



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

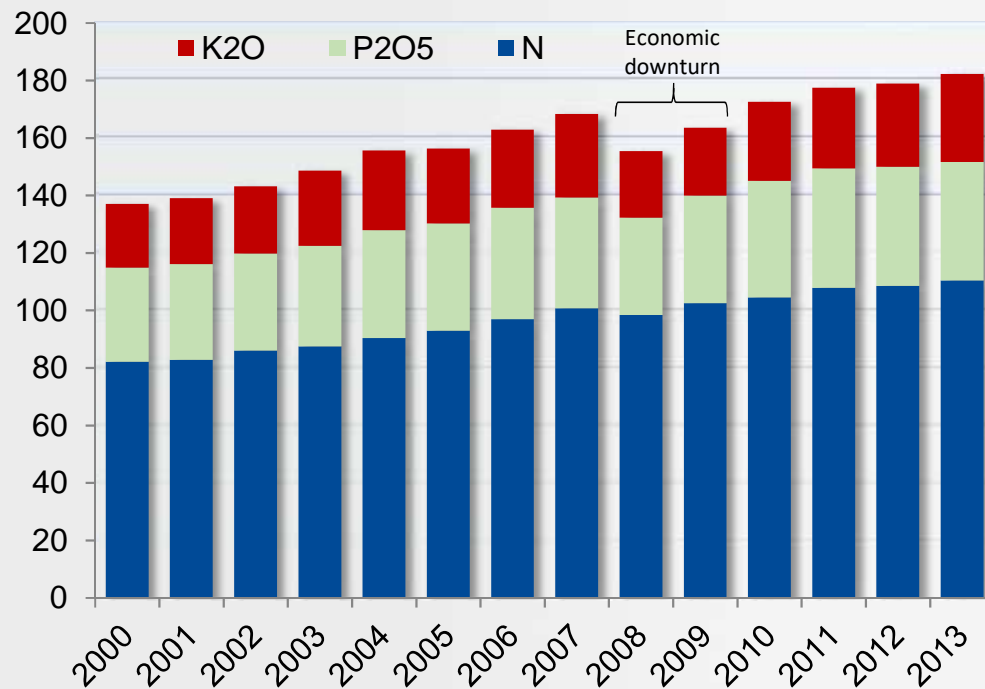
Patrick Heffer and Michel Prud'homme
International Fertilizer Association



7th International Nitrogen Initiative Conference, 4-8 December 2016, Melbourne, Australia

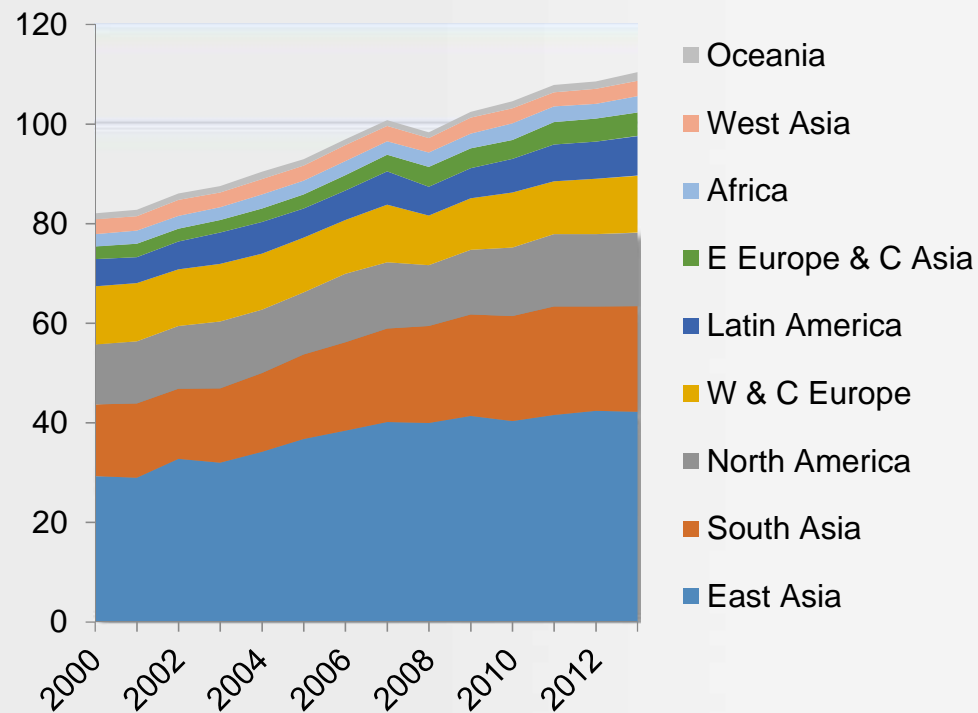
GLOBAL NITROGEN FERTILIZER DEMAND

Evolution of Global Fertilizer Consumption by Nutrient (Tg N+P₂O₅+K₂O)



- Global demand: +33% since 2000, to 182 Tg in 2013
- -8% in 2008/09 owing to economic downturn
... but -2% only for N
- Nutrient trend since 2000:
 - N: +35%, to 110 Tg
 - P₂O₅: +26%, to 41 Tg
 - K₂O: +39%, to 31 Tg

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

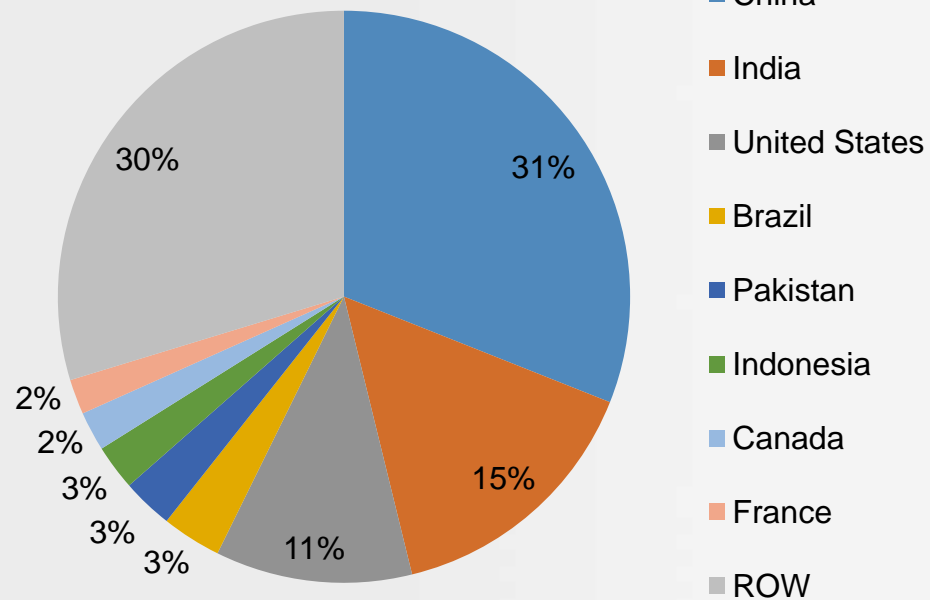


Source: IFA, 2016



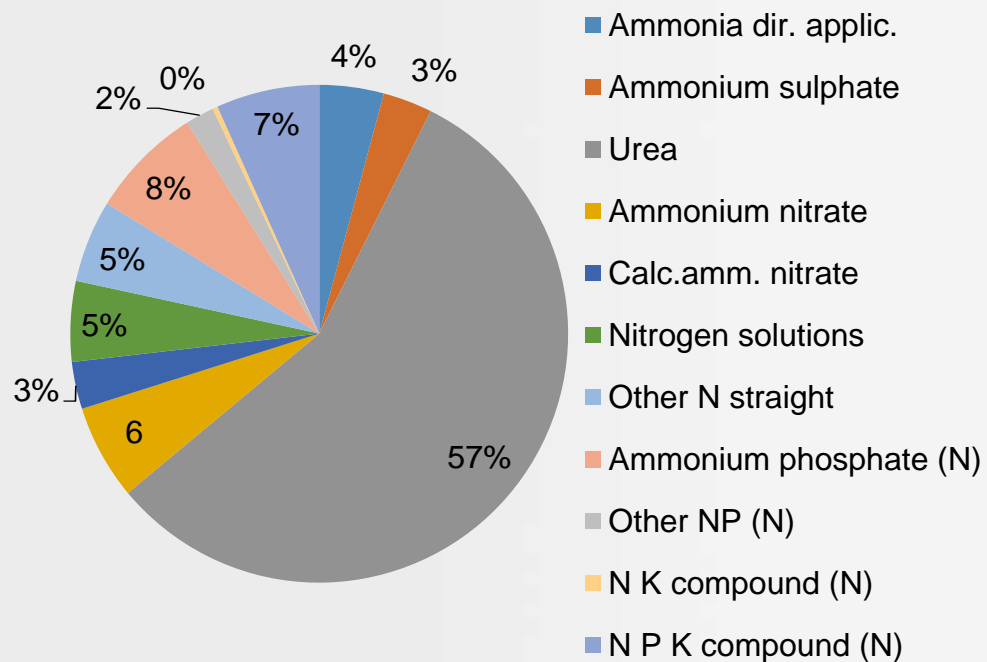
- Developing countries = 83% of the global increase
- East Asia (+13 Tg) & South Asia (+7 Tg) = 70% of the global expansion
- Fastest growth in EECA (+84%)
- SSA expands quickly since 2008
- W&C Europe: Only contracting region

Country Breakdown of Global N Fertilizer Consumption in 2013/14



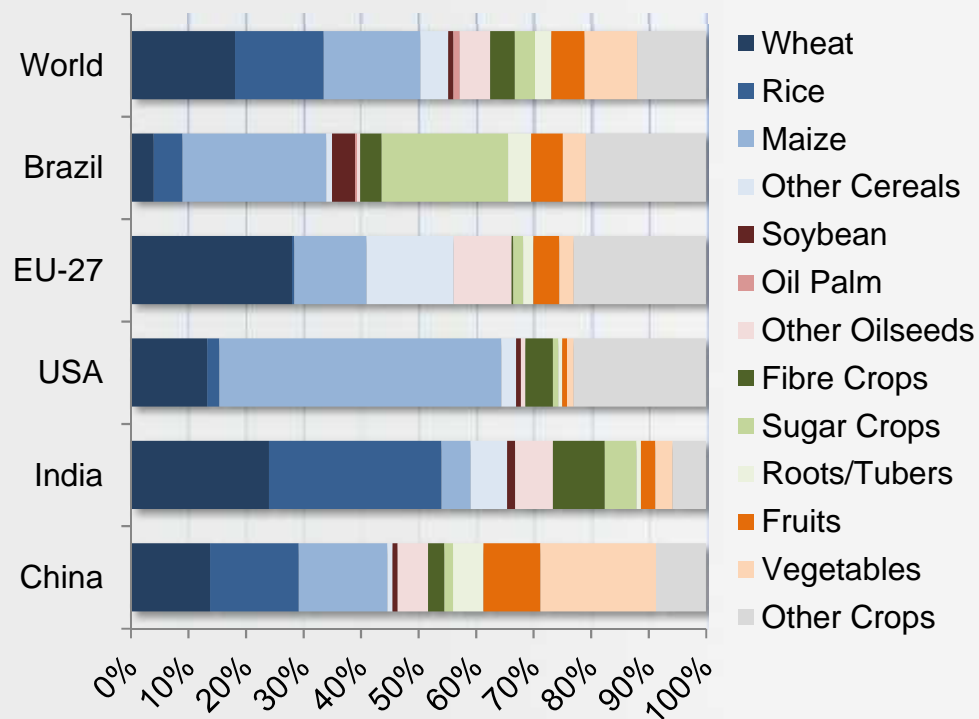
- China (34 Tg)
- India (17 Tg)
- USA (12 Tg)
- Top-3 countries = 57% market share
- Next 5 markets (2-4 Tg each) = 13% share
- Top-8 = 70% share

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: 2nd fastest growing N market:
 - +80% since 2000
 - 8% of current global N uses

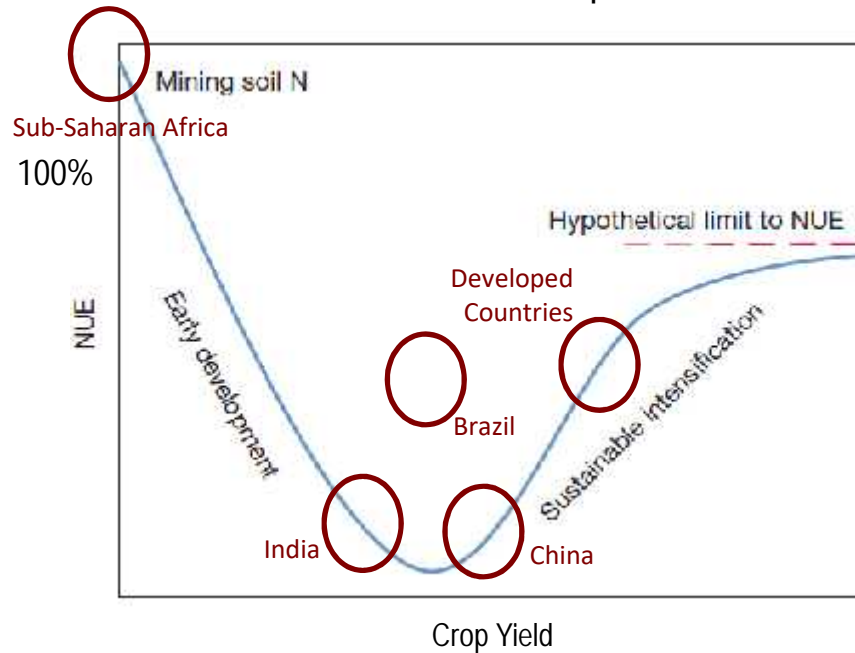
Relative Contribution of the Main Crop Categories to Total N Fertilizer Consumption in 2010/11 in the Main Fertilizer Markets



- 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
 - Fruits & veg: >30% in China

Typical Evolution of N Use Efficiency (NUE) Over Time

Different countries are on different points on the curve



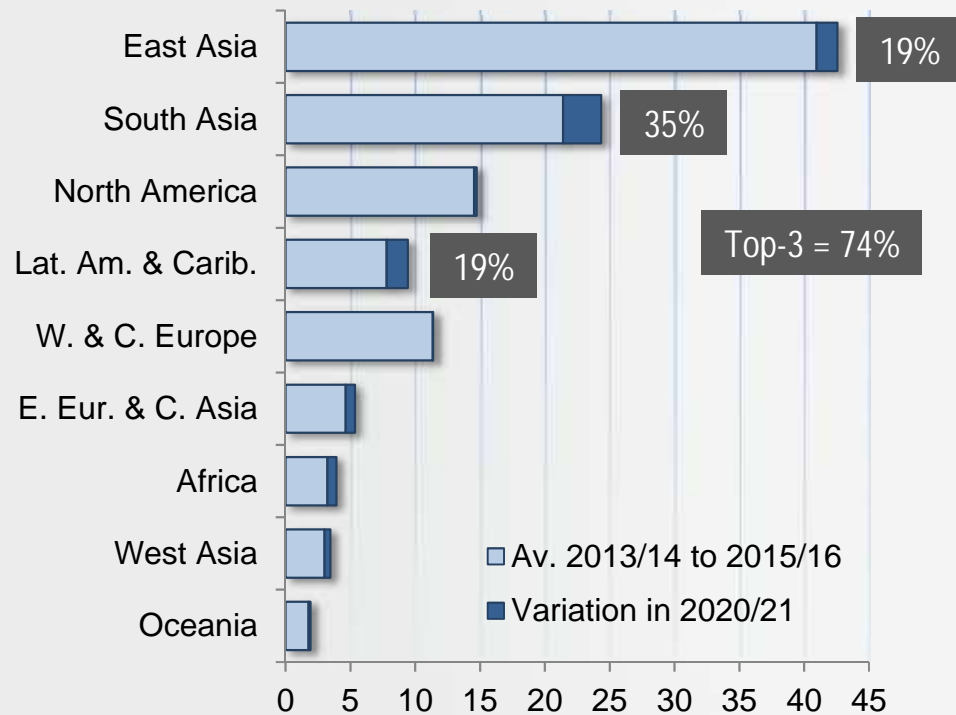
$$NUE = \frac{N \text{ output}}{\text{Sum of N inputs}}$$

- Fertilizer-N
- + Manure-N recycled
- + Crop BNF
- + Atmospheric deposition
- + (irrigation, biosolids...)

N Market Share in 2015/16	
Dev ^{ed} countries	26%
China	29%
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

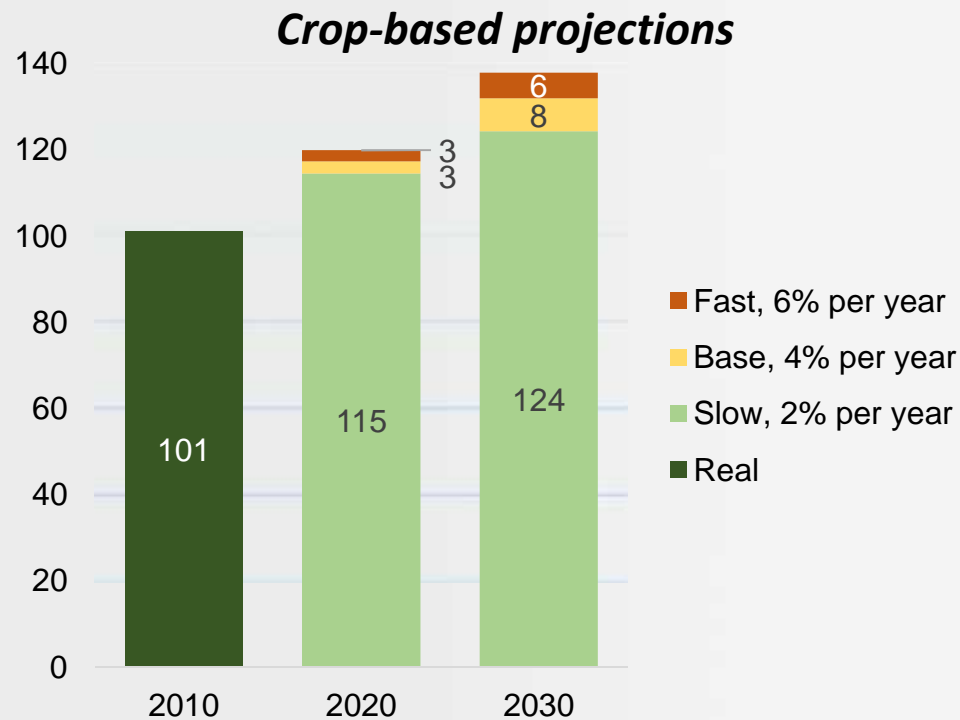


Source: Heffer and Prud'homme, 2016



- 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
- 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



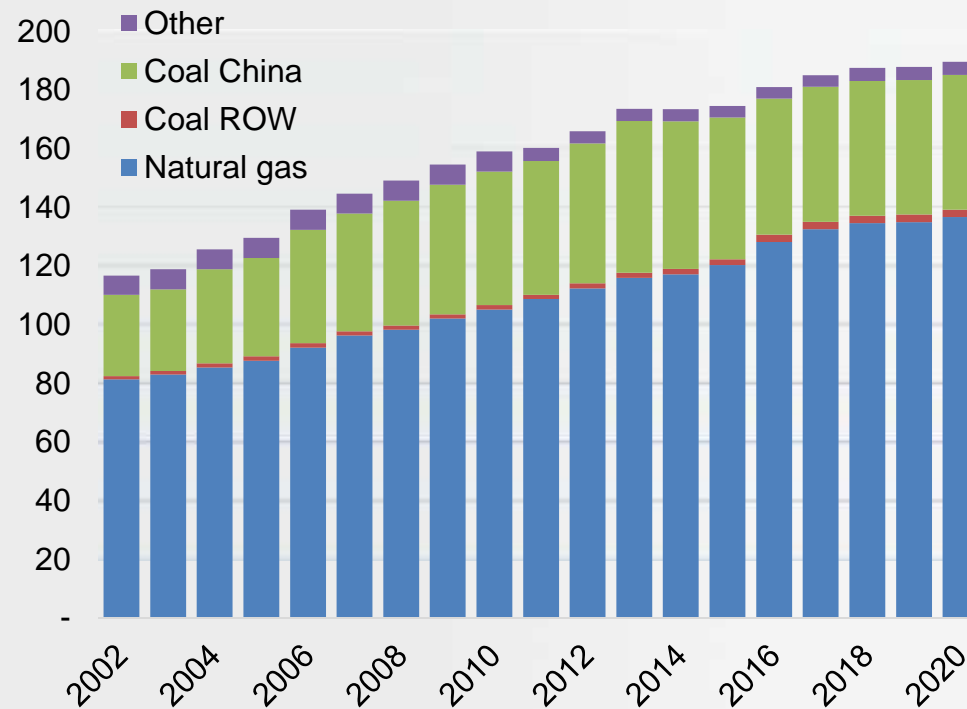
Source: Integer and LMC, 2013



- 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)

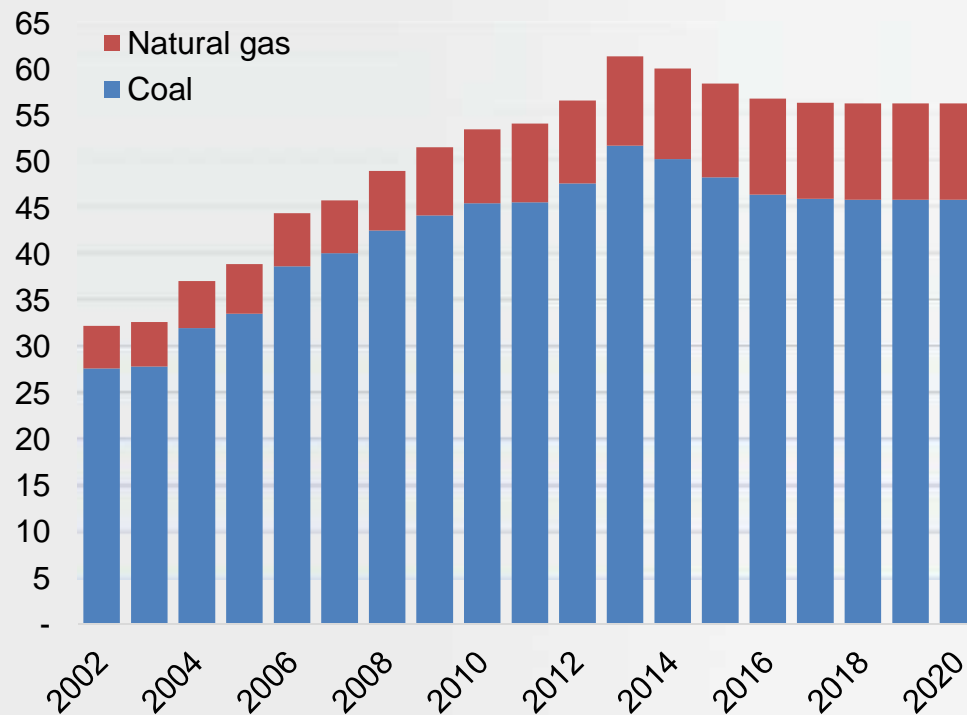


Source: Prud'homme, 2016



- 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
 - mostly from natural gas

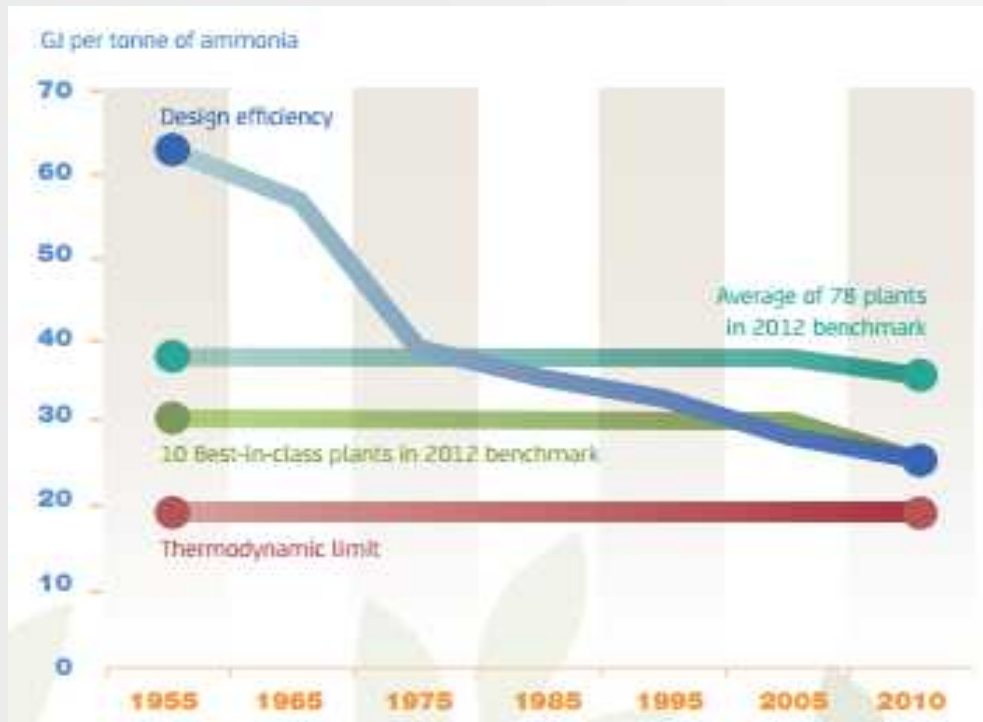
China Ammonia Production Capacity (Tg N)



- 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

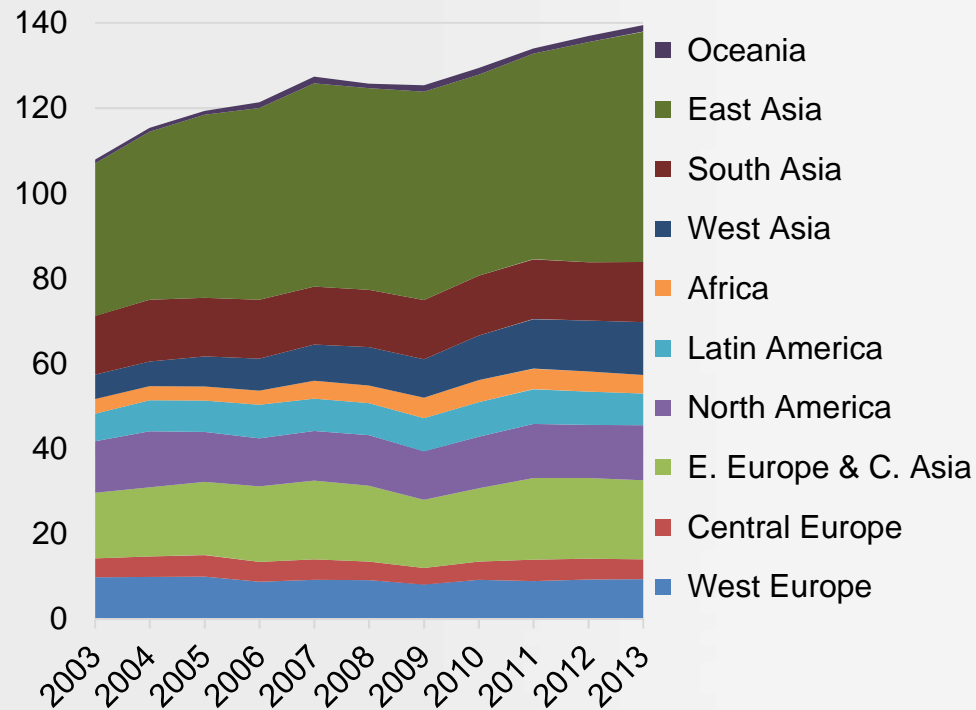
Global Energy Use Efficiency in Ammonia Production

Results of the 2012 IFA Benchmarking Survey



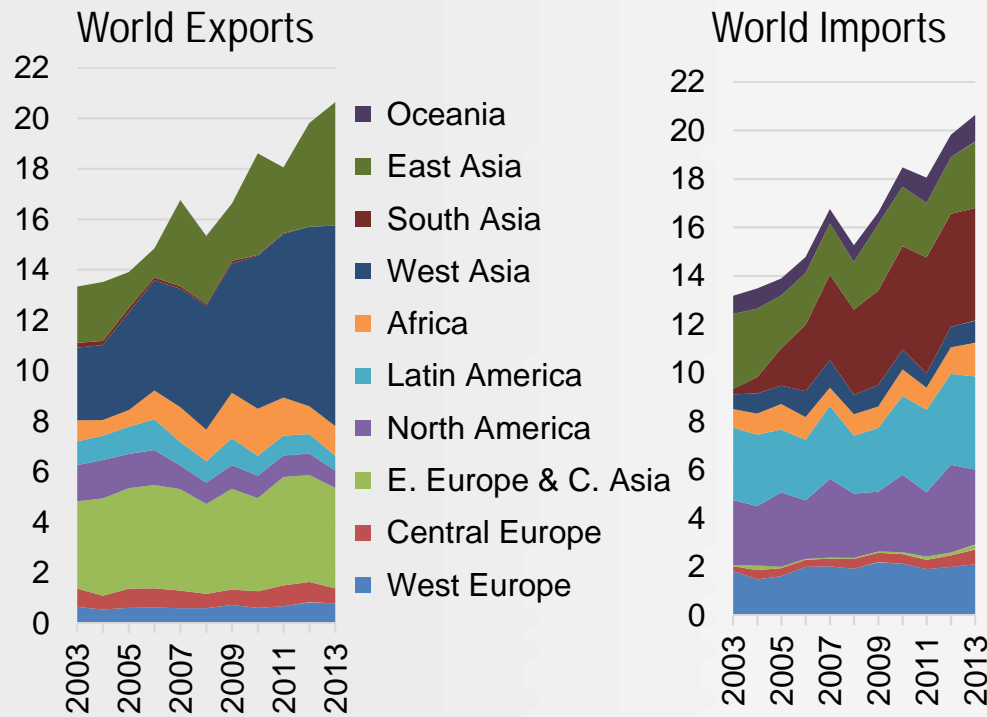
- Fertilizer production uses ~1.2% of world's total energy
- Of which ~90% is used for ammonia
- Large gains in energy efficiency (adoption of advanced technologies)
- New plants performing close to maximum efficiency

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)

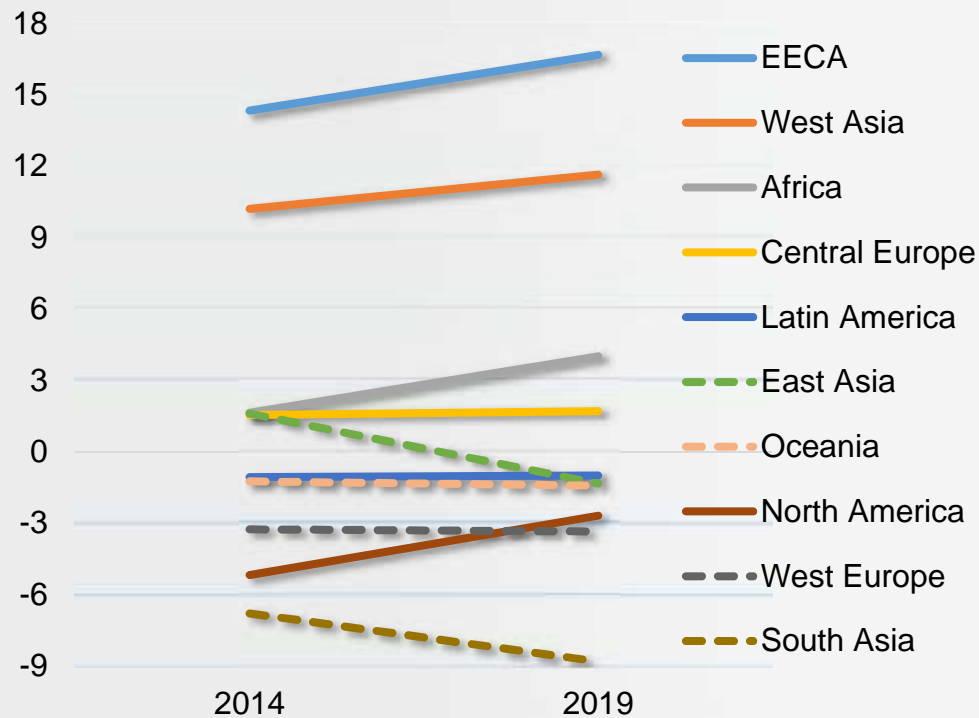


Source: IFA, 2016



- 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)



Source: FAO, 2016



- ⦿ 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

IN SUMMARY

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

Questions/comments:

pheffer@fertilizer.org

