GLOBAL NITROGEN FERTILIZER DEMAND
Evolution of Global Fertilizer Consumption by Nutrient
(Tg N+P$_2$O$_5$+K$_2$O)

Source: IFA, 2016

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
- P$_2$O$_5$: +26%, to 41 Tg
- K$_2$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

Source: IFA, 2016
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

Source: IFA, 2016
Breakdown by Product of Global N Fertilizer Demand in 2013/14

- Ammonia dir. applic.: 3%
- Ammonium sulphate: 7%
- Urea: 57%
- Ammonium nitrate: 5%
- Calc.amm. nitrate: 5%
- Nitrogen solutions: 6%
- Other N straight: 0%
- Ammonium phosphate (N): 4%
- Other NP (N): 3%
- N K compound (N): 2%
- N P K compound (N): 0%

Source: IFA, 2016

- **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

Source: Heffer, 2013
Typical Evolution of N Use Efficiency (NUE) Over Time

Different countries are on different points on the curve

- Sub-Saharan Africa
- Brazil
- Developed Countries
- India
- China

Crop Yield

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

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

Global NUE = 42-47\% \text{(Lassaletta et al., Zhang et al.)}

- Largely influenced by crop mix, management practices, policy
- Complementary indicators needed

N Market Share in 2015/16

- Developed countries 26\%
- China 29\%
- India 14\%
- Brazil 7\%
- SSA 2\%
- ROW 22\%

Adapted from Zhang et al., 2015
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

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

Crop-based projections

Source: Integer and LMC, 2013

**Fast, 6% per year**

**Base, 4% per year**

**Slow, 2% per year**

**Real**
GLOBAL NITROGEN FERTILIZER SUPPLY
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)

- Natural gas
- Coal

- 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

Source: Prud'homme, 2016
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

Source: IFA, 2014
World Ammonia Production by Region (Tg N)

- Oceania
- East Asia
- South Asia
- West Asia
- Africa
- Latin America
- North America
- E. Europe & C. Asia
- Central Europe
- West Europe

- **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

Source: IFA, 2016
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

Source: FAO, 2016
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
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<th><strong>SALES</strong></th>
<th><strong>EMPLOYMENT</strong></th>
<th><strong>INVESTMENT</strong></th>
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<td>- 2014 value of sales from fertilizer producers: US$172 bill</td>
<td>- 926,000 jobs in production around the world</td>
<td>- Industry to invest US$83 bill in revamps and expansions in 2015-2019</td>
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<td>- Of which sales value of US$84 bill for straight N fertilizers, US$25 bill for MAP/DAP and US$26 bill for NPKs</td>
<td>- N sector directly employing 482,000 workers + 31,000 for MAP/DAP and 112,000 for NPKs</td>
<td>- Anticipated investments of US$43 bill in straight N fertilizer capacities, US$3 bill in MAP/DAP and US$2 bill in NPKs</td>
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Source: Integer Research for FA, 2016
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