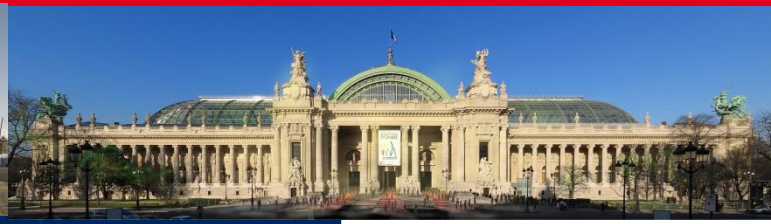
26th World Gas Conference

1 – 5 June 2015, Paris, France



GLOBAL GAS DEMAND – UNDERSTANDING THE NEXT 20 YEARS: China Case Study

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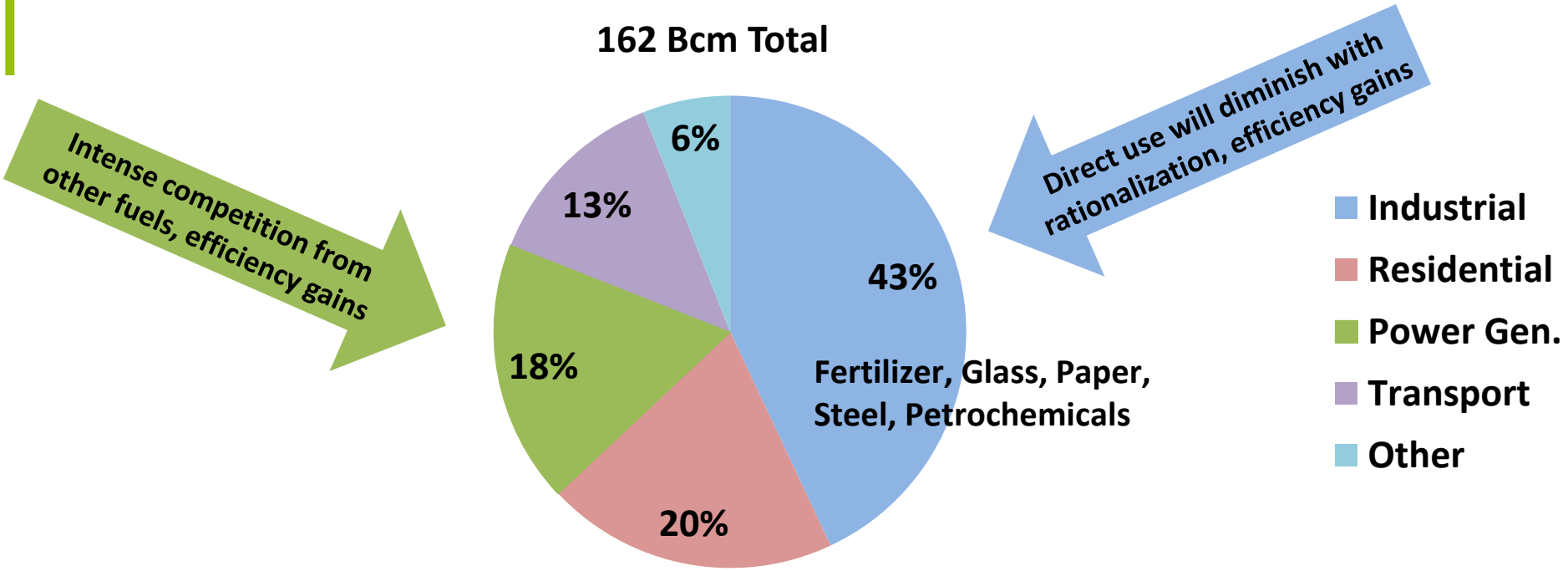
WORLD GAS CONFERENCE

What do changing expectations mean for China?

- Annual growth of 7% (or less) in 2015-20 (lower afterwards) versus 10% between 1980 and 2010
  - Consistent with stylized economic growth patterns
  - Slowing population growth – labor force issues
- Energy intensity declined significantly but has been stable in recent years and still higher than the world average (and OECD average)
- Electricity intensity continues to decline
- Hence, energy consumption growth should slow faster than GDP

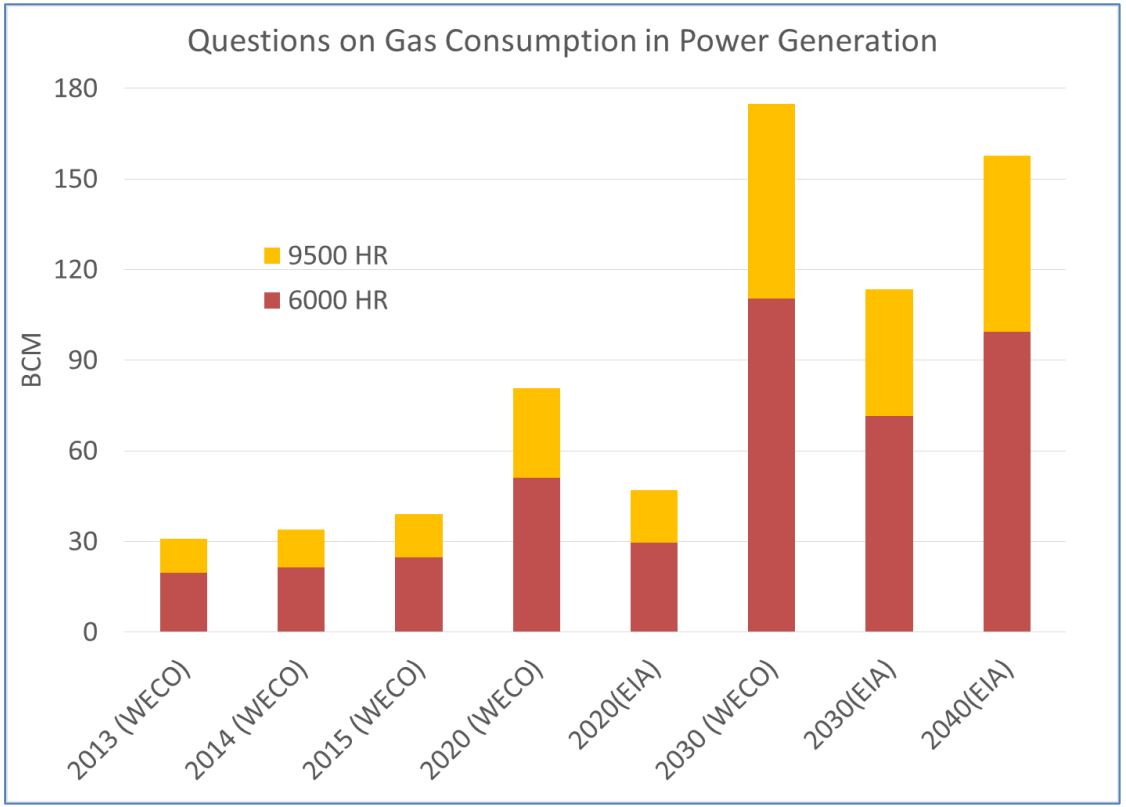
China natural gas consumption by sector 2013



Source: M. Chen, The Development of Chinese Gas Pricing, Oxford 2014

Gas is a small % of installed capacity and generation

- **Gas currently is 3% of power generation, could reach 4% by 2020**
- **Composition of gas fleet is shifting toward lower heat rate**
- **2020 outlook range 48-100 GW installed**
- **2030 outlook range 83-170 GW installed**



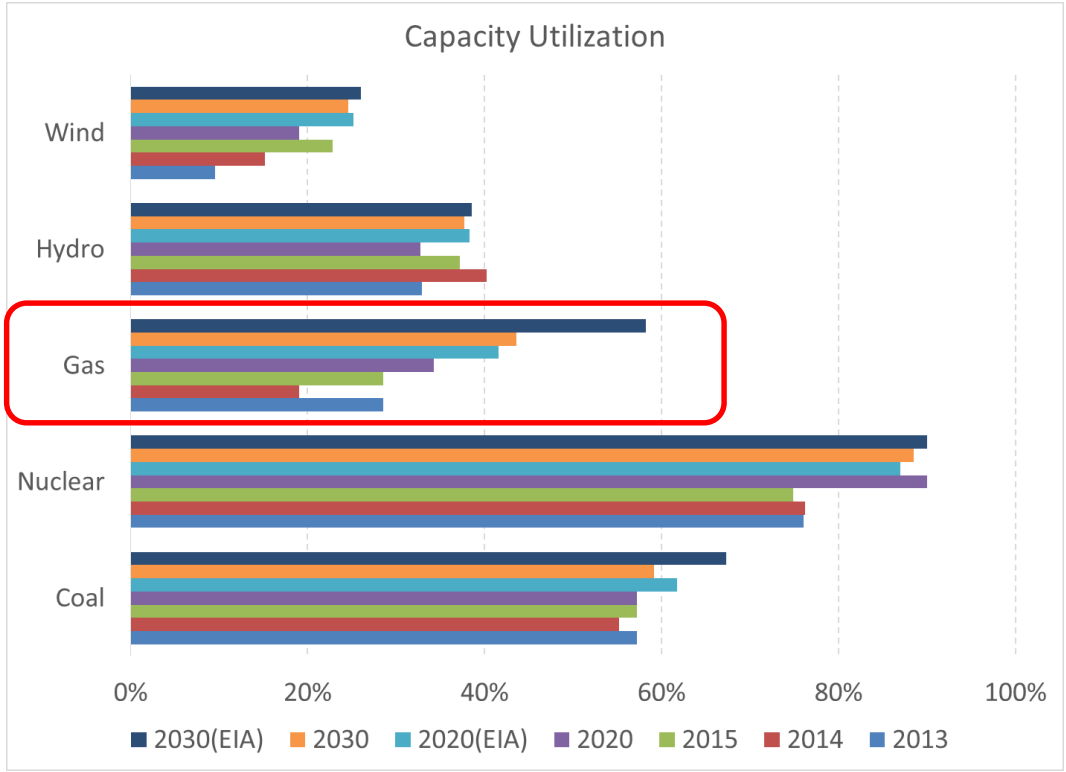
CEE calculations based on standard conversions and U.S. EIA outlooks

Can gas plants run at higher capacity factors?

Capacity factor for gas plants has been very low: less than 30% in recent years, 19% in 2014.

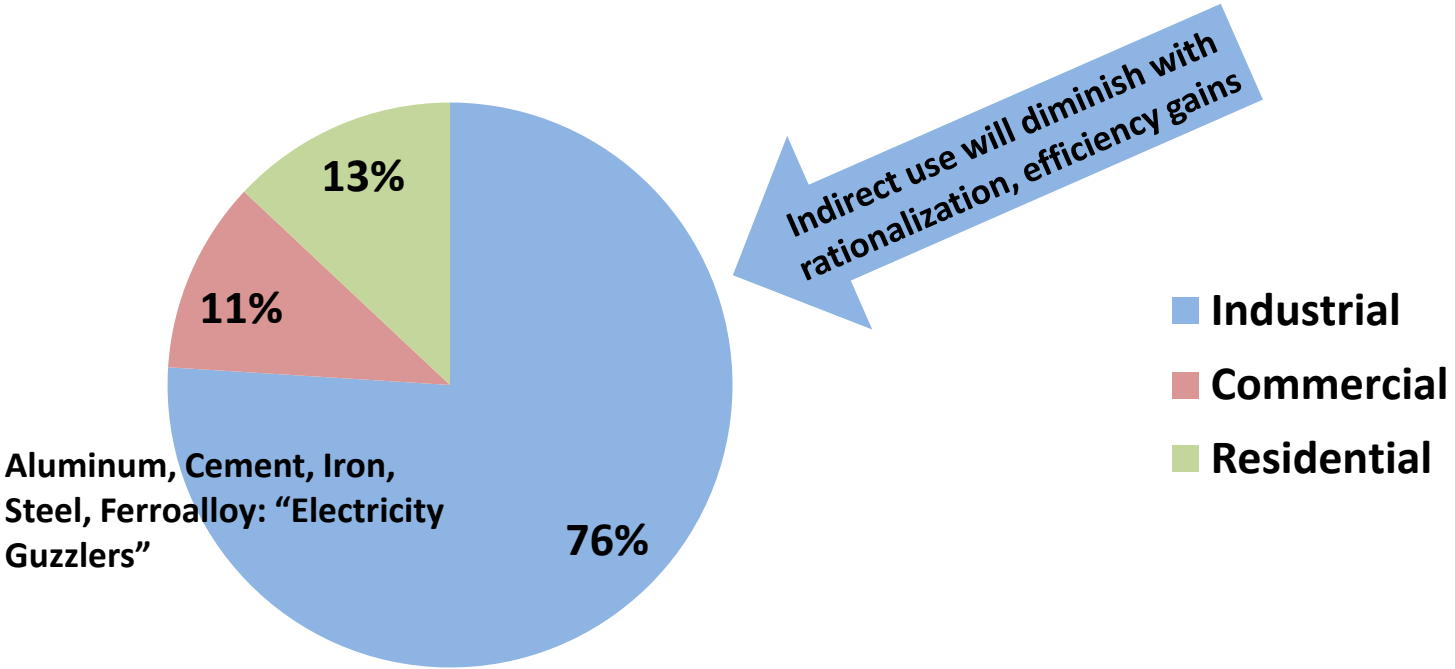
Challenges to higher CF for gas plants:

- New nuclear plants running at ~85%
- New coal plants are cleaner and more efficient and can increase CF to levels much higher than 60%
- Mine mouth supercritical coal with HVT is attractive
- Declining T&D losses
- Relatively high cost of gas



CEE calculations based on standard conversions and U.S. EIA outlooks

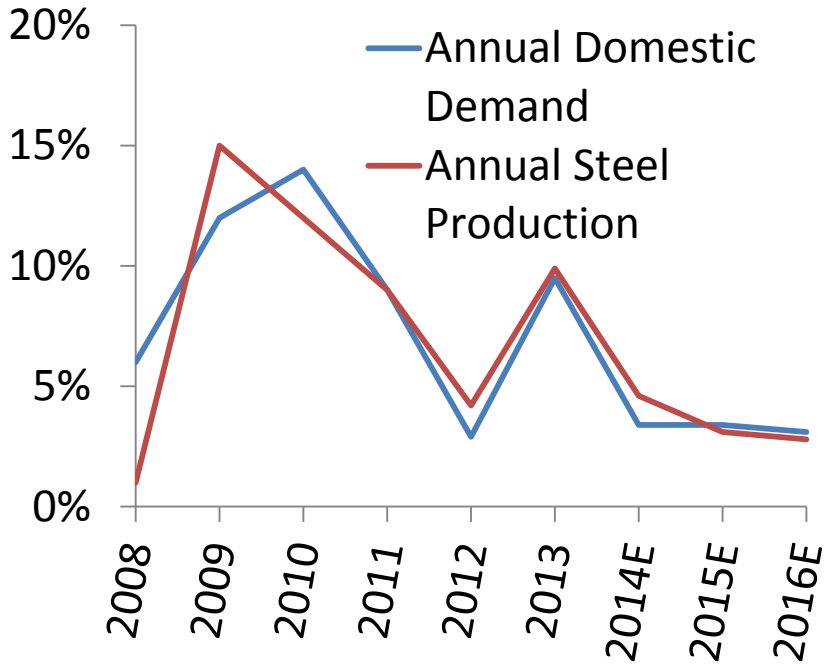
China electric power consumption by sector 2012



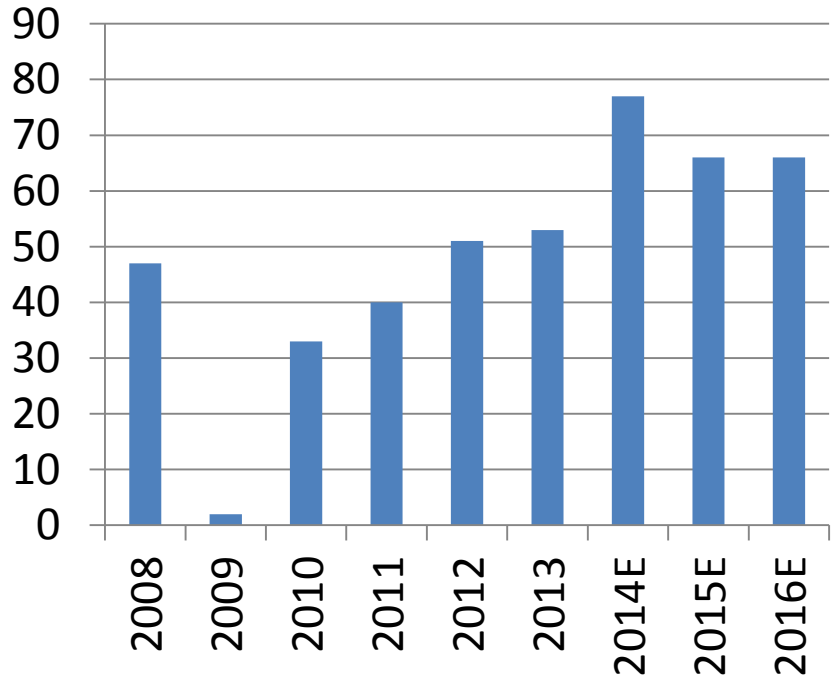
Source: China Electricity Council

Chinese steel example

Annual Growth Rate %



Net Exports (MM Tonnes)

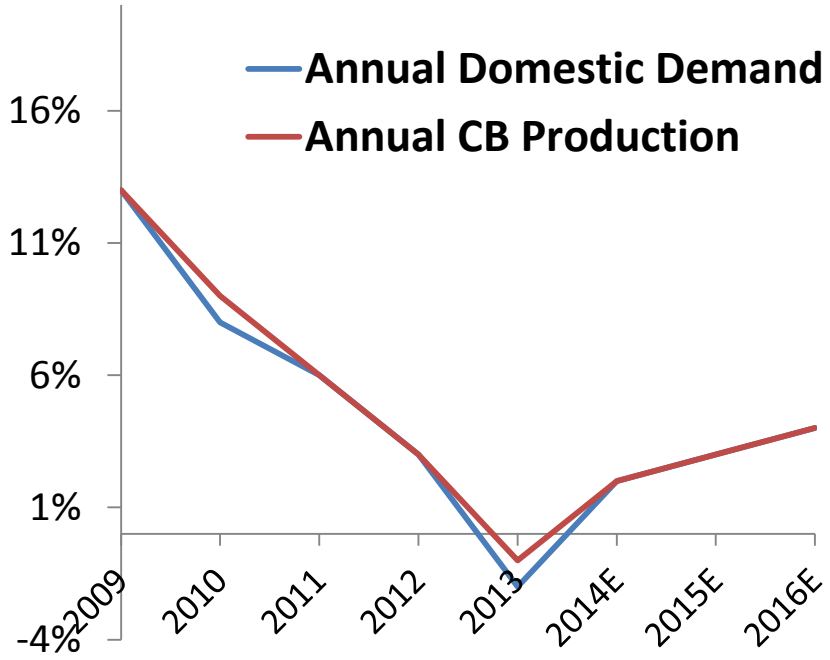


Source: Macquarie Research 12/14

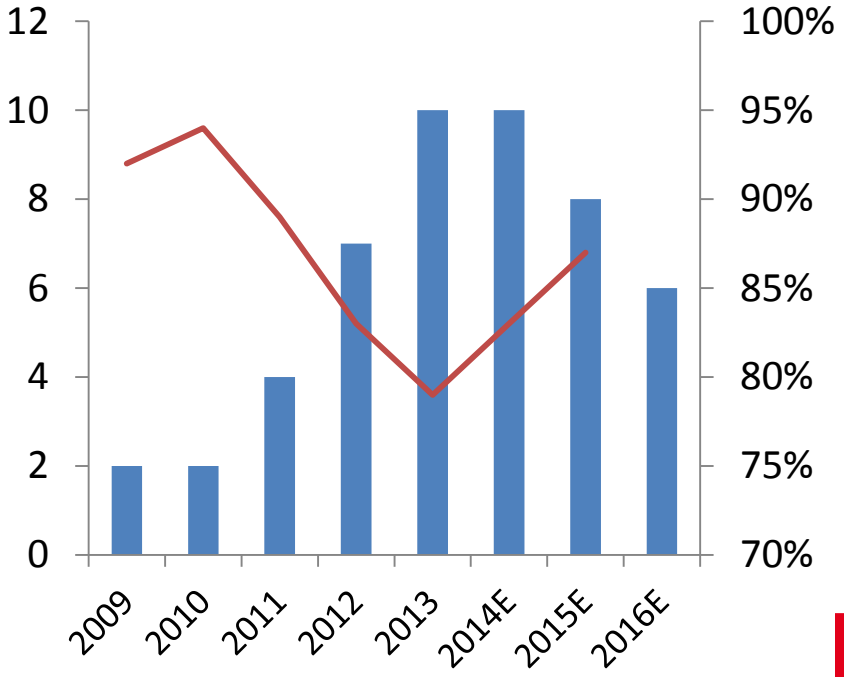
Capacity utilization has been mid-70s% and flat

Chinese paper/containerboard example

Annual Growth Rate %



Excess Capacity (MM Tonnes)



Source: Macquarie Research, China Basic Materials, 1/2/15

Conclusions

- The power generation sector's needs for natural gas can be curtailed significantly owing to several factors:
  - Expected growth in new, more efficient and cleaner coal plants, nuclear facilities and renewables, including hydro, wind and, to a lesser extent, solar.
  - Continued decline in electricity intensity of the Chinese economy.
  - Slower demand growth resulting from a maturing economy and peaking population.
  - Challenging economics of running gas plants at low utilization rates.

Conclusions

- The industrial sector's needs for natural gas can be curtailed owing to several factors.
  - Reforms of favourable pricing policies.
  - Modernization and more energy efficient industrial facilities and processes.
  - Elimination of excess and unprofitable industrial capacity, resulting in a lower growth, albeit more efficient and productive, industrial complex.
  - Potential switch to less energy-intensive services across the Chinese economy.
  - Competition from cheaper energy sources (e.g., electricity from coal and nuclear plants).