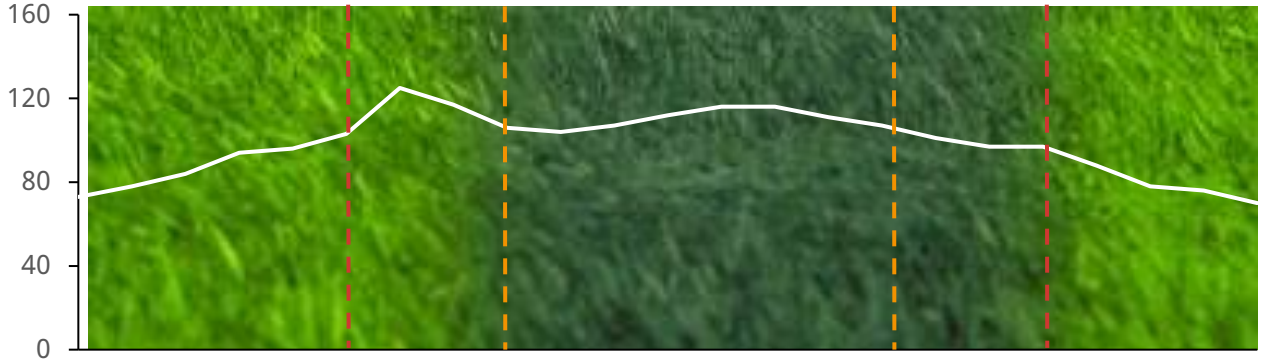
**Good uniformity with CAN**




*Due to better spreading quality of CAN a higher yield equivalent is achieved in field trials*



**Lower uniformity with Urea**



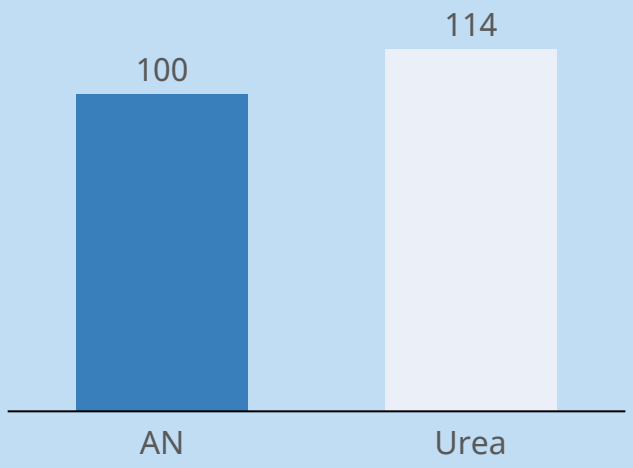

1) Source: Yara research, trial studies in Germany (n=112, 2007-2017) on different soil types

# Nitrate outperformance compared with commodity nitrogen products

*Trial results for arable crops (cereals, UK)*[1]

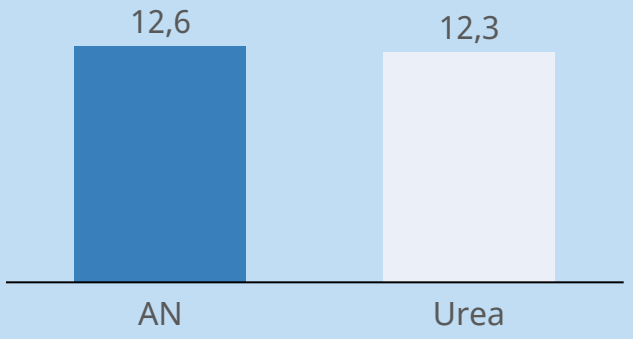
## Extra N required for same yield (%)

*To maintain the same yield, significantly more nitrogen was needed from urea than from ammonium nitrate*



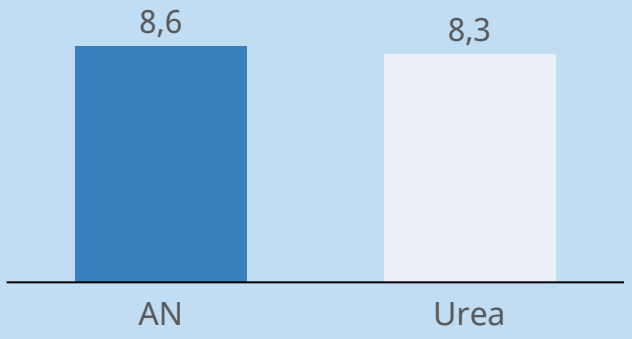

## Protein content at identical N rate (%)

*Protein content was significantly lower on fields fertilized with urea than with ammonium nitrate*




## Yield at identical N rate (%)

*Yield was also significantly lower with urea than with ammonium nitrate*




1) Source: DEFRA

# Compound NPKs contain all nutrients in one particle



**Compound NPKs**

- All nutrients in each and every particle
- Even spreading of all nutrients



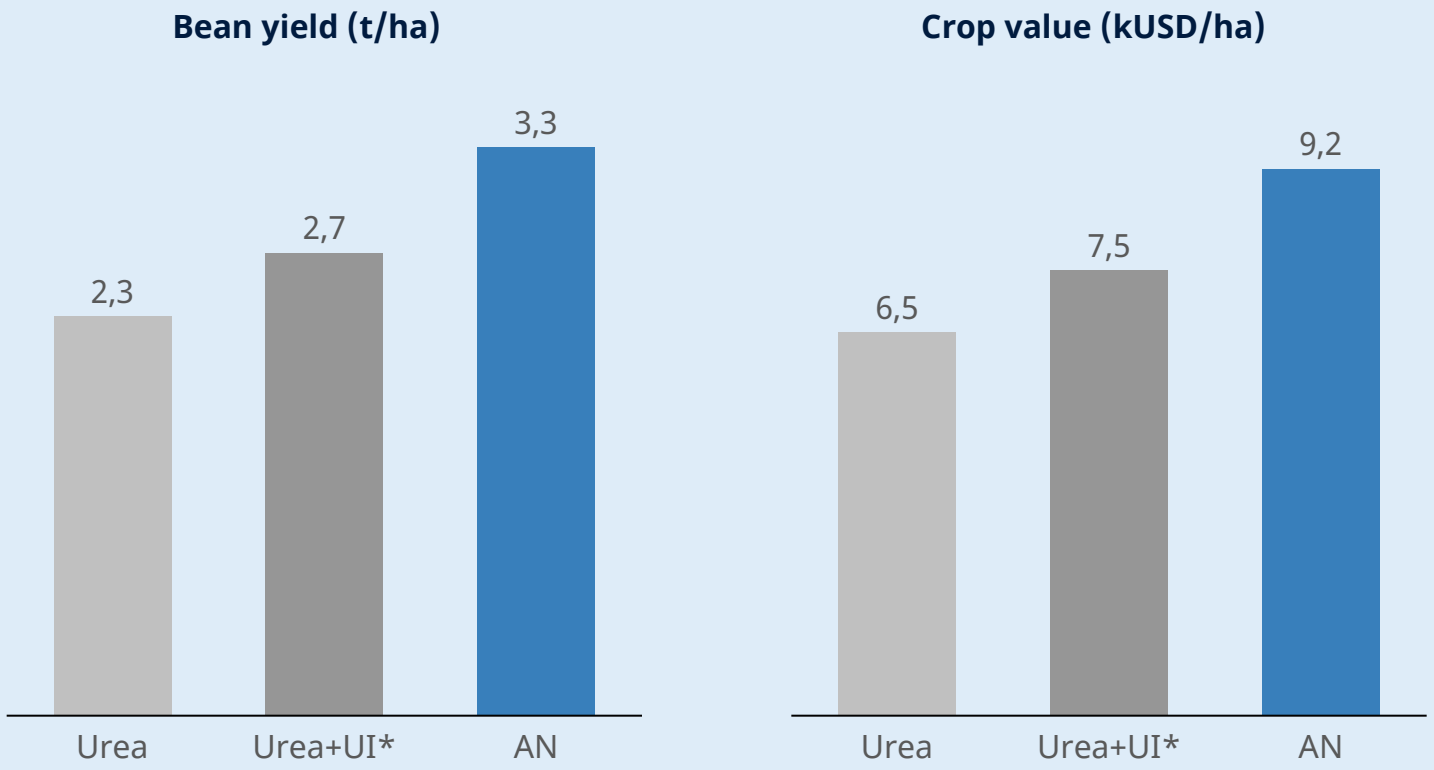
**NPK bulk blends**

- A mix of products with different spreading properties
- Risk of segregation and uneven spreading

# Yield advantages with nitrates in tropical climate

- Research shows that the benefits of nitrates are even more pronounced in the tropics than in colder climates
- Nitrates provide direct and efficient uptake of N

## Trial study in Brazil, higher coffee bean yield with nitrates as compared to urea[1]




1) Source: trial 2018/2019 - Lavras University, Minas Gerais, Brazil & Yara Research
*UI = Urease Inhibitor

# Better spreading with compound NPKs

The spreading width of light particles like Urea is less than those of heavier particles like DAP and MOP

**Poor spreading patterns cause striped fields and significant yield losses**



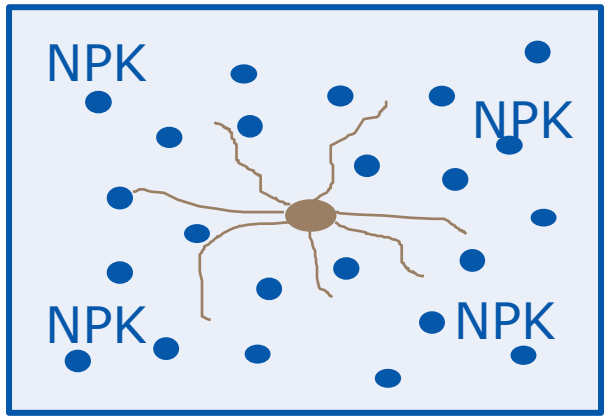
*Spreading width*



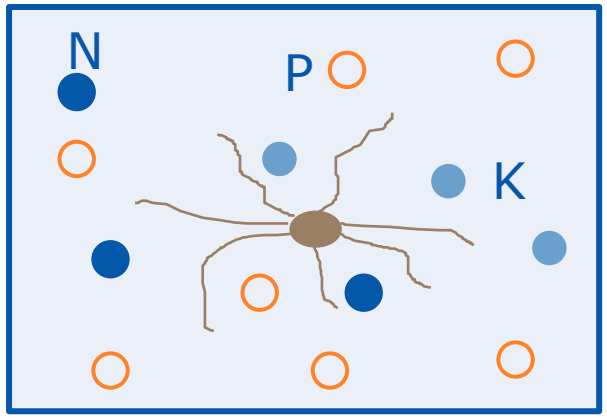


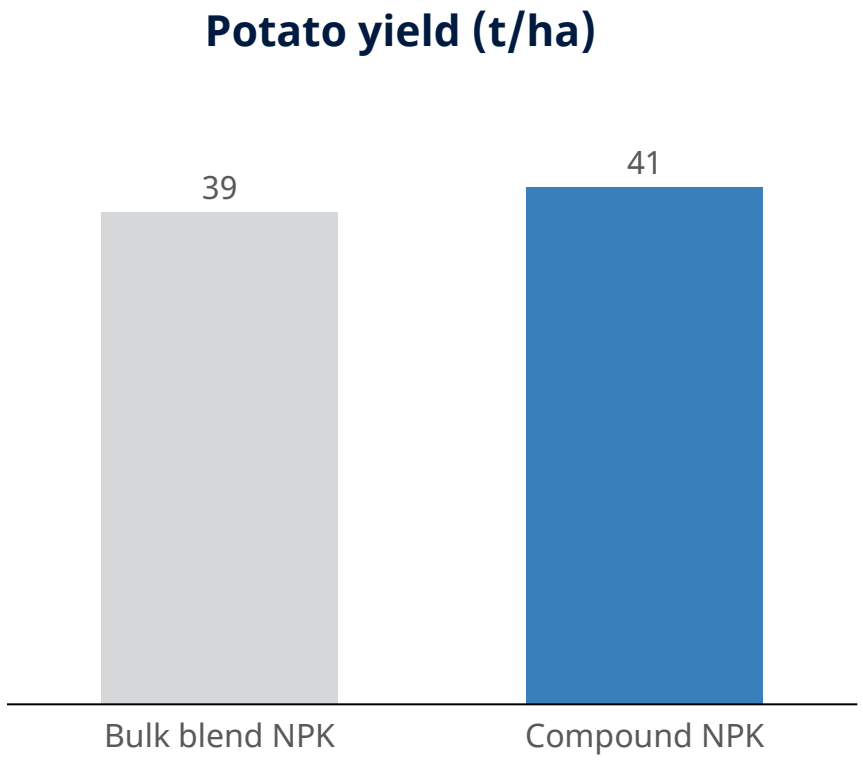

# Compound NPKs give excellent spatial distribution of nutrients and higher crop yields as a result

**Compound NPKs**
**16+16+16**
more particles and
better distribution



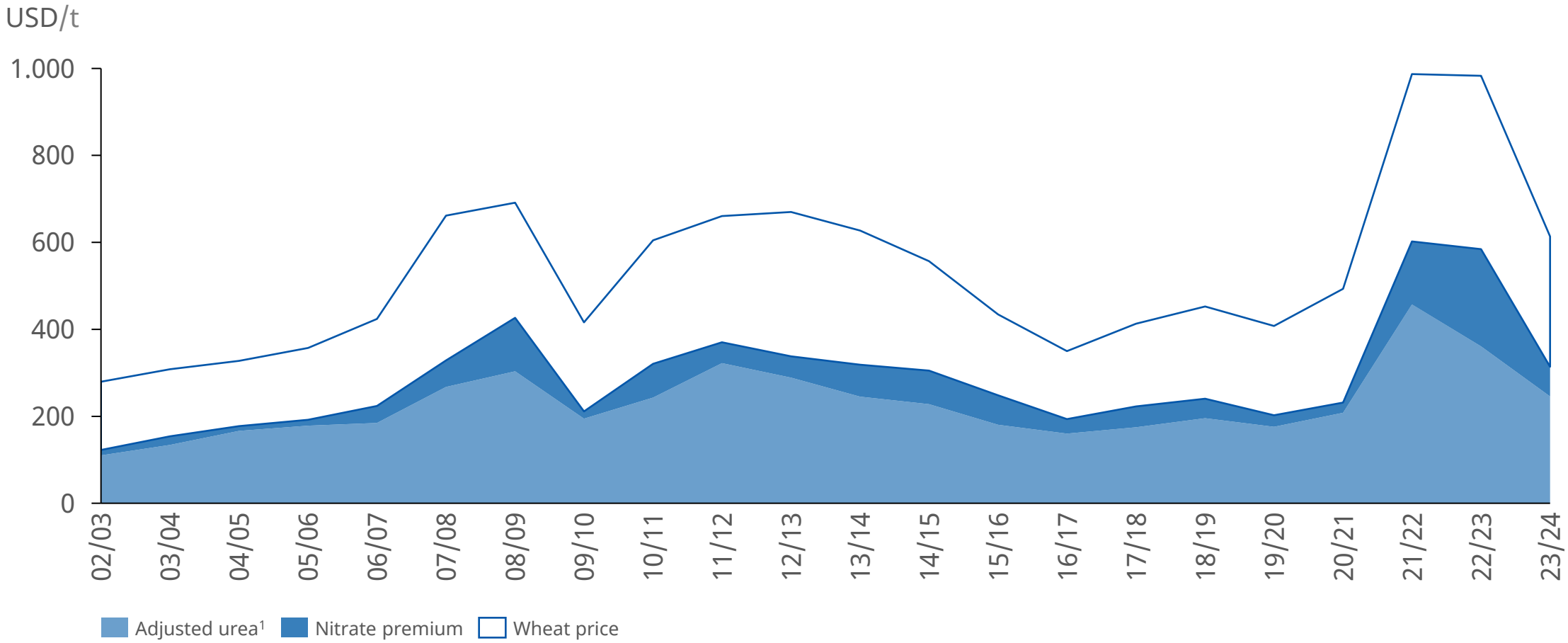

**Bulk blend**
**Urea-DAP-MOP**
fewer particles,
longer distance to roots



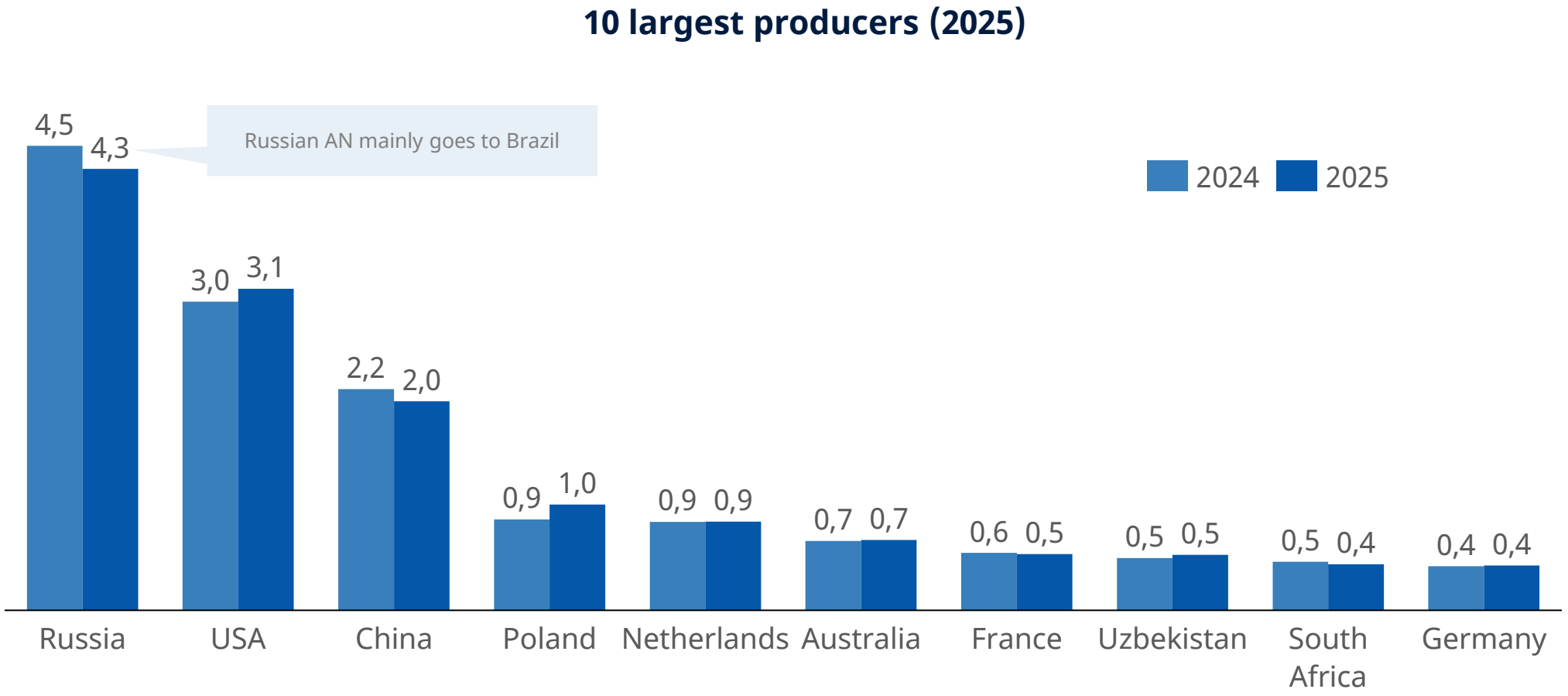

1) Source: Yara field trials, Hanninghof research center (9 harvest dates)

# Nitrate premium is mainly a function of crop prices



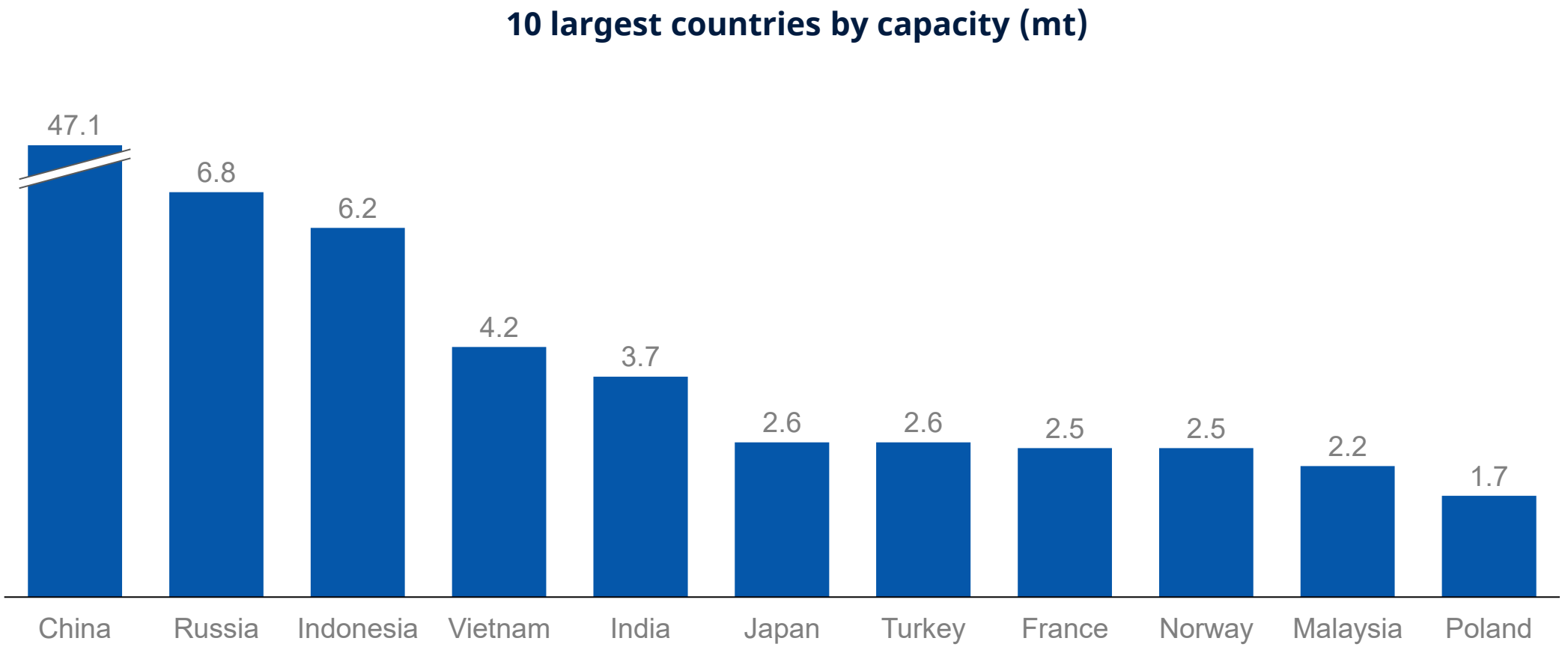

1) Urea fob Egypt sea adjusted for transport costs into Europe and nitrogen content similar to CAN
2) Source: World Bank, Fertilizer publications

# Global nitrate production was 19.7 million tons of nitrogen in 2025




Source: IFA, AN/CAN including nitrate part of UAN, as are industrial grades

# Global compound NPK capacities




Source: IFA 2016, data for 2013/2014




# Phosphates and Potash

Phosphate rock: China produce and consume domestically, while Morocco is a key exporter, home to the majority of world phosphate reserves

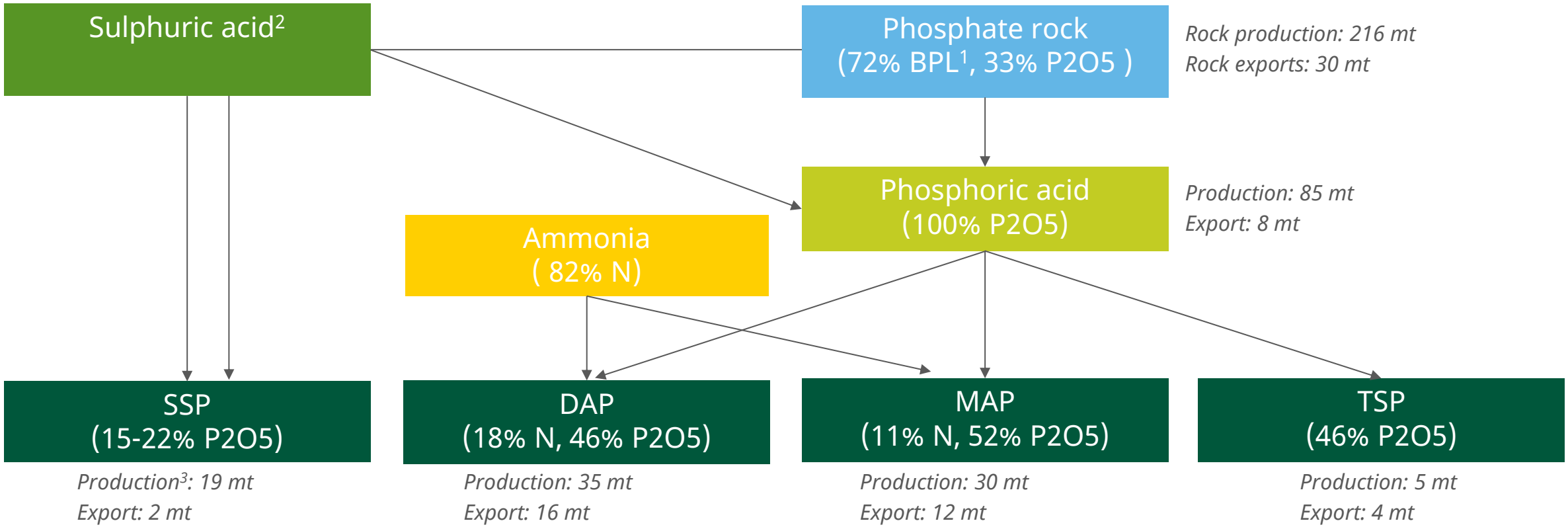
Concentrated trade between a few producers and India, US and China using it as raw material for finished products

Finished phosphates (DAP/MAP): Countries with phosphate rock reserves are also the biggest DAP/MAP producers

India heavily reliant on imports, but has some flexibility between importing rock and DAP

Potash: production is concentrated in Canada, Russia and Belarus being also the main exporters

# Main phosphate processing routes




Source: IFA, 2023 production and exports

1) Illustrative, P2O5 content of phosphate rock varies
2) 1 ton of phosphoric acid requires 1 ton of sulphur
3) 2020 figures

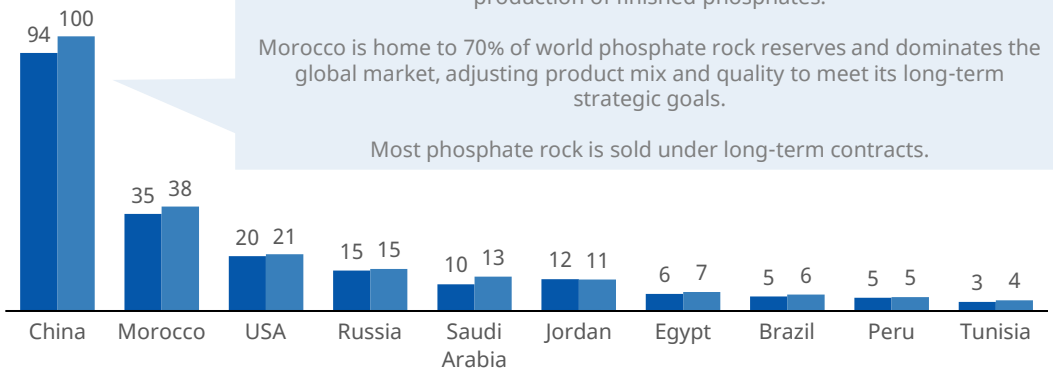
# Phosphate rock production, consumption, exporters and importers

## 10 largest producers, mt

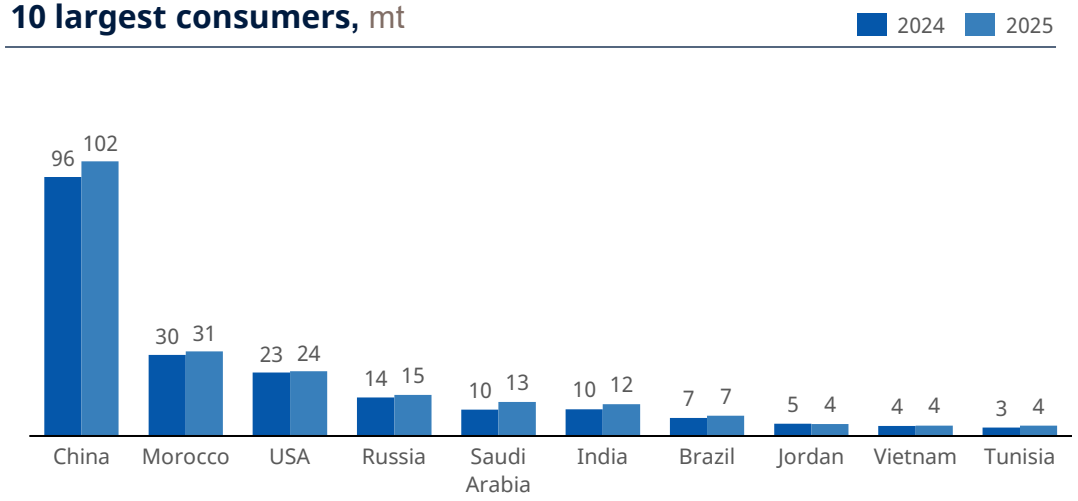
China dominates world phosphate rock production, however all is used for own production of finished phosphates.

Morocco is home to 70% of world phosphate rock reserves and dominates the global market, adjusting product mix and quality to meet its long-term strategic goals.

Most phosphate rock is sold under long-term contracts.



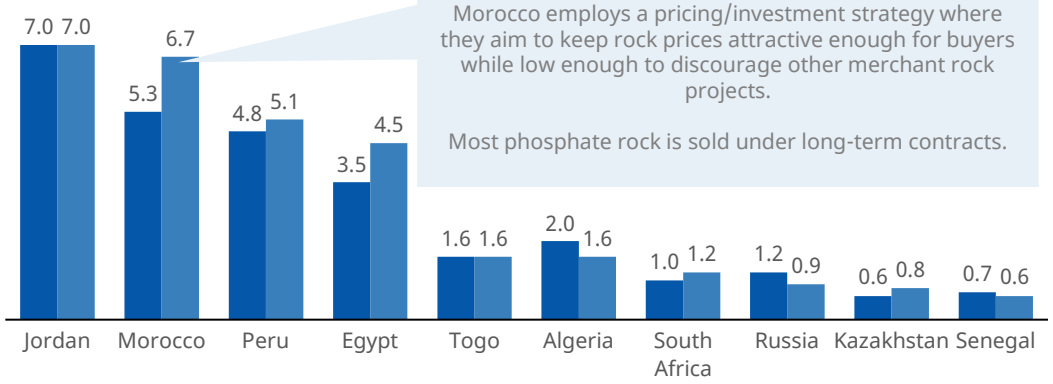

## 10 largest consumers, mt




## 10 largest exporters, mt

Morocco employs a pricing/investment strategy where they aim to keep rock prices attractive enough for buyers while low enough to discourage other merchant rock projects.

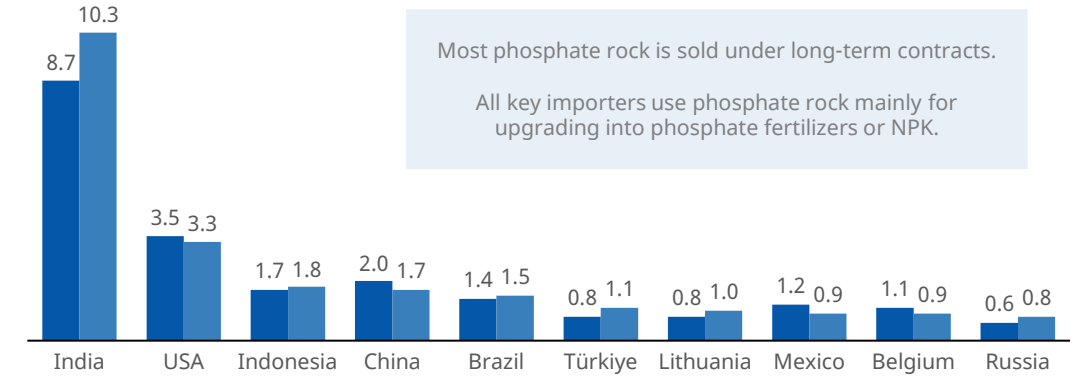
Most phosphate rock is sold under long-term contracts.




## 10 largest importers, mt

Most phosphate rock is sold under long-term contracts.

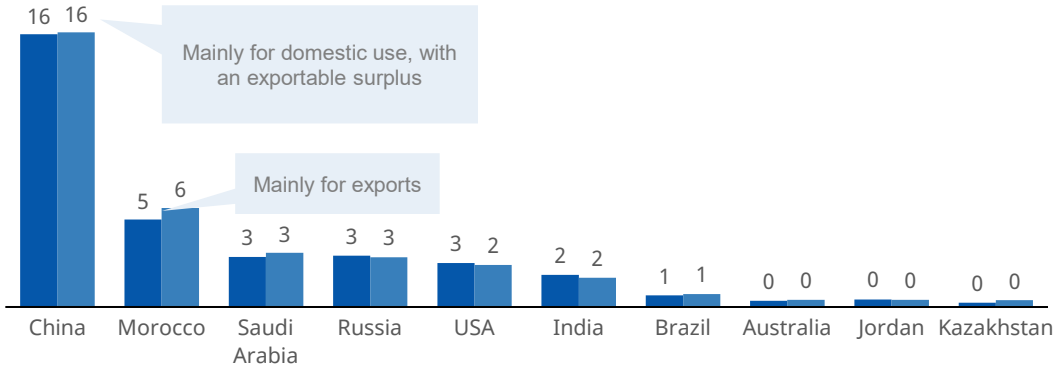
All key importers use phosphate rock mainly for upgrading into phosphate fertilizers or NPK.



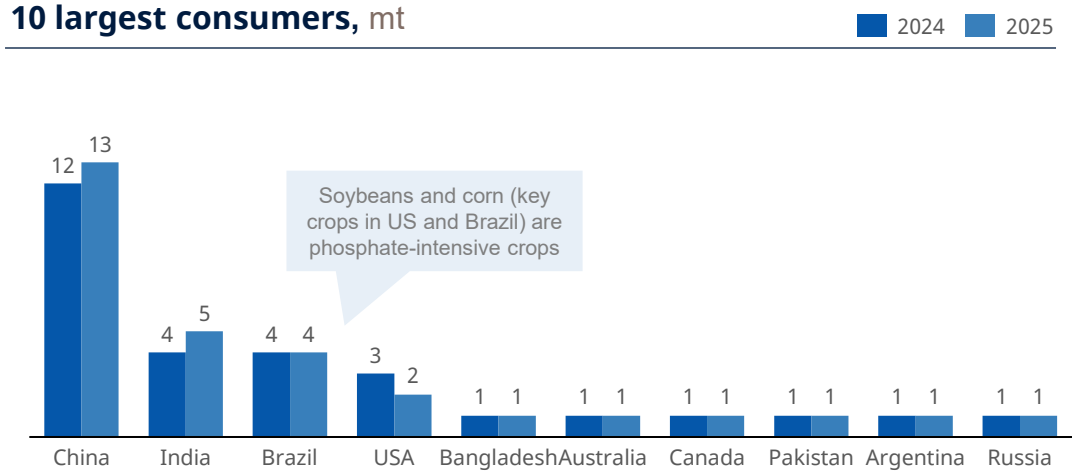

Source: IFA, 2025 data

# Finished phosphates – DAP/MAP/ TSP production, consumption, exporters and importers

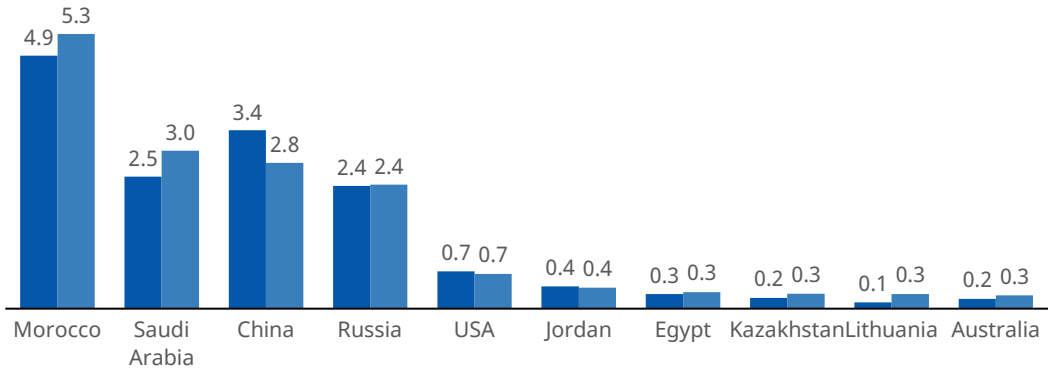
## 10 largest producers, mt



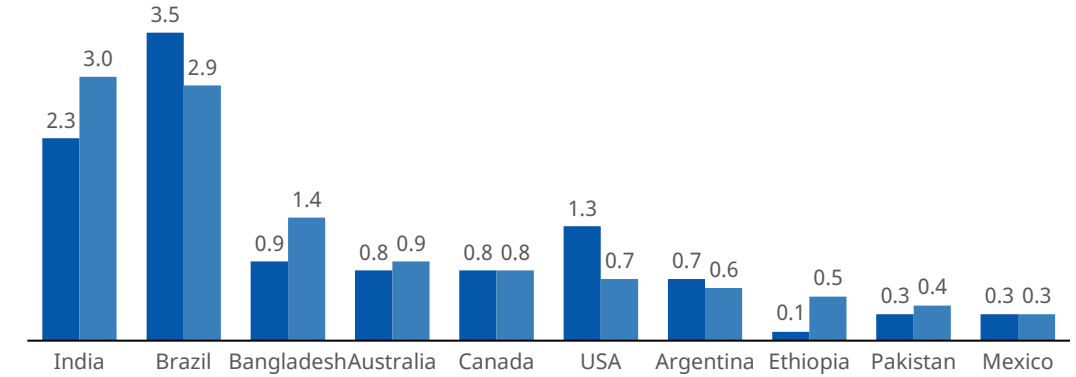

## 10 largest consumers, mt




## 10 largest exporters, mt



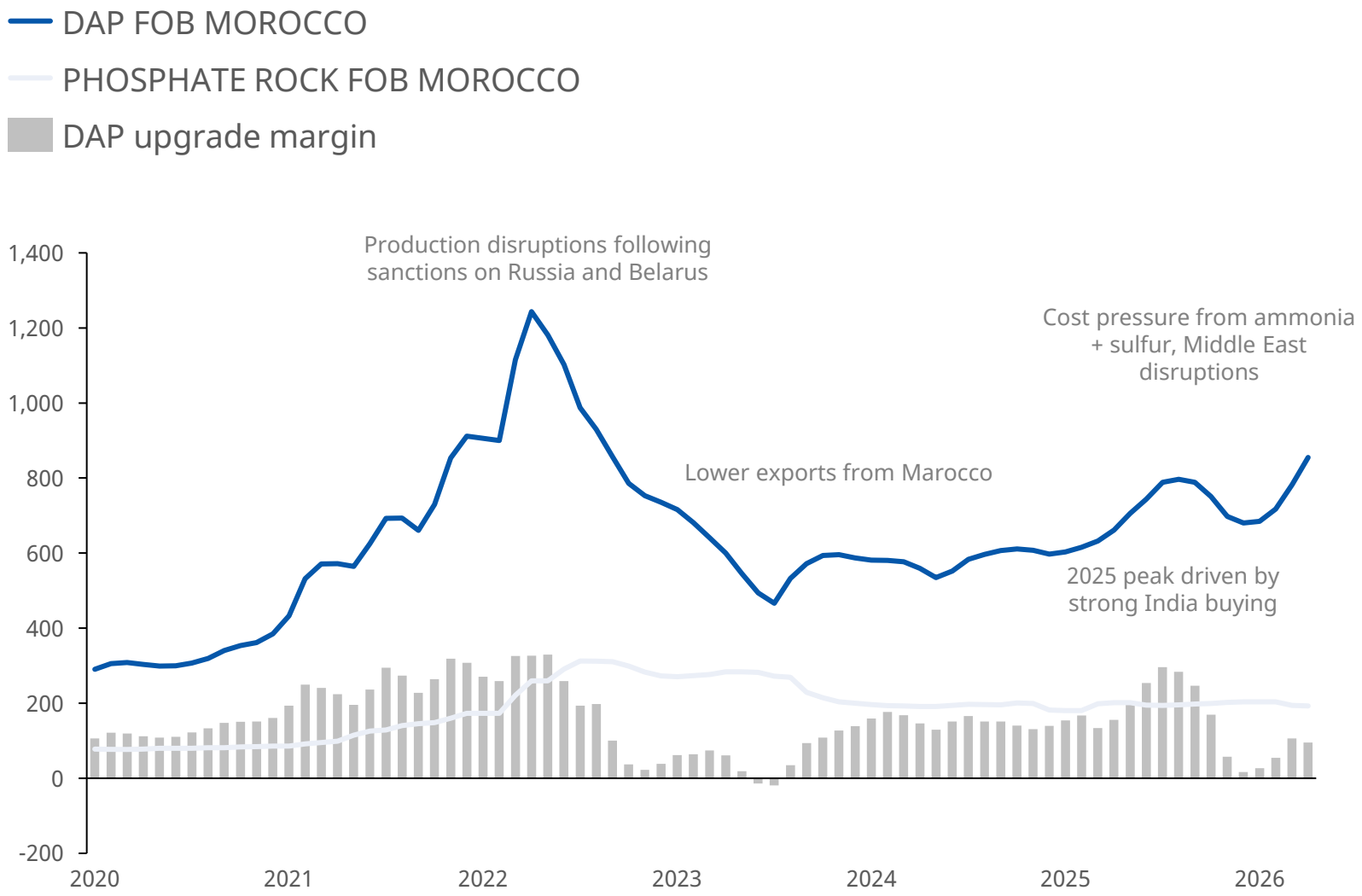

## 10 largest importers, mt




Source: IFA, 2025 data ($P_2O_5$)

# Phosphate price dynamics

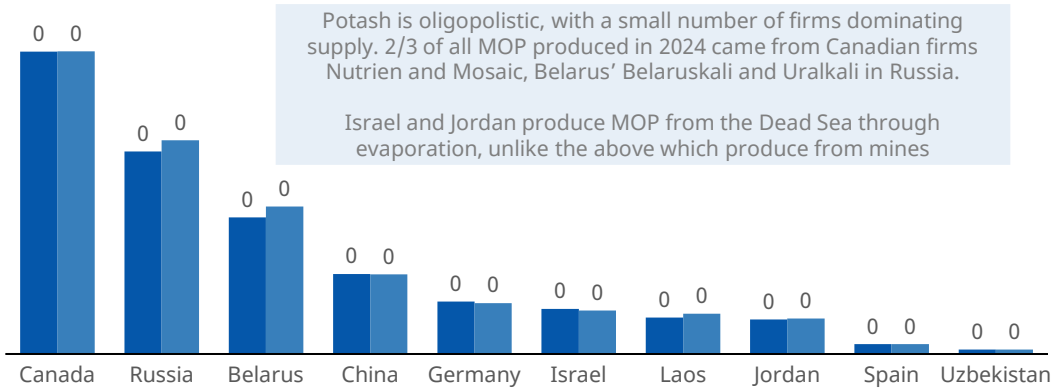
- DAP/MAP prices fluctuate with market demand
- Upgrade margin illustrate the margin of a non-integrated DAP/MAP producer, deducting cost of raw materials (p rock, ammonia and sulfur)




Source: Average of publications

# Potash production, consumption, exporters and importers

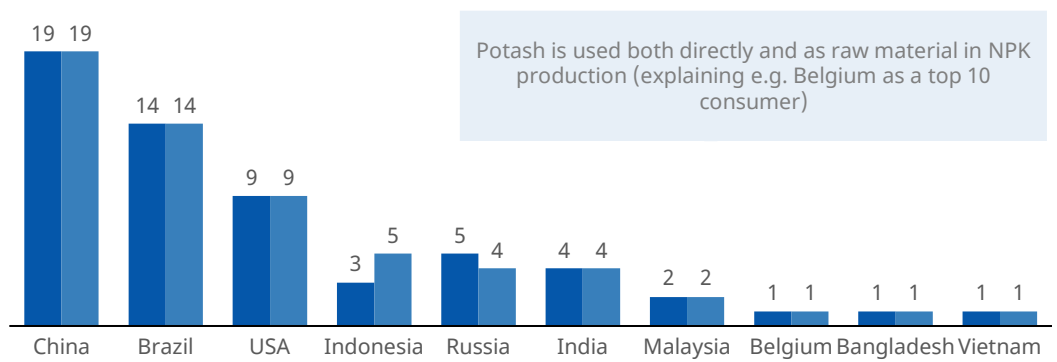
## 10 largest producers, mt




Potash is oligopolistic, with a small number of firms dominating supply. 2/3 of all MOP produced in 2024 came from Canadian firms Nutrien and Mosaic, Belarus' Belaruskali and Uralkali in Russia.

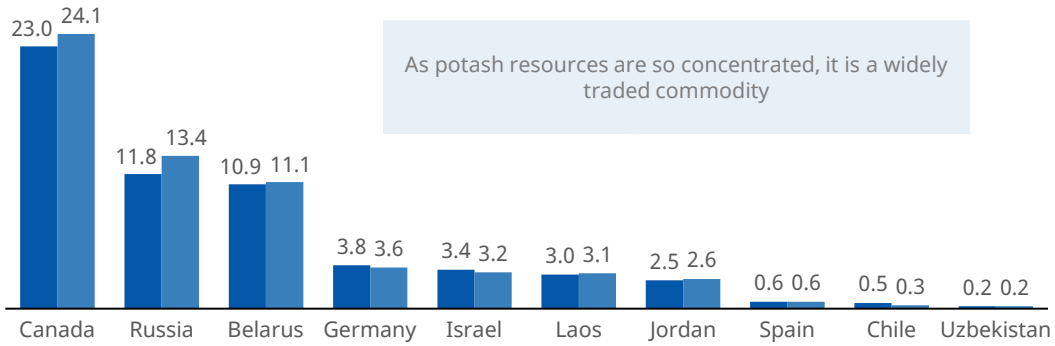
Israel and Jordan produce MOP from the Dead Sea through evaporation, unlike the above which produce from mines

## 10 largest consumers, mt



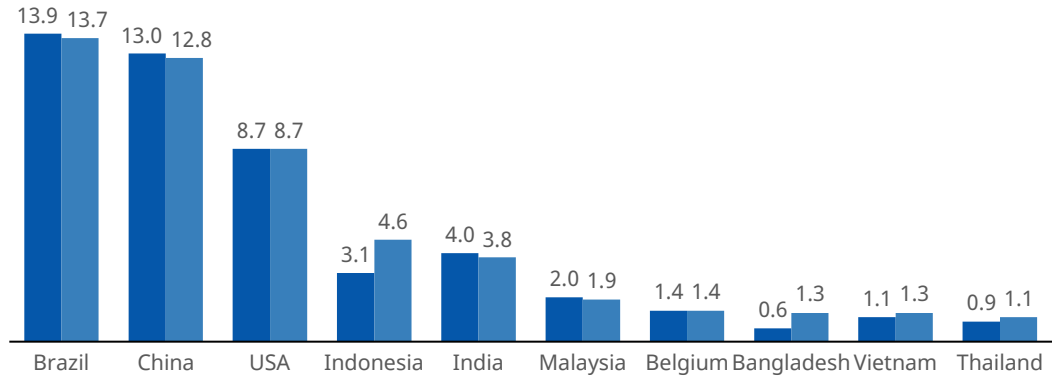

Potash is used both directly and as raw material in NPK production (explaining e.g. Belgium as a top 10 consumer)

## 10 largest exporters, mt




As potash resources are so concentrated, it is a widely traded commodity

## 10 largest importers, mt




Source: IFA, 2024 data

# The potash market appears well supplied, with a wave of new capacity in the next years




Source: IFA, CRU



# Production economics

Natural gas is the major nitrogen cost driver

Approximately 90% of nitrogen producer operational cash costs are raw materials, energy and freight

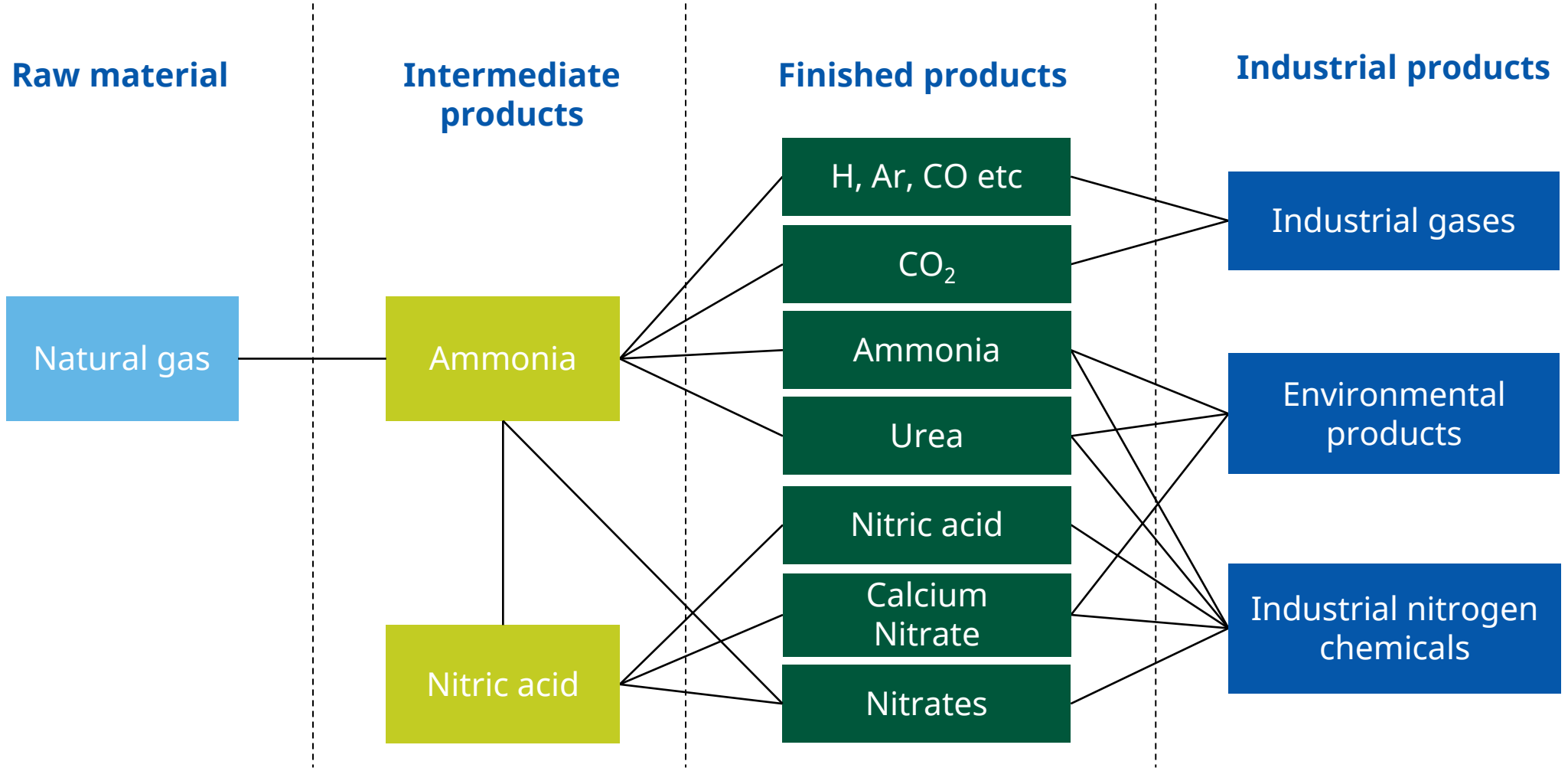
Energy costs for the ammonia swing producers set a price floor for ammonia

Ammonia price sets a floor for the urea price.

Other types of hydrocarbon can be used in production. In China most plants use coal.

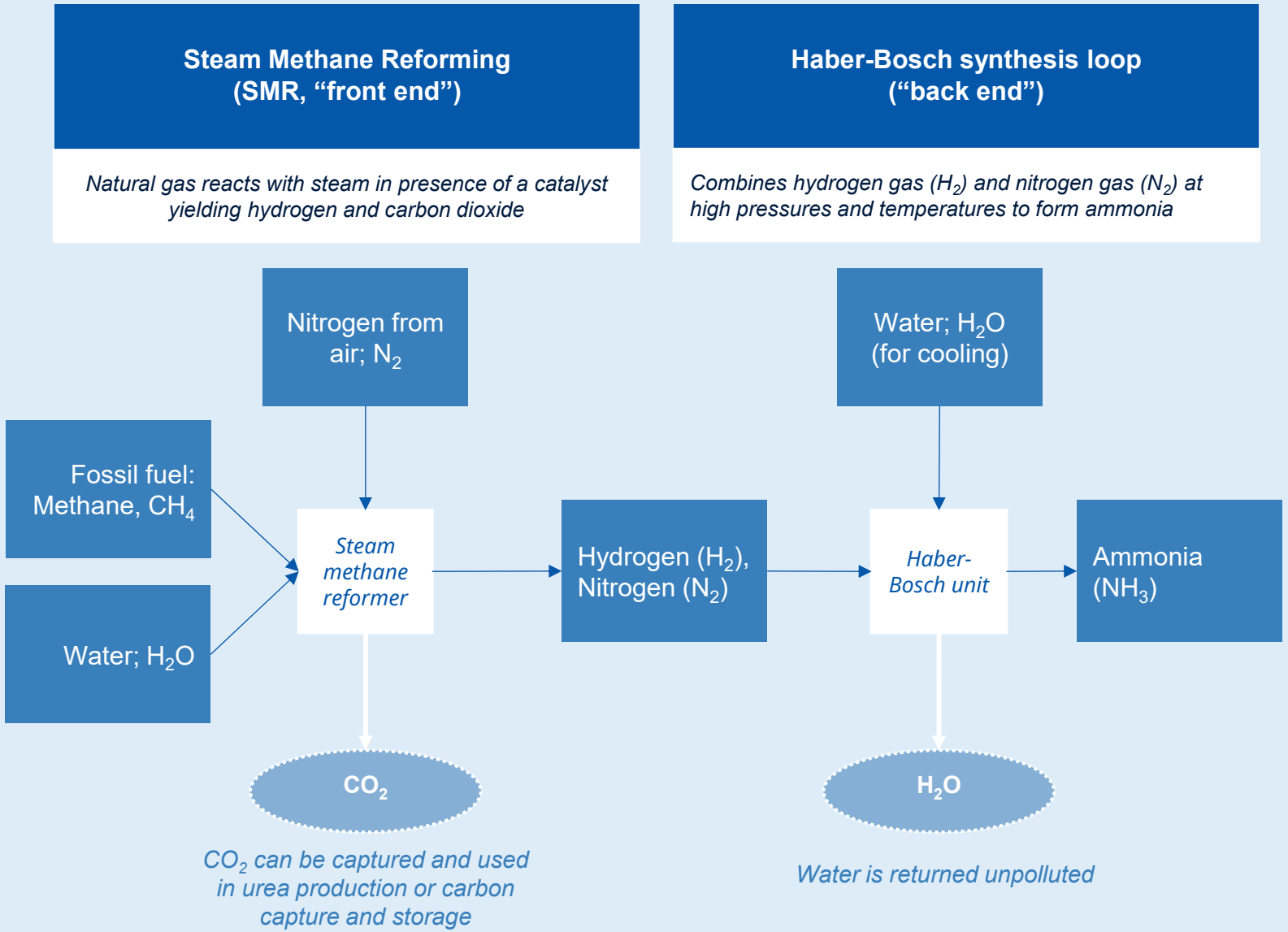
For an efficient plant using natural gas it takes approximately 33 MMBtu of natural gas to produce one tonne of ammonia.

# Nitrogen value chain - natural gas is the major nitrogen cost driver

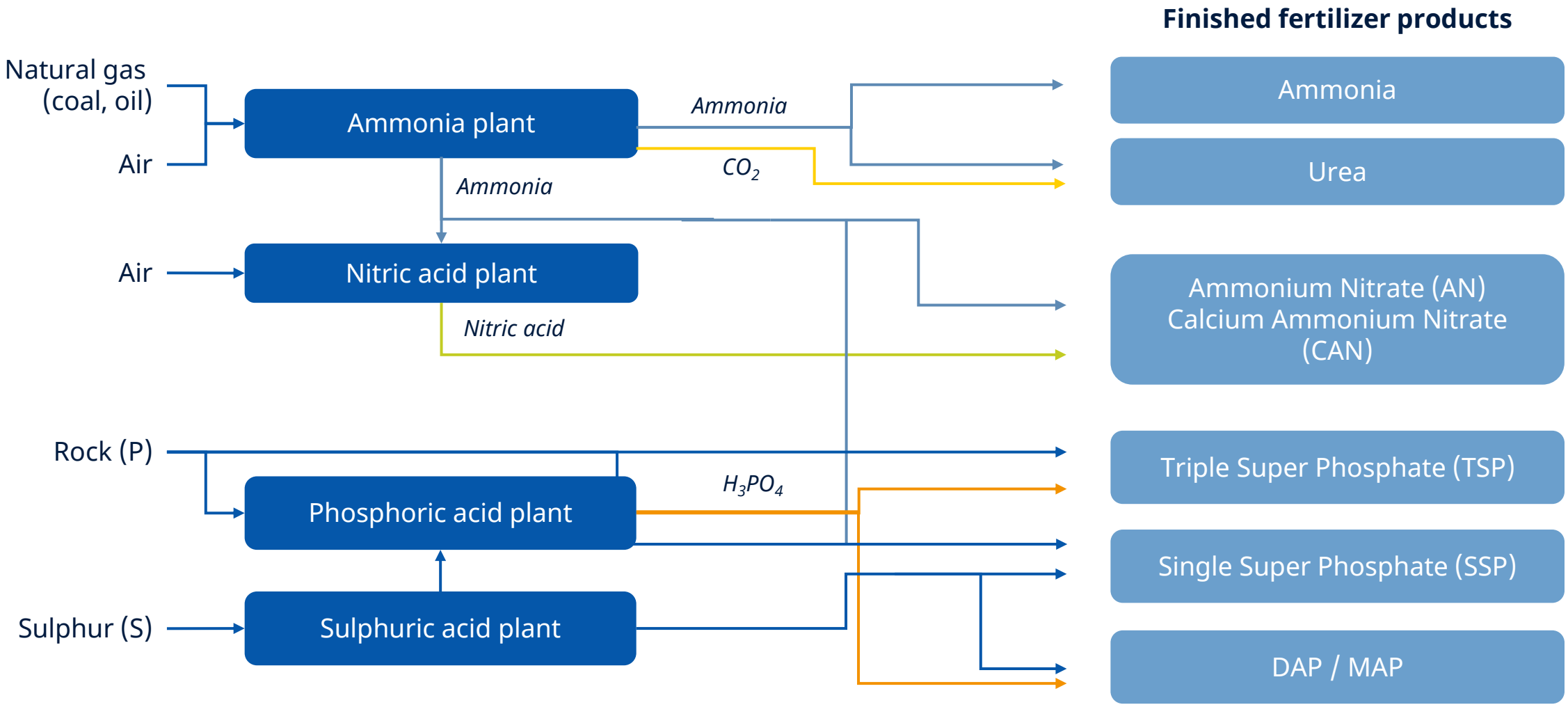


# Ammonia production process based on natural gas

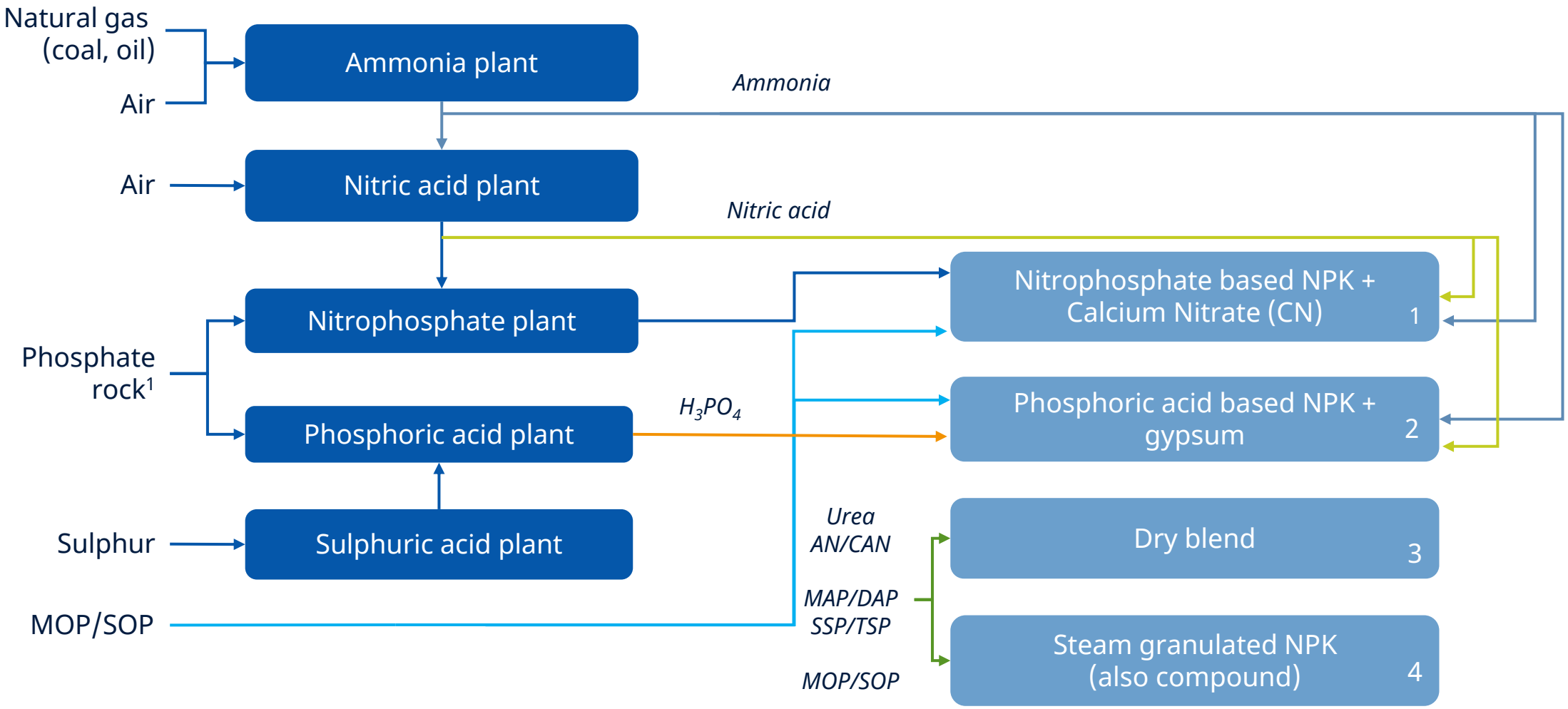
- Production process requires high pressure and temperatures
- Ammonia is a hazardous gas and requires expertise for safe handling
- At -33 degrees/pressure ammonia is a liquid and can be stored and transported in tanks / specialized vessels



# Industrial production of fertilizers involves several chemical processes



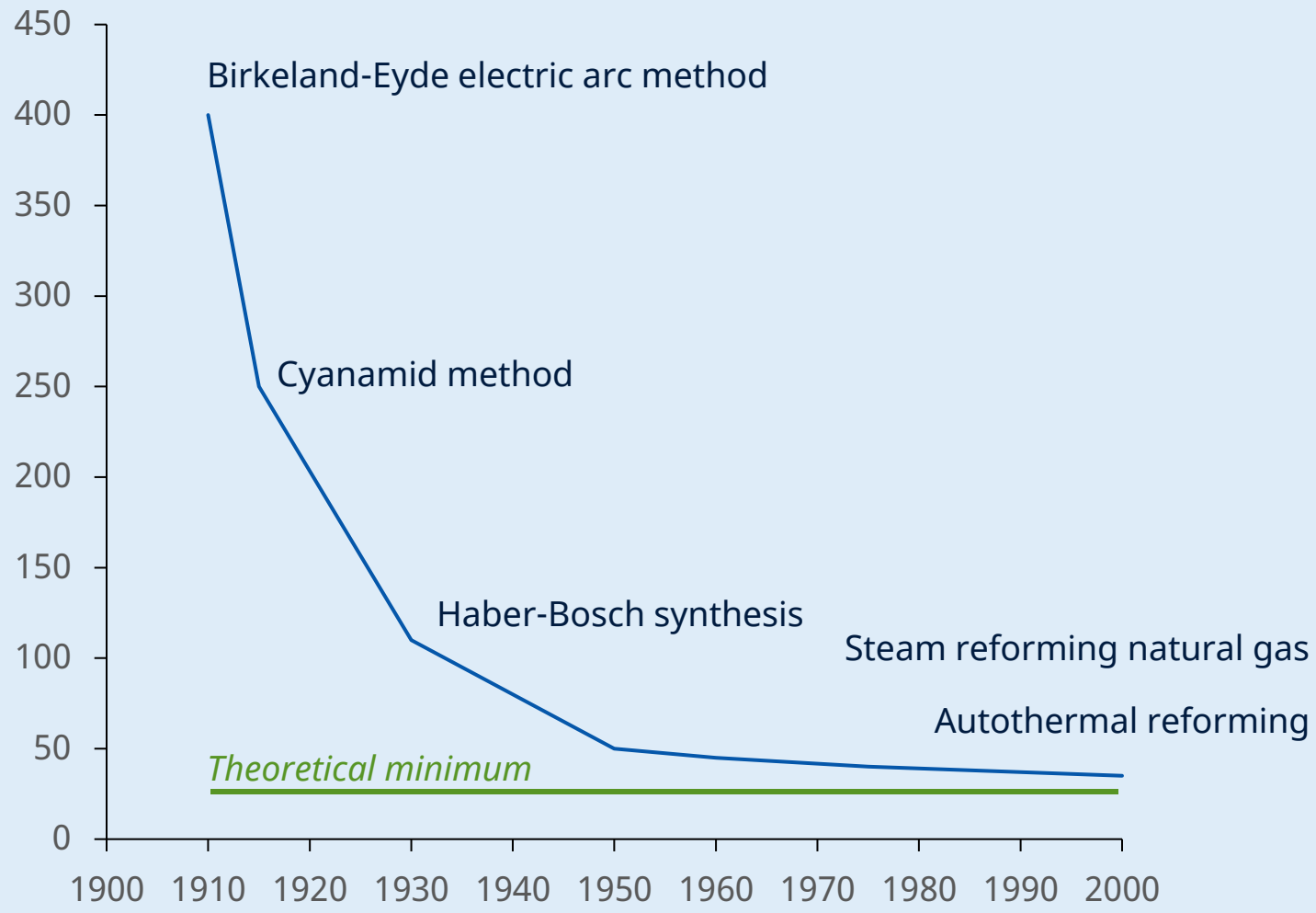
# Four different routes to produce NPK fertilizers




1) Igneous and calcined sedimentary

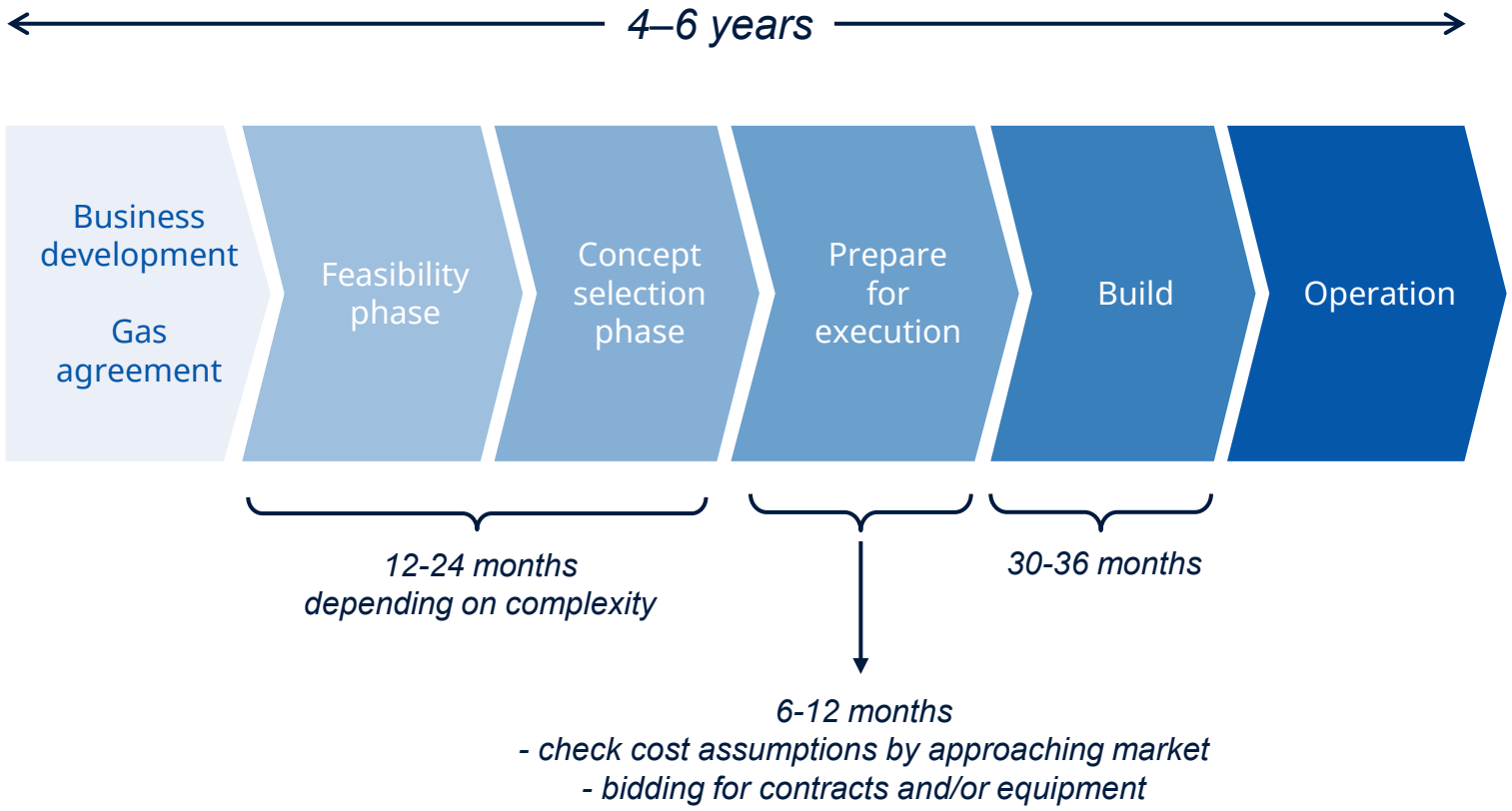
# Nitrogen technology evolution

- The Haber-Bosch synthesis has not been challenged for more than 80 years, but technology development in the 20th century has reduced energy consumption down towards the practical and theoretical minimum.
- Most nitrogen fertilizer plants utilize natural gas.
- Any type of hydrocarbon or coal can be used (in China most plants use coal).
- Energy consumption can vary significantly.
- For an efficient plant using natural gas it takes approximately 33 MMBtu of natural gas to produce one tonne of ammonia.
- Ammonia plants using coal require between 50 per cent and 100 per cent more energy per unit of nitrogen produced.



# 5-year typical construction time for nitrogen fertilizer projects[1]

Over the last years it has typically taken at least 5-6 years from a project for a new ammonia and urea plant is initiated until the new plant is operational, even without unexpected delays.



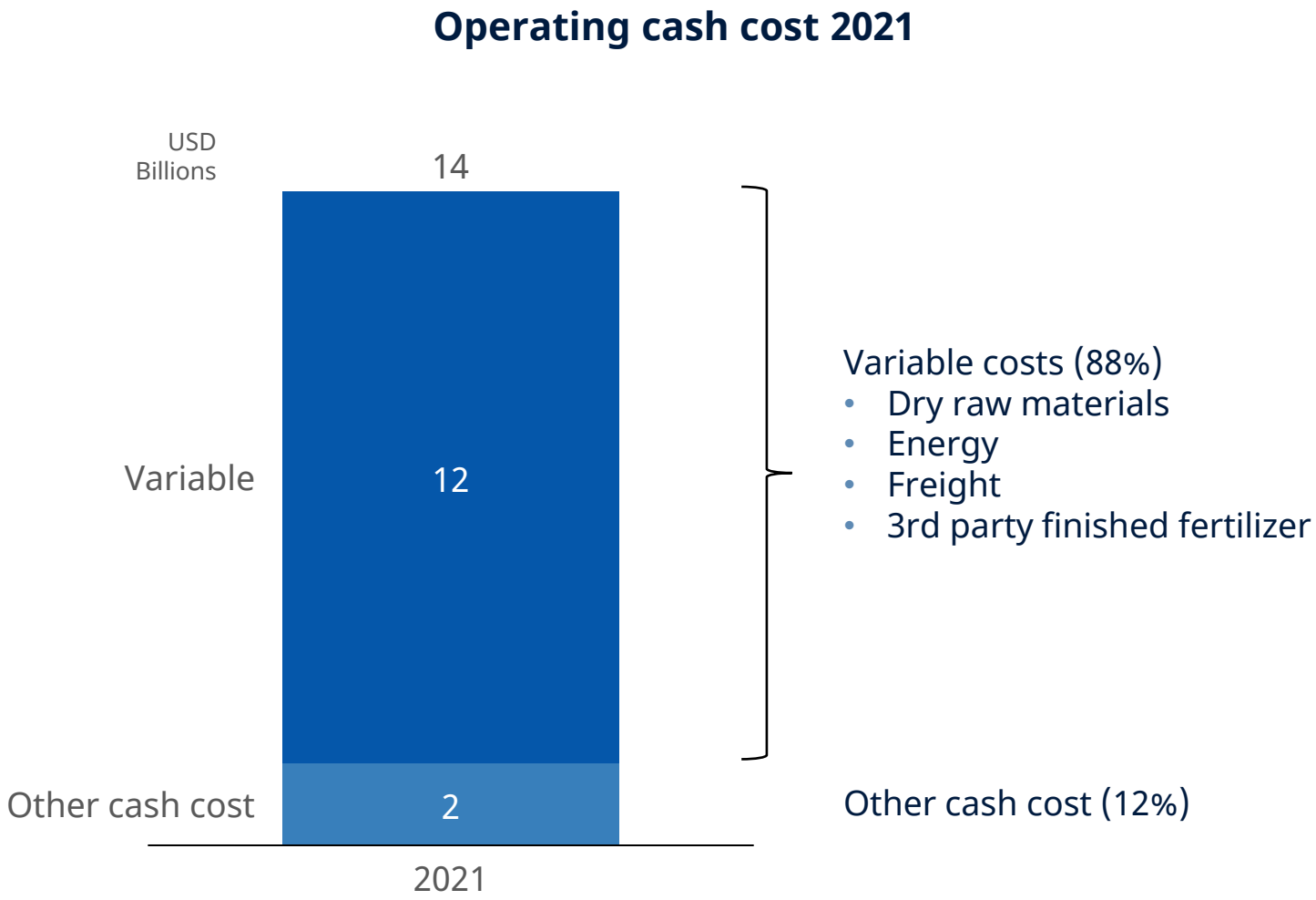

1) Ammonia and urea plant example

# Yara's operating cash costs are mainly variable

Temporary plant closures can be carried out with limited stop/start costs

Example for ammonia/urea plants:

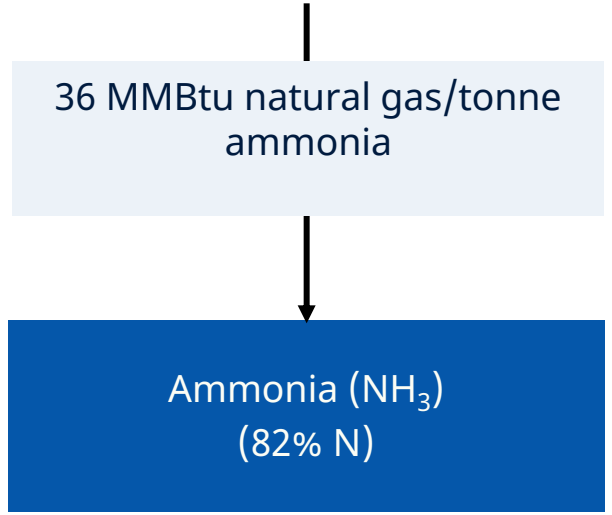
- Typically, half a week to stop and up to a week to start
- Cost of stopping is 2 days energy consumption
- Cost of starting is 3 days energy consumption



# Ammonia cash cost build-up – example

| | | | |
|---|---|---|---|
| | Gas price: | 7 | USD/MMBtu |
| x | Gas consumption: | 36 | MMBtu/mt $NH_3$ |
| = | **Gas cost:** | **252** | **USD/mt $NH_3$** |
| + | Other prod. cost*: | 29 | USD/mt $NH_3$ |
| = | **Total cash cost:** | **281** | **USD/mt $NH_3$** |

| | | |
|---|---|---|
| Emissions[1]: | 1.8-2.4 | $mtCO_2$/mt $NH_3$ |




*Typical natural gas consumption for ammonia production*

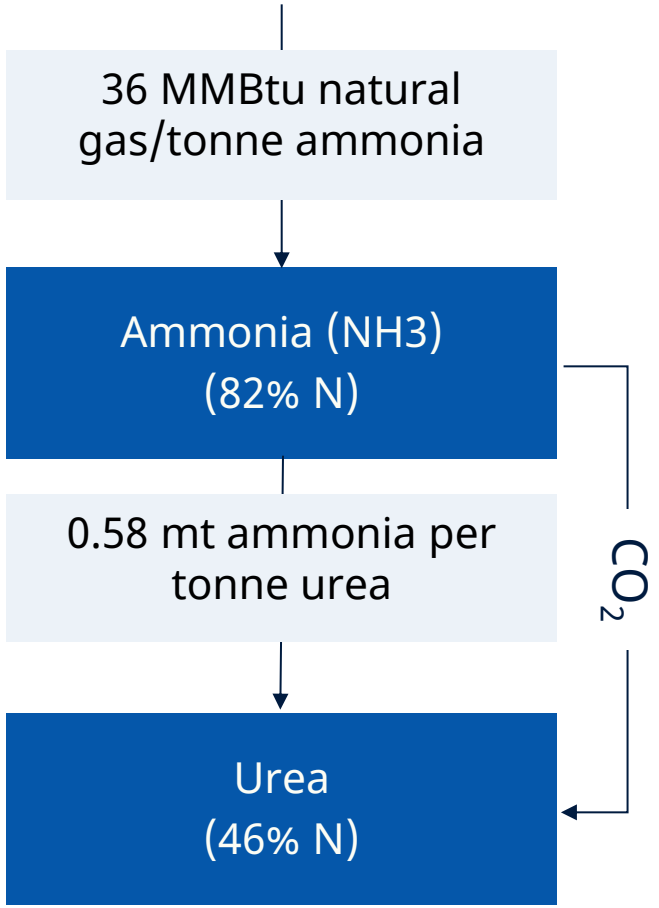
1) *European ammonia production is exposed to a carbon/EU ETS cost. Currently each producer receives free allowances based on the current ammonia product benchmark of 1.57 $mtCO_2/mtNH_3$ adjusted for historical activity level, cross sectoral correction factor and exchangeability of fuel and electricity.*

Source: other production cost is based on publications

# Urea cash cost build-up – example

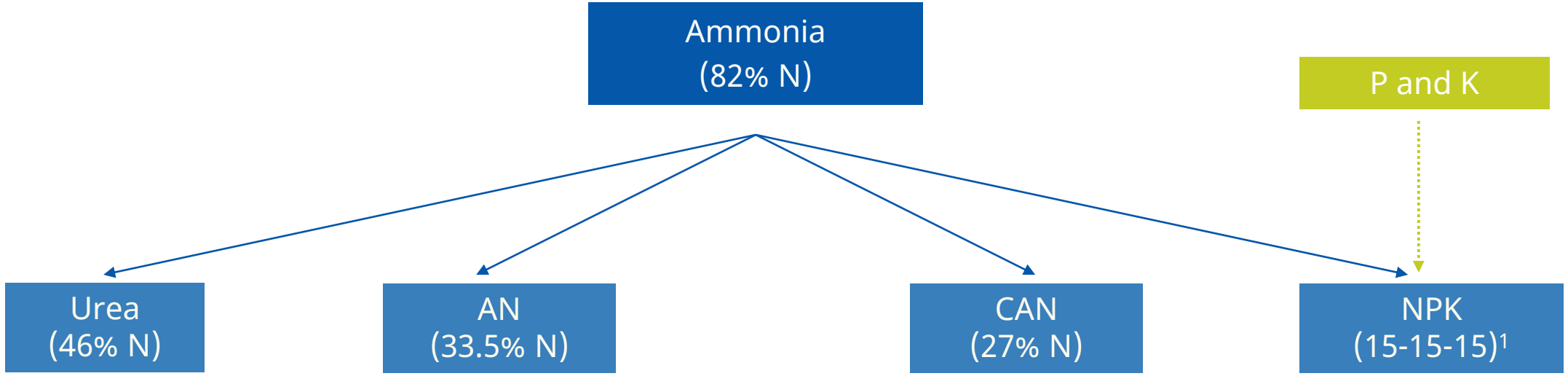
| | | | |
|---|---|---|---|
| | Ammonia cost: | 281 | USD/mt $NH_3$ |
| x | Ammonia use: | 0.58 | $NH_3$/mt urea |
| = | **Ammonia cost:** | **163** | **USD/mt urea** |
| + | Process gas cost*: | 36 | USD/mt urea |
| + | Other prod. cost: | 22 | USD/mt urea |
| = | **Total cash cost:** | **221** | **USD/mt urea** |

** Process gas cost is linked to natural gas price, 5.2 MMBtu gas per 1 mt urea*




Source: other production cost is based on publications

# Theoretical consumption factors




- *Price comparisons should always be based on nutrient tons, not product tons*



1) There are many NPK formulas; 15-15-15 is one example



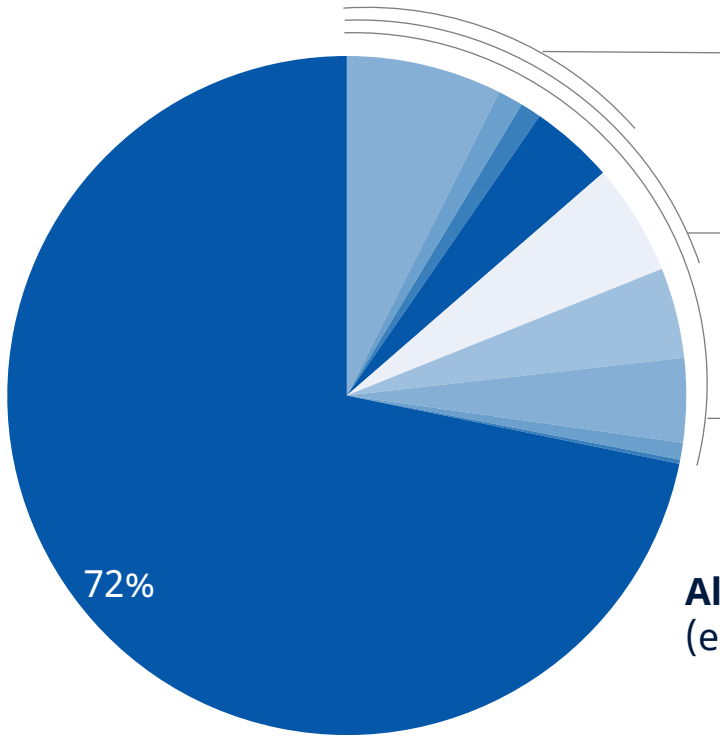
# Environmental topics

- Production is a smaller part of the carbon footprint; efficient application is more important
- More than half of total GHG emissions from fertilizer take place in the field

- Huge positive effects of fertilizer use, since higher yields enable lower land area use
- Efficient farming with high yields contributes to preserve forests and soils, which are the real “carbon sinks”.

- With implementation of CBAM, EU-produced and imported products will be subject to the same carbon costs
- Yara’s production is more energy-efficient than the competitor’s average

# The agri-food system is responsible for <30% of global greenhouse gas emissions while fertilizer production and use represent <2%[1]




**Farm gate 13.6%**

7.4% Livestock and manure
1.2% Rice
**1% Mineral fertilizers (use)**
4% Others (e.g., residues, org. soils, energy use)

**Agricultural land 19%**

5.3% Agricultural land use change

**Agri-food system 28.3%**

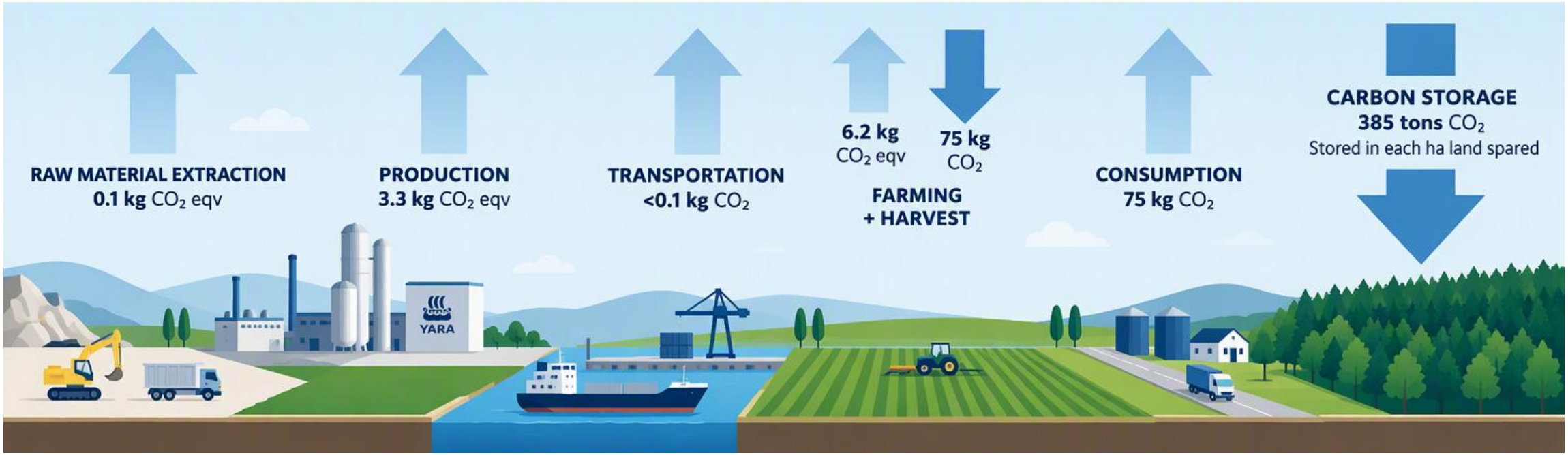
4.3% Food consumption and waste
4% Food processing and retail
**0.8% Fertilizers production**
0.2% Pesticides production

**All other sources 71.7%**
(e.g., energy, transport, industry, waste etc.)

*Total emissions in 2022: 57.4 Gt CO2e[2]*

1) Source: FAOSTAT
2) When including removals from forestland, the net balance is 54.8 Gt CO2e. All figures are rounded to one decimal place.

# Fertilizer reduces the carbon footprint of farming




**Fertilizer - an efficient solar energy catalyst**

- Production is a marginal part of the carbon footprint; efficient application is more important
- Huge positive effects of fertilizer use, since higher yields enable lower land area use
- Yara's production is more energy-efficient than the competitor's average

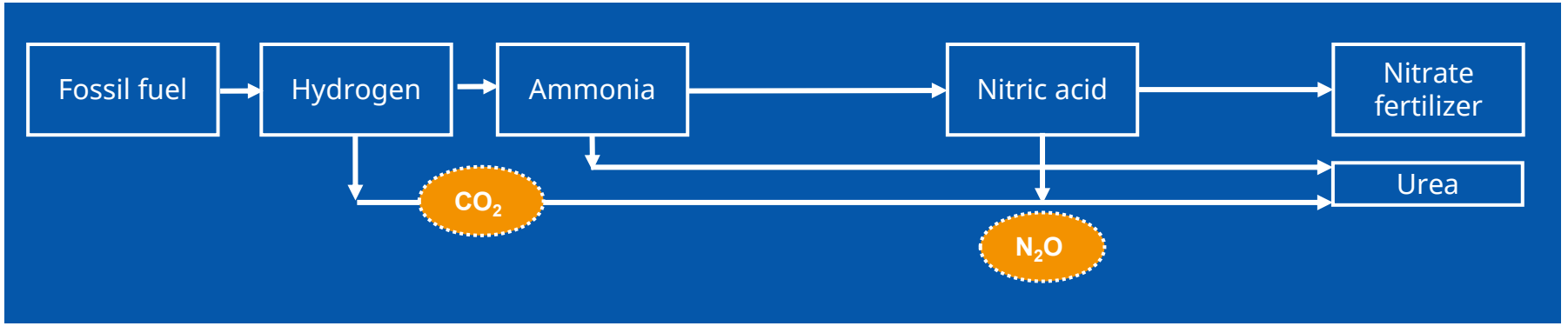
**Application**

- Efficient farming with high yields contributes to preserve forests and soils, which are the real "carbon sinks".
- Higher application efficiency with nitrates
- Precision farming tools and practices help increase efficiency of application

1) Numbers show emissions as CO2eqv per kg Nitrogen in fertilizer product for Calcium Ammonium Nitrate 27%

# Emissions in the production process occur mainly in the ammonia production step, catalyst technology invented by Yara has almost eliminated $N_2O$ emissions

**Standard fertilizer production**




| | | |
|---|---|---|
| **Emissions** | 1.8-.2.4 mt $CO_2$ per mt ammonia[1] | 0.03 -0.2 mt $CO_2$e per tonne nitric acid[2] |
| **Decarbonization routes** | • Carbon capture and storage (blue ammonia)<br>• Replace fossil fuel with hydrogen from electrolysis (green ammonia) | • Catalyst abatement technology |

1) Source: IFA
2) Source BAT (Best Available Techniques) Large Volume Inorganic Chemicals Ammonia, Acids and Fertilizers (2007) new plants

# More than half of total GHG emissions from fertilizer take place in the field



**More than half of total emissions in the fertilizer industry comes from fertilizer use** – Scope 3 category 11 emissions from:

- Direct $N_2O$ emissions (nitrification and denitrification)
- Indirect $N_2O$ emissions (ammonia volatilization and nitrate leaching followed by nitrification/denitrification)
- $CO_2$ emissions from urea hydrolysis

In-field N2O emissions occur when nitrogen (mineral fertilizer or organic matter), is applied to the soil and transformed by different soil microbes in the natural nitrogen cycle.

**Key mitigation levers are: inhibitors, climate-smart fertilizer management, nitrogen use efficiency, carbon sequestration**

**An ideal target setting for scope 3, category 11, is a crop intensity-based target setting.**

This approach can better support collaboration across the food value chain, and it can be developed so that it does not jeopardize food security.

# Increase in $N_2O$ abundance is primarily being driven by global emissions from agriculture

- Atmospheric abundance of nitrous oxide ($N_2O$) has increased by more than 20 per cent since the pre-industrial era due to human activities
- Nitrous oxide's current contribution to warming is about 0.1° Celsius and is growing. Because it has a long atmospheric lifetime (around 120 years), its warming effect accumulates and will last long time
- Nitrous oxide is currently the most significant ozone-depleting substance emitted and poses a serious threat to stratospheric zone
- Emissions from adipic acid and nitric acid production can almost be eliminated by adopting relatively lost cost abatement measures
- Through installation of Yara's own catalyst technology Yara had by the time of the Paris agreement negotiations eliminated nearly half of its scope 1 GHG emissions.

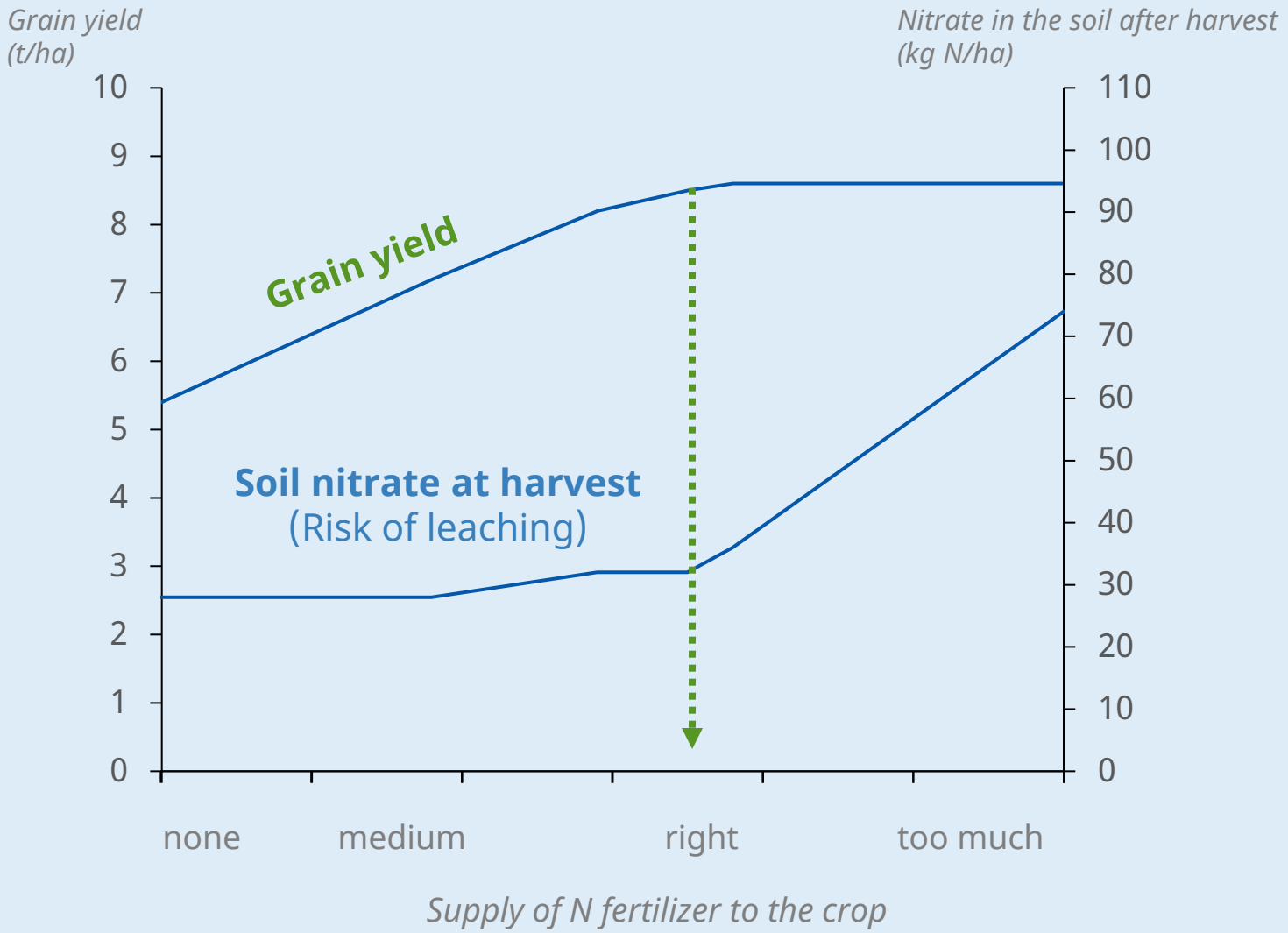
## Examples of nitrogen abatement measures per sector[1]

| Sector | Measure |
|---|---|
| **Agricultural sector** | **Nitrogen testing**: Soil and plant nitrogen testing |
| | **Nitrogen application**: Split application using controlled-release fertilizers; urease and nitrification inhibitors; reduced application rates; and increased manure recycling |
| | **Crop management**: Integrating nitrogen-fixing crops in rotations; reduced tillage; and the use of cover crops |
| | **Livestock diets**: Optimizing protein intake |
| | **Grazing**: Rotational grazing |
| | **Manure storage/process**: Solid/slurry separation; storage under dry conditions and rapid drying; anaerobic digestion. |
| | **Drainage control**: Buffer strips |
| | **Planning**: Integration of crop and livestock production |
| **Chemical sector** | **Adipic acid production**: Catalytic reduction and thermal destruction |
| | **Nitric acid production**: Catalytic reduction and thermal destruction |
| **Waste sector** | **Wastewater**: Process optimization to increase the $N_2$ /$N_2O$ ratio |

1) Global nitrous oxide assessment, UN environment program

# The right nitrogen fertilizer rate is key to avoid nitrate leaching

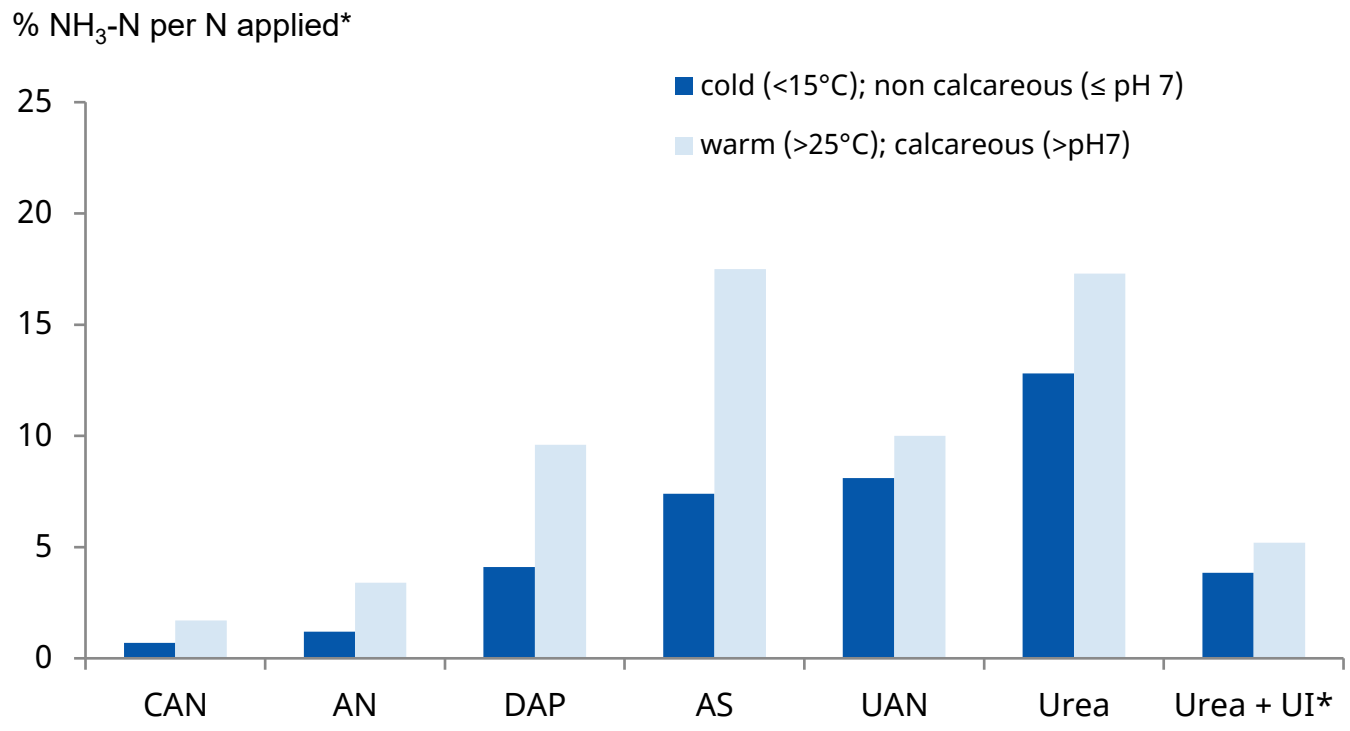
- Leaching of nitrate into groundwater affects water quality and can contribute to eutrophication[1]
- Oversupply of organic and mineral nitrogen fertilizer is the main driver for nitrate leaching
- Nitrogen fertilizer application according to crop demand does not increase the risk of nitrate leaching
- The risk of nitrate leaching increases only when too much N fertilizer has been applied




1) Excessive richness of nutrients in a lake of another body of water

# Ammonia volatilization: Choosing the right nitrogen fertilizer is key to avoiding ammonia volatilization losses

- Volatilization of ammonia gas affects air quality and induces soil acidification
- The use of organic or urea-based nitrogen fertilizer is the main driver for ammonia losses
- Nitrate-based N fertilizer or immediate incorporation of urea into the soil avoids volatilization losses
- Urease inhibitor is a chemical compound which delays the conversion of urea to ammonium



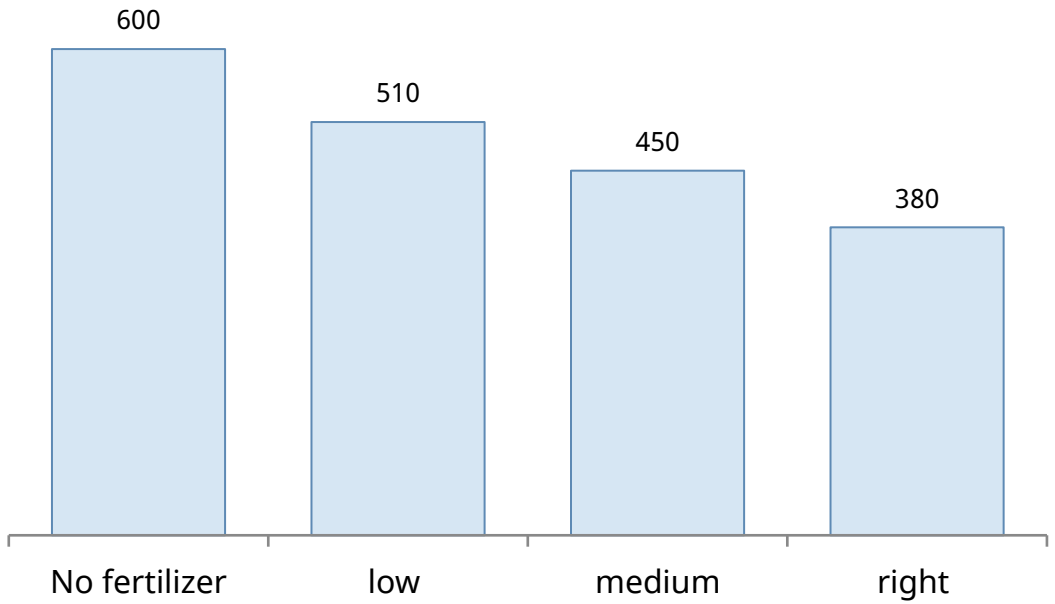

* Urea + Urease Inhibitor (Urea + UI) assuming 70% reduction of ammonia emissions

*NH3-N per N applied is the amount of nitrogen as ammonia (NH3) released per tonne of nitrogen applied
Source: http://www.eea.europa.eu/publications/emep-eea-guidebook-2016

# Water: Good crop nutrition enables increased water efficiency: “more crop per drop”

- Water is a key input for crop growth
- About 70% of global water consumption is for agriculture
- Optimized crop nutrition improves water use efficiency, mainly because a well-nourished crop creates a soil cover which reduce evaporation of water from the soil

**Water requirement (liter per kg of wheat grain)**




*Supply of fertilizer to the crop*

Source: Yara research

# European carbon taxation

- The purpose of the Carbon Border Adjustment Mechanism (CBAM) is putting a price on carbon emitted for fertilizers entering the EU, as EU producers have for many years faced a domestic carbon price under EU ETS, and have been at a cost disadvantage to importers

- As EU ETS free allowances are gradually phased out, CBAM is simultaneously phased in. This parallel transition will lead to a level playing field for all nitrogen-based fertilizers sold within the EU, regardless of origin.

- The cost impact will depend on the emission intensity of imported nitrogen product to Europe. Urea is the marginal nitrogen tonne in Europe. Urea inherently contains $CO_2$ and cannot be decarbonized, meaning urea imports cannot avoid CBAM.

- Price impact depends on the emission intensity of the marginal imported tonne;
  - Finished nitrogen fertilizers: Urea is the marginal nitrogen tonne in urea, and will be price setter for finished nitrogen fertilizer products
  - Ammonia: the emission intensity of the marginal imported ammonia tonne will set the ammonia price uplift

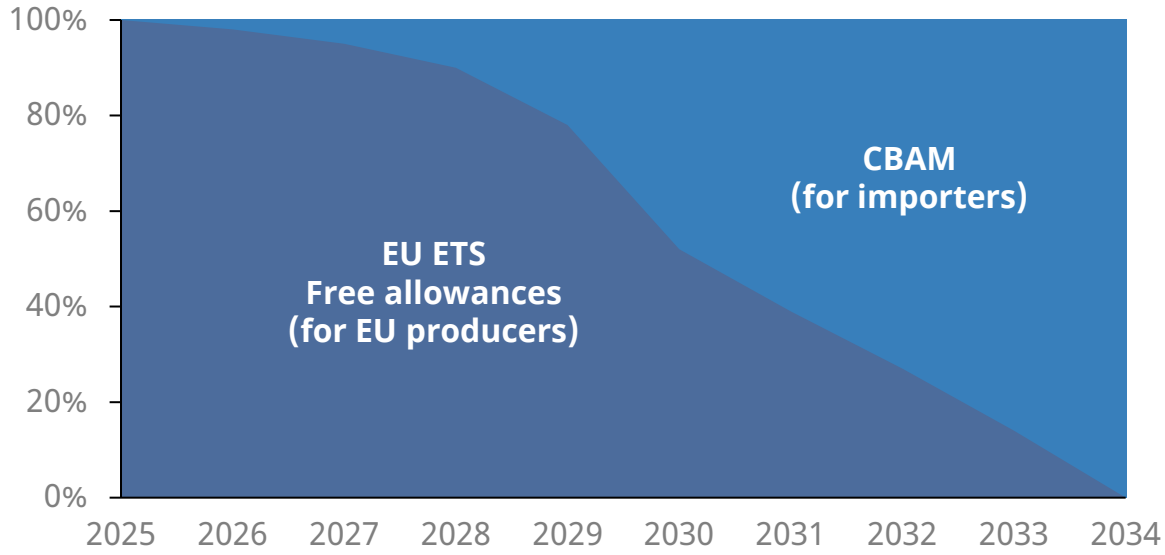
Yara supports the entry into force of CBAM in 2026 as a necessary complement to the EU ETS. This measure helps maintain fair competition on the internal market and support decarbonization of production and avoid carbon leakage. Yara believes that CBAM is important for levelling the playing field as EU producers have for many years been exposed to a domestic carbon price under EU ETS. In the absence of a carbon tax on imports, EU ETS would increasingly become a competitive disadvantage.

# Post implementation of CBAM in 2026, EU-produced and imported products are subject to the same carbon costs

## CBAM designed to level the playing field

- Currently, European fertilizer producers are liable for carbon cost under the EU ETS scheme where free allowances cover part of the emission costs
- Pre-CBAM imported fertilizers products were not exposed to carbon costs
- Under CBAM, carbon is charged based on the emissions in the imported product above a benchmark level set by the EU. The benchmark will be progressively reduced towards 0 in 2034, in parallel with phasing out of free allocations for EU producers.
- The implication is that from 2026, importers and EU producers face the same carbon cost.

## EU ETS phase-out for EU producers and CBAM introduction for importers[1]



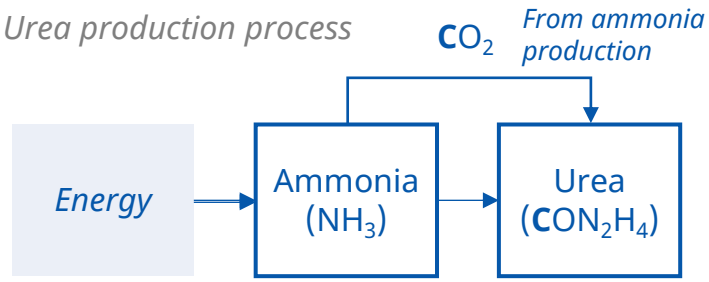

## Calculation example

| CBAM cost = | Carbon price in EU (EUA price) | x | (Embedded emissions – benchmark for that year) | |
|---|---|---|---|---|
| *Example 2026* | *85 USD/t CO2* | *x* | *(1.5 t CO2/t urea – 0.9 benchmark)* | *= ~50 USD/t urea* |

1) Source: https://taxation-customs.ec.europa.eu/carbon-border-adjustment-mechanism_en

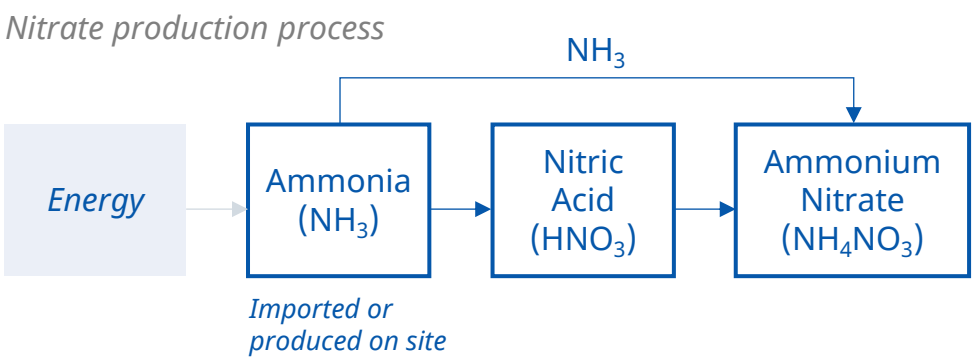
# Nitrates and NPK are ideally suited for decarbonization

## Urea contains carbon and can not become carbon free




- Urea ($CON_2H_4$) is carbon-stabilized ammonia and can not become carbon free
  - ~0.7 tons $CO_2$ per tonne urea is emitted when urea is applied on the field
- Access to renewable carbon is required to decarbonize urea. Renewable carbon can stem from organic waste materials or CO2 captured from biogenic sources. However, these sources are limited, geographically dispersed and challenging to scale
- Urea plants are located next to an ammonia plant as the $CO_2$ in the ammonia production is used to produce urea

## Nitrates and NPK do not contain carbon




- Nitrates ($NH_4NO_3$) and NPK[1] do not contain carbon and carbon is not an integral part of the production process
- Nitrate and NPK plants are often operated as stand alone plants as the production process is not dependent on having an adjacent ammonia plant (or another source of $CO_2$)
- The molecules of low-carbon ammonia are the same indepentent of production process and as such, the productoin of nitrates and NPKs can be decarbonized by upgrading from low-carbon ammonia

1) Phosacid and Nitrophosphate based compound NPK




# Yara market offering

Nitrogen is key for food production and indispensable in numerous industrial applications in addition to fertilizer

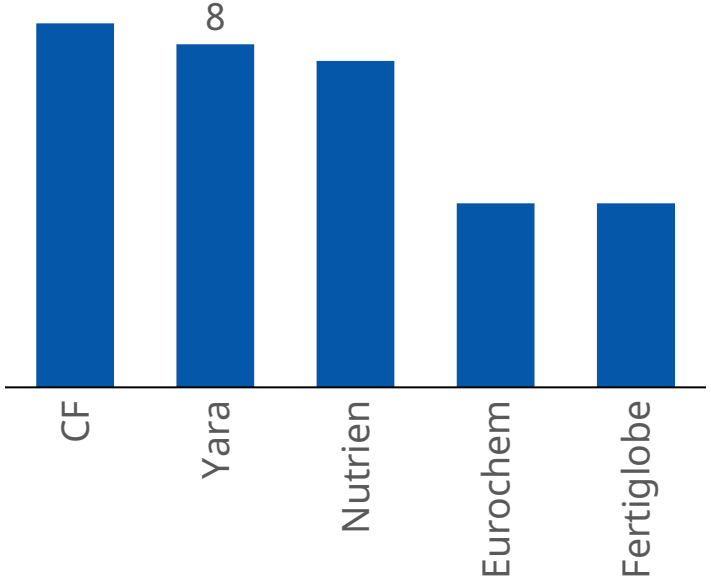
Yara’s position gives it unique opportunities to leverage economies of scale and drive best practice across a large network of plants

Scale and global reach, combined with agronomic knowledge and closeness to the farmer, are key drivers for Yara’s competitive edge

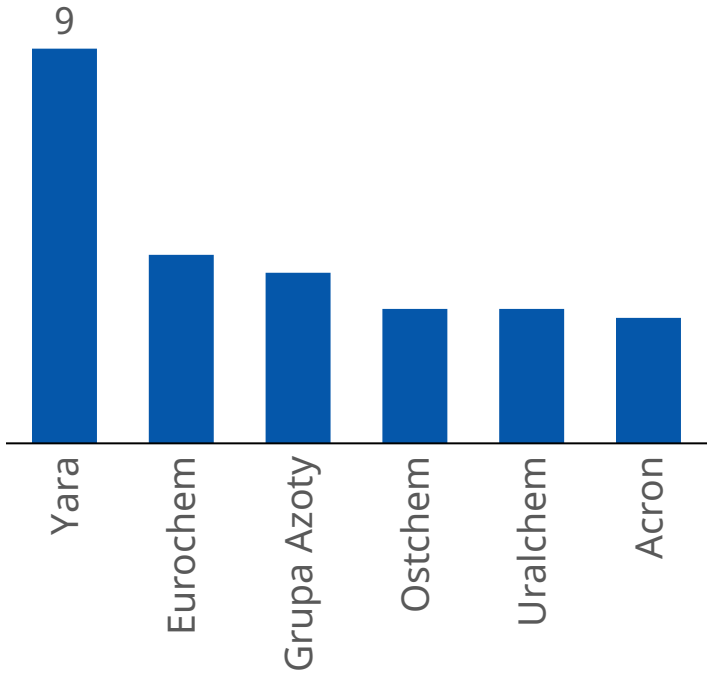
# Yara – the leading crop nutrition company

## 2023 production capacity, excl. Chinese producers[1] (mill. tonnes)

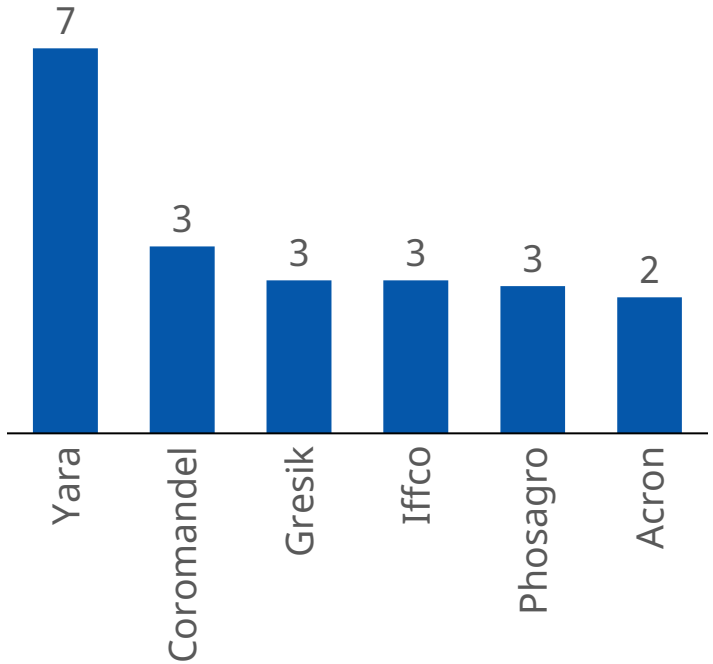
### Global no. 2 in ammonia




### Global no. 1 in nitrates
incl. TAN and CN




### Global no. 1 in NPK
Compound NPK excl. blends




Source: Yara estimates, company info
1) Incl. companies' shares of JVs
2) Yara capacity as of February 2025

# The Yara brand is one of the most respected and widely recognized brands in agriculture




Nitrate fertilizers

YaraBela™




Compound fertilizers

YaraMila™




Calcium nitrate fertilizers

YaraLiva™



Micronutrient fertilizers

YaraVita™



Biostimulants

YaraAmplix™




Fertigation fertilizers

YaraRega™




Fertigation fertilizers

YaraTera™




Organic-based fertilizers

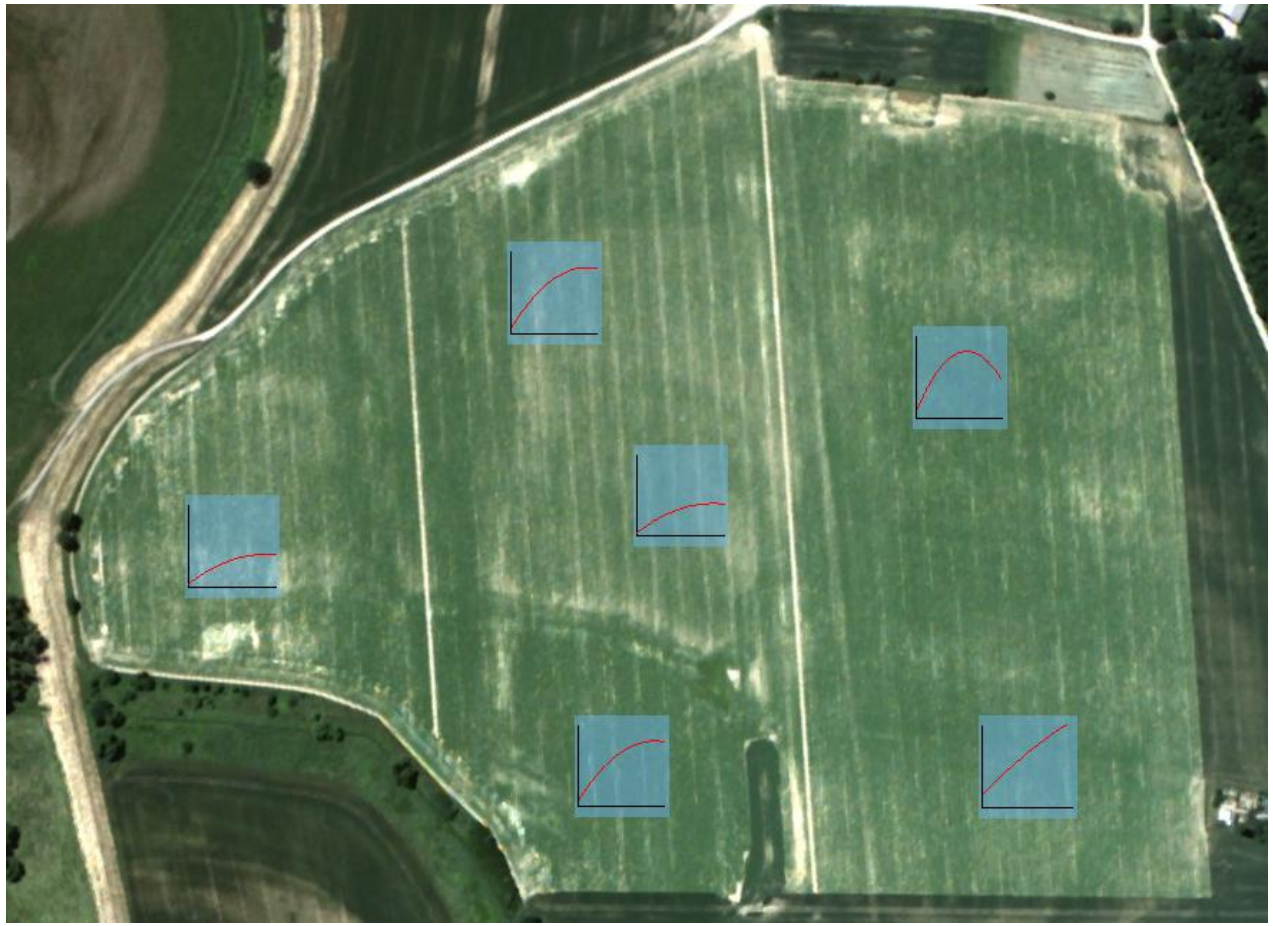
YaraSuna™




Urea fertilizers

YaraVera™

# Precision farming: applying the right nutrients in the right quantity at the right time



- Growth conditions within fields are heterogeneous, affecting the crop yield and fertilizer demand
- Estimation of the nitrogen status of crops is a requirement to respond to this heterogeneity
- Digital tools enable growers to estimate the nitrogen status of crops and use this information to determine how much fertilizer to apply and when to apply it

**Benefits of precision farming** include higher yields, improved crop quality, lower emissions and other environmental impacts and cost savings for the farmer

# Digital crop sensing tools enable variable rate nitrogen application






N-Tester BT



Photoanalysis



Digital Leaf Color Chart (DLCC)



N-Sensor ALS2

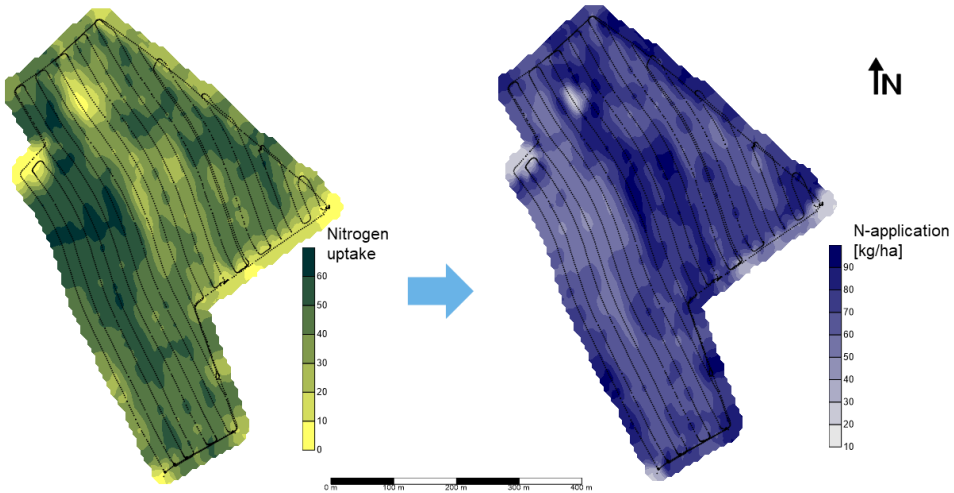


Atfarm

# Examples of digital solutions provided by Yara

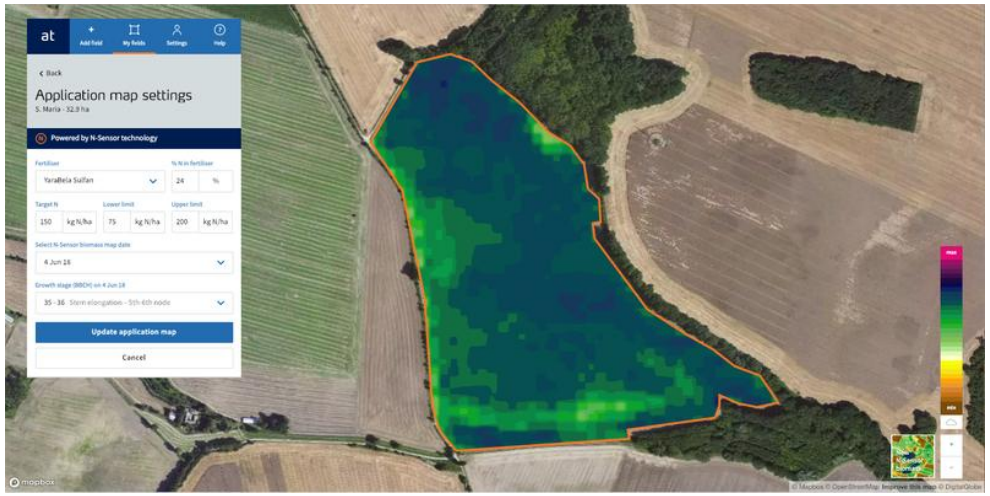
## N-sensor

- Measures crop nitrogen uptake and creates a prescription map for variable rate application



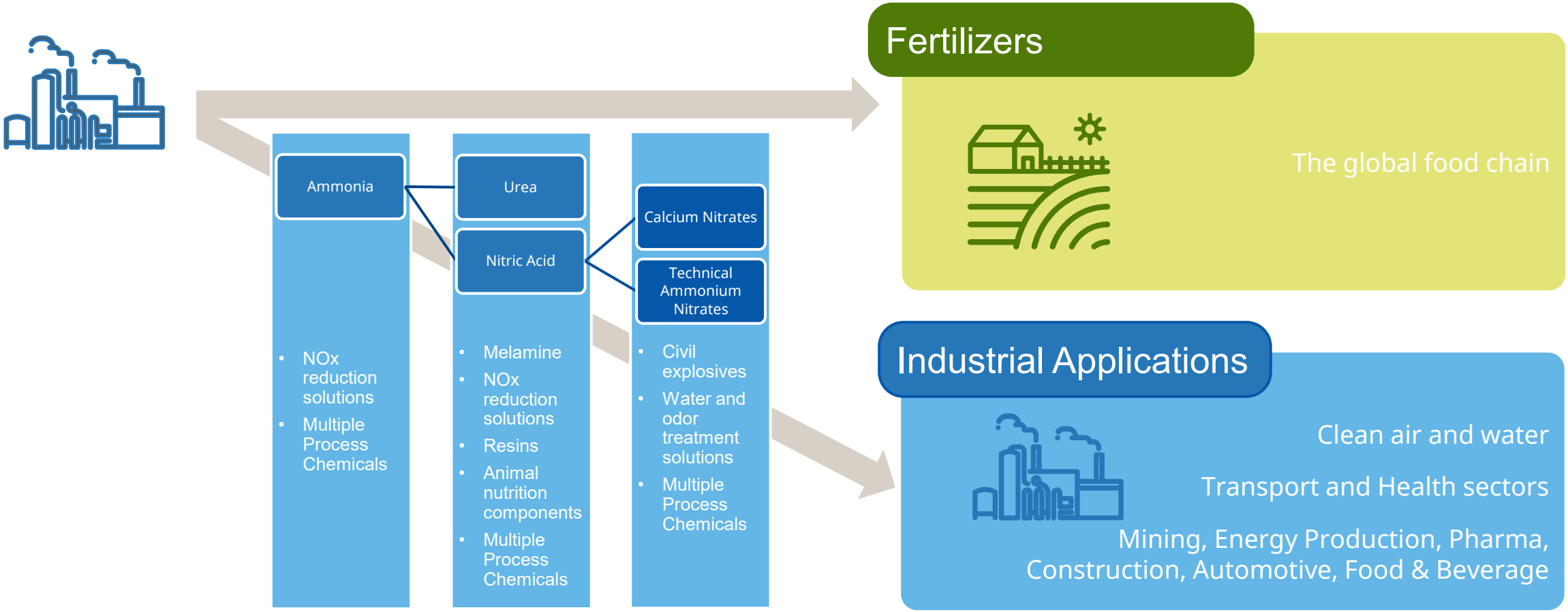

## AtFarm

- Atfarm uses state-of-the-art satellite imagery combined with Yara's expertise and products to create variable rate fertilizer application maps.
- Proof points; up to 6% yield gain, up to -12% fertilizer use[1], up to -20% carbon emissions from fertilizer[1]

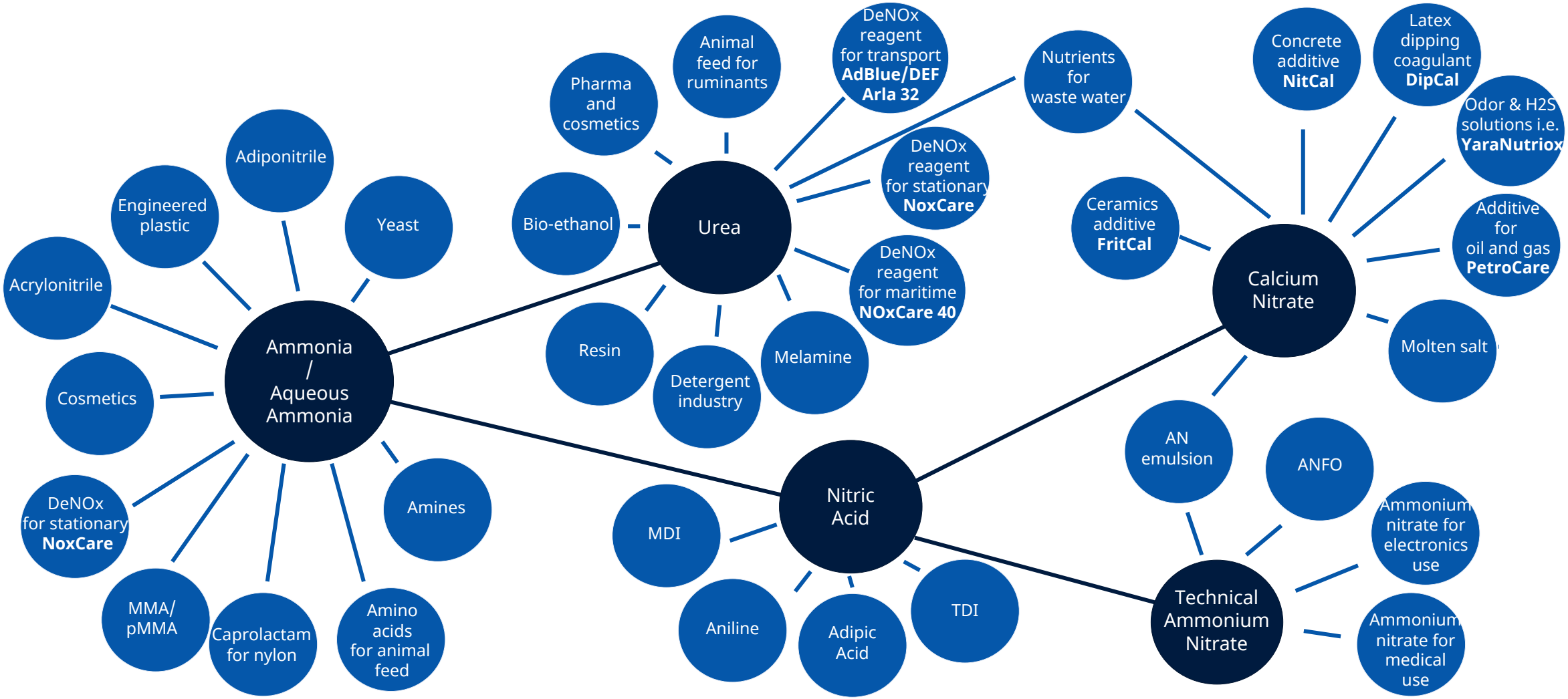



1) By using best practices and solutions that exist today, farmers* can already in average reduce nutrient losses by 20%, increase yields and incomes by 5-7% and reduce their carbon footprint related to mineral fertilization up to 20%**
*Assumption are built with major crops in major EU countries (e.g. cereals)
**CFP considers mineral fertilizers produced with BAT-Best Available Technology, as mineral fertilizers without BAT may have around +30-40% carbon footprint. It does not consider the potential of using carbon sequestration farming practices

# Nitrogen is key for food production and indispensable in numerous industrial applications in addition to fertilizer



# Nitrogen has many industrial applications



# Industrial Solutions: Diversified applications beyond agriculture




## Air Quality & Emissions Control

- **Air1™ (AdBlue/DEF)** and **NOxCare™** reduce NOx emissions in transportation, power plants and industrial facilities through SCR/SNCR technologies.
- Global leader in reagents and solutions supporting tighter environmental regulations and cleaner air.




## Calcium Nitrate-Based Industrial

- **ApplicationsNutriox™**: $H_2S$ prevention, odor control and corrosion reduction in wastewater systems.
- **PetroCare™**: Well souring and $H_2S$ formation prevention in oil & gas operations.
- **NitCal™**: Concrete admixture.
- **DipCal™**: Coagulant solution for the latex industry.




## Mining & Civil Explosives

- **Technical ammonium nitrate** and calcium nitrate are key raw materials for commercial explosives used in mining and infrastructure development.
- Strong exposure to open-pit mining and civil explosives markets.



## Animal Nutrition

- Portfolio includes feed phosphates, feed acidifiers, feed urea and ammonia for amino acid production.
- Supports animal productivity, feed efficiency and reduced reliance on traditional protein sources.

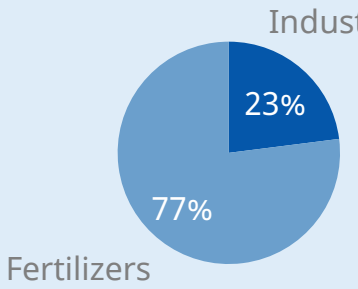
**Strategic value**

- Leverage of Yara's core ammonia, nitrate and phosphate chemistry across industrial, environmental, mining and feed markets.
- Diversification and exposure to structural sustainability trends including air quality, wastewater treatment and resource efficiency.

# Industrial use accounts for ~23% of global nitrogen consumption

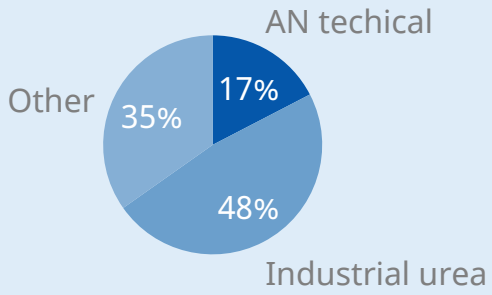
**Global ammonia consumption**

*~ 200 mt ammonia*



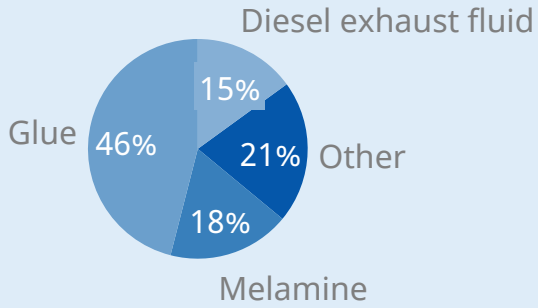

**Industrial ammonia consumption**

*~45 mt ammonia*




**Technical grade urea consumption**

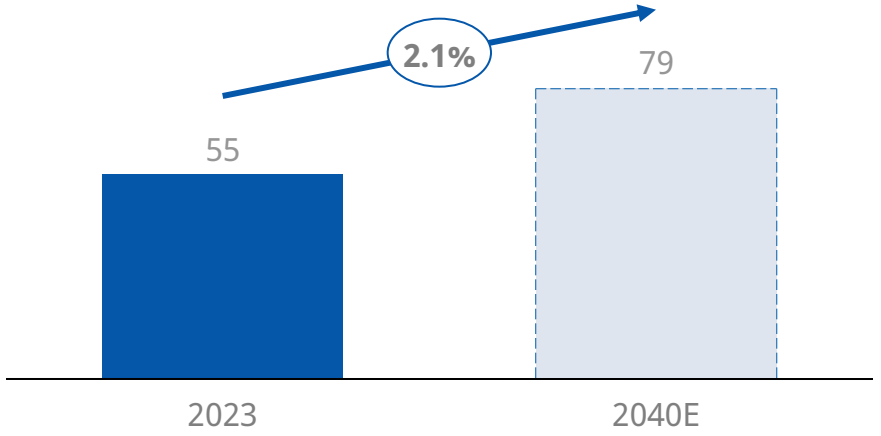
*~35 mt urea*




Source: S&P Global Energy/ Fertecon, data for 2023

## Global demand development for industrial nitrogen applications is strong

*Million tonnes nitrogen*




*Demand growth for Industrial applications is estimated to ~2.1 % annually*



# Market Data Sources

# Sources of market information

## Fertilizer market information

| | |
|---|---|
| Argus | www.argusmedia.com |
| Fertecon – S&P Global Energy | www.spglobal.com |
| Fertilizer Week | www.crugroup.com |
| Profercy | www.profercy.com |
| ICIS/The Market | www.icis.com |
| Green Markets (USA) | www.fertilizerpricing.com |
| China Fertilizer Market Week | www.fertmarket.com |

## Fertilizer industry associations

| | |
|---|---|
| International Fertilizer Industry Association (IFA) | www.fertilizer.org |
| Fertilizers Europe (EFMA) | www.fertilizerseurope.com |

## Food and grain market information

| | |
|---|---|
| Food and Agriculture Organization of the UN | www.fao.org |
| International Grain Council | www.igc.org.uk |
| Chicago Board of Trade | www.cmegroup.com |
| World Bank commodity prices | www.worldbank.org |
| US Department of Agriculture (USDA) | www.usda.gov |

Investors and equity/credit analysts can reach out to Yara's Investor Relations team.

ir@yara.com