Global Nutrient Supply Outlook 2019 - 2021

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France

2019 Fertilizer Outlook and Technology Conference – Savannah (USA) – November 2019

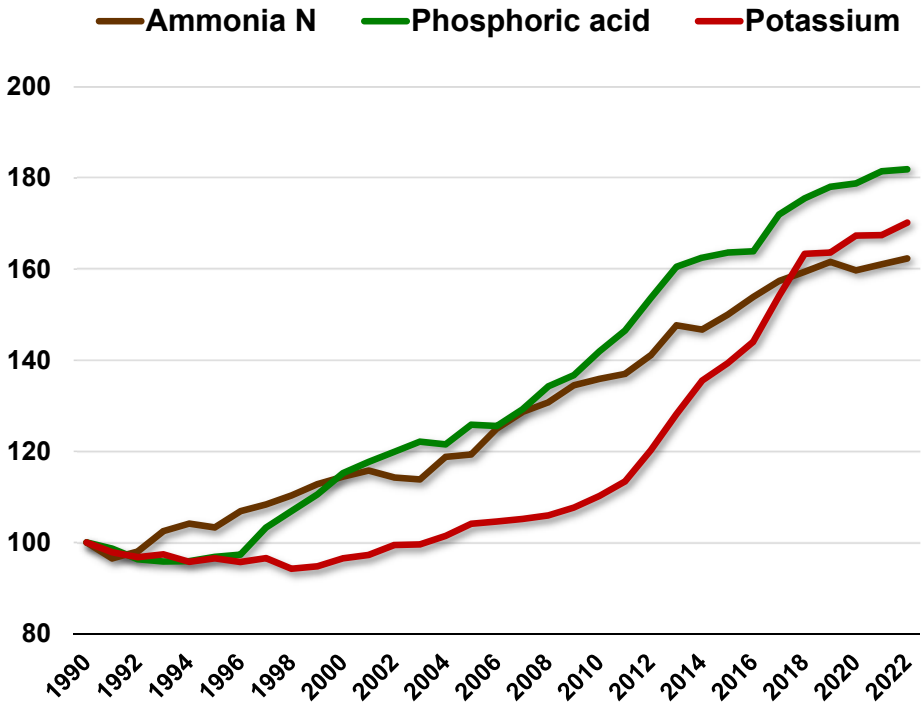
Content

- **Global Supply Context & Capacity Factors**
- **Capacity Developments in the N-P-K Segments**
- **Supply Challenges & Trends**

Context : Rising Demand Requires Growing Capacity

World nutrient capacity growing by 66% between 1990 and 2022

1990 = 100



Nitrogen: +56%

- 2000-2017 Large increases in China, West Asia and EECA
- 2015-2022 Significant reductions in China
  Slightly offset by increases in USA, Russia, Africa, India

P acid: +90%

- 1990-2000 Capacity rationalisation in USA
- 2001-2016 Sustained capacity increases in China
- 2011-2022 Massive capacity projects in Africa and West Asia

Potassium : +78%

- 1991-1995 Rationalisation in USA and Europe
- 1991-2010 Little capacity expansions globally, except in China
- 2010-2022 Rapid capacity expansion in China, Canada and EECA

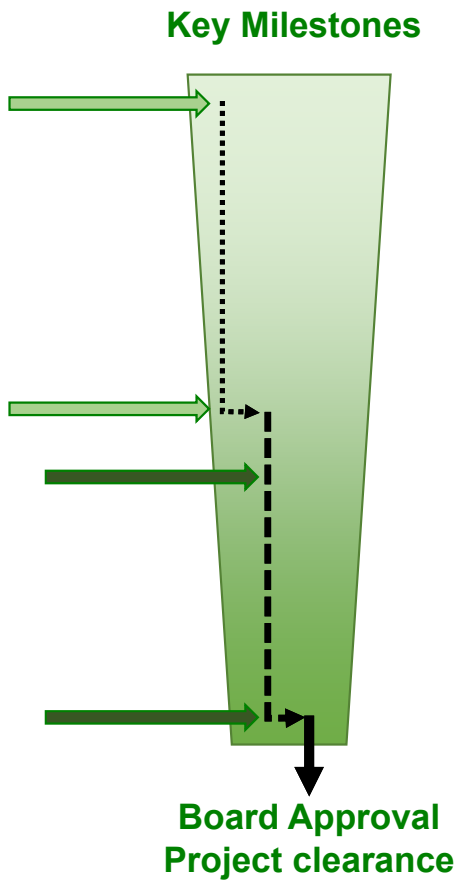
Source: IFA, January 2019

Drivers and Impacts of Supply Factors

Drivers	Factors	Production	Trade
Resources	Access to World-class Economic Reserves	+	=
	Feedstock Supply Shortfall / Depletion	-	+
	Natural Gas developments	+	=
	Economic & Financial Situation	-	-
Regulations	Environmental regulations	-	+
	Product safety	-	-
Policy	Trade Policy / Export Taxes	-	-
	Domestic investment Policies	+	-

Supply Issues' Matrix and Project Clearance Steps

Issues	Nitrogen	Phosphorus	Potassium
Environmental Issues	Licensing-Permitting	**Exploration and Mining Permitting / EIA**	
	Societal benefits or disturbence (NIMBY)		
	CO_2 emissions / Carbon tax	Tailing / Water supply management	
On-site risks	N emissions	Tailing leakage Dam collapse	Tailing leakage Waste water disposal
	NH3 / IGAN Transportation	NORMs	Flooding
Economics	**Access to Feedstock**	Ore depletion	
	Project Financing		
	Feedstock competing uses	Market specifications	Long lead-time, IRR
Management of associated products	CO2 generation	Heavy metals - Uranium	Salts - $MgCl_2$
Technology	**Availability of state-of-art Technology**		
	Energy efficiency	Advanced exploration techniques	
	Coal gasification processes	Marine sediment dredging	Solution Mining Calcination technologies



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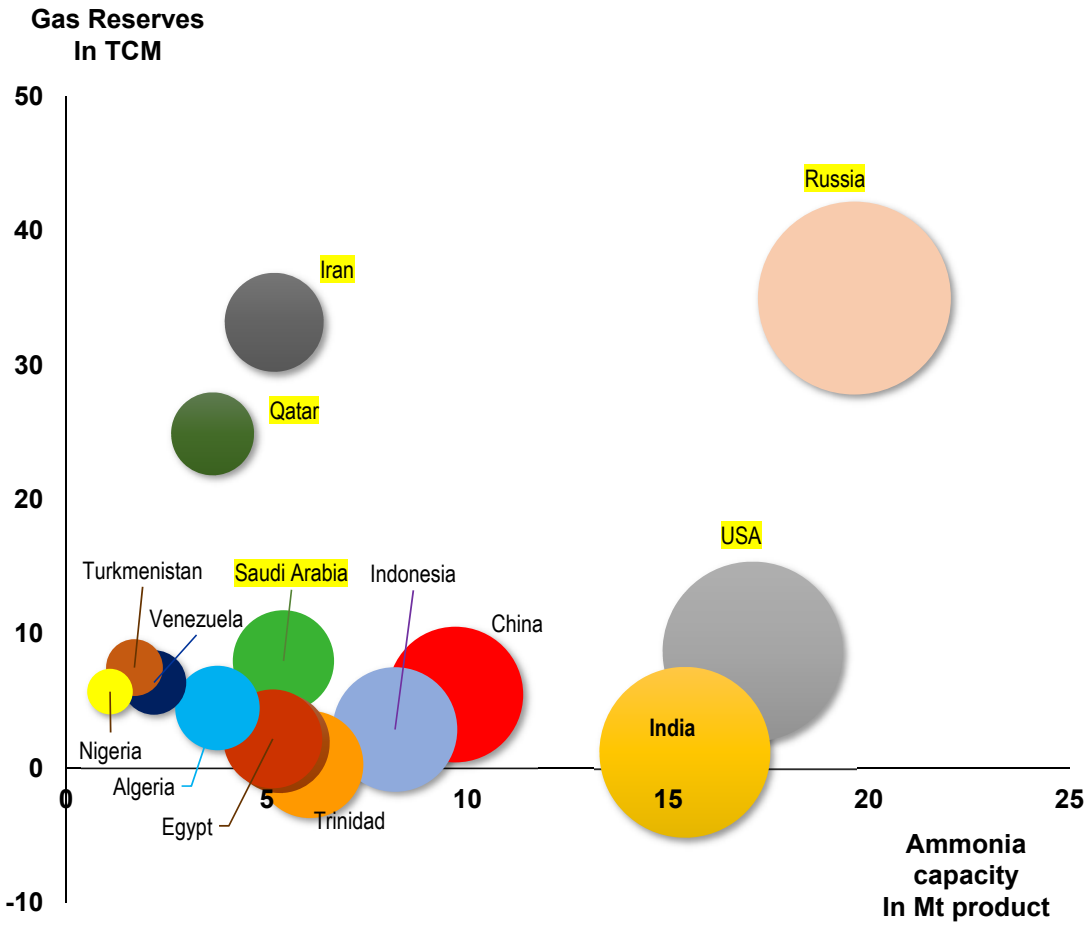
2018 Ammonia Capacity related to Natural Gas Reserves



Top 5 largest NG reserves = 25% of world NH_3 capacity

Trends

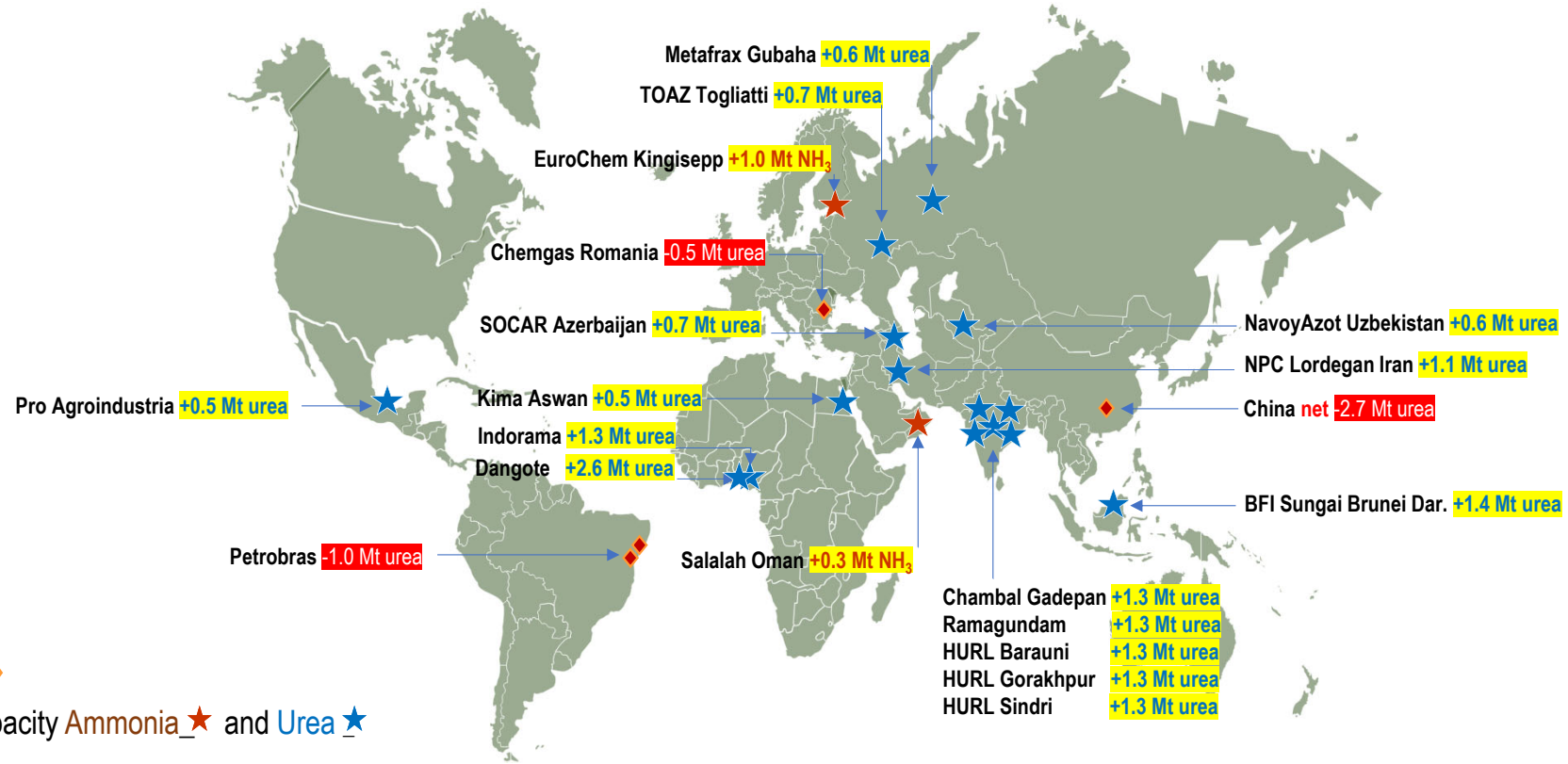
- USA emerging NG supplier = new N capacity
- India rising N capacity = NG supply vulnerability
- Trinidad = Largest NH_3 exporter but low NG reserves
- Canada = Low NG reserves

Potential growth for future N capacity on natural gas reserves = Africa, EECA, West Asia

Sources: EIA/DOE USA; BP 2019; IFA June 2019

Seaborne Ammonia & Urea : Main Capacity Developments 2019-2021

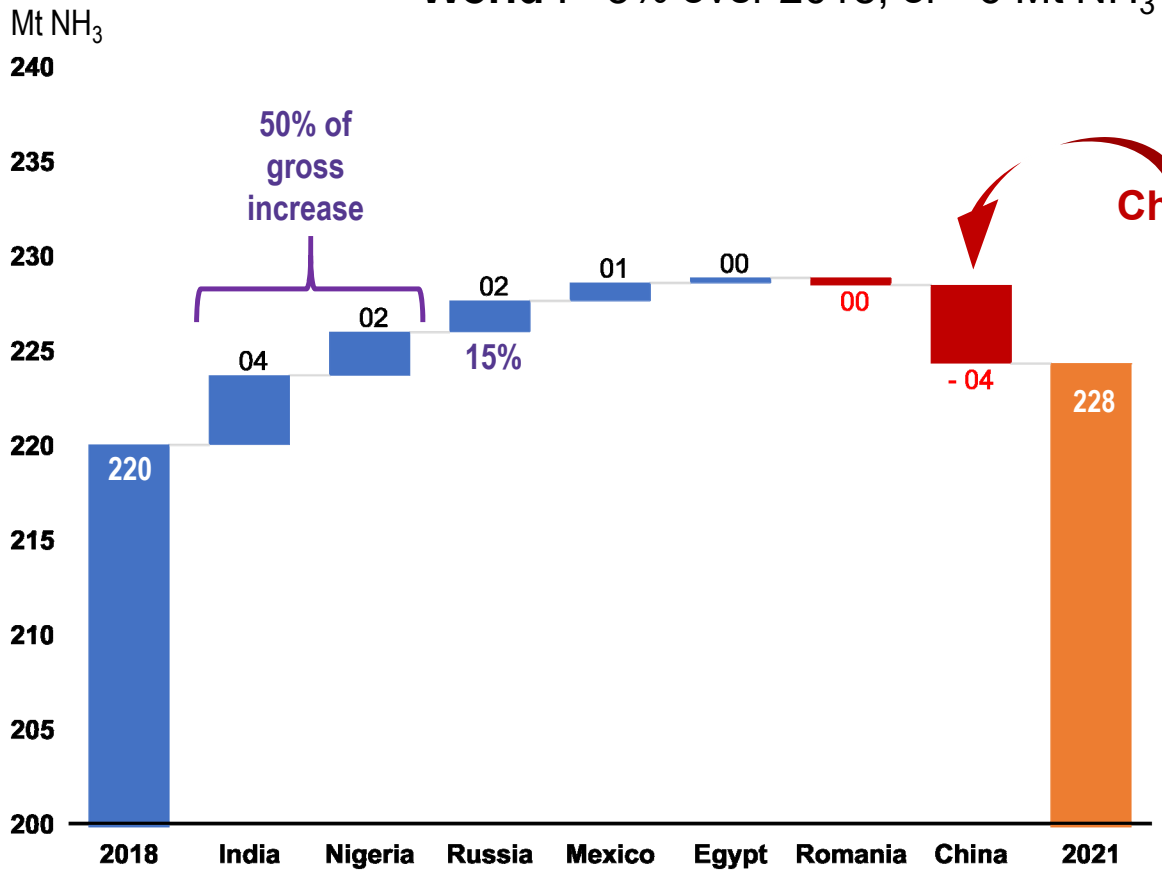
Mt products



Source: IFA, June 2019

Global Ammonia Capacity : 2019-2021

World : +3% over 2018, or +6 Mt NH_3 to 228 Mt NH_3 in 2021



China : -6% (-4 Mt) down to 62.3 Mt NH_3 in 2021
28% of world capacity in 2021
vs 30% in 2018

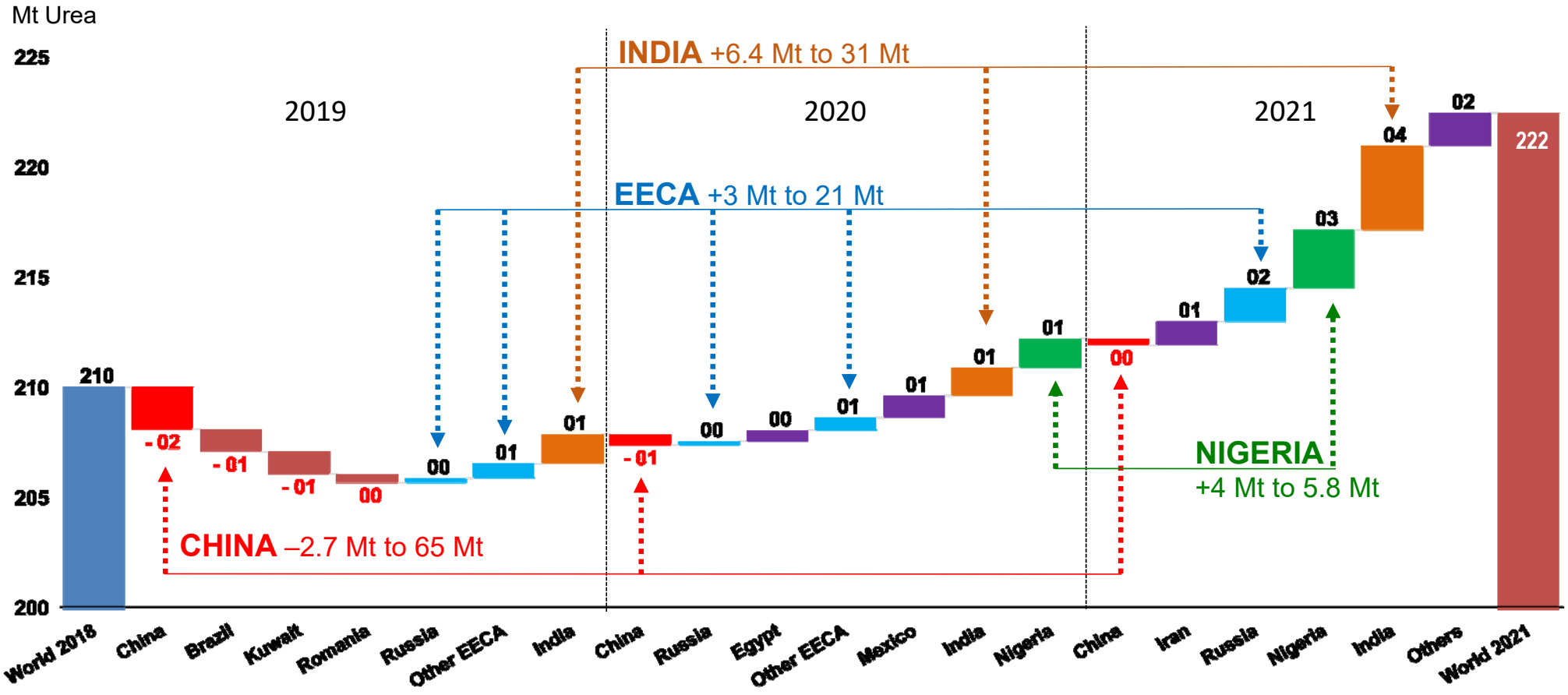
Main capacity increases in India and Nigeria

- India: +30% (+3.7 Mt), to 19.1 Mt NH_3
- Nigeria: x3 (+2.3 Mt), to reach 3.4 Mt NH_3

Source: IFA, June 2019

Urea Capacity Developments : 2019-2021

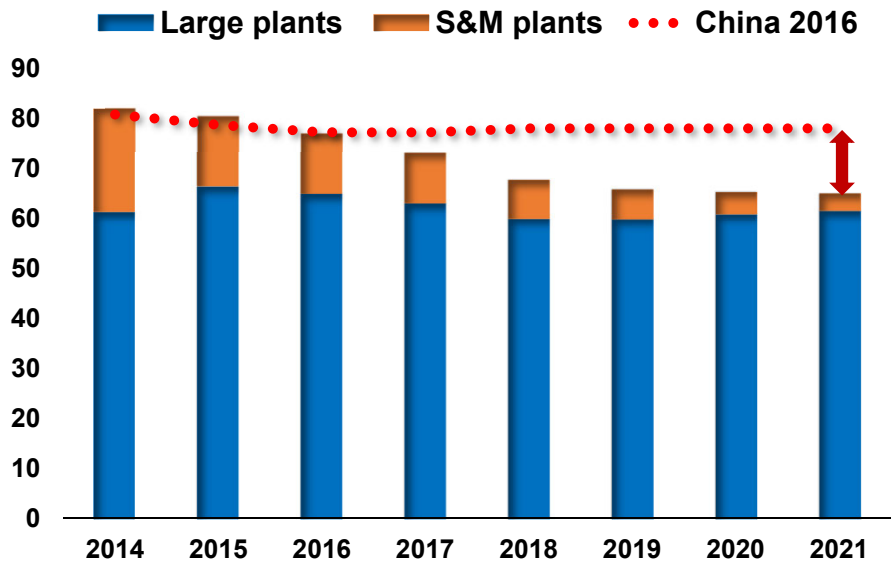
World : -2 Mt in 2019; +4 Mt in 2020; **+10 Mt** in 2021, then reaching 222 Mt

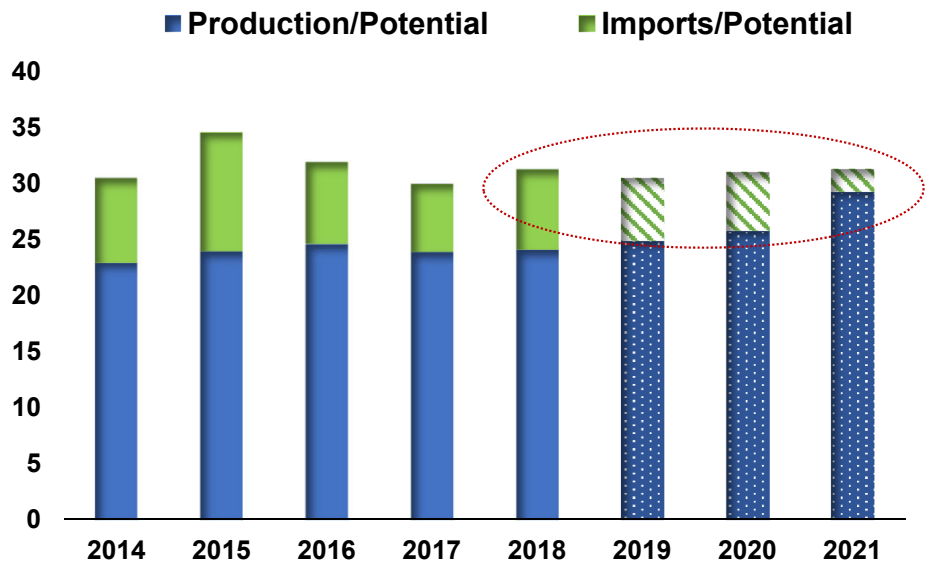


Source: IFA, June 2019

China & India Urea Capacity 2018-2021 : Opposite Trends

Mt urea





China : urea capacity dropping by 2.7 Mt over 2018, to 65 Mt in 2021

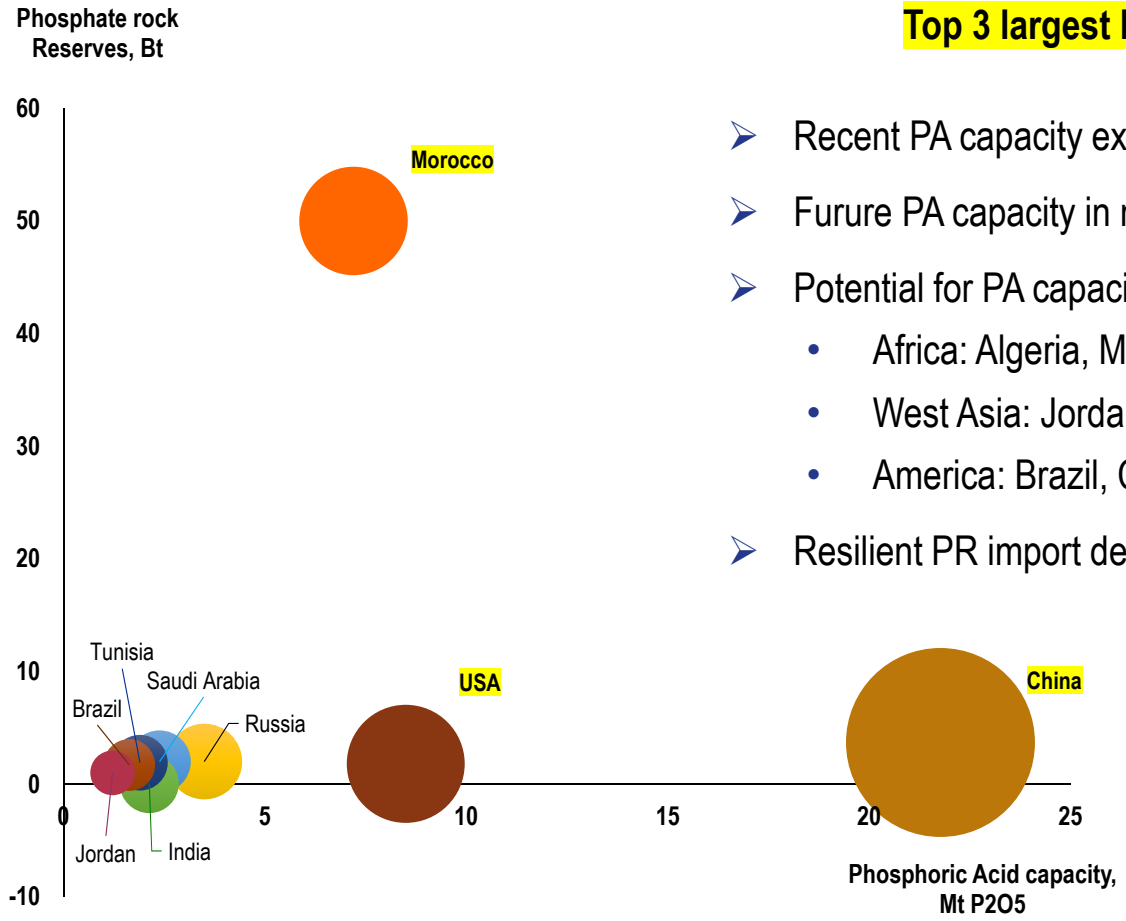
- **-4.3 Mt** reduction in the small & medium plant sector
- **+1.6 Mt Net** increase in large plant sector
- Correction over 2016 projections: **-16 Mt** in 2021

India : urea capacity surging over the next five years

- End-2021: 5 urea plants (+**6.4 Mt of capacity)**, reaching **31.2 Mt** in 2021
- Total urea demand ranging between **31-32 Mt** in 2021
- Urea potential imports dropping from **8 Mt** in 2018 to around **2.0 Mt** in 2021

Sources: CICCC, FAI Statistics; IFA June 2019

Phosphoric Acid Capacity related to Phosphate Rock Reserves



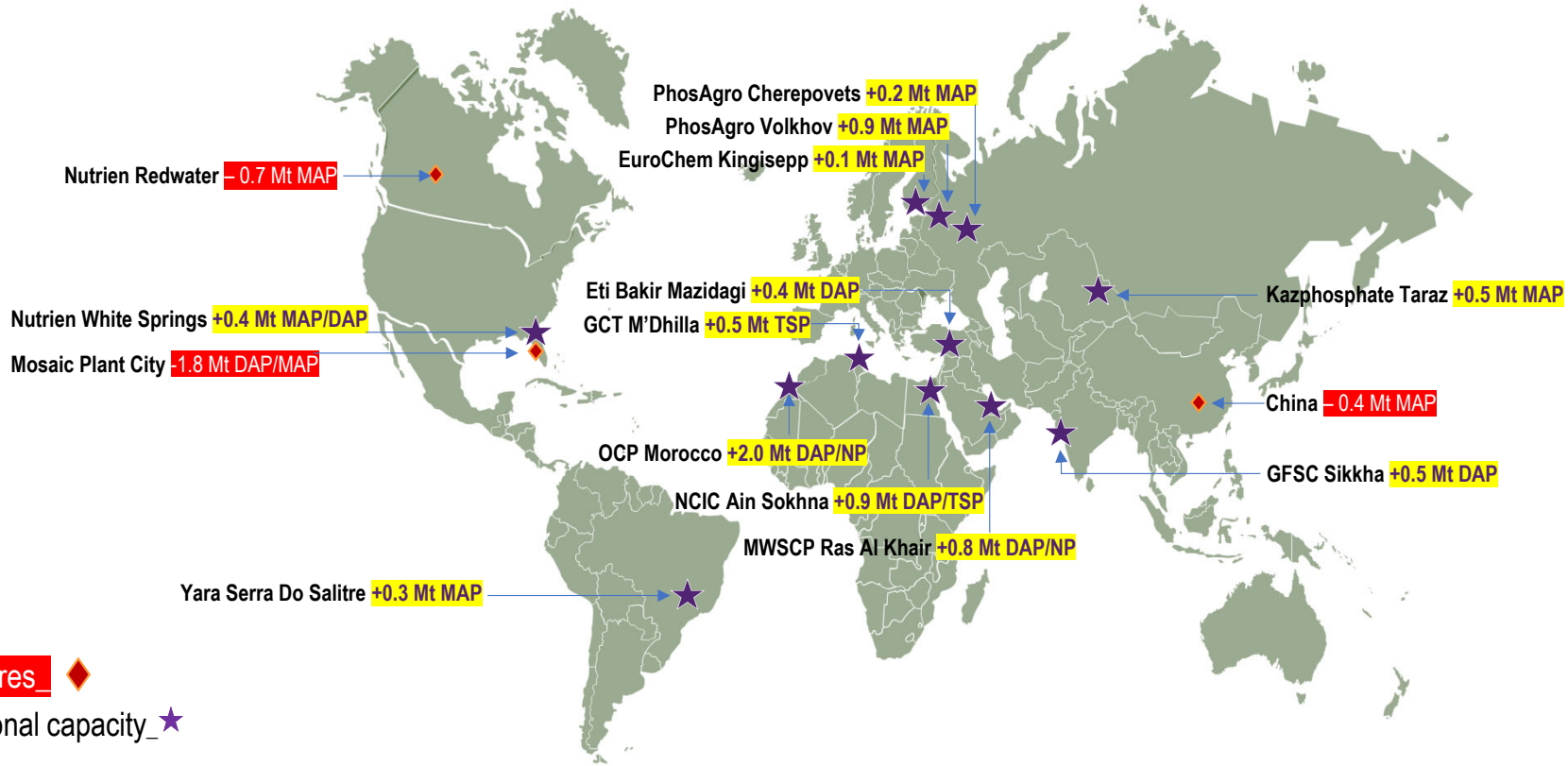
Top 3 largest PR reserves = 63% of global PA capacity

- Recent PA capacity expansions occurred in China, Saudi Arabia and Russia
- Furure PA capacity in near term emerging in Morocco, Russia, Saudi Arabia
- Potential for PA capacity growth
  - Africa: Algeria, Morocco, Tunisia
  - West Asia: Jordan, Saudi Arabia, Syria
  - America: Brazil, Canada
- Resilient PR import dependence for India, Europe,

Sources: USGS, IFDC, Company reports, IFA June 2019

Processed Phosphates : Main Capacity Developments : 2019-2021

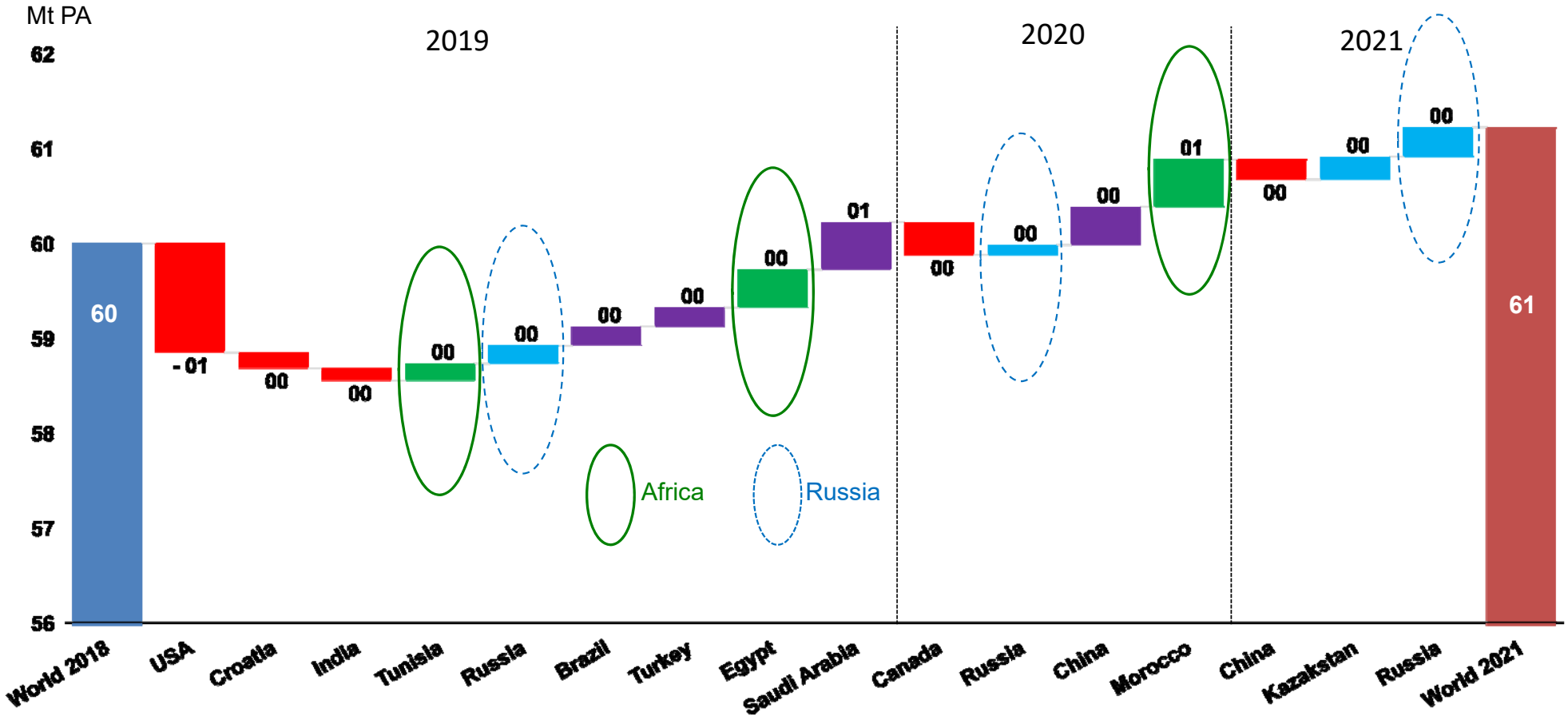
Mt products



Source: IFA, June 2019

Phosphoric Acid Capacity Developments : 2019-2021

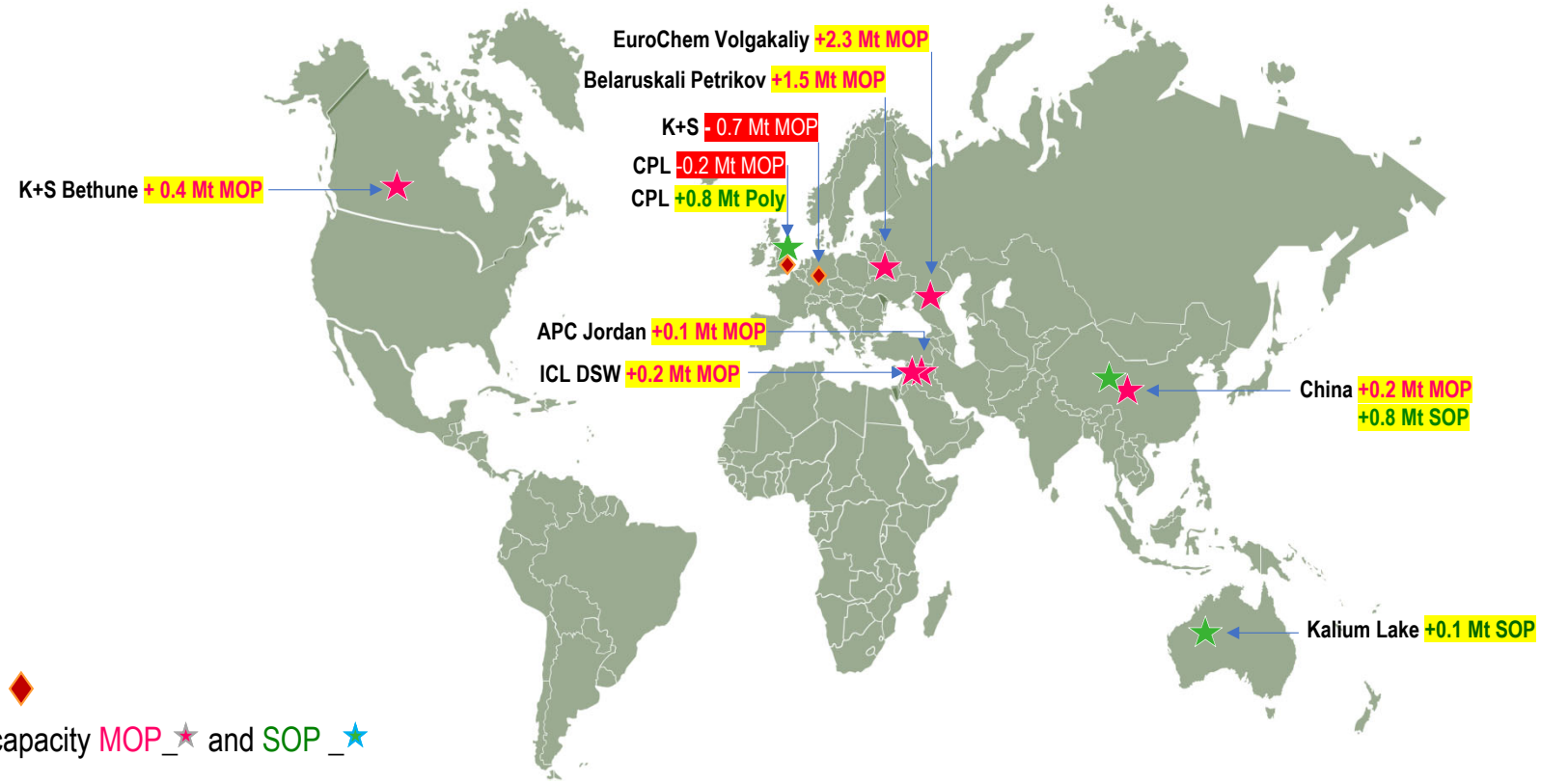
World : -0.2 Mt in 2019; +0.7 Mt in 2020; +0.3 Mt in 2021 reaching 61 Mt P_2O_5



Source: IFA, June 2019

Potash : Main Capacity Developments : 2019-2021

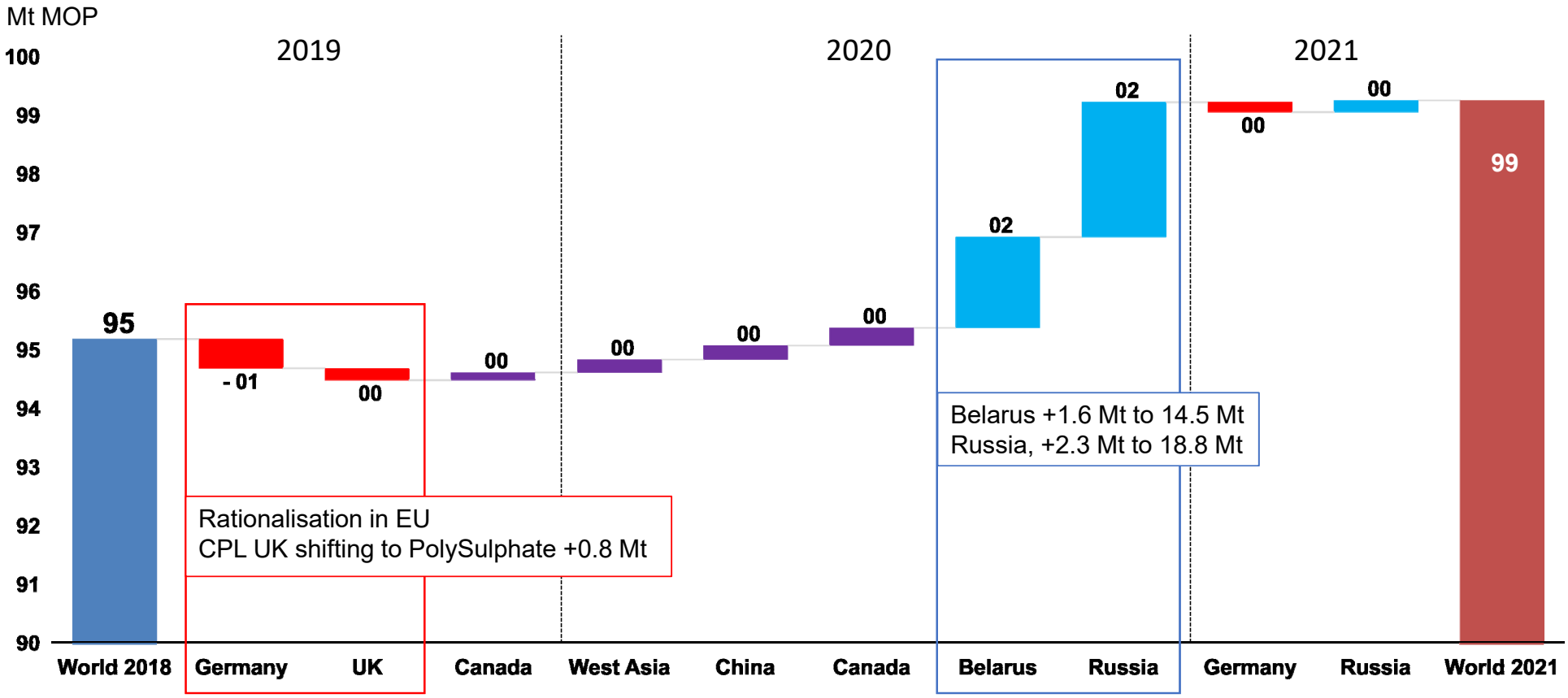
Mt products



Source: IFA, June 2019

MOP Capacity Developments: 2019-2021

World : -0.6 Mt in 2019; +4.6 Mt in 2020 reaching 99 Mt MOP



Source: IFA, June 2019

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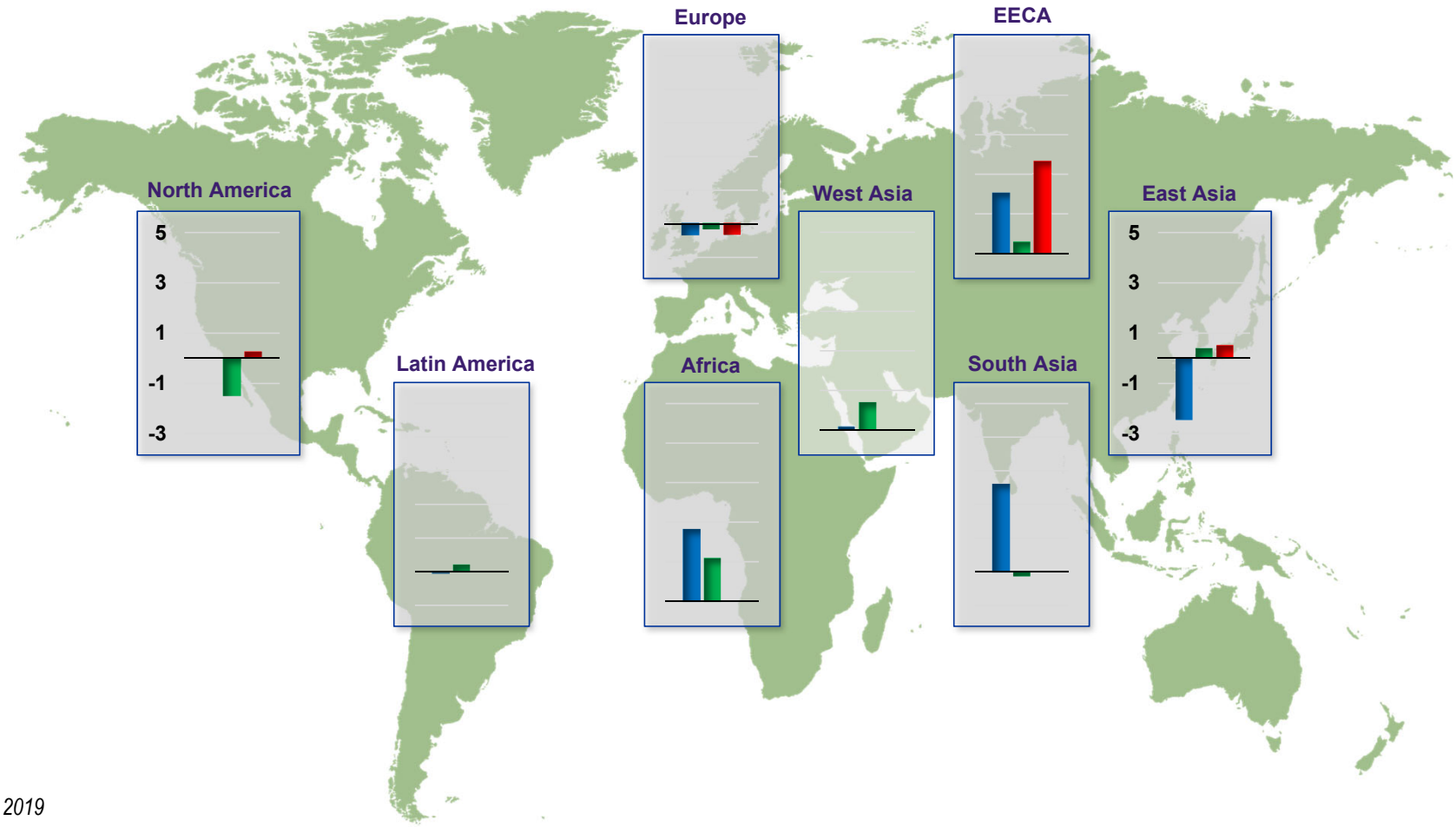
Regional Capacity Trends in Main Segments : 2018 and 2020

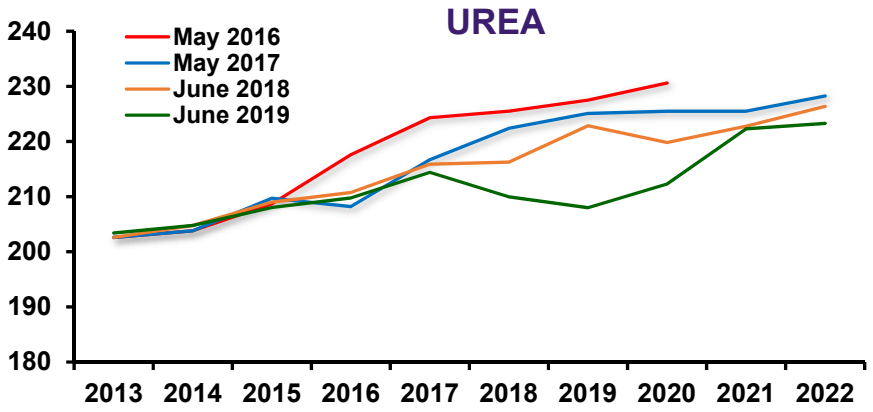
Mt Urea; Mt P_2O_5 and Mt K_2O

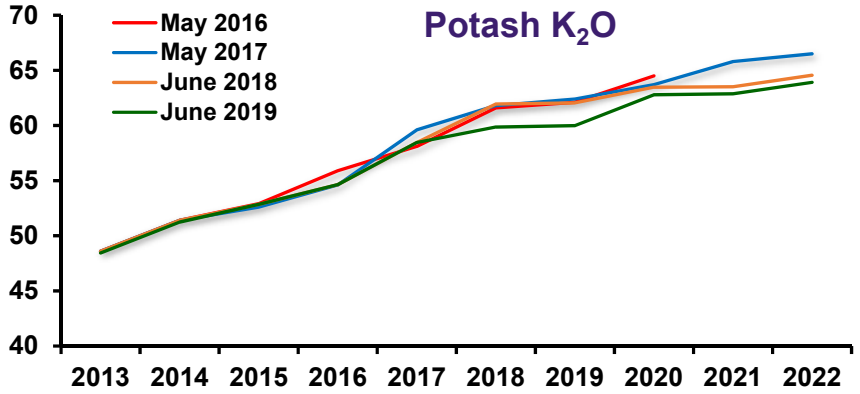


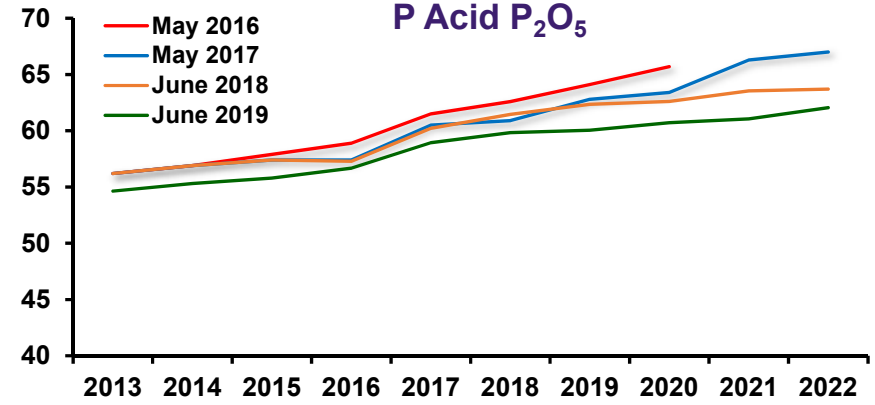
Source: IFA, June 2019

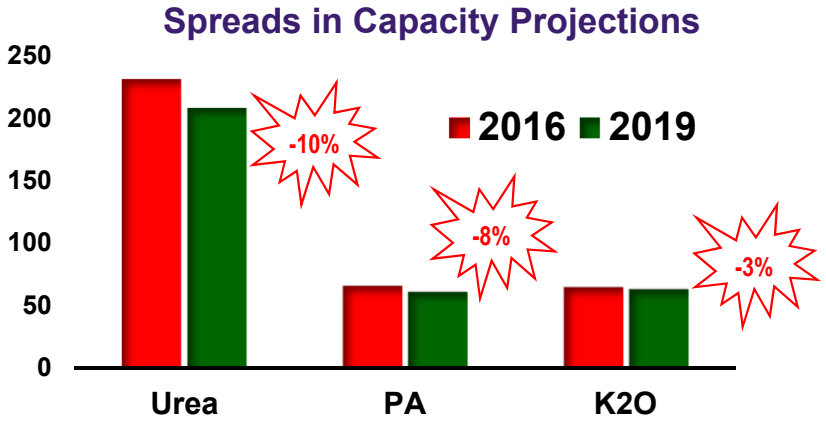
Four Years of Global Capacity Projections for 2013-2022

Mt Urea; Mt P_2O_5 and Mt K_2O



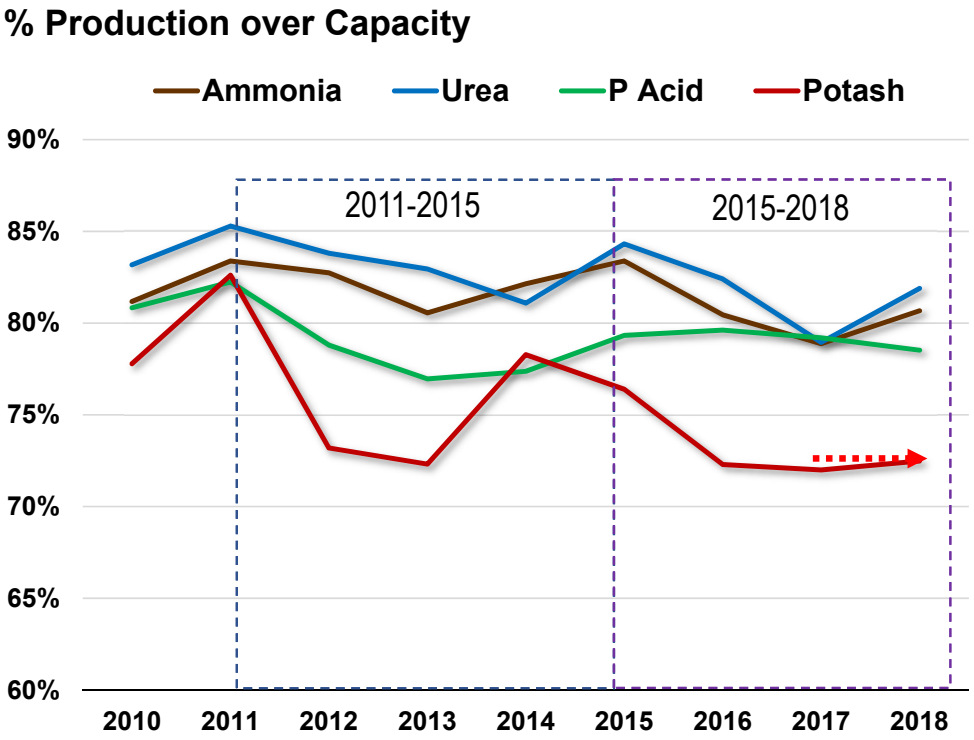






Source: IFA, June 2019

Trends in Global Operating Rates 2010-2018



2011-2015

Post-2008 financial crisis

- Operating rates declined in all segments until 2014
- In K segment, rate recovery started in 2014
- In urea and P acid segments, rate recovery by 2015

2015-2018

- Lower operating rates in all segments
- Lower global ammonia/urea capacity 2017-2019
- PA and K capacity rising faster than production
- Resilient low operating rates on capacity / effective capacity in K segment

Source: IFA, June/Oct 2019

Challenges & Trends relating to Fertilizer Supply

CHALLENGES

- Alleviate impact of overcapacity risks
- Replace and upgrade obsolete / inefficient capacity
- Secure access to mineral resources / feedstock
- Promote license to operate, with environmental stewardship
- Address societal/regulatory expectations on fertilizer supply
- Meet demand for added-value and customized fertilizers
- Ensure global distribution vs protectionism / trade barriers

TRENDS

- Regional clusters of competitive segments
- Capacity evolution along with access to competitive resources and/or with large emerging/importing countries
- Resilient oversupply in potash segment in near/long term
- Emerging oversupply in phosphate and urea segments
- Balancing supply will come from further rationalization (plant obsolescence, M&As, shortfalls to feedstock/ore depletion, pressures from efficient competition)
- Key factor: compliance to environmental/safety regulations

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Global Nutrient Supply - Outlook 2019-2021

Thank You

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