

The nitrogen business: recent developments and prospects

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Foro PPQ 2014, September

- Breaking news!
- Nitrogen fundamentals
 - Global supply and demand
 - Summary for Mexico
- Recent changes in the industry
 - Price changes and influences
 - Profitability
 - Energy costs and competitiveness; impact of shale
 - Growth of China
- Focus on key nitrogen markets
 - UAN
 - AS
 - DEF
- Outlook
 - General market balance
 - Impact of shale and cheap gas in North America
- Conclusions and implications for Mexico

Breaking News: Yara and CF Industries merger talk

	CF Industries	Yara
Total revenues	US\$5.5 billion	US\$13.6 billion
EBITDA	US\$2.7 billion	US\$2.1 billion
Volume sales	11.7 million (mostly UAN)	30.8 million (ammonia, nitrates, urea, NPKs)
Ammonia capacity	7 million tpy	~8.5 million tpy
Geographical interests	North America	Base in Europe, production in 15 countries, trading worldwide
Plans	Spending \$4 billion on US expansion	Various ongoing

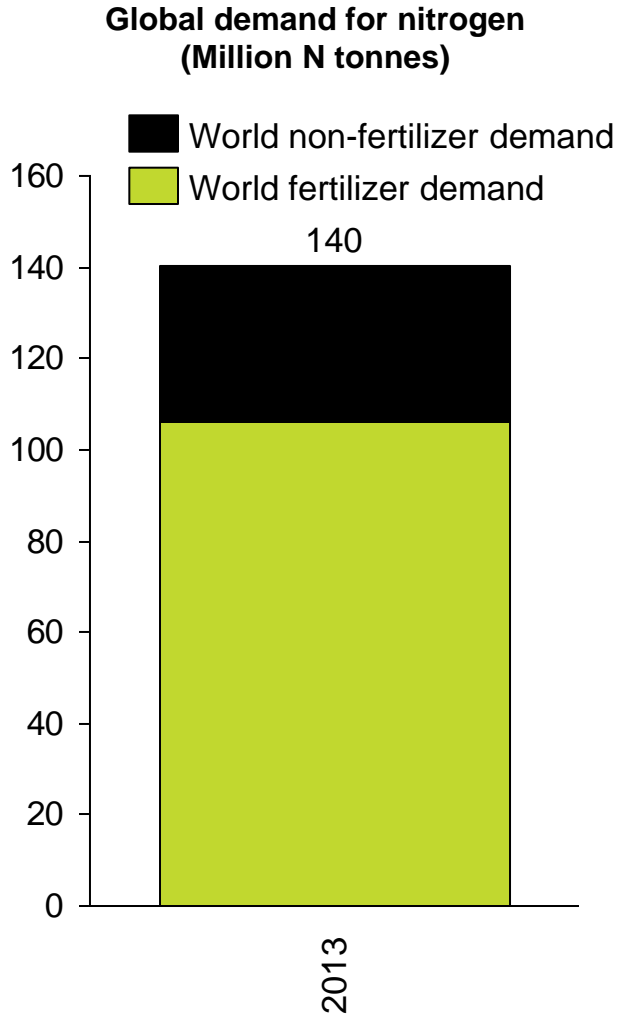
NewCo would control approaching 10% of world nitrogen capacity

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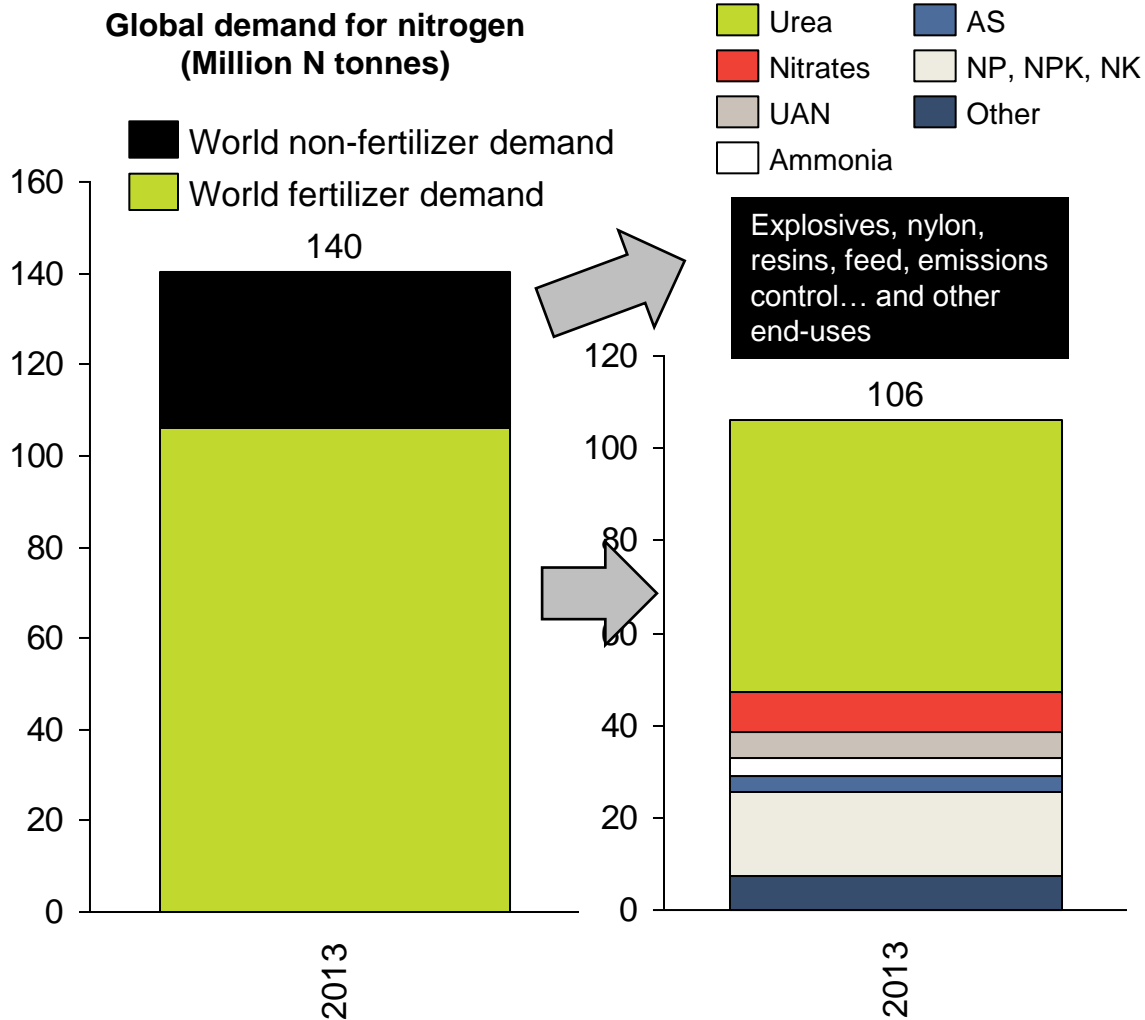
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Nitrogen fundamentals

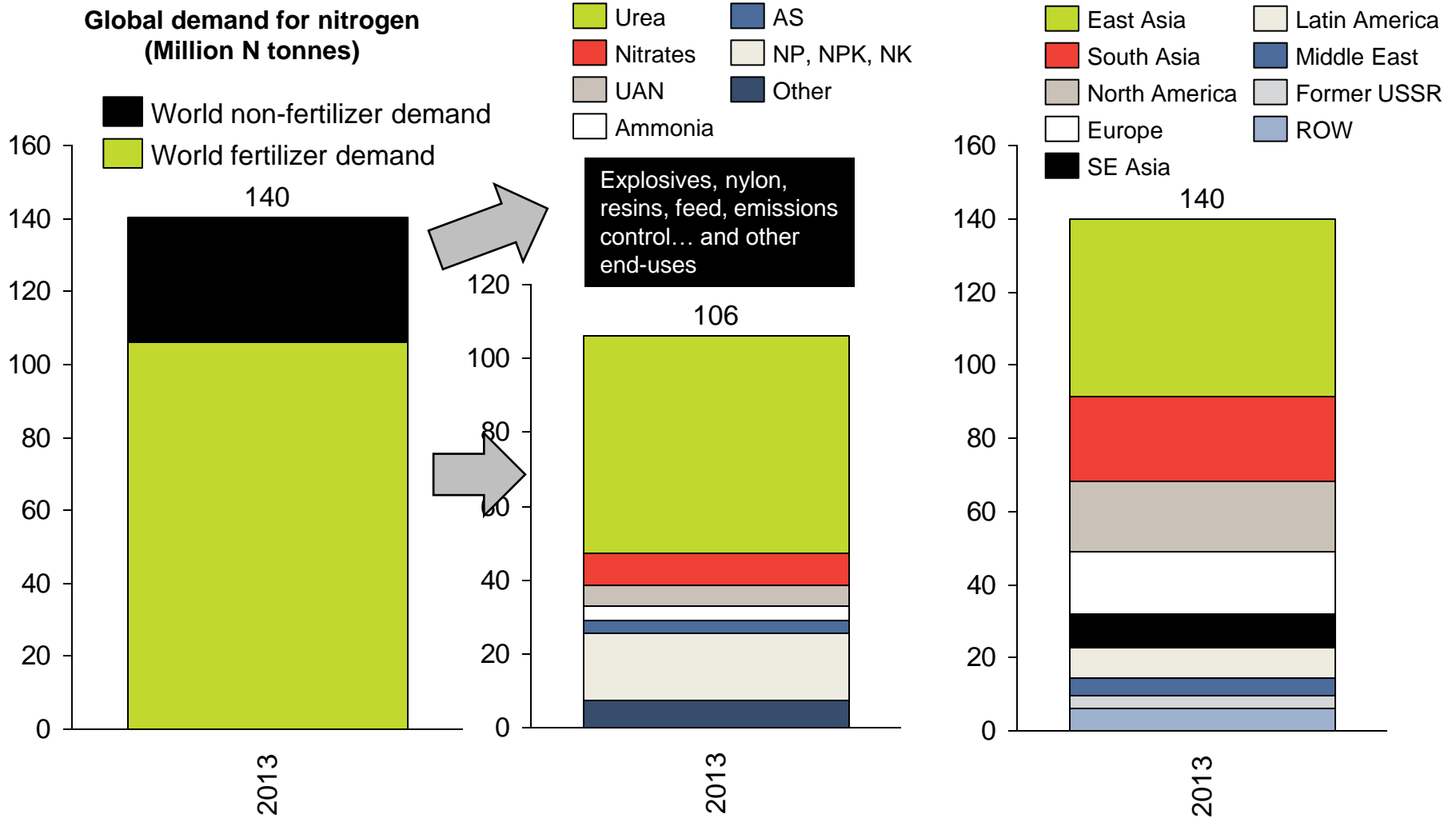
Global nitrogen demand is dominated by fertilizers, and urea is the dominant product. Non-fertilizer demand is highly diverse.



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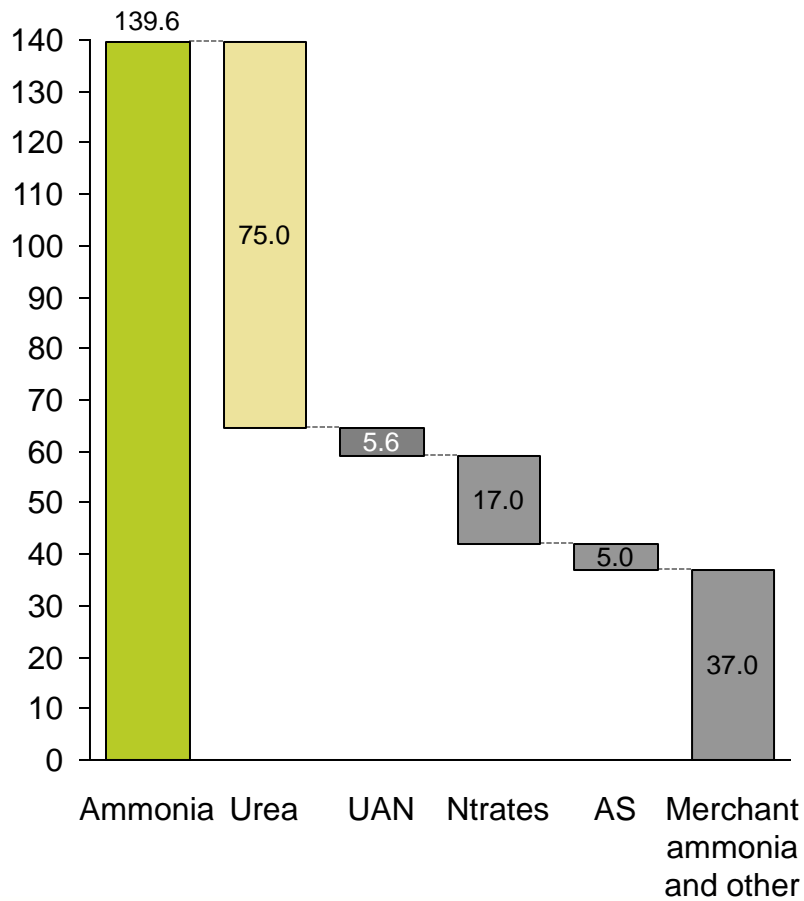


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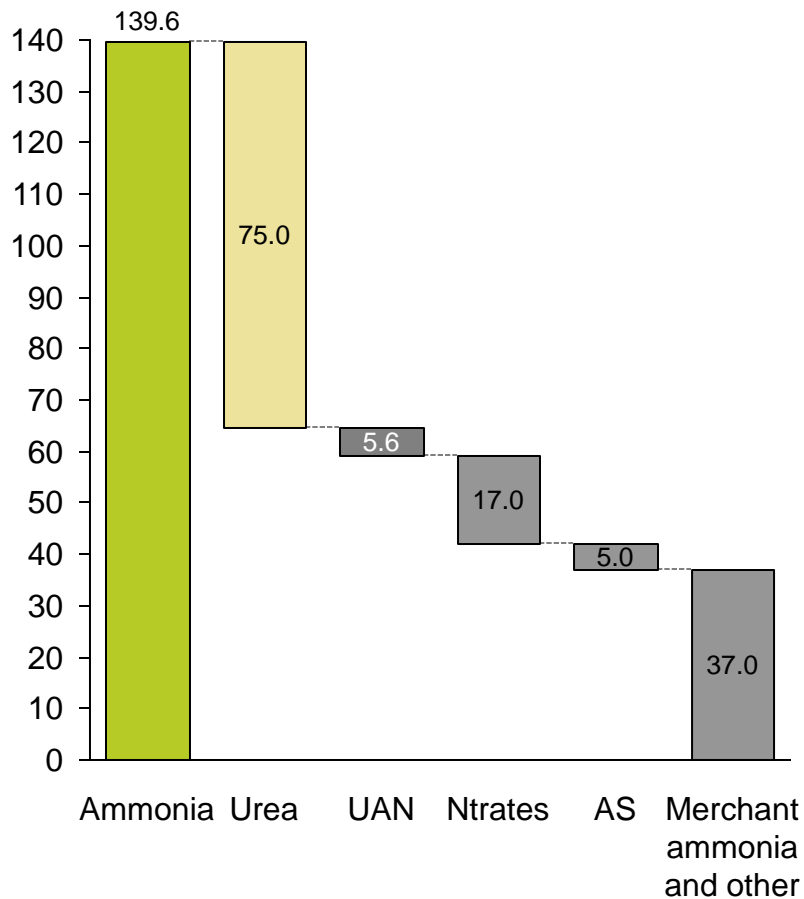
Global nitrogen production is relatively widespread. The growth of China has been phenomenal

Global nitrogen production
(Million N tonnes)

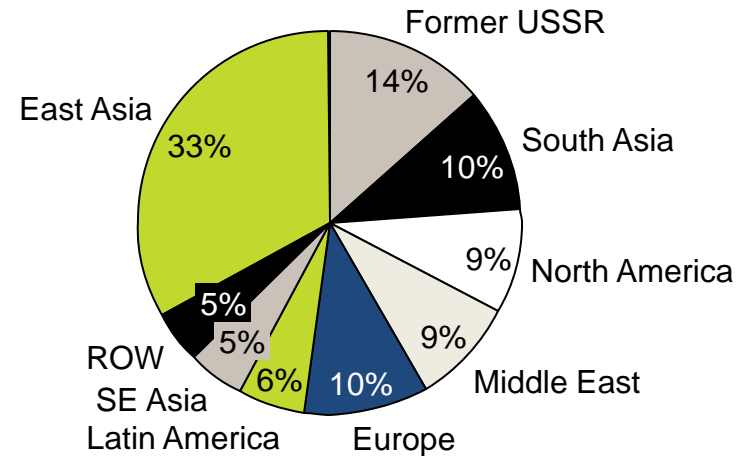


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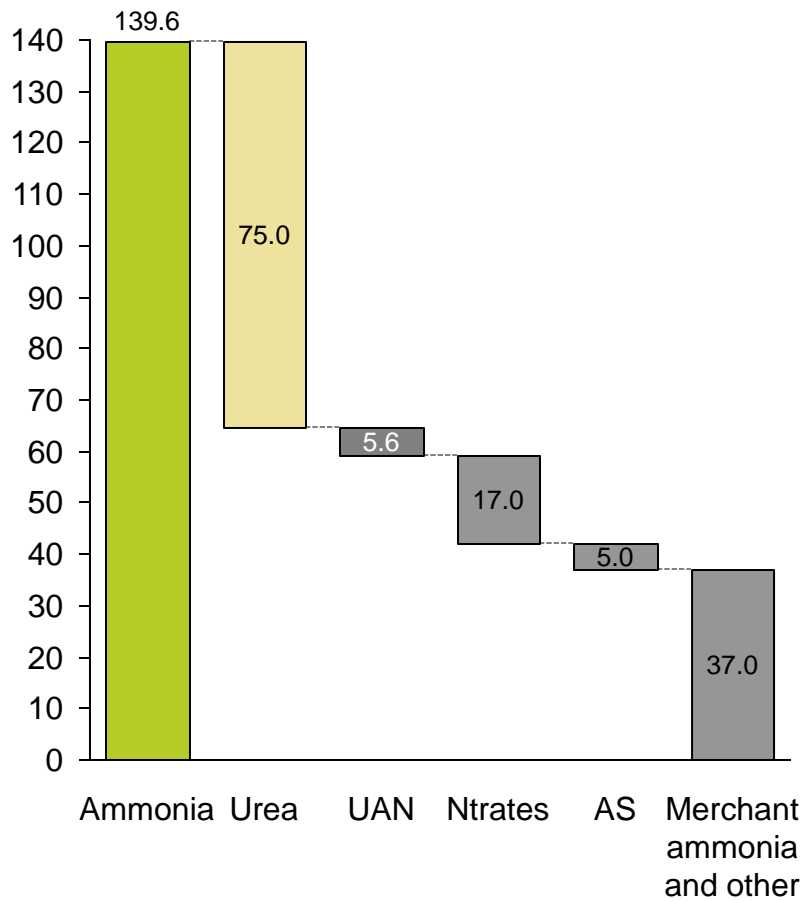


Nitrogen production by region

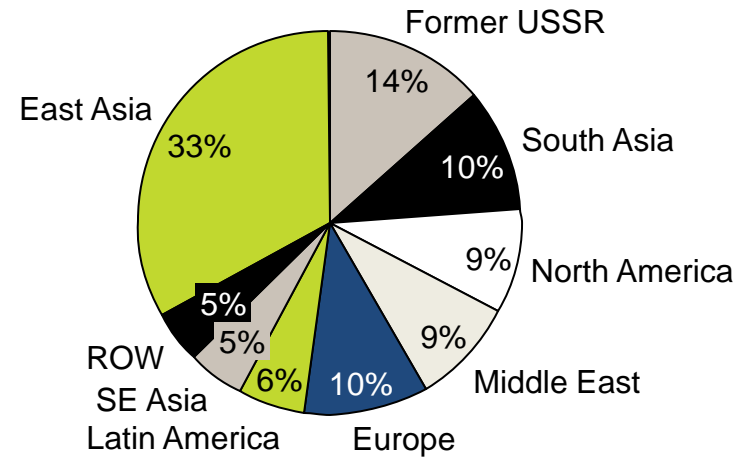


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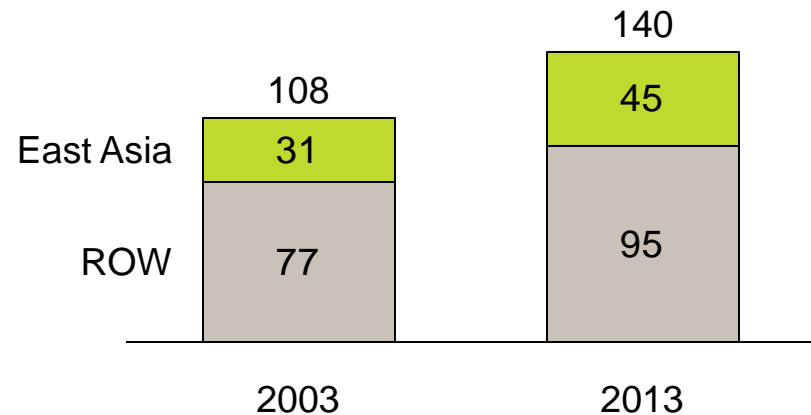
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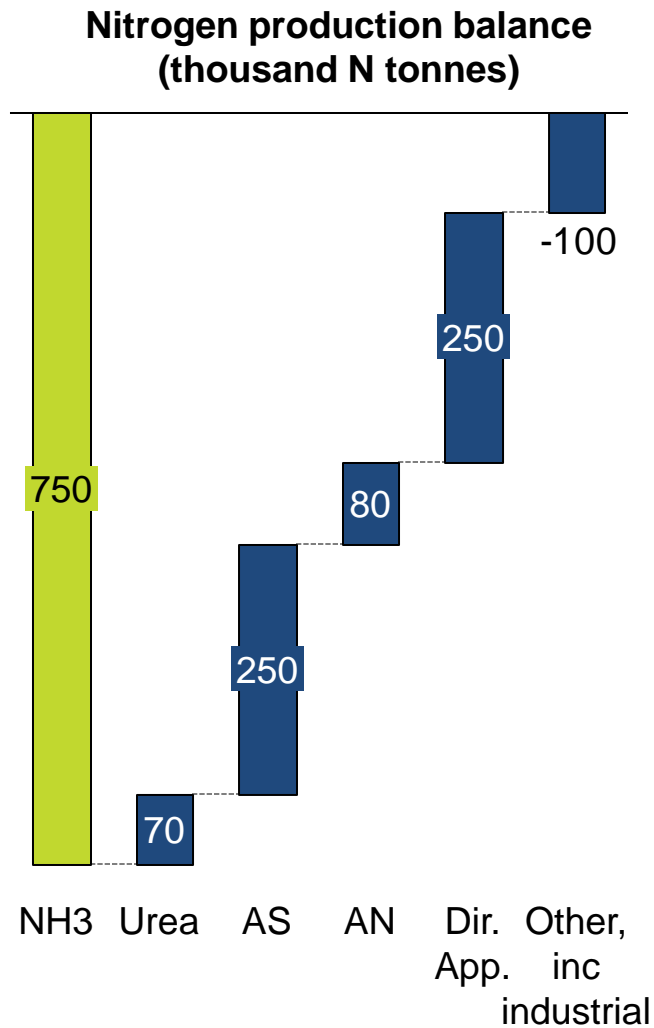
Nitrogen production by region



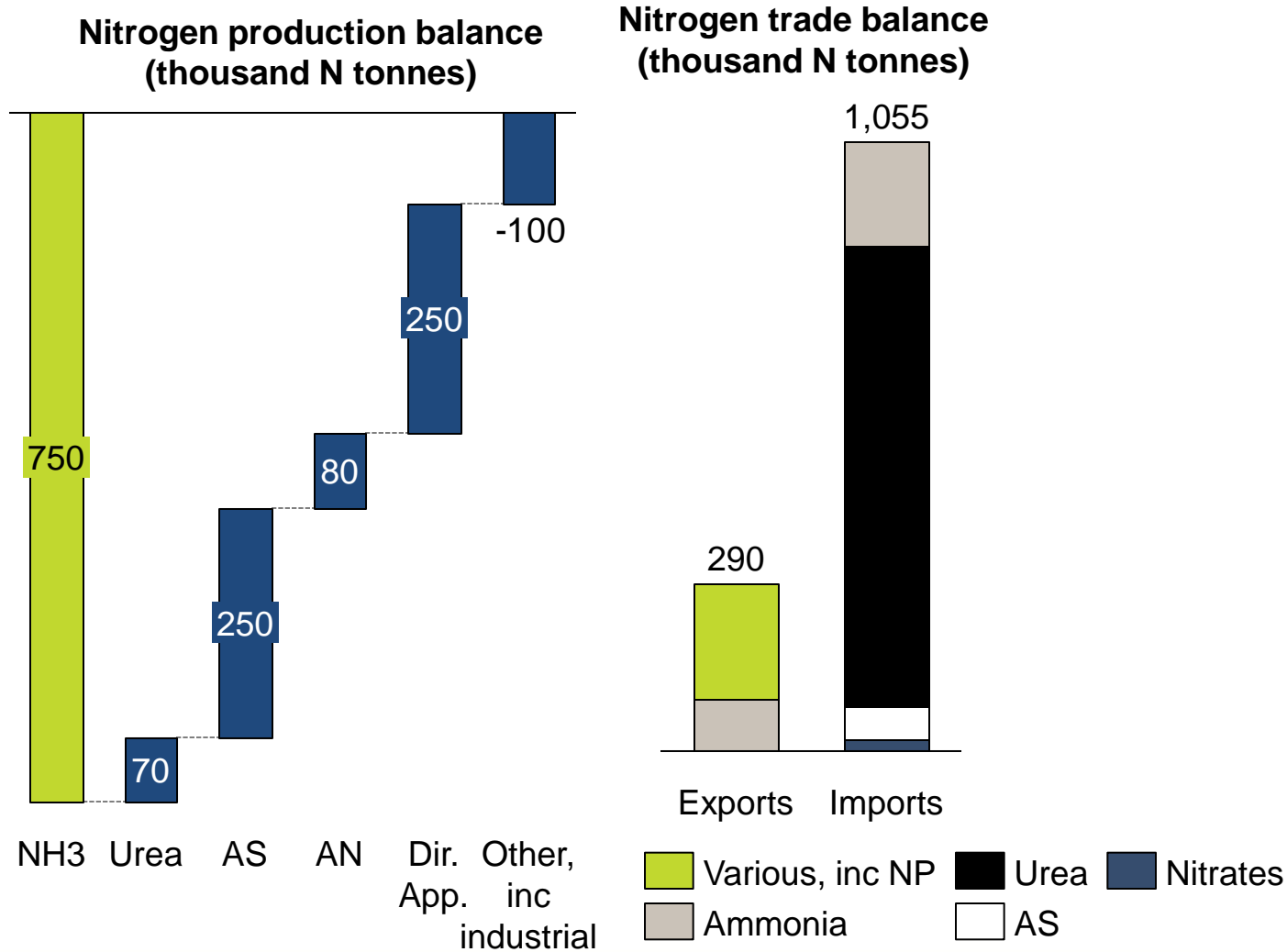
Change in nitrogen production by region



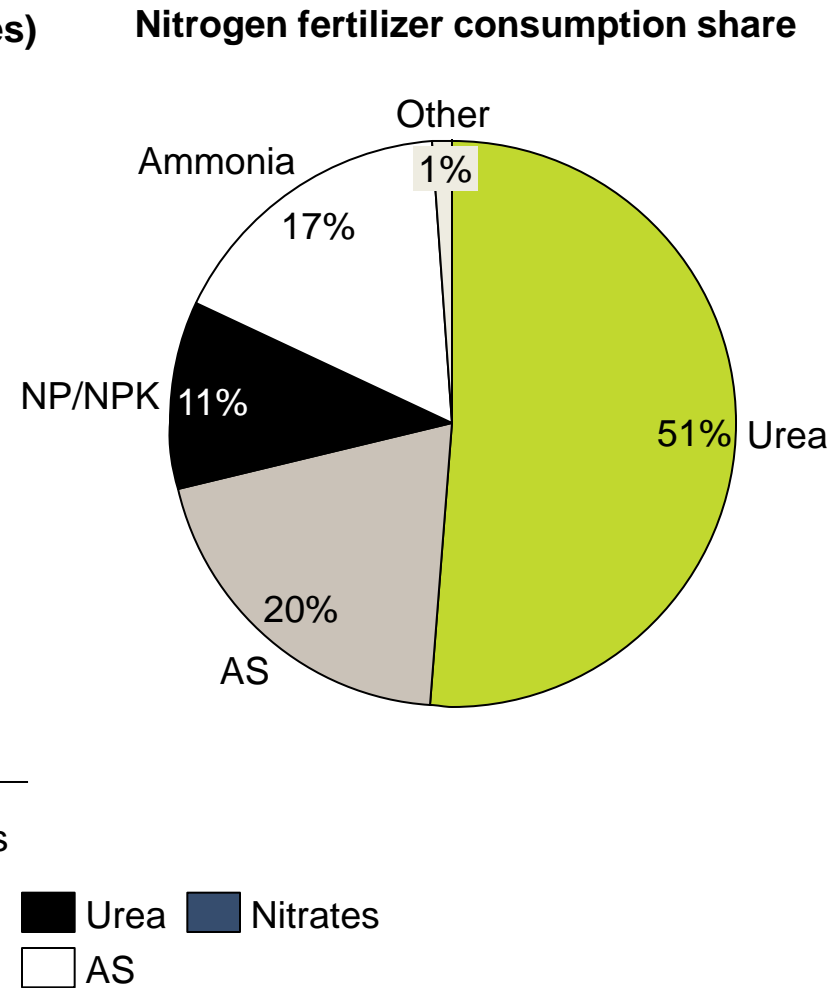
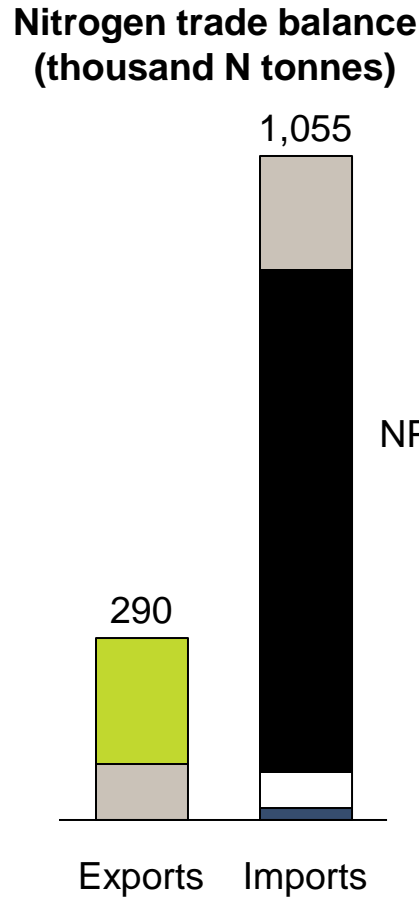
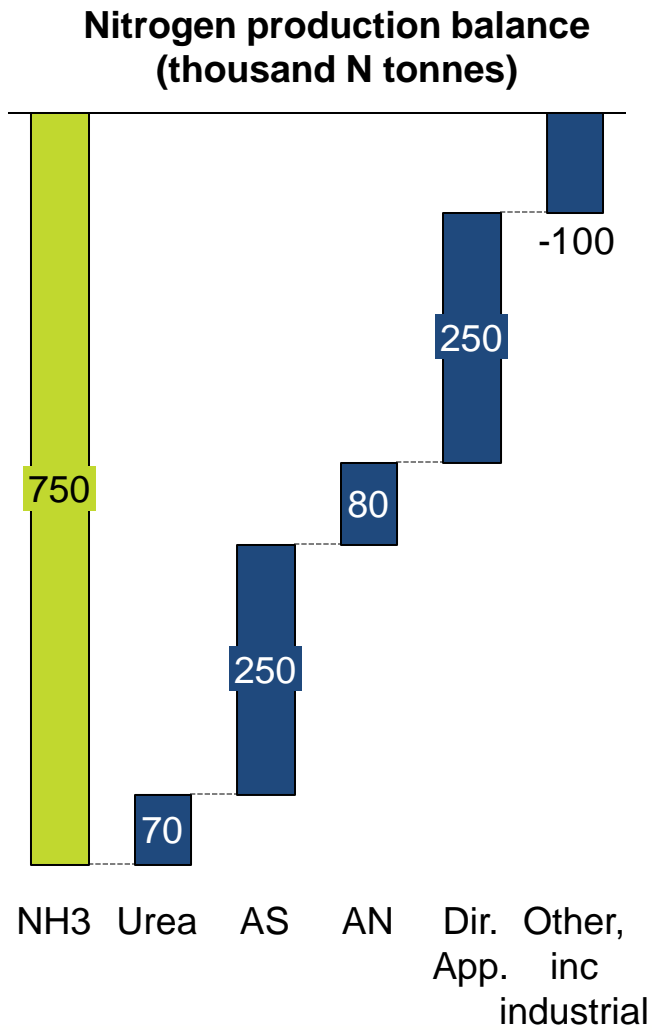
Mexican production is under-represented by urea



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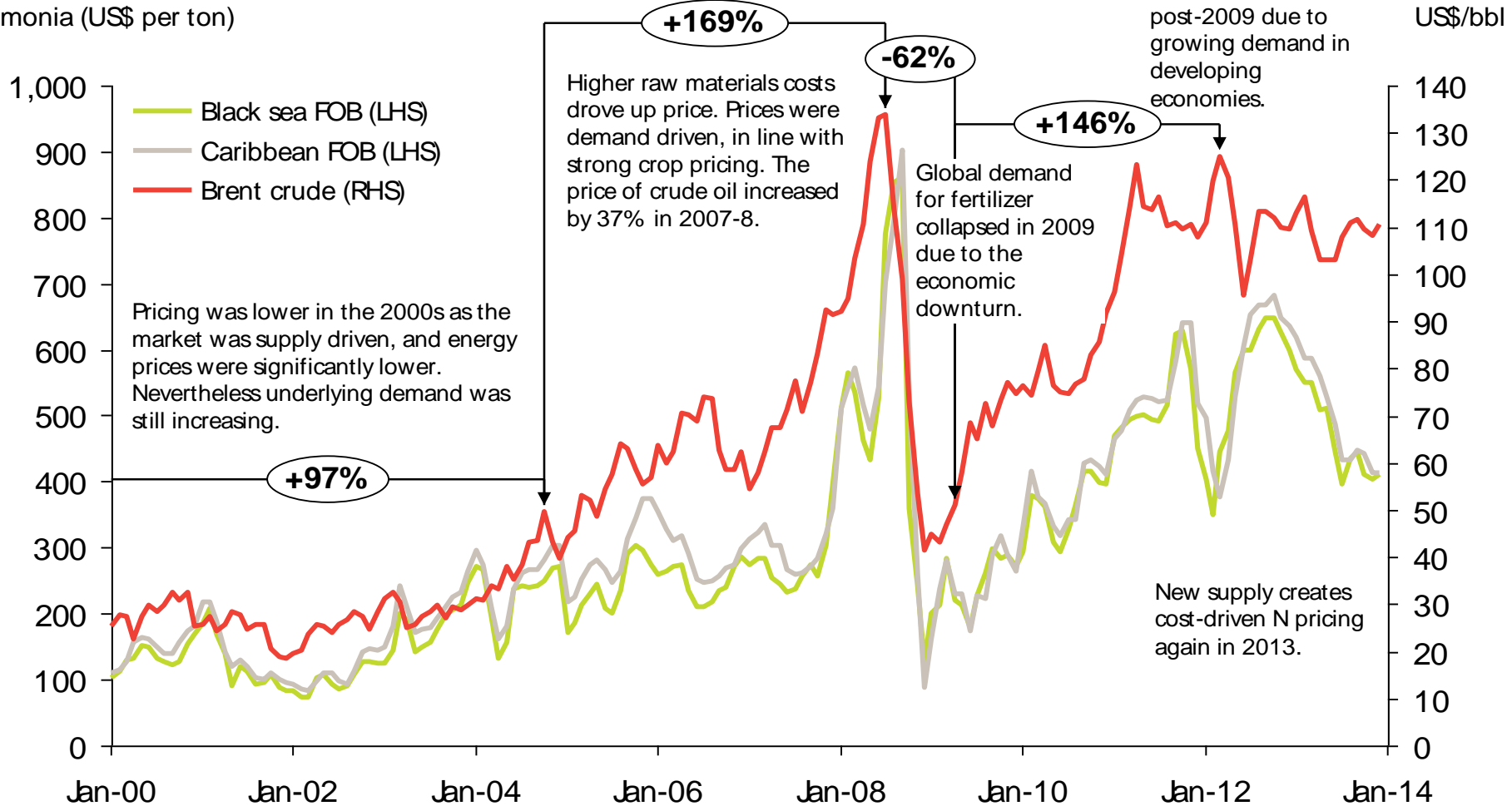
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Recent changes in the industry

In general, nitrogen pricing is predominantly supply-driven, and tends to track energy costs, with shorter cyclical fly-ups

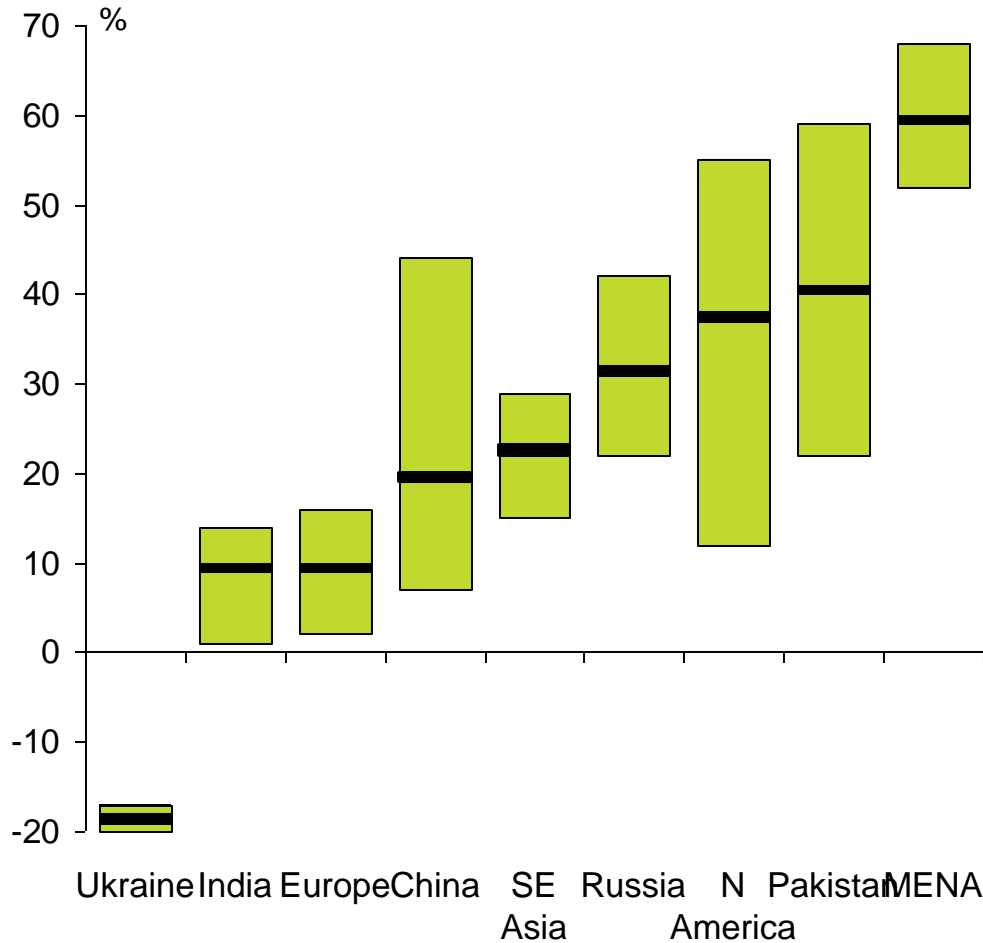
Supply-side nitrogen price drivers: energy prices and production costs

Ammonia (US\$ per ton)



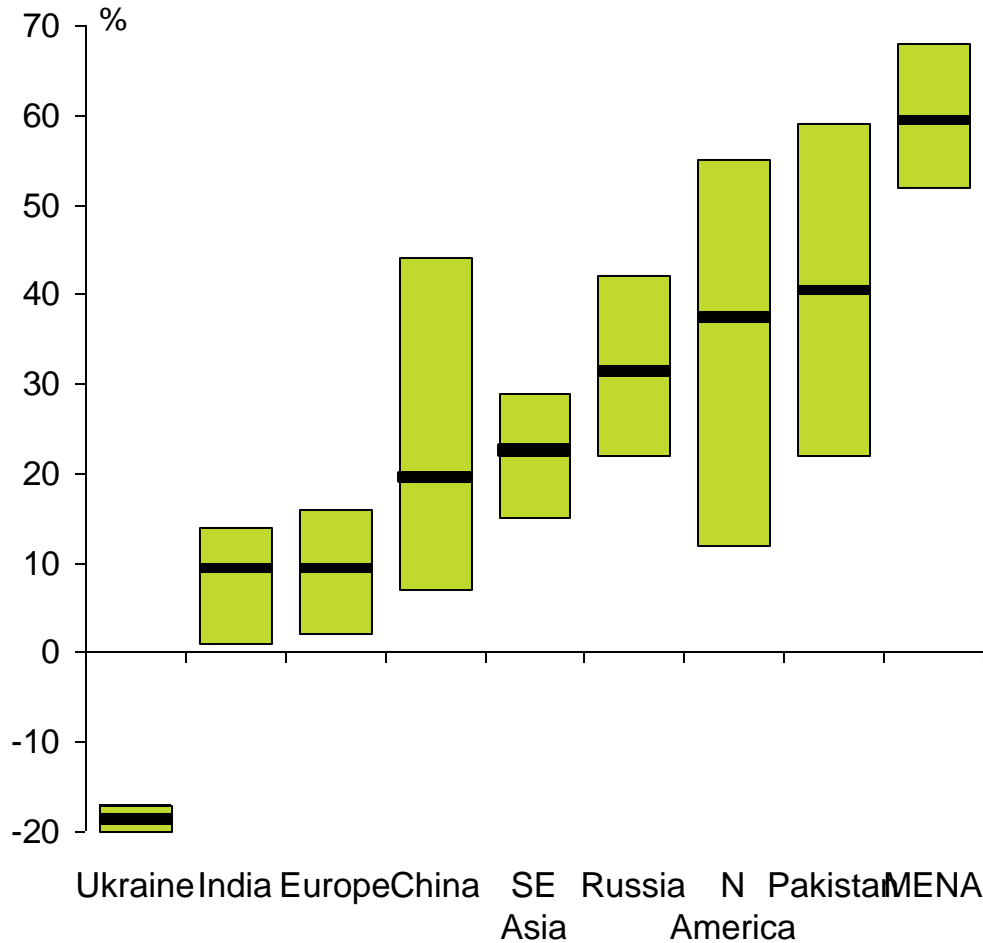
Regional gross margins vary between and within regions, with MENA generally the most profitable and Ukraine the least; the utilization rate defines the cycle

Nitrogen producer gross margin average and range, 2013

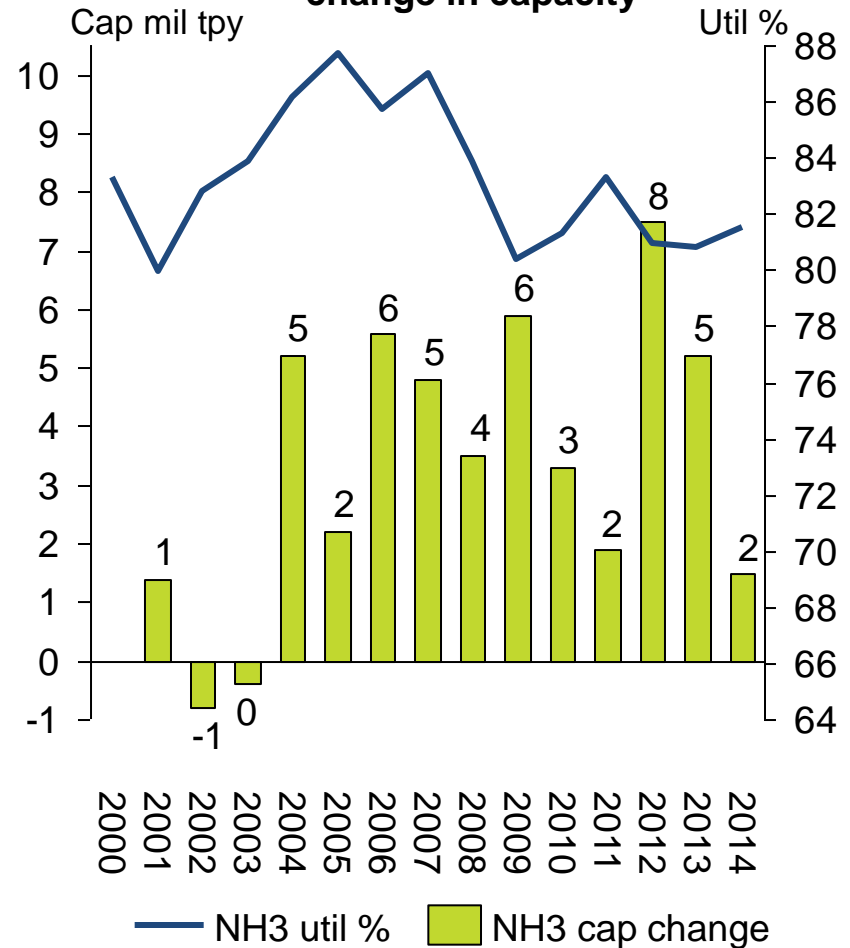


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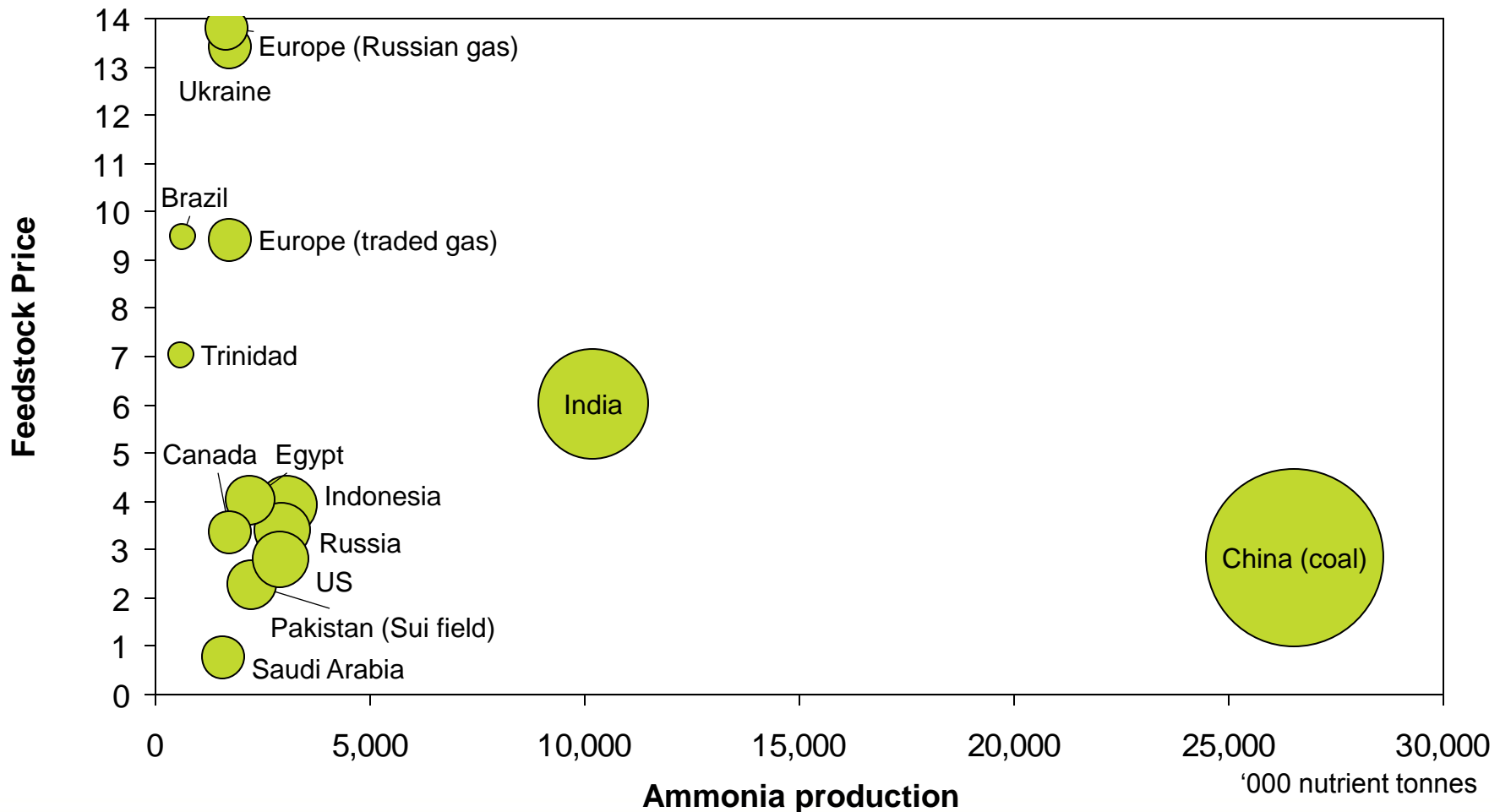
World nitrogen capacity utilization and change in capacity



Energy costs in to nitrogen producers are increasingly a function of energy competitive advantage; direct energy subsidies are reducing

US\$/MMBtu

Feedstock prices paid by nitrogen producers in 2013

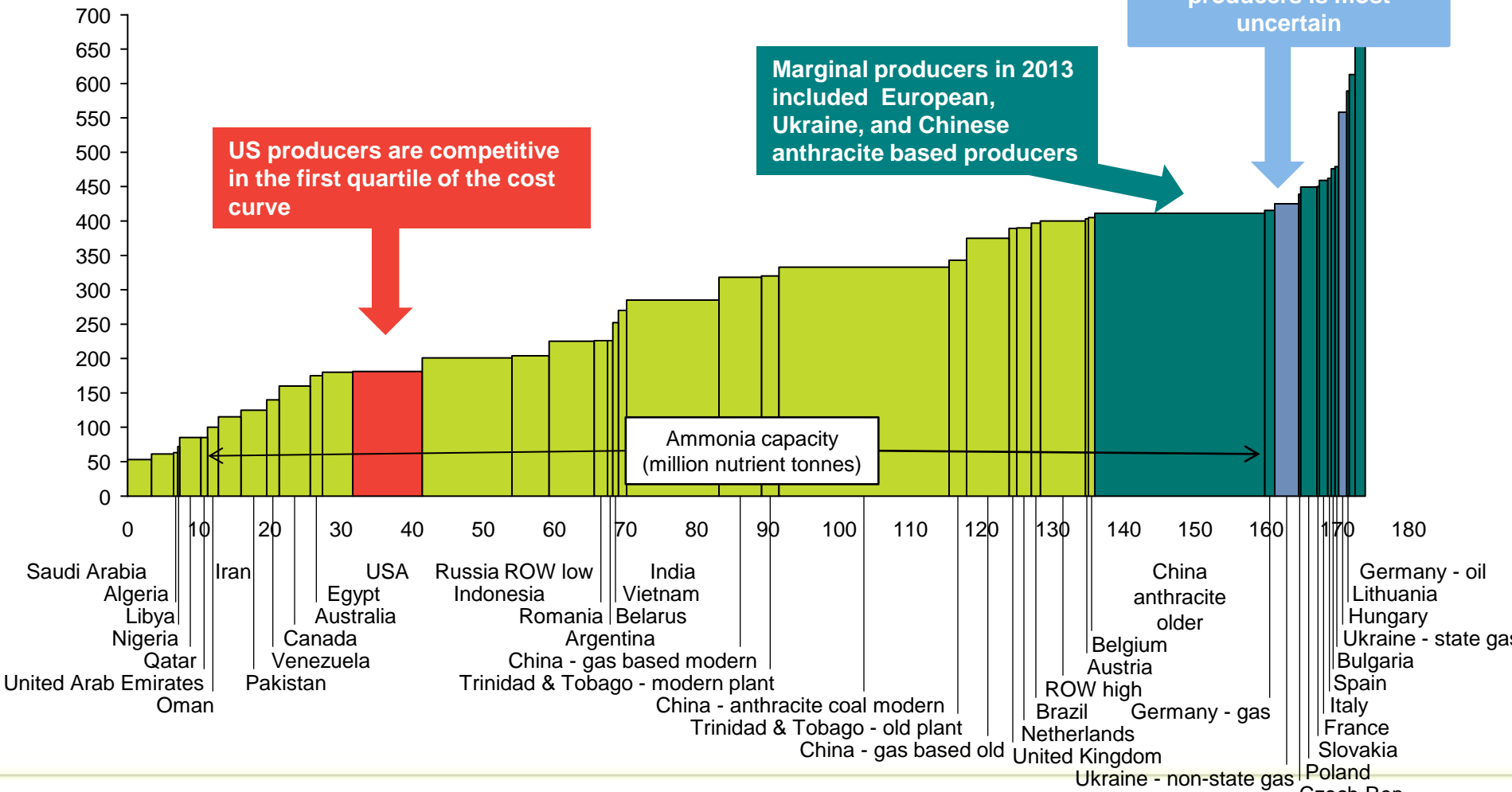


European, Ukrainian, and Chinese producers represent the current marginal producers, determining the nitrogen price floor

US\$ per short ton ammonia

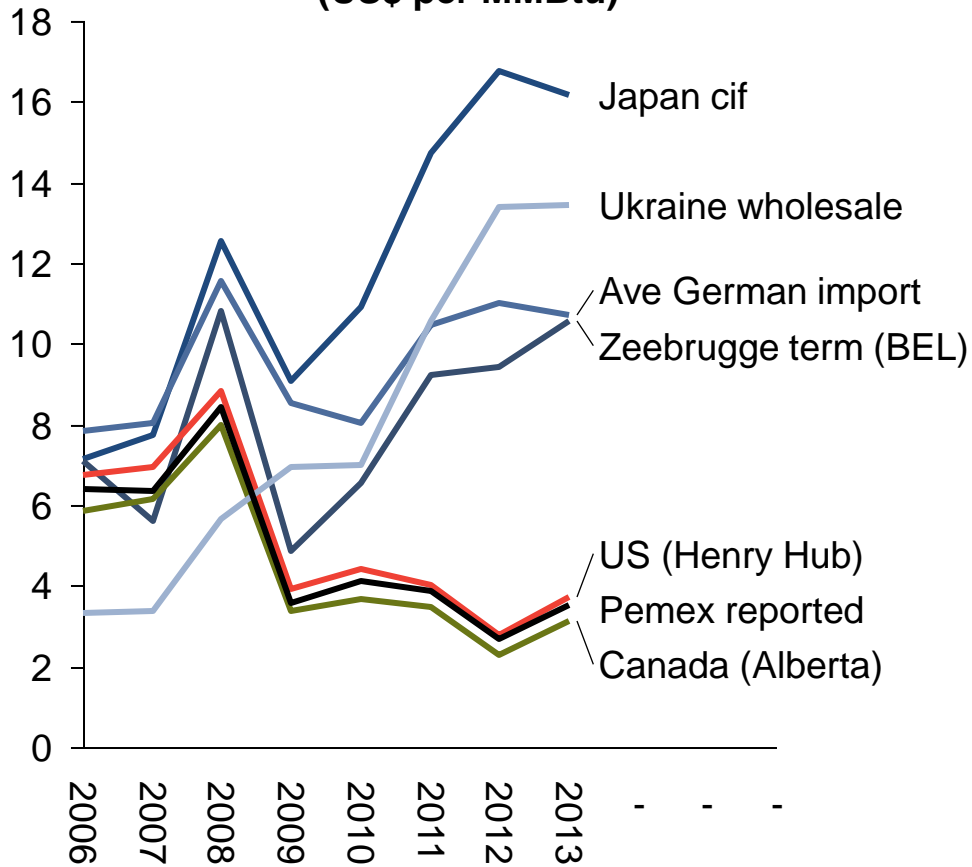
Global ammonia cost curve, 2013

US\$ per tonne ammonia



The effect of lower gas prices has transformed US production economics; and the same for Mexico

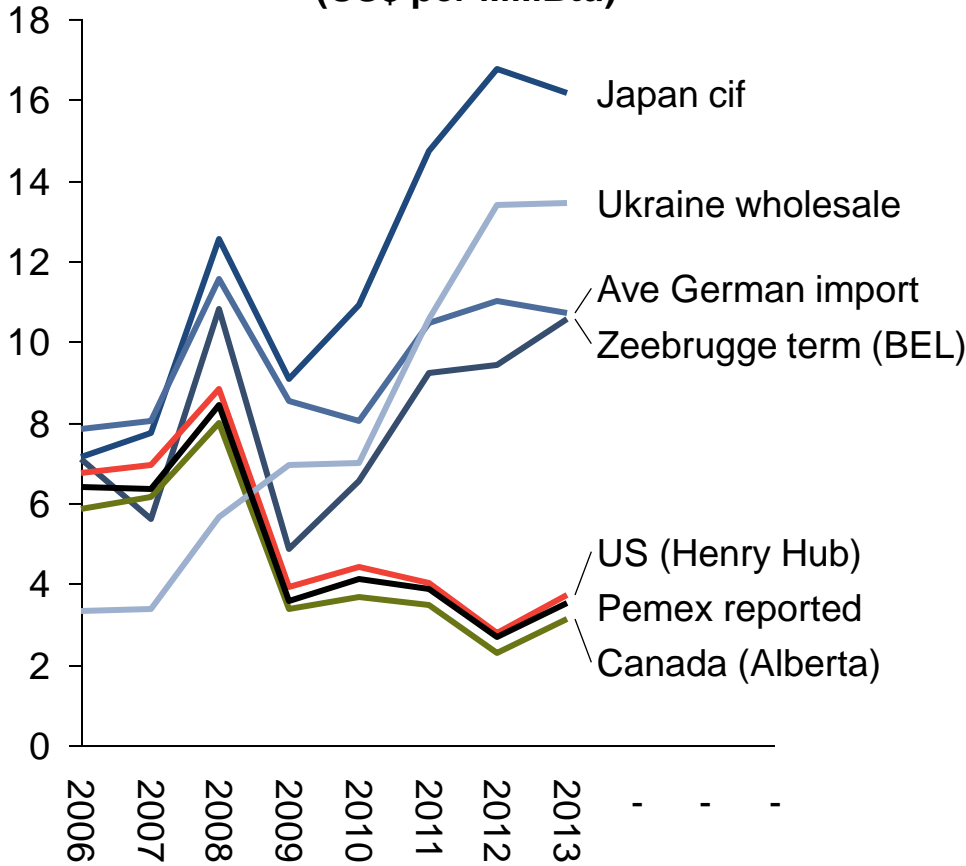
Selected annual ave gas prices
(US\$ per MMBtu)



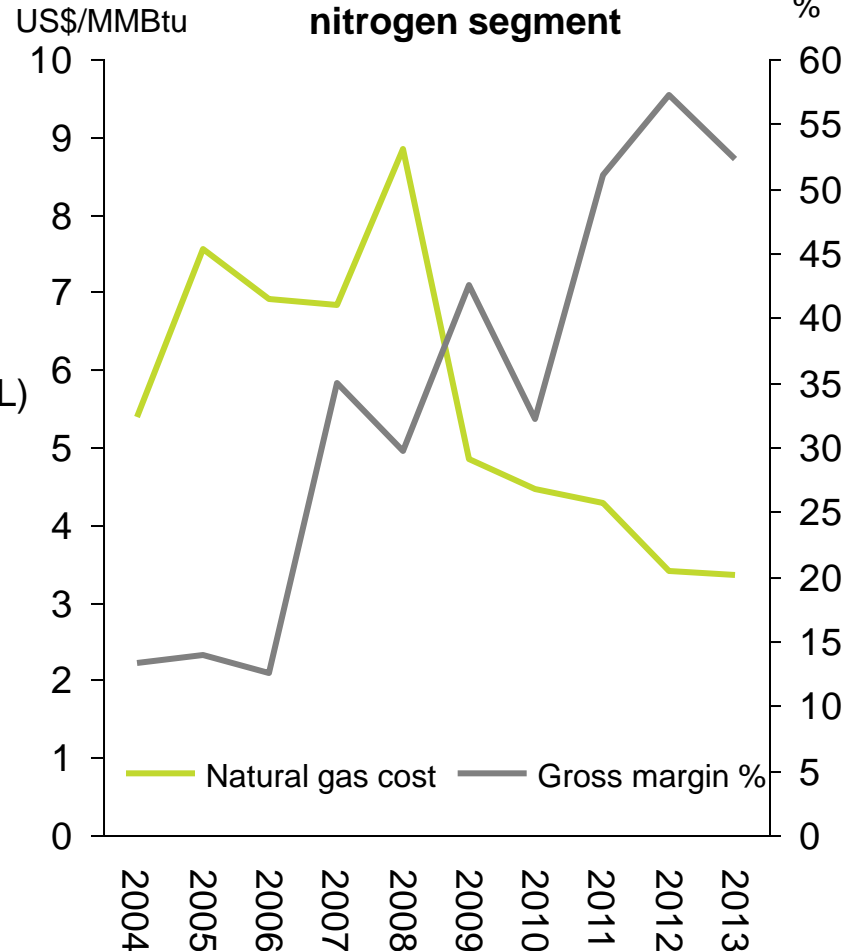
*Terra Nitrogen prior to 2008

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Selected annual ave gas prices (US\$ per MMBtu)



Profitability of CF Industries' nitrogen segment

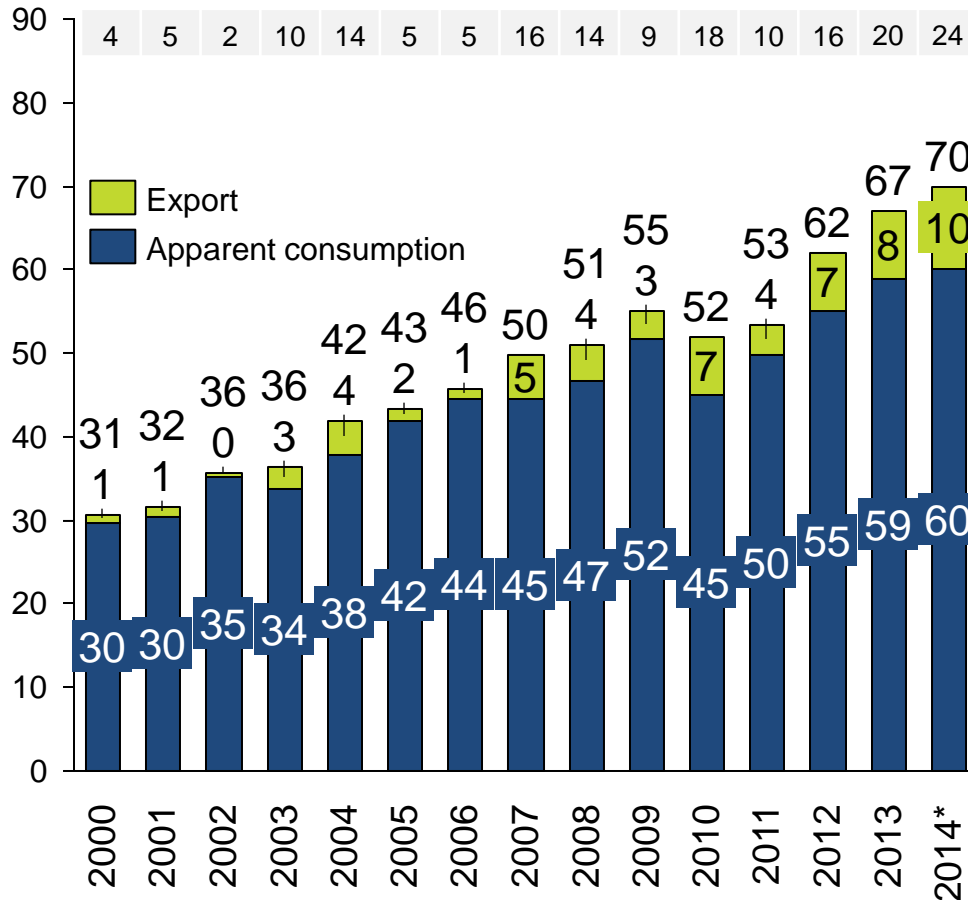


*Terra Nitrogen prior to 2008

Chinese exports and consumption of urea have been steadily growing

Chinese apparent consumption and exports of urea

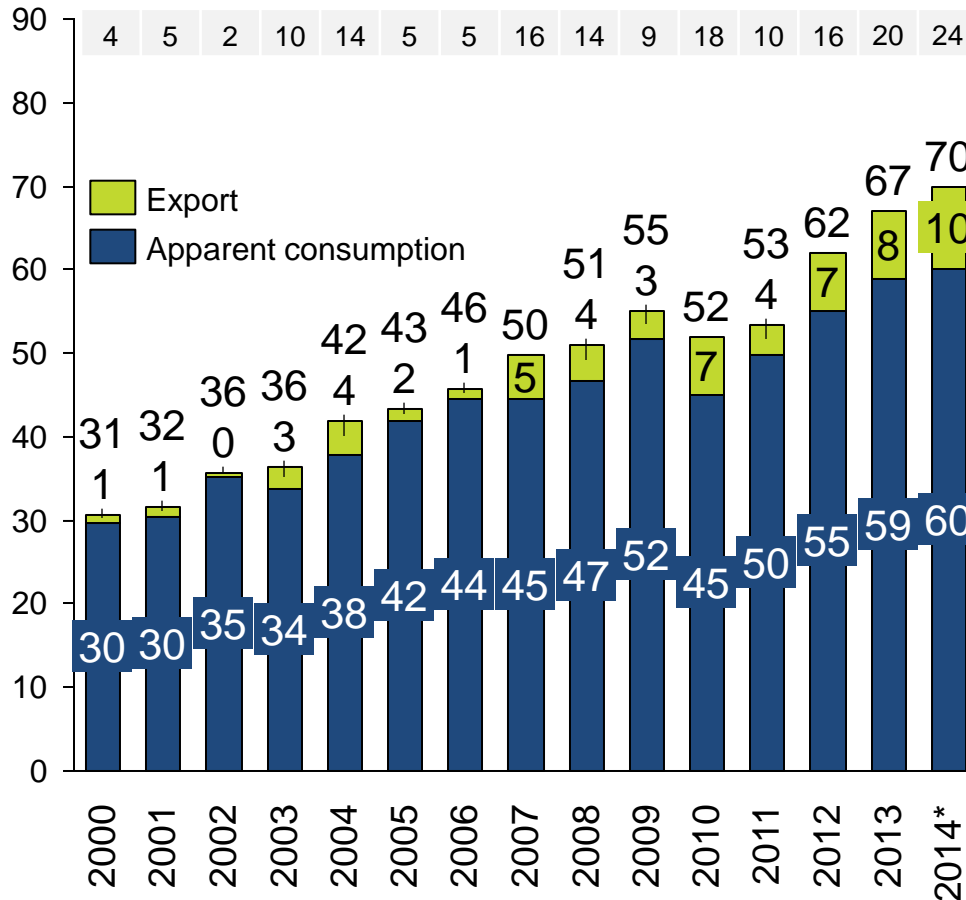
Million tonnes, product



Chinese exports and consumption of urea have been steadily growing

Chinese apparent consumption and exports of urea

Million tonnes, product



- Domestic urea apparent consumption has increased steadily and growing production has resulted in increased exports, despite recent export controls.
- **Chinese urea export volume have tripled in Jan-May 2014**, with shipments to India, USA and Bangladesh rising dramatically.
- With fiscal stimulus, new plants continue to be built
- Changing energy balance of the Chinese economy has led to cheaper coal



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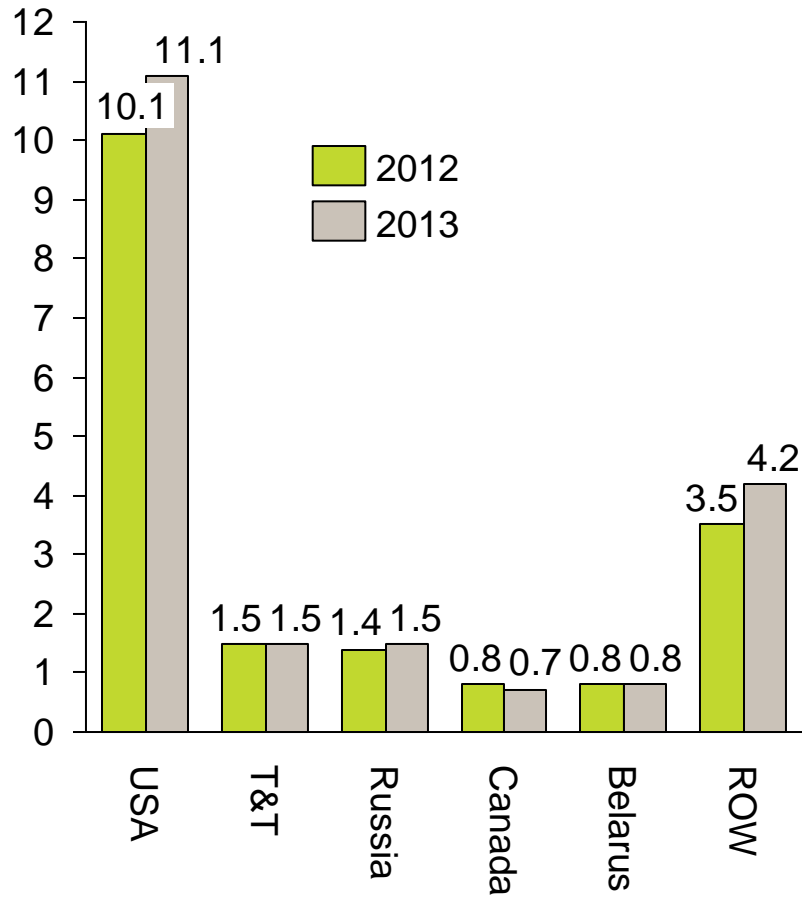
Key market developments: UAN

- What is it?
 - UAN consists of a mixture of around 35% urea and 45% ammonium nitrate in solution, with 28-32% N content depending on grade.
- Why use it?
 - It can be combined with other nutrients and agricultural input products where suitable mixing, storage and application equipment is available
 - It can be measured and applied more uniformly and accurately
 - It contains nitrogen in different forms: nitrate, ammoniacal and amide, and therefore contains nitrogen available immediately (nitrate) and with retarded action. Potentially, losses are smaller
- **But...**
 - It requires appropriate storage and specialist handling equipment and tends to be suited to larger scale, more sophisticated farming.

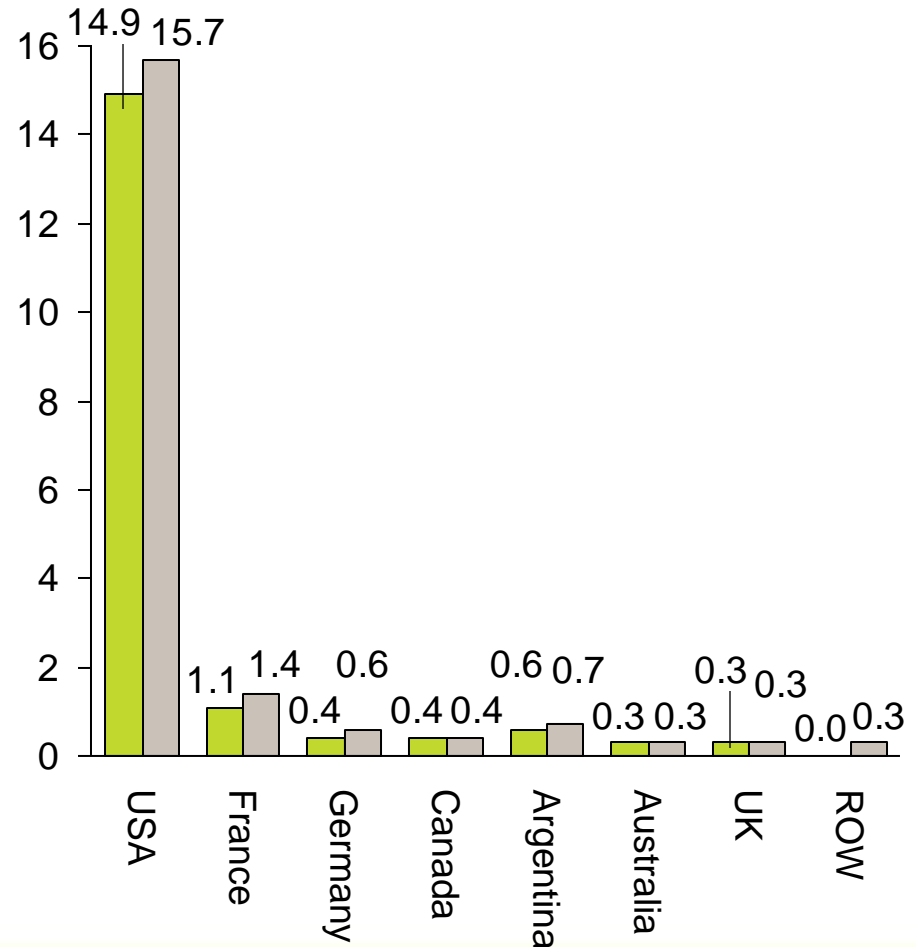


The UAN business is highly concentrated and dominated by the US. Much of production is for domestic delivery or to a few key markets

World production of UAN (million tonnes)

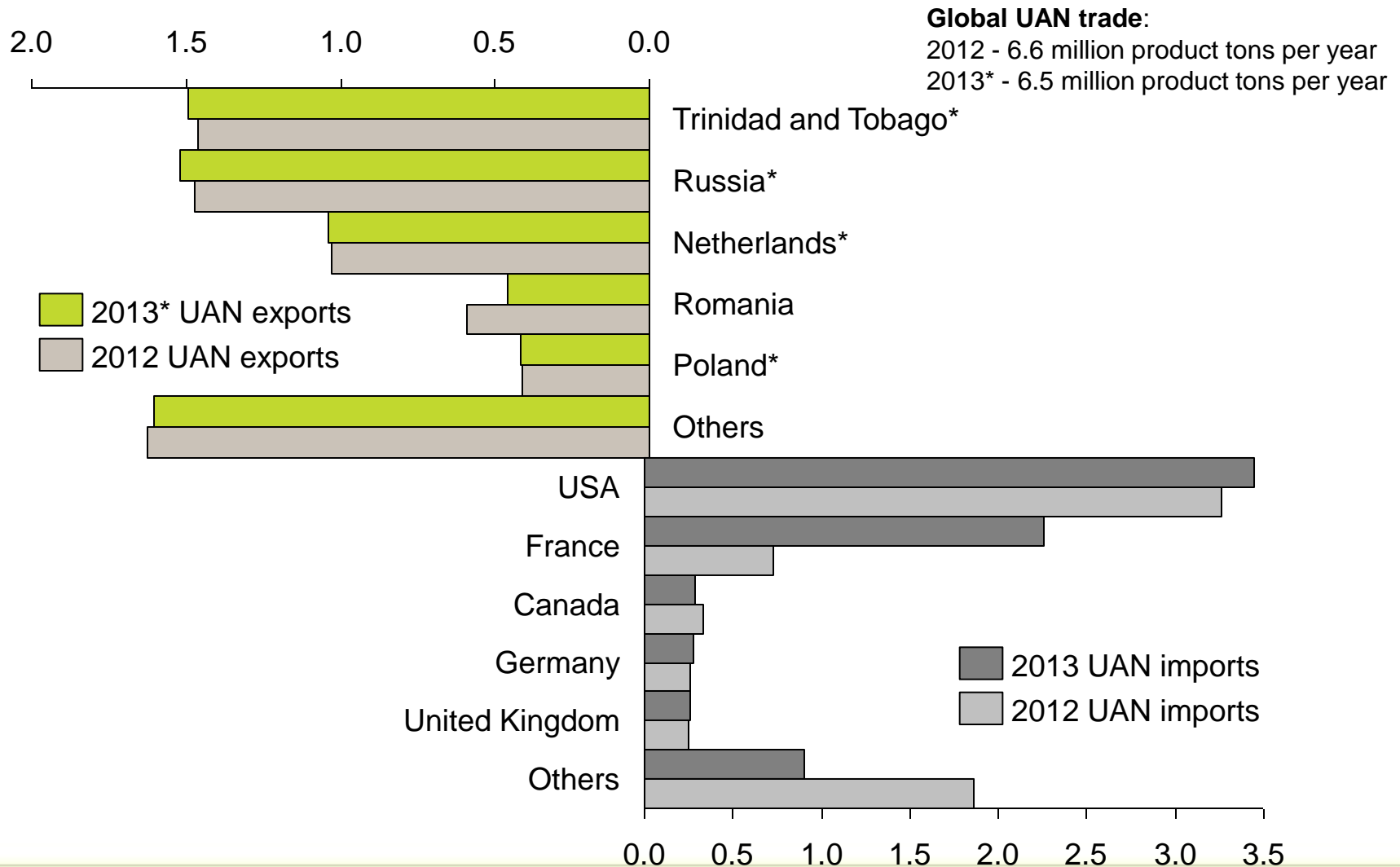


World consumption of UAN (million tonnes)



Global UAN trade is relatively stable.... For now

Million product tons per year



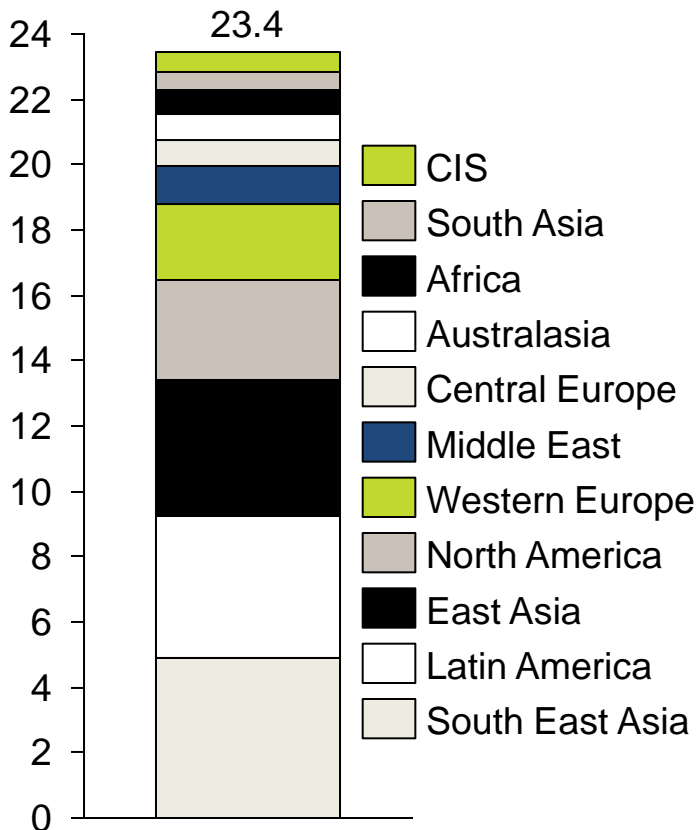
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Key market developments: ammonium sulphate

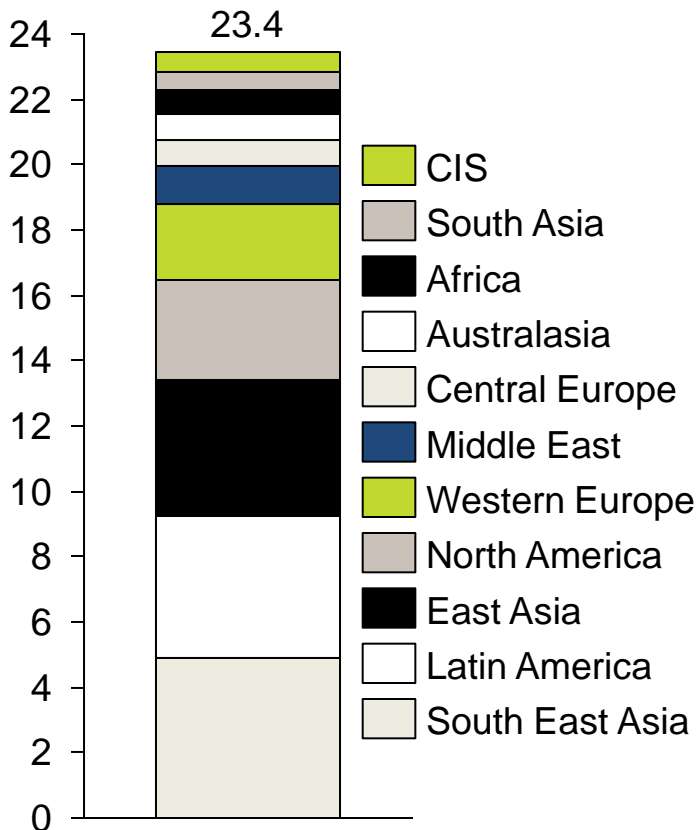
AS production and consumption is diverse. It is consumed primarily as a relatively cheap source of N; the value of S varies from market to market.

World demand for AS 2013
(million tonnes)

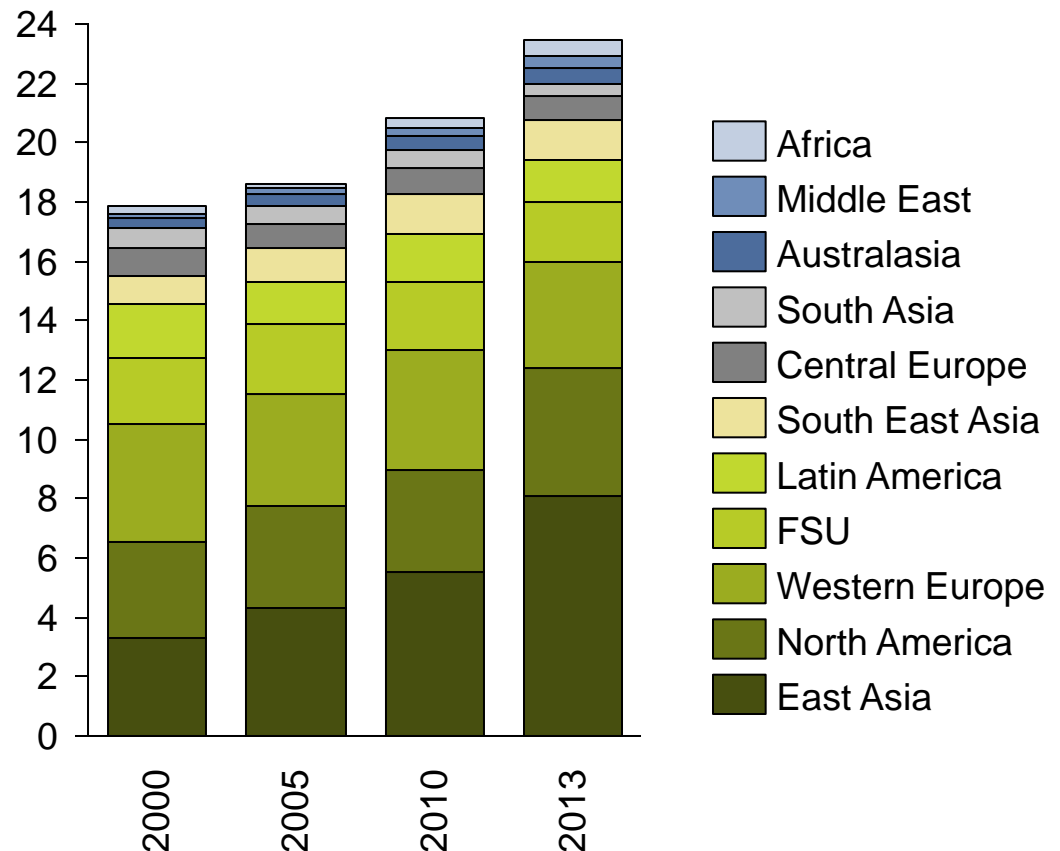


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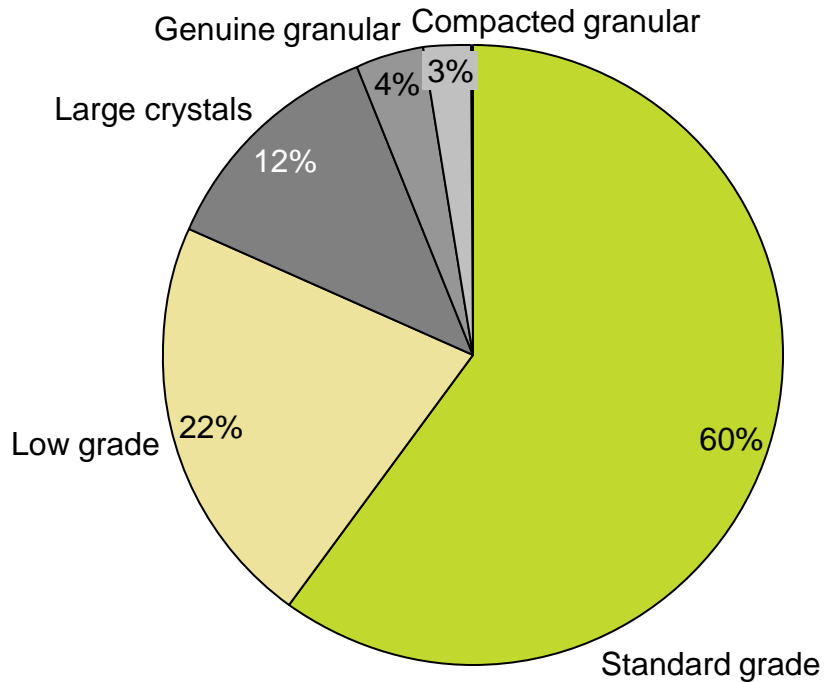


World AS supply (million tonnes)



AS production is also highly variable by production source and grade. It is non-commoditized; sophisticated markets will only take larger white product

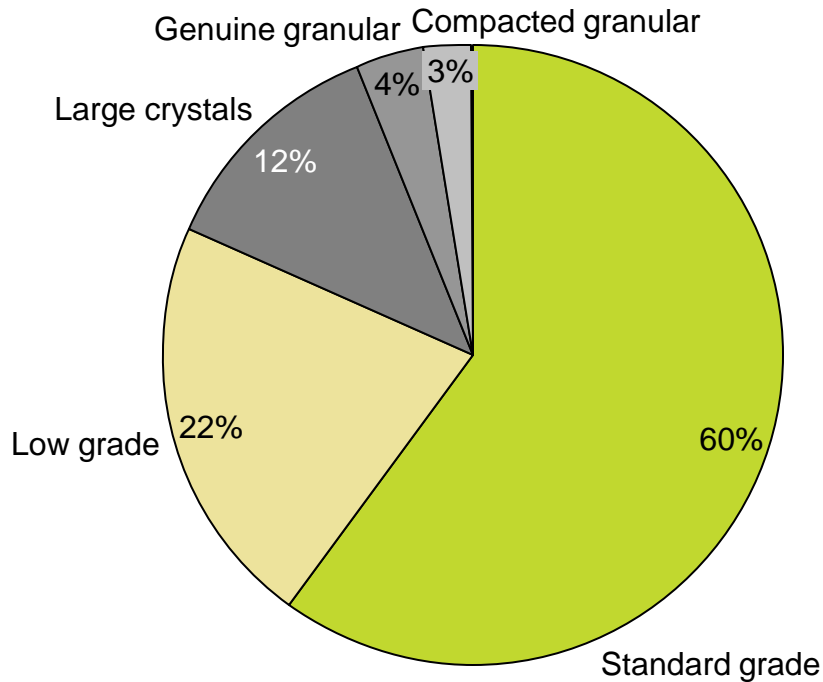
AS capacity by grade, 2012



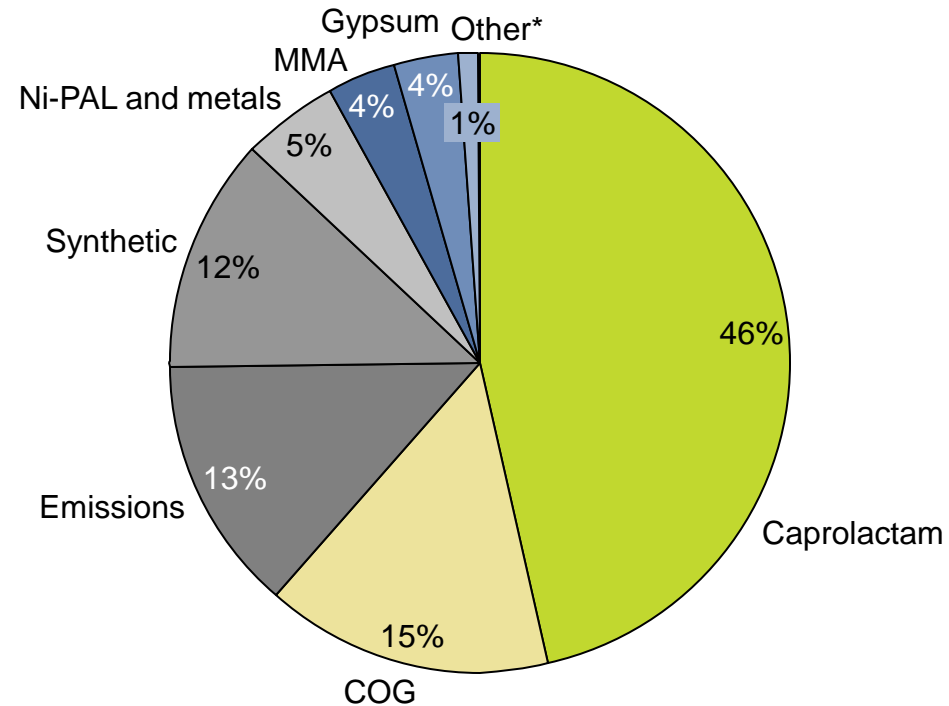
Total capacity in 2012: 31 million tpy

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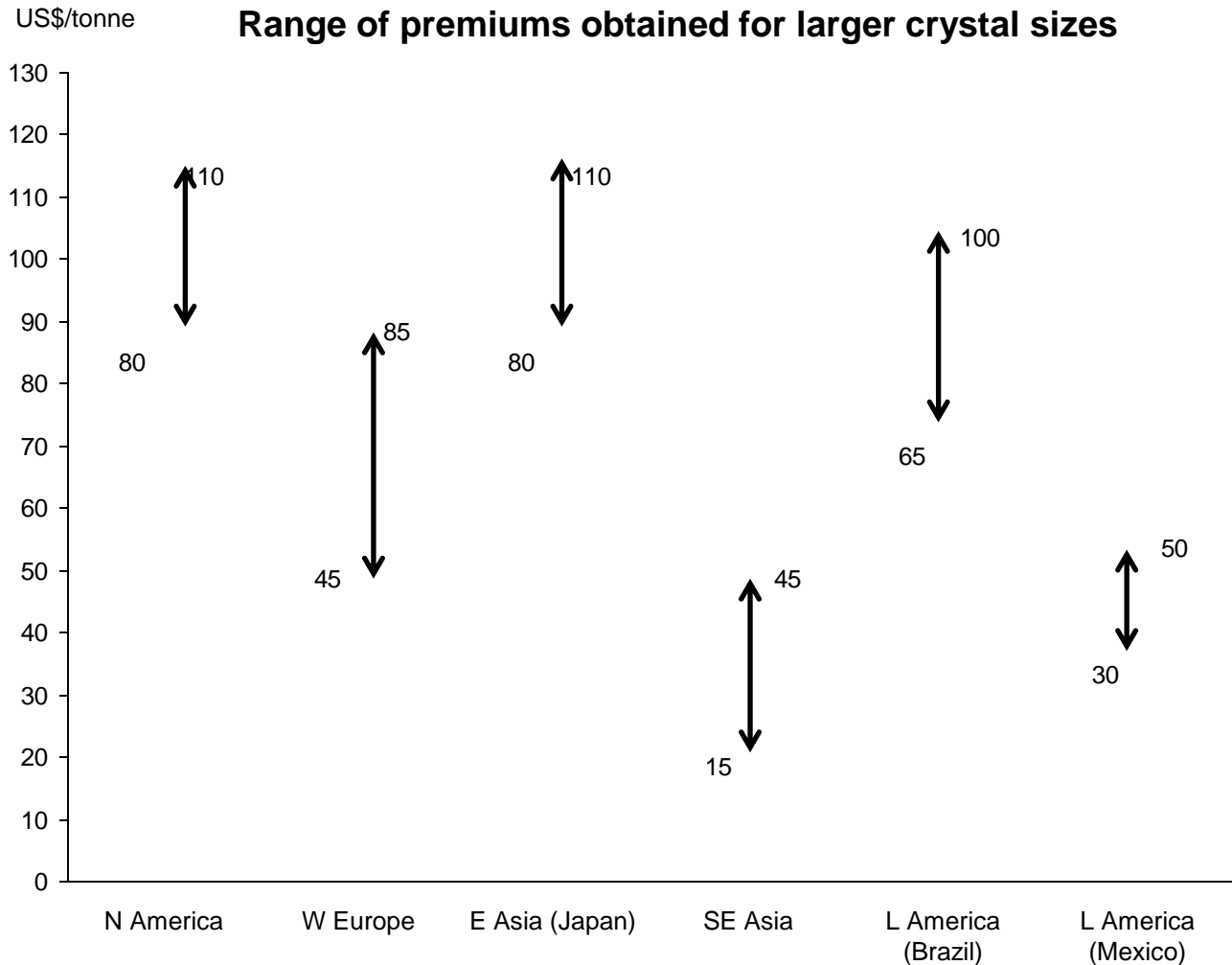
AS capacity by technology, 2012



Total capacity in 2012: 31 million tpy

* Includes ACN and cyanuric acid

AS pricing premium : big crystals (2-3mm) obtain a premium compared with standard grade crystals (<1mm)



- The listed premiums are estimates based on prices in 2012 and 2013.
- The difference in premiums is widest in developed markets such as Europe, North America, Australia and New Zealand. It is lower in Asia, SE Asia, Africa and the Middle East
- Premiums are partly a result of the fact that there is stronger competition amongst suppliers in standard grade markets than in bigger crystals.
- Large crystals are not available in some markets that are not included in this chart, such as FSU countries, India and China.

China is also transforming the AS market: in 2012 East Asia was the biggest exporter mainly exporting to SE Asia

AS trade matrix, 2012 (000 tonnes)

Exporters Importers	Africa	Australasia	CIS	East Asia	Eastern Europe	Latin America	Middle East	North America	South Asia	South East Asia	Western Europe	Total
Africa		-	66	61	8	-	-	28	-	-	161	323
Australasia	-		-	92	-	-	-	127	-	10	-	229
CIS	-	-		2	-	-	-	-	-	-	-	2
East Asia	-	-	-		-	-	-	28	-	18	5	50
eastern europe	-	-	140	-		-	4	-	-	-	146	290
Latin America	-	-	463	237	164		-	1,052	-	-	876	2,791
Middle East	-	-	655	11	19	-		-	-	-	157	842
North America	-	-	-	24	5	-	-		-	-	41	70
South Asia	-	-	15	70	-	-	-	-		-	12	96
South East Asia	2	40	200	3,088	-	-	-	1	-		143	3,474
Western Europe	-	-	27	-	82	-	4	-	-	-		114
Total	2	40	1,566	3,585	278	-	8	1,236	-	28	1,541	

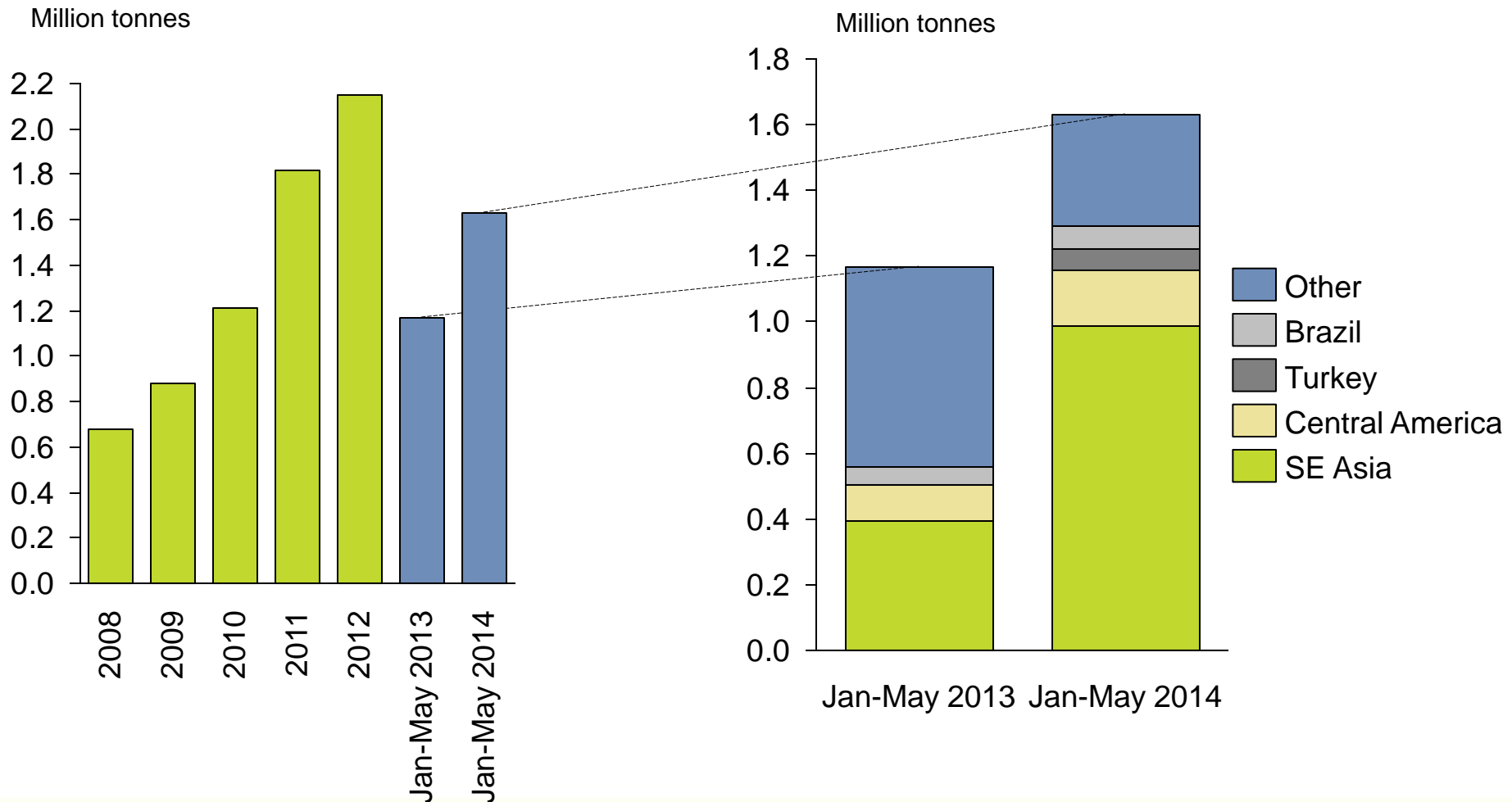
Huge investment in caprolactam in China is changing the supply balance; and with it the AS market

AS capacity expansion projects in China from CPL, 2013-2016 ('000 tpy)

Company	Location	CPL capacity	Projected AS capacity	Comment / Completion time
Shandong Haili	Jiangsu	200	280	On-stream in August 2013
Hubei Sanning	Hubei	200	320	On-stream in August 2013
Luxi Chemical Group	Shandong	100	160	On-stream in June 2013
Fuzhou Yaolong Chemical	Fujian	200	320	2012-2014
Hebei Xuyang Chemical	Hefei	400	640	2012-2014
Dongju Chemical	Shandong	100	160	2012-2014
Juhua Group	Zhejiang	100	160	2012-2014
Shanxi Lanhua Kechuang	Shanxi	200	320	2012-2014
Inner Mongolia Qinghua	Inner Mongolia	200	320	2012-2014
Dongxin Oil & Chemical	Fujian	100	160	2012-2014
Shandong Huamao	Shandong	100	160	2012-2014
Sinopec Balin Petrochemical	Fujian	200	320	2013-2015
Sinopec Balin Petrochemical	Guandong	200	320	2013-2015
Yangquan Coal	Shanxi	200	320	2013-2015
Jiangsu Sanding Petrochemical	Jiangsu	100	160	2013-2015
Fujian Shen yuan	Fujian	200	320	2013-2016
Pingmei Shenma	Henan	200	320	2013-2016

Chinese export volumes have increased substantially in 2014, with volumes growing to SE Asian markets as well as Central America and Turkey

Chinese AS export volumes



AS trade: East Asia will remain the biggest exporter by 2025

AS trade matrix, 2025 (000 tonnes)

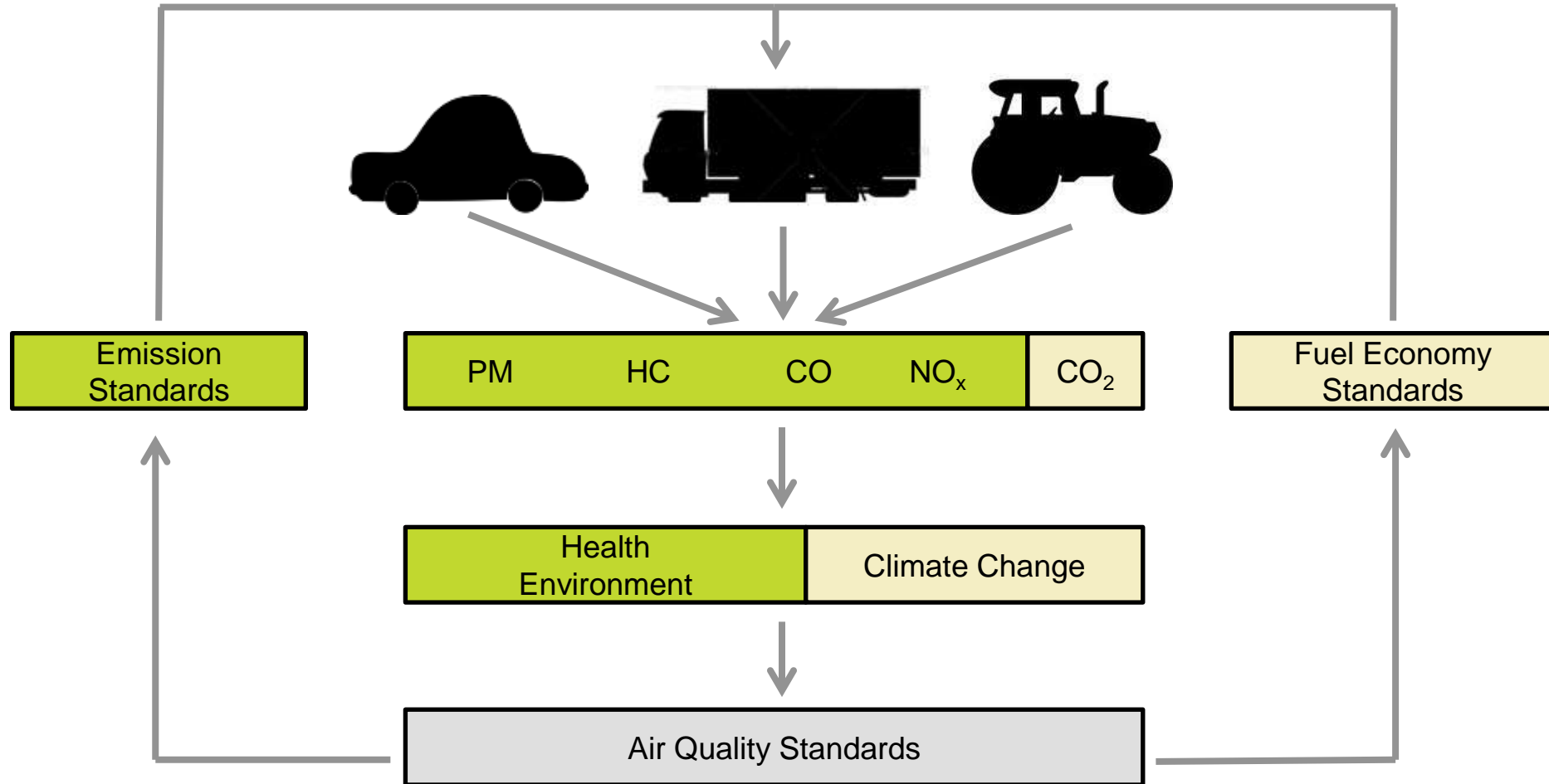
Exporters Importers	Africa	Australasia	CIS	East Asia	Eastern Europe	Latin America	Middle East	North America	South Asia	South East Asia	Western Europe	Total
Africa		-	-	135	8	-	122	35	-	-	155	454
Australasia	-		-	144	-	-	-	162	-	2	-	308
CIS	-	-		2	-	-	-	-	-	-	-	2
East Asia	-	-	-		-	-	-	43	-	0	5	48
eastern europe	85	-	42	-		-	113	-	-	-	141	381
Latin America	21	-	155	359	154		130	1,306	-	-	925	3,049
Middle East	13	-	452	52	19	-		-	-	-	160	695
North America	-	-	-	94	5	-	-		-	-	42	141
South Asia	4	-	15	119	-	-	65	-		-	12	215
South East Asia	2	72	-	4,073	-	-	50	1	-		98	4,296
Western Europe	64	-	27	-	72	-	106	-	-	-		269
Total	189	72	691	4,978	258	-	586	1,547	-	2	1,538	



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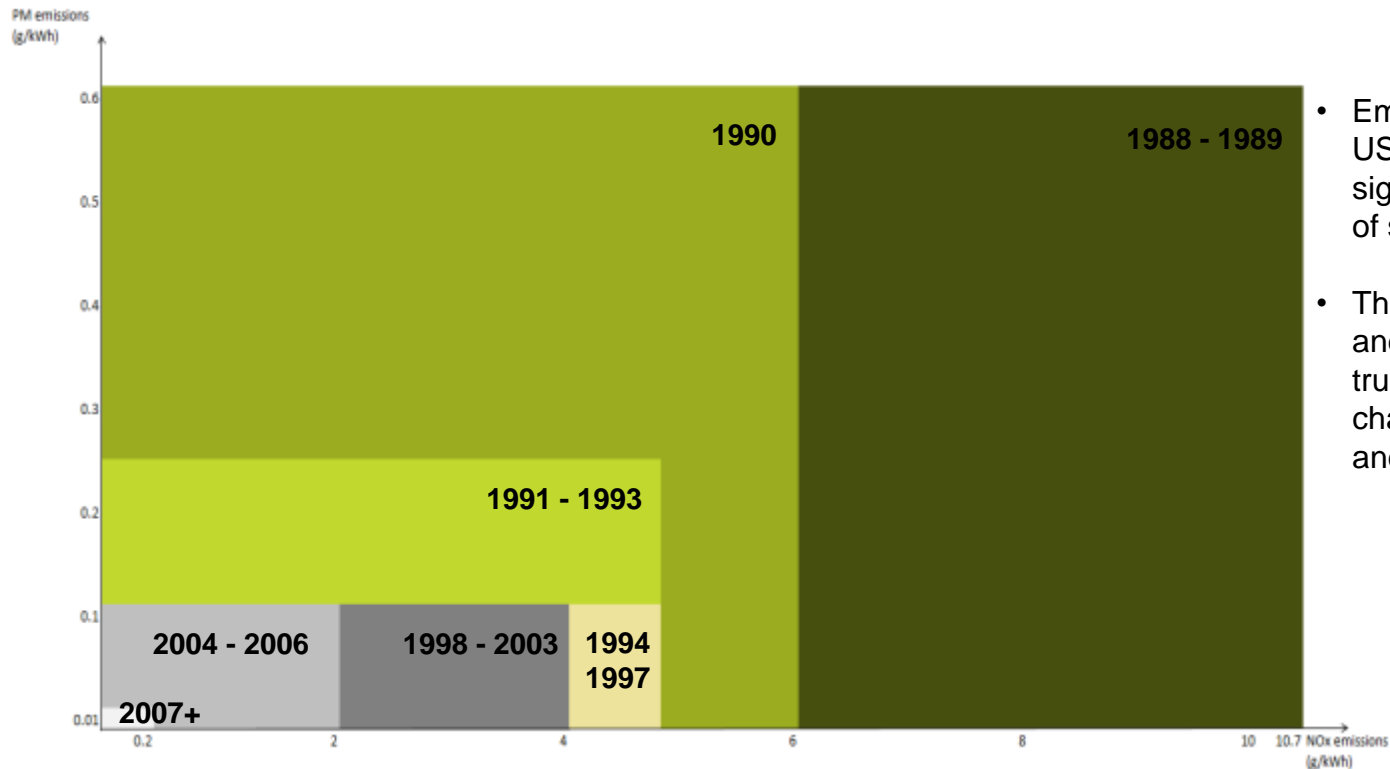
Key market developments: urea for emissions control/DEF

The relationship between air quality, emission standards and DEF



PM – particulate matter, HC – hydrocarbons, CO – carbon monoxide, NO_x – nitrogen oxide, CO₂ – carbon dioxide

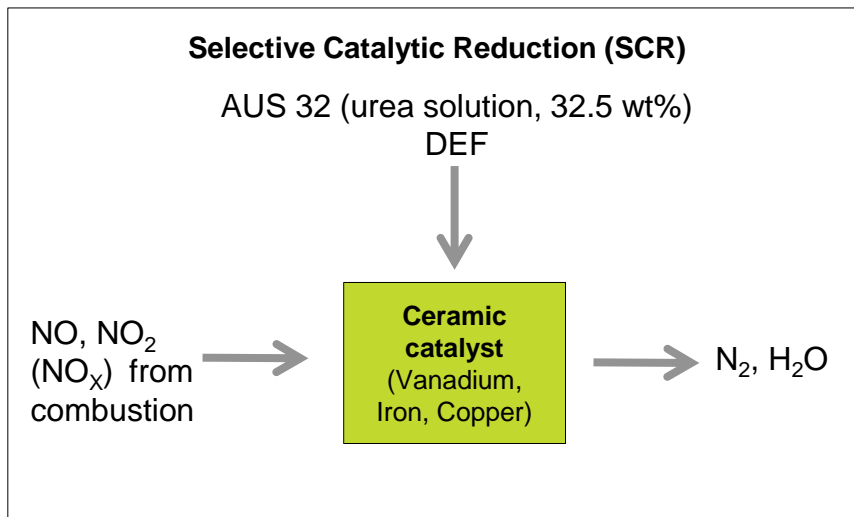
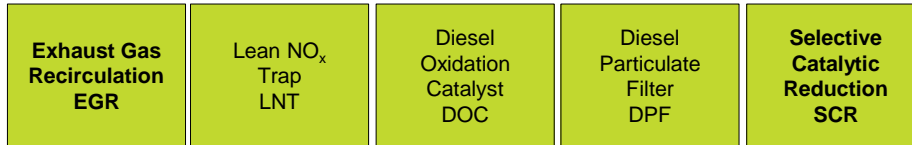
Regulations are gradually being introduced to reduce emissions of NO_x and PM



- Emission limits for NO_x and PM in the US and Canada have been significantly lowered since the first set of standards in 1988.
- The chart shows the evolution of NO_x and PM emissions for heavy-duty trucks. The years indicated in the chart refer to the vehicle model year and not to the calendar year.

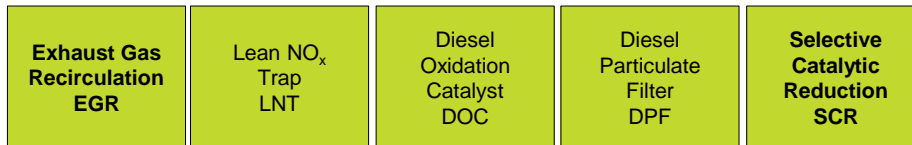
Different standards can be achieved with different technology, but at a certain point, SCR technology is necessary, which consumes urea

Aftertreatment technologies to reduce NO_x and PM levels



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Aftertreatment technologies to reduce NO_x and PM levels



Selective Catalytic Reduction (SCR)

AUS 32 (urea solution, 32.5 wt%)

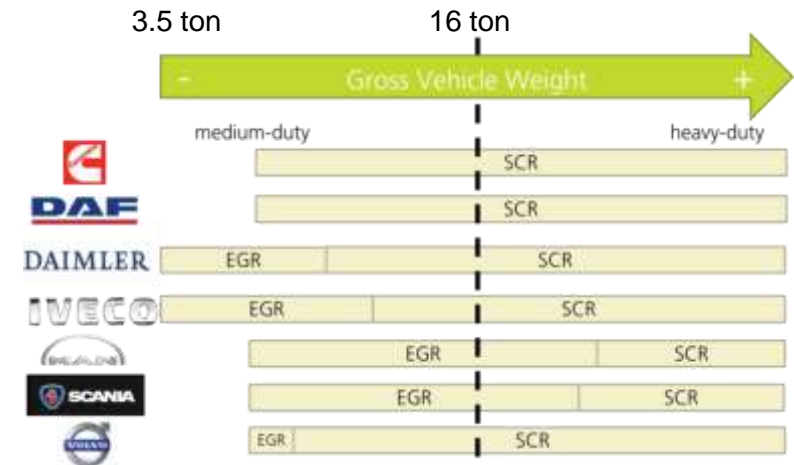
DEF

NO, NO₂
(NO_x) from
combustion

Ceramic catalyst
(Vanadium,
Iron, Copper)

N₂, H₂O

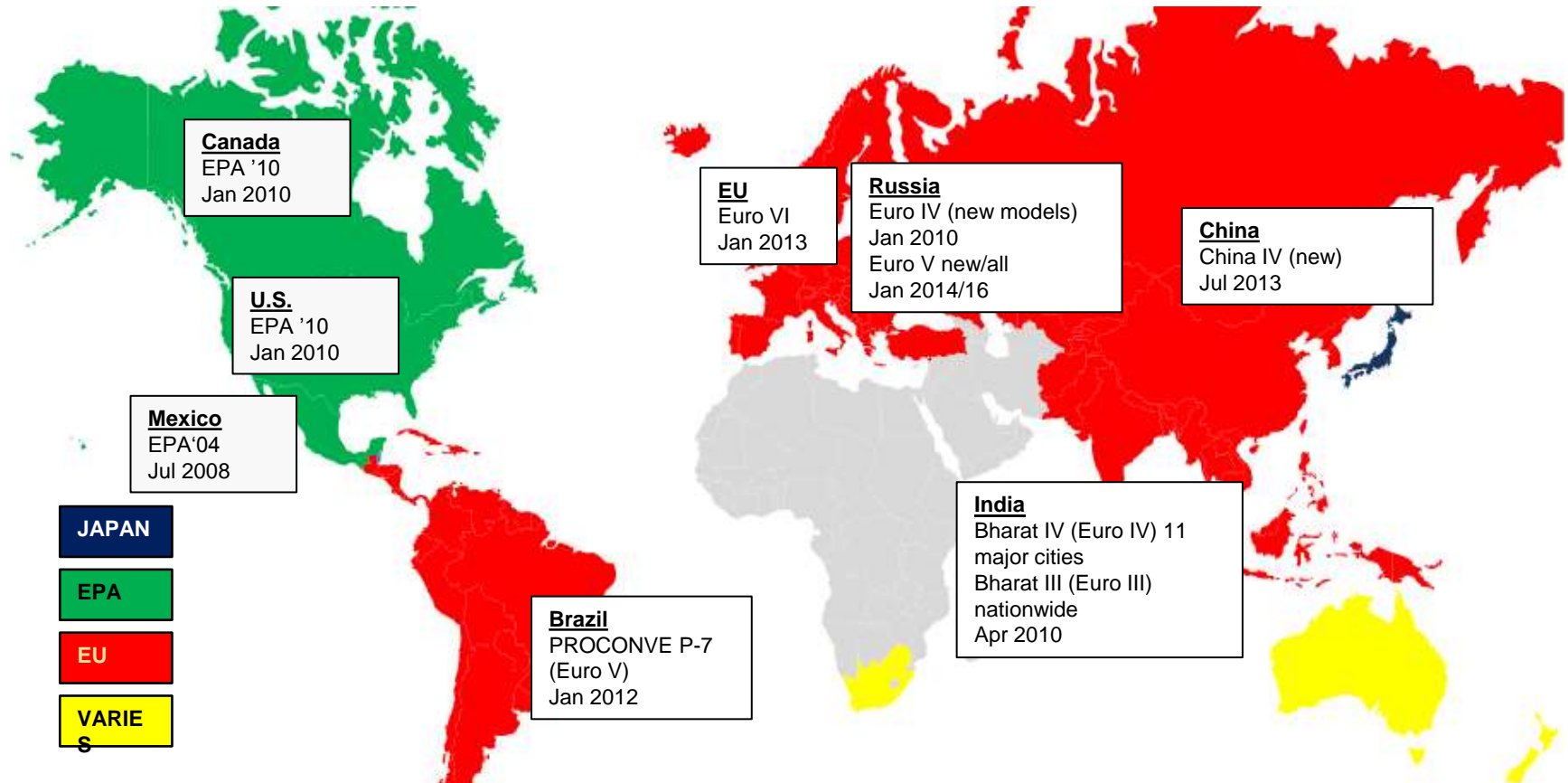
European truck manufacturers' choices for Euro IV and V



In the U.S. and Canada:

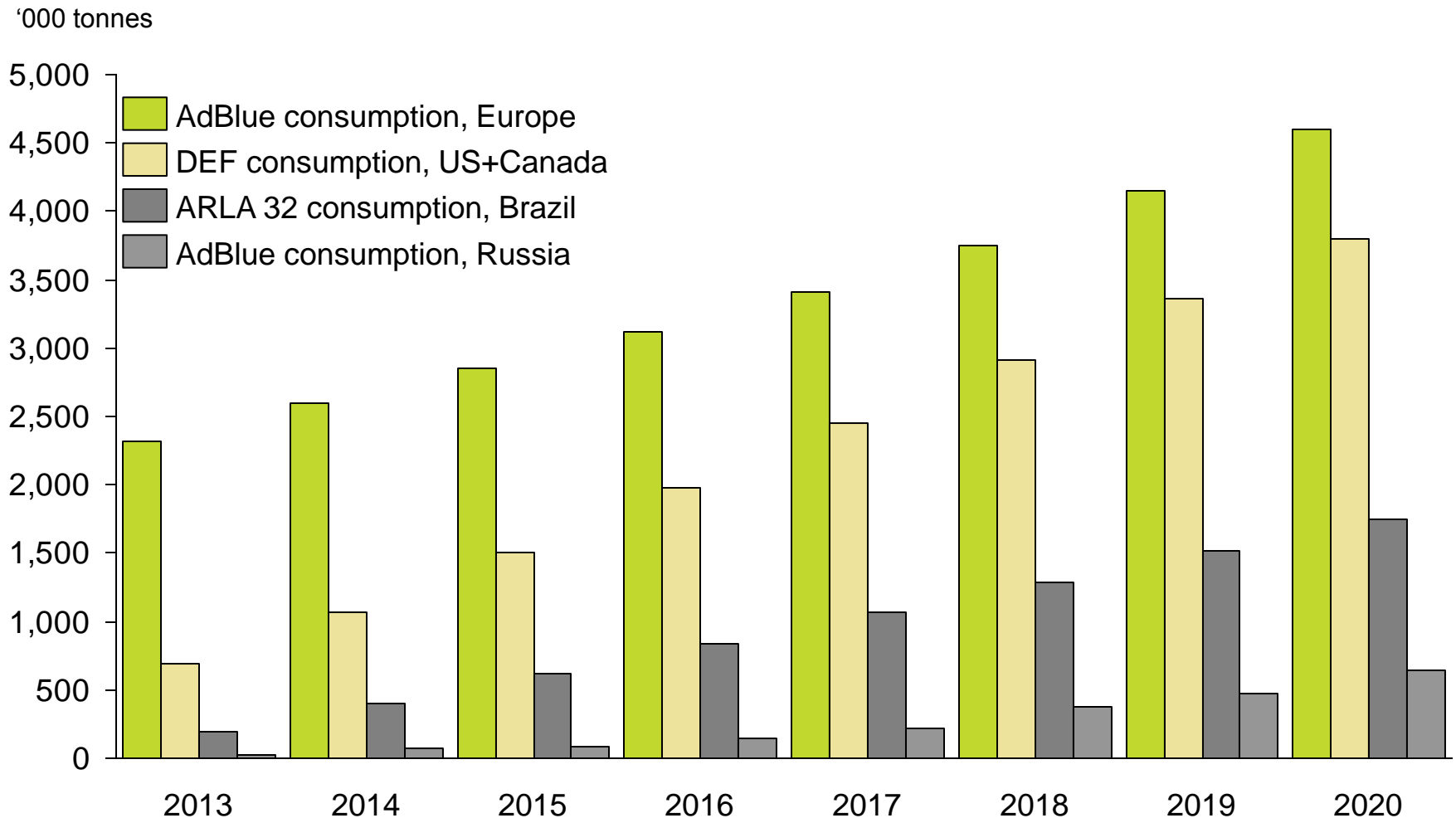
- **SCR** is the best aftertreatment technology to meet EPA 2007 NO_x levels
- The **Averaging, Banking and Trading (ABT) system** allowed OEMs to accumulate emission credits since EPA 2004 and engines between 2007 and 2009 did not necessarily meet standards
- In 2010, all OEMs implemented SCR in medium and heavy-duty vehicles, except Navistar, which was still benefitting from the credit system
- Navistar has the last OEM to switch from EGR to SCR, with a full implementation in December 2013

Emission standards are the main driver to the development of DEF markets worldwide



European Union, U.S. and other developed countries have the most stringent emission standards for medium and heavy-duty vehicles

The countries and regions with the strictest regulations drive the DEF market: Europe, U.S. and Canada are forecast to remain the main DEF/AdBlue consumption markets



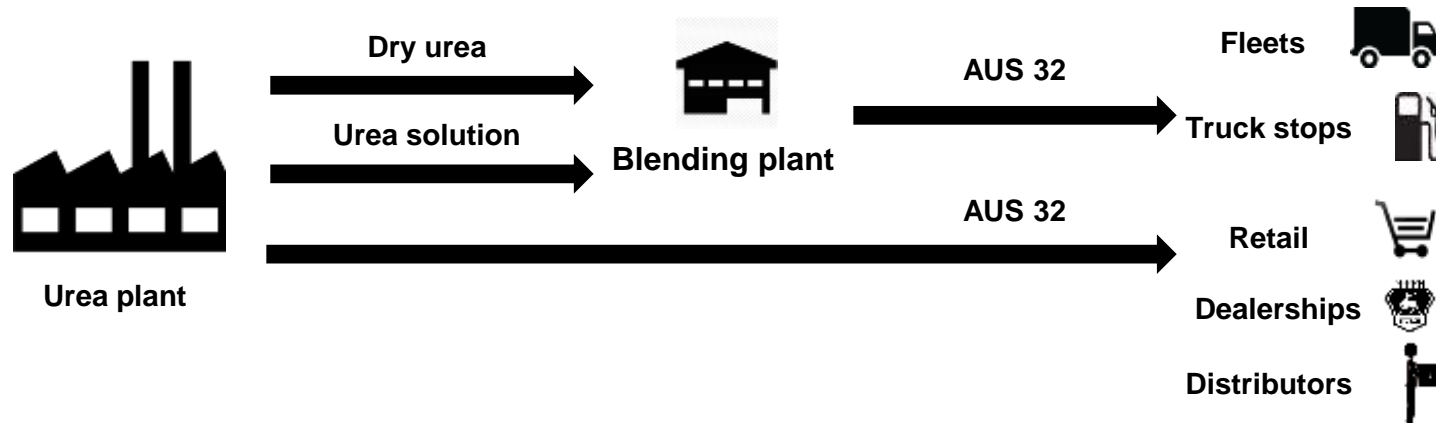
DEF is produced using two methods:

1. **From hot urea melt:** Plants that produce urea can produce DEF directly from the hot urea melt at the same location. This is the most common method to produce DEF, 15 plants in total. The product can be shipped as finished DEF to distributors and customers, or transported as a high concentration urea fluid (~50%), which is then diluted at blending plants.
 2. **From dry urea:** Urea plants can also produce prilled urea and then ship this product to blending sites closer to a consumption market. Prilled urea is then mixed with deionized water to produce DEF. There are approximately 42 blending sites operating in North America.
- Urea used in DEF production is distinct from agricultural urea and needs to meet much higher quality standards in terms of purity.

DEF production process overview

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The logo for 'integer' consists of a solid blue square with the word 'integer' written in white lowercase letters inside it.

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The future: opportunities and challenges

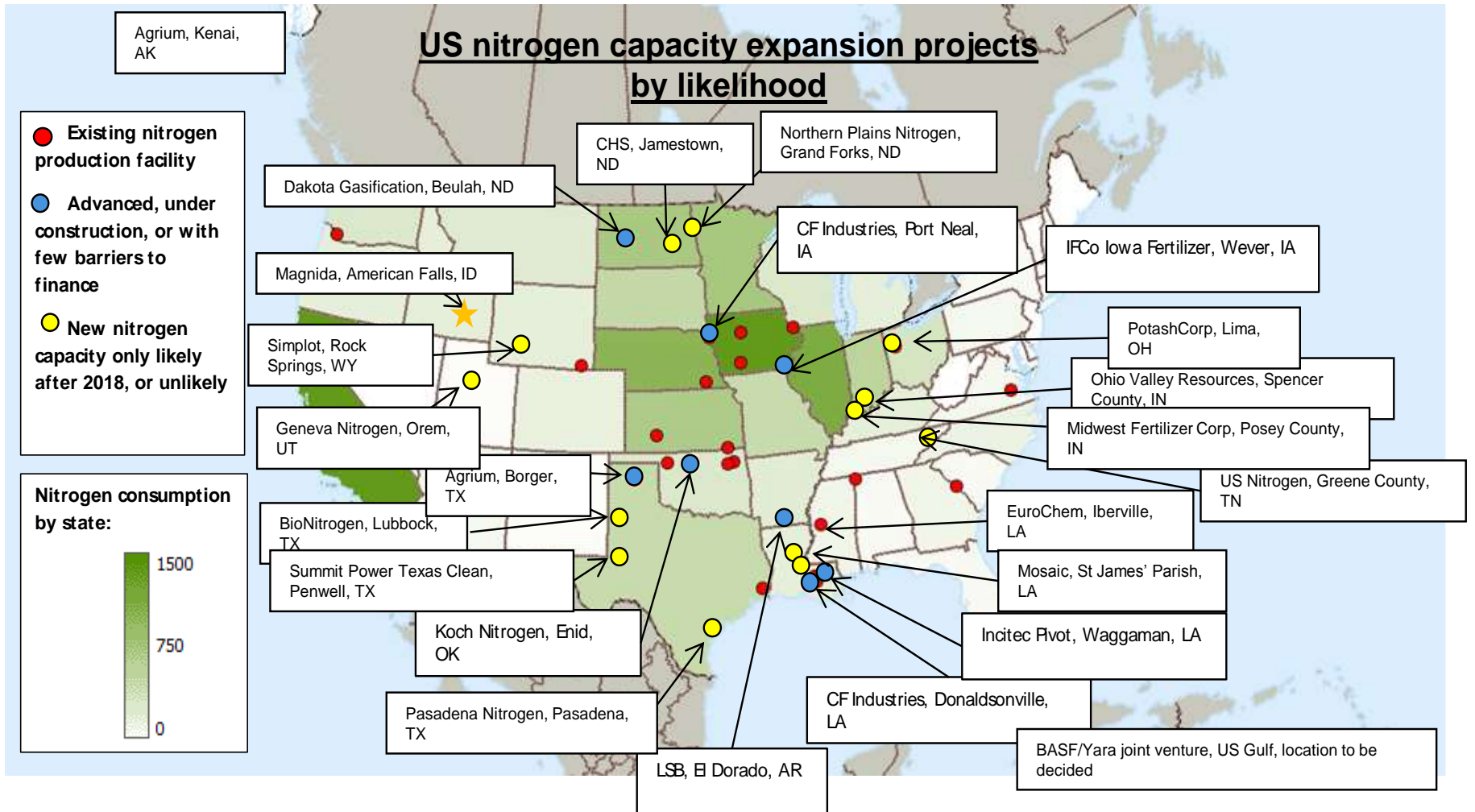
General outlook is that the market will remain supply driven: there will be significant spare capacity for several years

Global nitrogen capacity utilization rate (%)

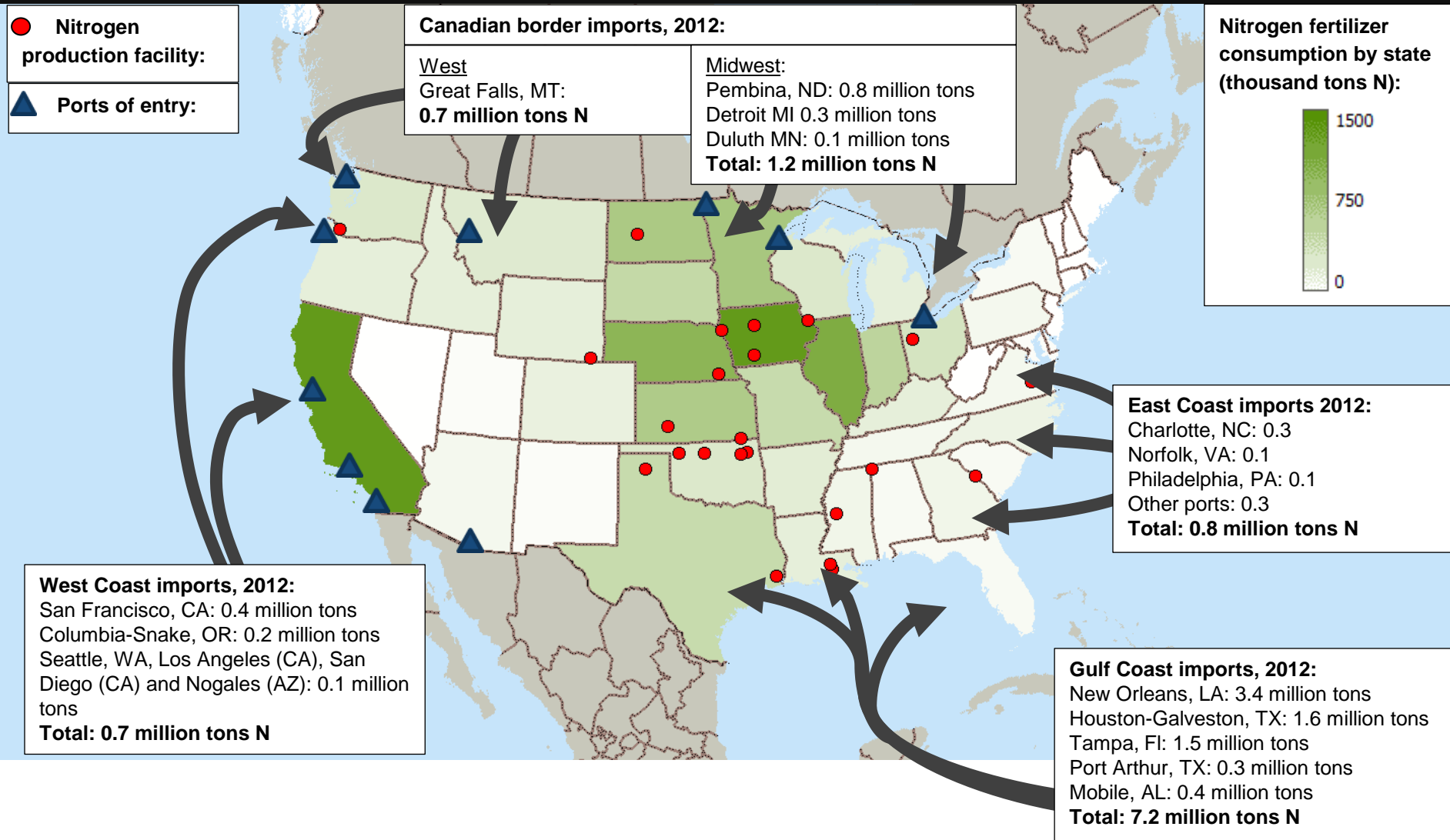


- Legacy of investment over the last few years contributes to supply surplus
- Shale gas has inspired significant investment interest in North America
- China continues to build new capacity, though we are seeing a slowdown
- Low cost gas locations like the Middle East can still justify the investment, but cap-ex costs are escalating, driving up the incentive price
- Utilization expected to pick up around 2017/2018 as we enter the next phase of the cycle

In response to low gas prices in North America, numerous nitrogen projects are planned, but not all are likely to go ahead. The objective is nitrogen import displacement



The US imports around 10 million tons of N, primarily as ammonia, urea and UAN. There are numerous ports of entry for imports, but the US Gulf Coast dominates



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Conclusions and implications for Mexico

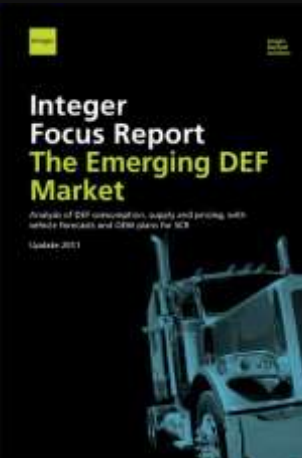
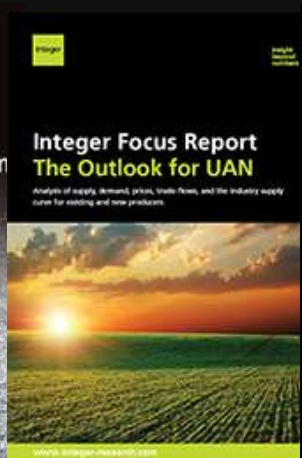
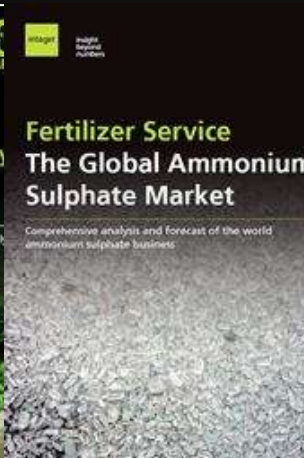
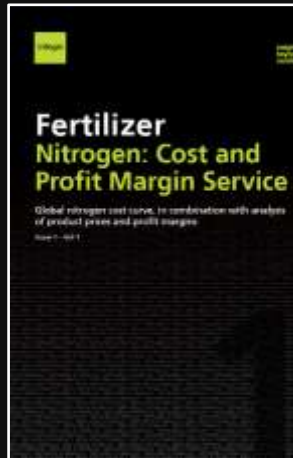
General outlook is that the market will remain supply driven: there will be significant spare capacity for several years. Product level dynamics will be important

- In the mainstream, the nitrogen business remains a commodity energy derived business
- Profitability is a function of low cost (cheap raw materials, high efficiency) and achieving the highest prices – being close to customers.
- In the near term the nitrogen business will remain relatively weak compared to the period 2008-2013
- As investment starts to slow down, and some suppliers are rationalised, the market will start to balance and utilization rates will rise once more
- The market will remain dynamic at product level
 - China is reshaping AS
 - UAN and urea displacement in North America will shake up trade
 - New industrial markets like DEF offer diversification opportunities to suppliers worldwide

- The Mexican market is expected to continue to grow slowly but steadily. There is potential to increase fertilizer demand as crop yields rise
- Mexico production will remain cost competitive with gas influenced by US market prices
 - Like in the US, there appears to be an opportunity to use relatively cheap gas to displace urea imports building new capacity or increasing utilization
- There are specific challenges at product level:
 - Ammonium sulphate competition is likely to intensify as China extends its reach. Product quality may become more sophisticated.
 - The nitrogen import substitution drive in the US will have a knock-on effect. Displaced volumes of ammonia, urea, AN and UAN from Russia, Ukraine, Europe, and Trinidad will look to adjacent markets like Mexico
 - New niche markets like DEF offer potential diversification opportunities

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Thank you

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