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The Chinese fertilizer industry

Current situation and outlook

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For the GPCA Fertilizer Convention, 6-8 September 2016

Overview

- Why are we talking about China?
  - Background
- Look at current nitrogen and phosphates situation in turn
  - Scale of demand, capacity, production and exports
  - Evolution of volumes and costs
- Conclusions

- This presentation is based largely on the research and analysis of my colleague Lynn Wang in our Beijing office

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Background – why are we talking about China?

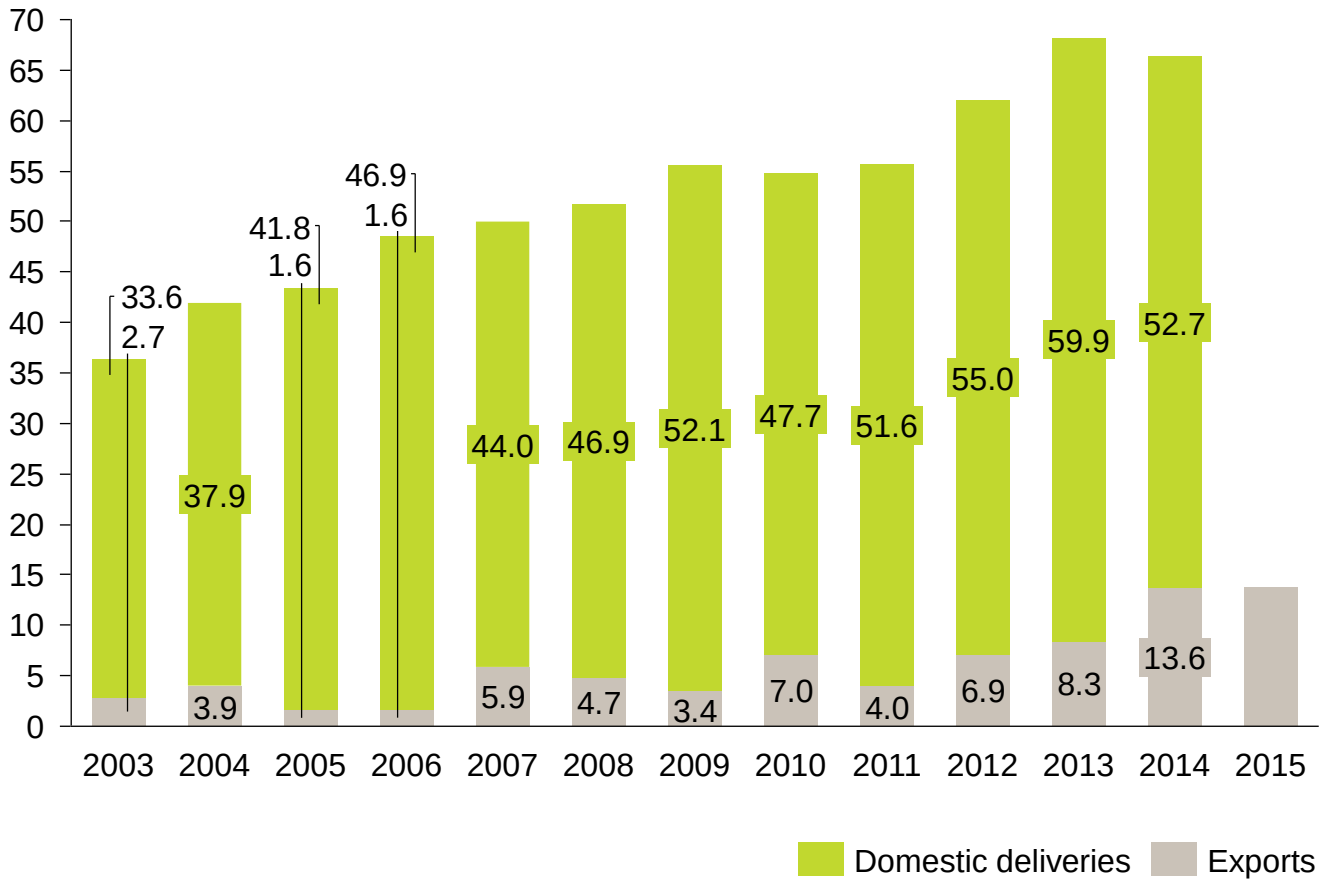
China is the biggest and most influential fertilizer producer and consumer in the world

- **Demand**
  - Total fertilizer consumption in 2015 was about 60 million tonnes accounting for almost one third of global fertilizer use.
    - Basic cereals are the largest consumers of fertilizer at the N+P+K level with a share of 44%
    - Fruit and vegetables follow cereals at 30% of consumption
    - Oil crops, mostly rapeseed and soyabean, use around 8%
    - Sugar crops use 2%, cotton around 3%, pulses 1%.
  - Demand has grown rapidly but inefficiently
    - In March 2015, the Chinese Ministry of Agriculture (MOA) announced that China will launch a zero growth campaign for fertilizer consumption by 2020. According to the programme, China will reduce or control nitrogen and phosphate fertilizer consumption, stabilize potash consumption and increase secondary and trace element demand.

- **Supply**
  - Urea
    - China has rapidly built up its nitrogen supply base. This has uniquely utilized its abundant resources of coal
  - Phosphate
    - China has extensive resources of phosphate rock which includes extensive lower grade reserves. It has been innovative in developing and monetizing these reserves.

China's nitrogen urea sector in a global context

Chinese urea volume development (million tonnes)



China's share of world urea production:

- 31% 2003
- 40% 2015

China's share of world urea exports:

- 9% 2003
- 29% 2015

Source: Integer

China’s phosphate business in a global context

Chinese MAP and DAP volume development (million tonnes)

China’s share of world MAP production:
- 23% 2003
- 50% 2015

China’s share of world MAP exports:
- 2% 2003
- 25% 2015 est.

China’s share of world DAP production:
- 14% 2003
- 50% 2015

China’s share of world DAP exports:
- 7% 2003
- 33% 2015 est.

Source: Integer

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Nitrogen

Chinese urea export declined to 4.3 million tonnes in Jan-May of 2016 compared to 6.1 million tonnes in the same period of 2015 – a margin squeeze is constraining exports

Urea prices were high enough in the last few years (and the international market was short enough of product) to absorb much of the increase in China's growing supply surplus; but this is changing.

Source: Integer

The weakest Chinese urea producers are withdrawing product from the international market

- Many Chinese urea producers cannot make money with urea prices below US$200 per tonne.
- Chinese urea capacity is highly diverse in terms of ownership, scale, location, age, and fuel/feedstock.
- Costs are not the only driver as local market prices deviate by +/-$10 per tonne according to location.
- The weakest producers tend to based on:
  - Gas, or
  - Older/poorly located anthracite plants

Source: Integer; note: vertical axis deliberately redacted

Chinese urea capacity is expected to stabilize in the range of 85-90 million tpy during the next five years

- Chinese urea capacity reached 87 million tpy in 2015, up 5% year-on-year.
- The growth in capacity has been stimulated by relatively abundant coal resources and fiscal stimulus which has made capital available for urea and other capital intensive projects.
- Capacity has grown in excess of domestic and international requirements. In 2015 around 15 million tpy of urea capacity was idle

- New plants are still being added, but the rate of additions has slowed substantially.
- Weaker plants are closing.
- We expect total Chinese urea capacity will peak in 2017 and then decline slightly.

Source: Integer

Conclusions and outlook on Chinese urea supply

- Feedstock prices outlook
  - Coal prices are expected to remain weak in the next five years because of overcapacity and in view of the Chinese economic downturn. However, we note that the Chinese government appears to be getting more serious about rationalizing the coal over-supply.
  - Gas prices for fertilizer producers will remain stable as China is short of gas supplies and its demand is expected to rise in the future. Gas based urea plants will remain uncompetitive.

- Export availability
  - Main variables: coal prices, RMB/USD exchange rate, international urea S/D; domestic demand
  - Assumptions: coal and f.ex. unchanged; domestic demand growth modest; international market doesn't need more urea =
    - Chinese urea exporters will remain swing supply, volumes at ~10 million tonnes.

- Chinese 13th Five Year Plan on nitrogen fertilizer
  - The market share of bituminous coal based urea capacity will increase to 40% of Chinese total urea capacity in 2020 comparing to 25% in 2015.
  - Anthracite coal based urea capacity share will decrease to 41% comparing to 50% in 2015
  - Gas based urea capacity will decrease to 17% comparing to 22% in 2015. The rest 2% of total urea capacity will be based on coking gas.
  - Chinese urea operation rate was about 80% in 2015, and is target to reach 85% in 2020. But this seems high without closures.
  - China is targeting 'value-added' urea and UAN consumption

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Phosphates

Chinese DAP and MAP exports declined significantly in the first five month of 2016, affected by weak international demand and low prices

- In the first five months of the year, China exported about 1.4 million tonnes of DAP, down 37% y-o-y.
- China exported 622,000 tonnes of MAP in Jan-May of 2016, down 64% y-o-y.

Source: China Customs, Integer

Only a few DAP producers were able to fetch significant margins in export markets in H1 2016

- Chinese phosphate producers have become the key swing supplier.
- The fundamentals of Chinese phosphate production costs are even more diverse than nitrogen.
- Producers have different degrees of integration with rock, Sulphur/sulphuric acid, and ammonia.
- Location is also a factor.
- Low cost producers can live with current prices, but many cannot

Source: Integer ; note: vertical axis deliberately redacted

Chinese ammoniated phosphate capacity expanded very rapidly – at 15% CAGR during 2000-2015, but we do not expect to see significant changes to capacity in the next five years.

- We expect to see capacity stabilizing at about 16.8 million tpy in 2020
  - New ammoniated phosphate fertilizer capacity additions will slow down.
  - Some low analysis phosphate fertilizer capacity is expected to close due to poor economics.
- New projects will more or less offset closures, so overall we do not expect to see significant changes to total Chinese ammoniated phosphate capacity.

Source: Integer

Conclusions and outlook on Chinese phosphate supply

- China's phosphate fertilizer capacity expanded quickly in recent decades, but the pace of growth in the future is expected to slow as fewer new plants are added. A combination of the factors, such as declining state support, weaker producer margins, low utilization and spare capacity, and stagnant future growth prospects, underline the relatively static supply outlook.

- As Chinese phosphate fertilizer consumption gradually declines, we expect to see low grade phosphate fertilizer capacity and production shrink as market share is taken by high analysis ammoniated phosphate fertilizers.

- There is significant speculation that China's phosphate reserves are significantly declining and that this is likely to negatively affect the country's ability to maintain production. We can find little evidence that declining reserves will influence production in the short to medium term at least.

- Export volume:
  - Again, key assumption is the exchange rate, along with international prices of phosphate but also sulphur.
  - Export volumes will remain highly sensitive to international prices, with significant swing capacity.
  - The international market is unlikely to need more DAP and MAP than China can supply.

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Conclusions

Summary

- China has quickly become the world's leading producer, consumer and exporter of nitrogen and phosphate products
- Growth has moved in line with the country's rising economic strength
- But, both supply and demand growth are slowing:
  - There is now a significant supply surplus leading to exports and idle capacity
- Future industry development depends on general Chinese government economic policy toward spare capacity
    - Rationalise supply, or
    - Export
  - Exchange rate is critical
  - Energy prices are important
  - Availability and cost of capital are of decreasing importance, new capacity is less relevant
- China appears to have abundant resources of phosphate and coal
  - This will not be a supply constraint in the next 5 years.
- The environment is important, but only so much:
  - Some coal based nitrogen capacity is closing, but opening somewhere else, it is migrating
- We expect to see a gradual and slow withdrawal from the export market

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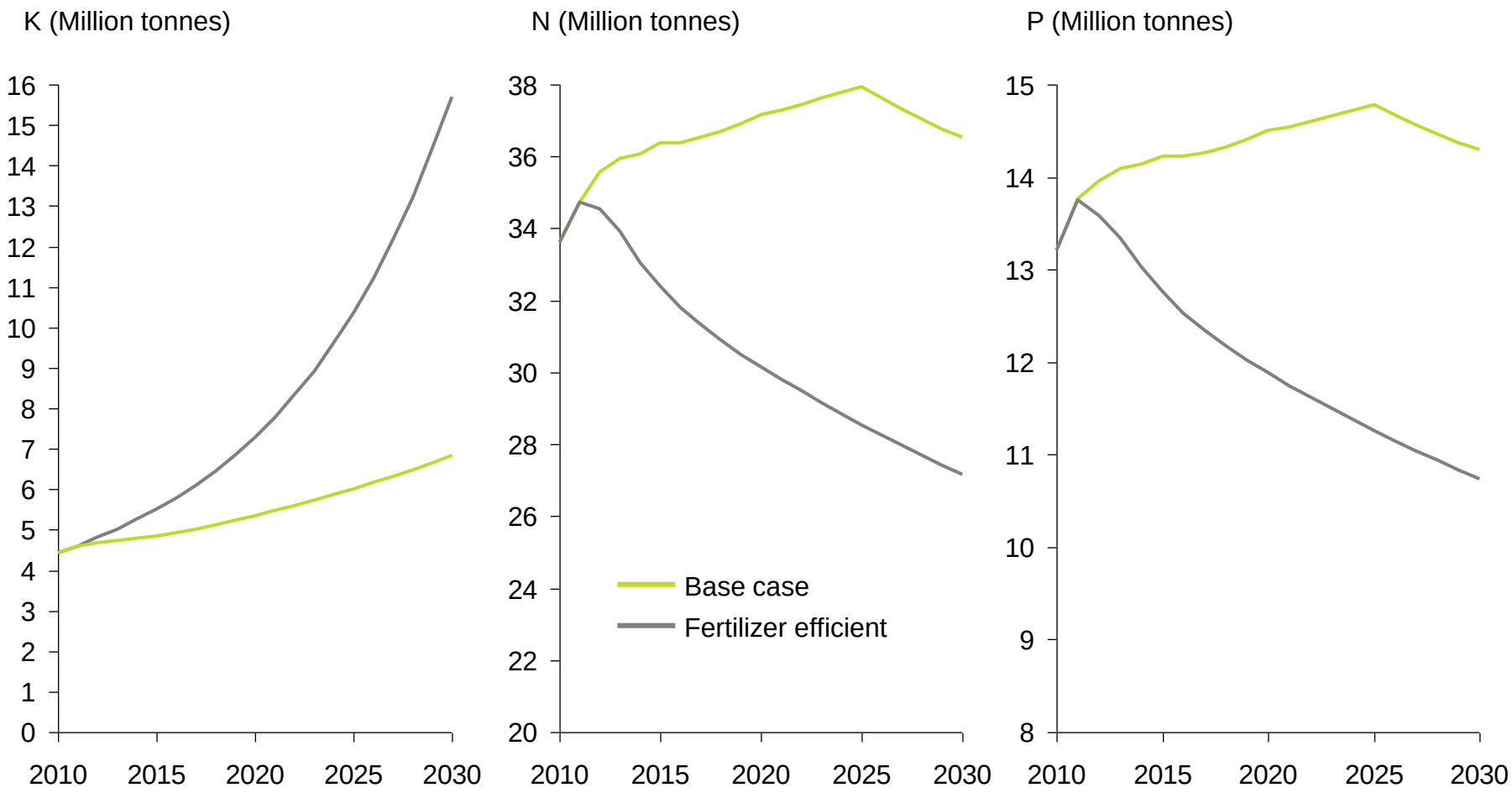
Demand is a key point to watch: there tends to be a strong focus on Chinese supply, but demand will become increasingly influential. Extrapolation is a useless demand forecasting tool.



Source: Integer, LMC