

## Global Nitrogen Fertilizer Demand and Supply: Trend, Current Level and Outlook

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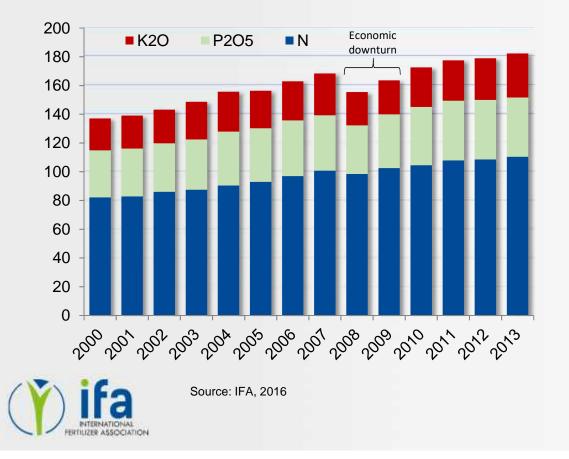
7<sup>th</sup> International Nitrogen Initiative Conference, 4-8 December 2016, Melbourne, Australia



## **GLOBAL NITROGEN FERTILIZER DEMAND**

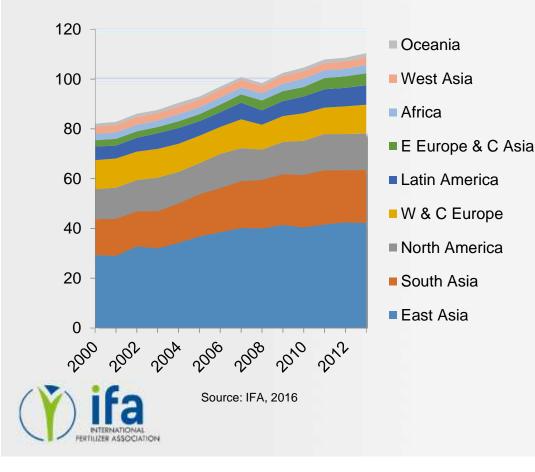


# Evolution of Global Fertilizer Consumption by Nutrient $(Tg N+P_2O_5+K_2O)$



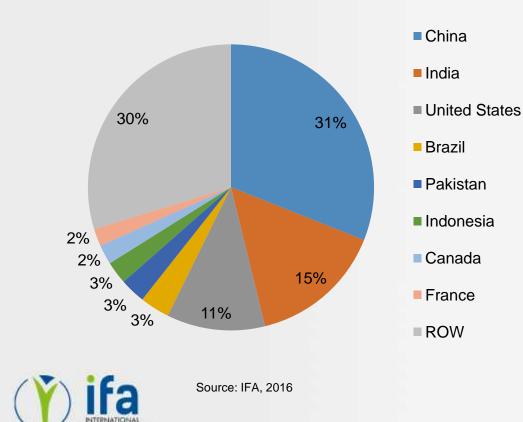
- Global demand: +33% since 2000, to 182 Tg in 2013
- -8% in 2008/09 owing to economic downturn
   ... but -2% only for N
- O Nutrient trend since 2000:
  - N: +35%, to 110 Tg
  - $P_2O_5$ : +26%, to 41 Tg
  - K<sub>2</sub>O: +39%, to 31 Tg

#### Evolution of Regional N Fertilizer Consumption by Region (Tg N)



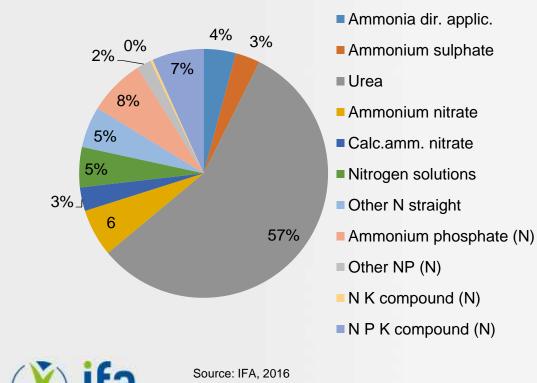
- Developing countries = 83% of the global increase
- East Asia (+13 Tg) & South Asia (+7 Tg) = 70% of the global expansion
- Fastest growth in EECA (+84%)
- SSA expands quickly since 2008
- W&C Europe: Only contracting region

#### Country Breakdown of Global N Fertilizer Consumption in 2013/14



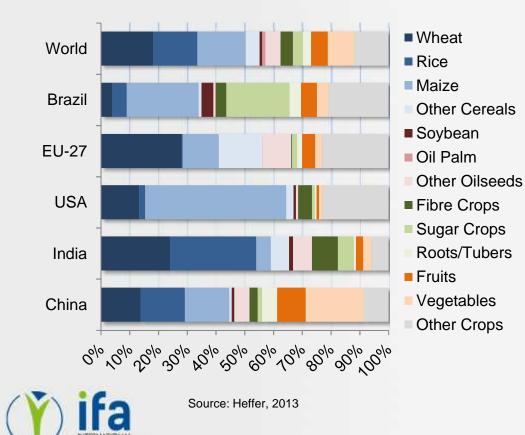
- O China (34 Tg)
- 🗿 India (17 Tg)
- 🗿 USA (12 Tg)
- Top-3 countries = 57% market share
- Next 5 markets (2-4 Tg each)
  = 13% share
- O Top-8 = 70% share

#### Breakdown by Product of Global N Fertilizer Demand in 2013/14



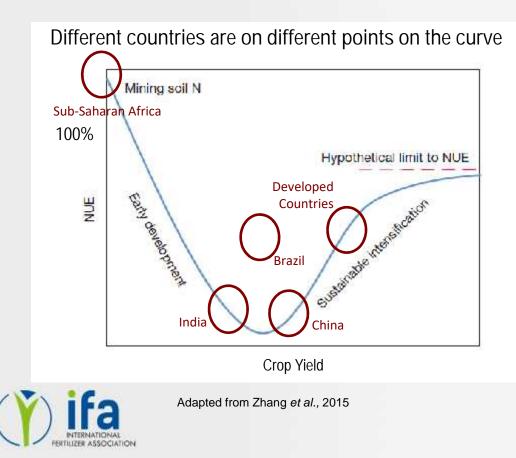
- N market dominated by urea
  - Fast increasing urea market: +54% since 2000
  - Urea's share rose from 49% in 2000 to 57% in 2013
- Ammonium phosphates: 2<sup>nd</sup> fastest growing N market:
  - +80% since 2000
  - 8% of current global N uses

#### Relative Contribution of the Main Crop Categories to Total N Fertilizer Consumption in 2010/11 in the Main Fertilizer Markets



- Cereals = 55% of global N fertilizer uses (58 Tg N) Rice, wheat, maize: 15-18% each
- Fruits & vegetables: 15%
- Oil crops: 7%
- Fibre crops, sugar crops, roots & tubers: 3-4% each
- Huge country diversity
  - Maize: ~50% in the USA
  - Fuits & veg: >30% in China

## **Typical Evolution of N Use Efficiency (NUE) Over Time**



N output	N Market Share in 2015/16	
NUE =Sum of N inputs	Deved countries	26%
	China	29%
Fertilizer-N + Manure-N recycled + Crop BNF + Atmospheric deposition + (irrigation, biosolids)	India	14%
	Brazil	7%
	SSA	2%
	ROW	22%

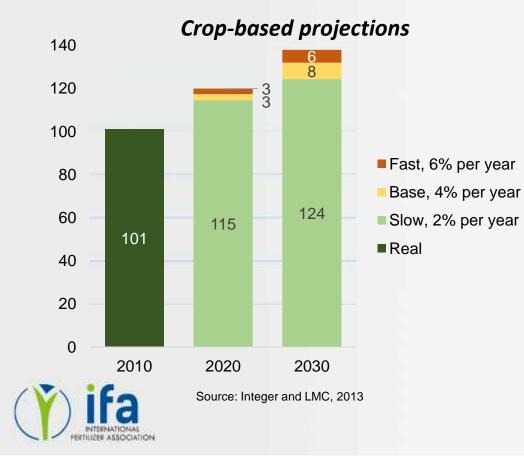
- Global NUE = 42-47% (Lassaletta et al., Zhang et al.)
- Largely influenced by crop mix, management practices, policy
- Complementary indicators needed

## 5-Year Outlook for World and Regional N Fertilizer Demand



- Global N demand seen up 1.2% per year, to 117 Tg by 2020
- P and K demand grow faster (1.7% and 2.3% per year); reflects improving NUE and N:P:K balance
- Growth driven by 3 regions: 74% share of the anticipated growth
- O No growth in China → half of world market is "mature"
- Africa, Latin America and EECA seen expanding faster

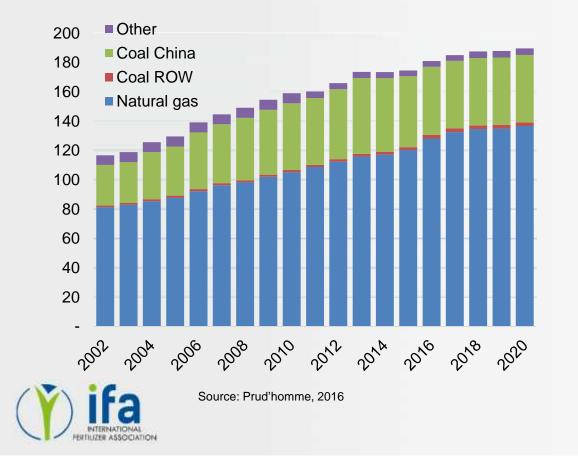
## Projections to 2030 for Global N Fertilizer Demand (Tg N) Under Three Different Economic Growth Scenarios



- Harvested area: +185 mill ha between 2010 and 2030 (mostly grains and oilseeds)
- Projected increase in application rates, moderated by NUE gains
- N demand: +1.3%/year, to 132
  Tg by 2030 (range 124-138 Tg)
  vs. +1.9% for P and +3.3% for K
- China and India to play less prominent role
- Cereals and fruits/veg drive demand expansion

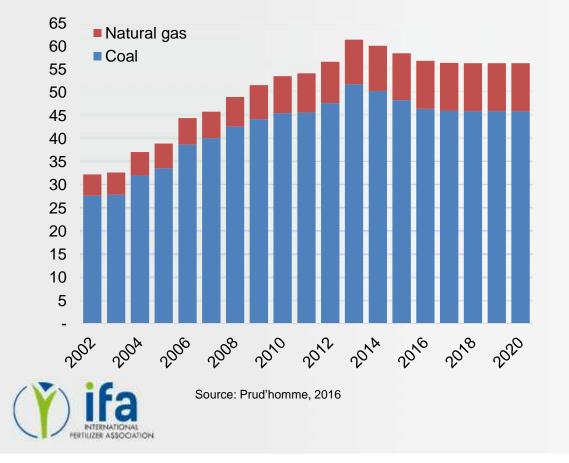
## **GLOBAL NITROGEN FERTILIZER SUPPLY**





#### World Ammonia Capacity (Tg Ammonia-N)

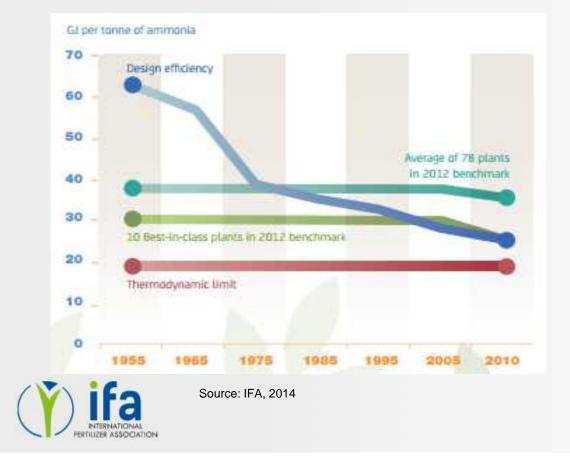
- Ammonia: the raw material for most N fertilizers
- Access to abundant, affordable energy supply is critical
  - Natural gas: 72% of the global ammonia feedstock; bulk of future growth
  - Coal: 26% of the feedstock
- Outlook: Global capacity seen up 9% bw 2015 and 2020, to 189 Tg N
  - in Africa, West Asia, North America, EECA
  - o mostly from natural gas



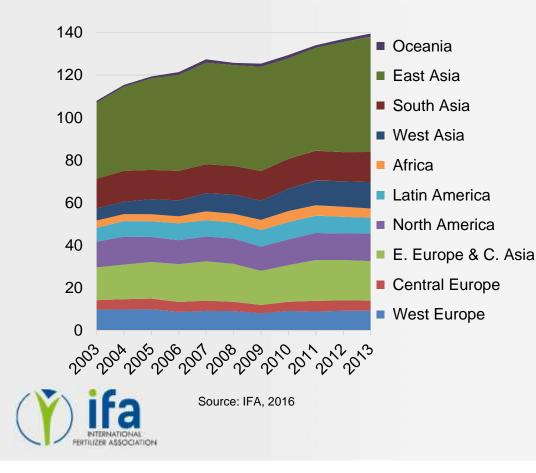
#### China Ammonia Production Capacity (Tg N)

- Recent consolidation of the Chinese N fertilizer industry
- China currently accounts for 95% of global coal-based ammonia capacity
- Coal-based ammonia ~82% of total Chinese ammonia capacity in 2016
- Share of coal seen stable between 2016 and 2020

## **Global Energy Use Efficiency in Ammonia Production** Results of the 2012 IFA Benchmarking Survey



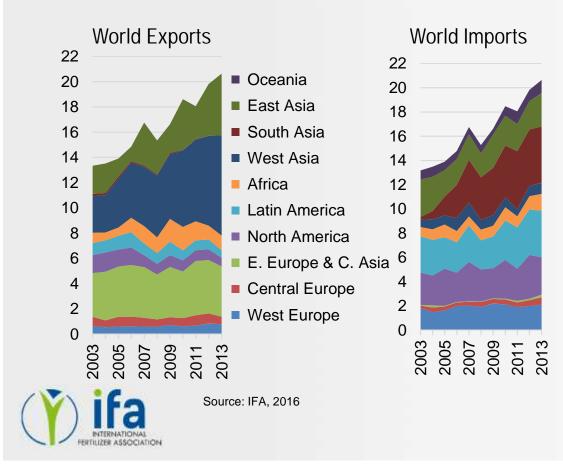
- Fertilizer production uses ~1.2% of world's total energy
- Of which ~90% is used for ammonia
- Large gains in energy efficiency (adoption of advanced technologies)
- New plants performing close to maximum efficiency



### World Ammonia Production by Region (Tg N)

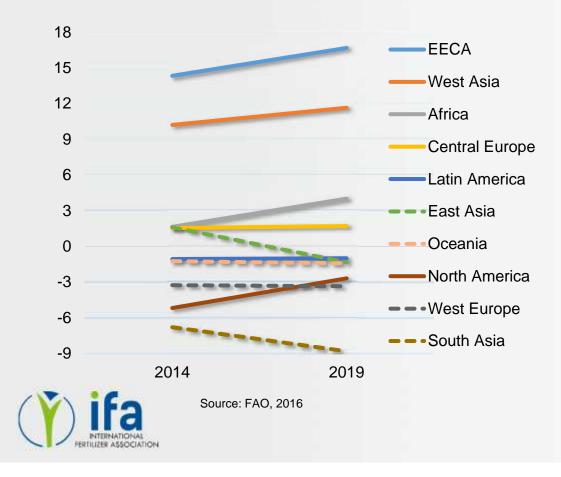
- Heavy investments in new capacity following 2007/08
- Global ammonia production: +29% bw 2003 and 2013, to 140 Tg N
- Strongest growth in East Asia: +51%, +18 Tg
- Rapid expansion in West Asia: +120%, +7 Tg

## World Urea Supply (Tg N)



- World urea production: +46% bw 2003 and 2013, to 78 Tg N; Bulk of the increase in East Asia and West Asia
- Global urea trade: +55%, to 21 Tg N in 2013
- Export growth largely captured by West Asia; export growth also in East Asia (China's shift from net importer to net exporter)
- South Asia accounts for most of the global import expansion
- Outlook: Global capacity seen up 10% bw 2015 and 2020, to 109 Tg N (mostly Africa, North America, EECA)

## Projected Evolution of Regional N Balances (Tg N)



- Faster growth of industrial uses vs. fertilizer uses of ammonia and urea
- Potential supply seen rising faster than demand
- World potential N surplus projected to grow from 10 to 15 Tg N bw 2014 and 2019
- Potential surpluses seen to further increase in EECA, West Asia, Africa
- Potential deficit forecast to further expand in South Asia
- Potential deficit in North America would sharply decline



## Key Take Home Messages

#### FERTILIZER DEMAND

- World N fertilizer demand projected to steadily increase, at least until 2030
- N demand growth rate seen slowing down vs. historical trend (reflecting NUE gains)
- Declining weight of Asia, and increasing contribution of Latin America and Africa
- Industrial N uses growing faster than N fertilizer demand

#### FERTILIZER SUPPLY

- Following 2007/08, heavy industry investments in new ammonia and urea capacity to secure supply for the coming decade
- Investments in countries with abundant access to natural gas reserves, and in large fertilizer-consuming countries
- South Asia, especially India, to remain the main importing market
- EECA and West Asia to strengthen their position as leading net exporters



# The Global Fertilizer Industry at a Glance

Macro-Economic Indicators

#### SALES

2014 value of sales
 from fertilizer producers:
 US\$172 bill
 Of which sales value
 of US\$84 bill for
 straight N fertilizers,
 US\$25 bill for
 MAP/DAP and US\$26
 bill for NPKs

#### EMPLOYMENT

 926,000 jobs in production around the world
 N sector directly employing 482,000 workers + 31,000 for MAP/DAP and 112,000 for NPKs
 Fertilizer industry responsible 2.3 mill jobs directly and indirectly

#### INVESTMENT

Industry to invest
 US\$83 bill in revamps
 and expansions in 2015 2019

Anticipated investments of US\$43 bill in straight N fertilizer capacities, US\$3 bill in MAP/DAP and US\$2 bill in NPKs



Source: Integer Research for FA, 2016

# Questions/comments:

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