CHINA, OIL PRICES, AND EUROPE: WHAT CAN THE CHEMICAL INDUSTRY EXPECT?"

A presentation to :

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There is so much that could be said about the drivers of the turmoil we in the chemical industry are experiencing and will likely continue to experience . . .

- Massive drop in the price of crude
  - Possible impacts of long-term comprehensive nuclear deal with Iran
- The slowdown in growth in China
- Concerns about lending and real estate bubbles in China
- Economic and financial struggles in Europe
- Emerging economy travails
- Geopolitical challenges in the Middle East
- Trans-Pacific Partnership (TPP) Free Trade Agreement

. . . but the format for today's panel allows us to say a little about a lot or focus – so we will focus

- Oil & gas
- Ripples: US and Europe
- China

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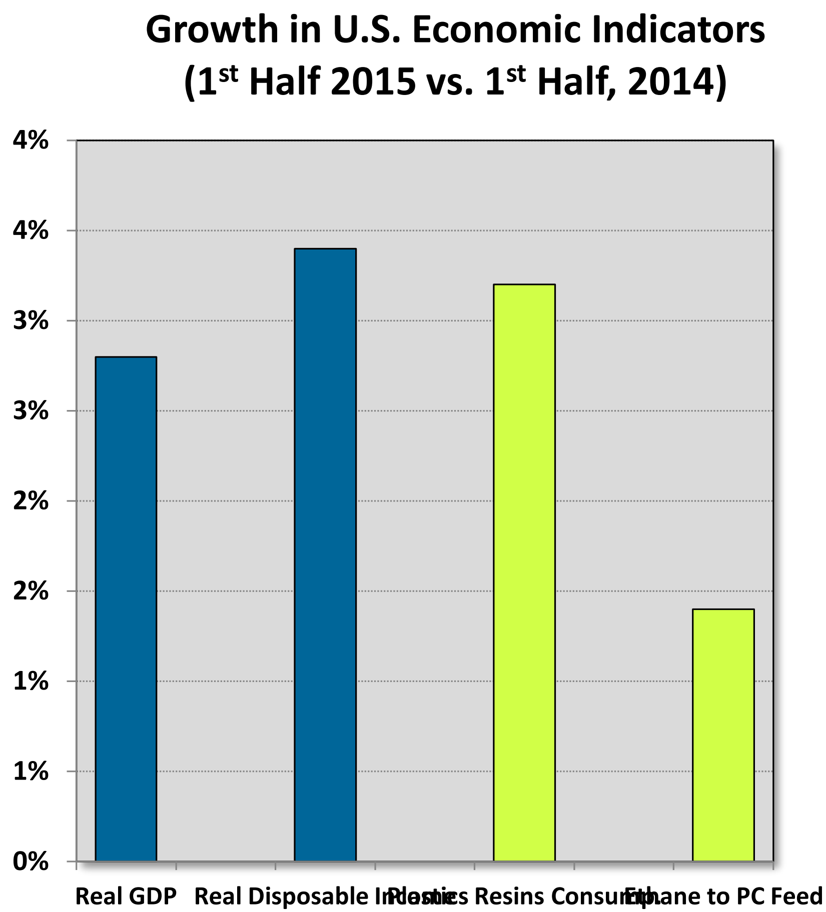
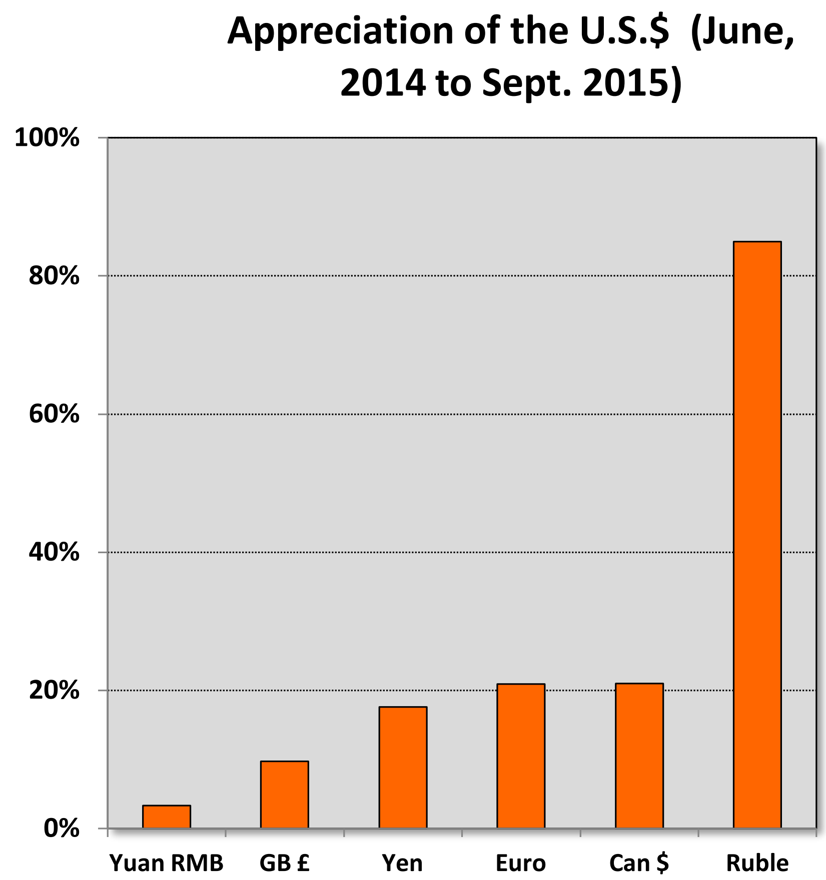
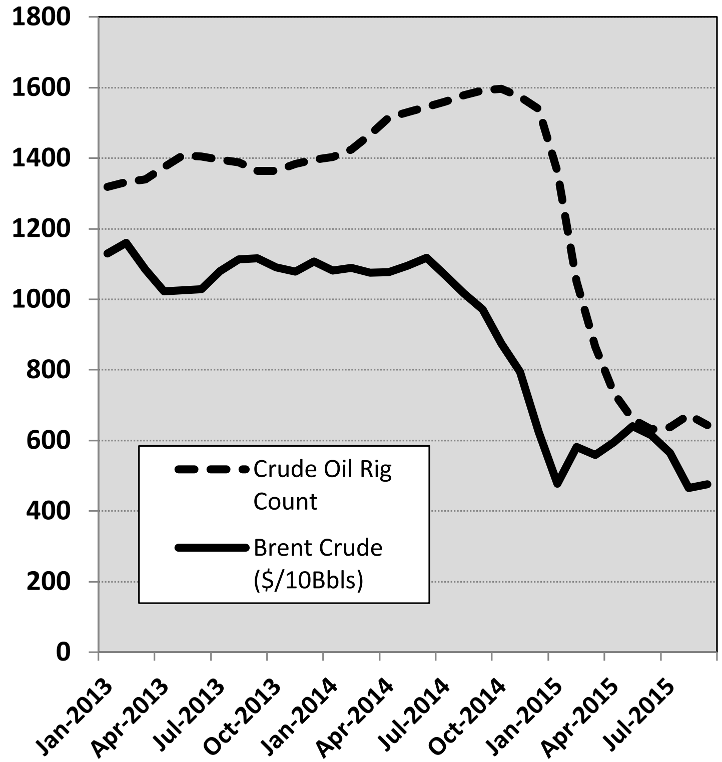
The relative strength of the U.S. economy in 2015 is reflected in both macroeconomic and chemical indicators, though exports are growing slower than imports due to the strengthening Dollar



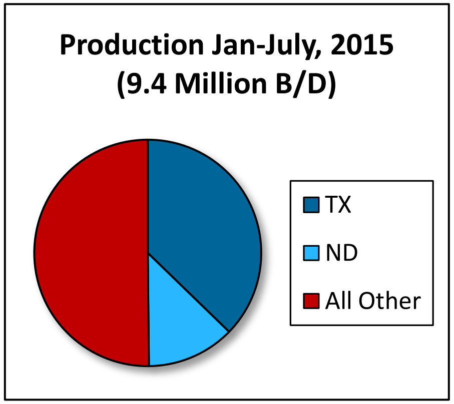


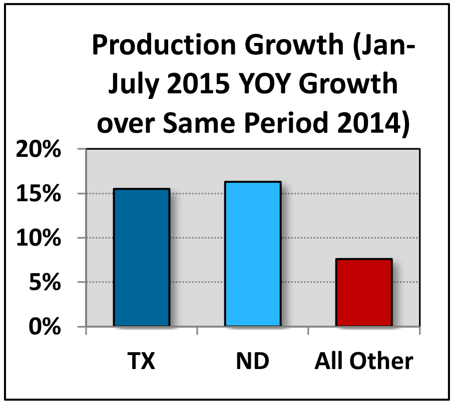
U.S. oil and gas rig counts have fallen in proportion to the decline in pricing of each commodity, but domestic production continues to rise, even in shale-rich Texas, North Dakota and Pennsylvania

U.S. Active Oil Rig Count vs. Brent Crude Oil Price

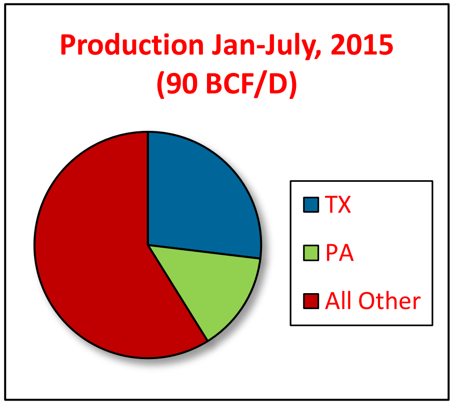


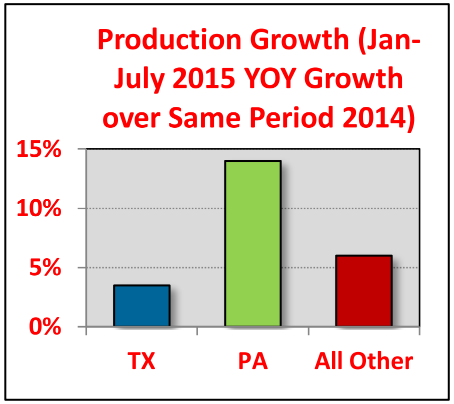
U.S. Crude Oil Production





U.S. Natural Gas Production

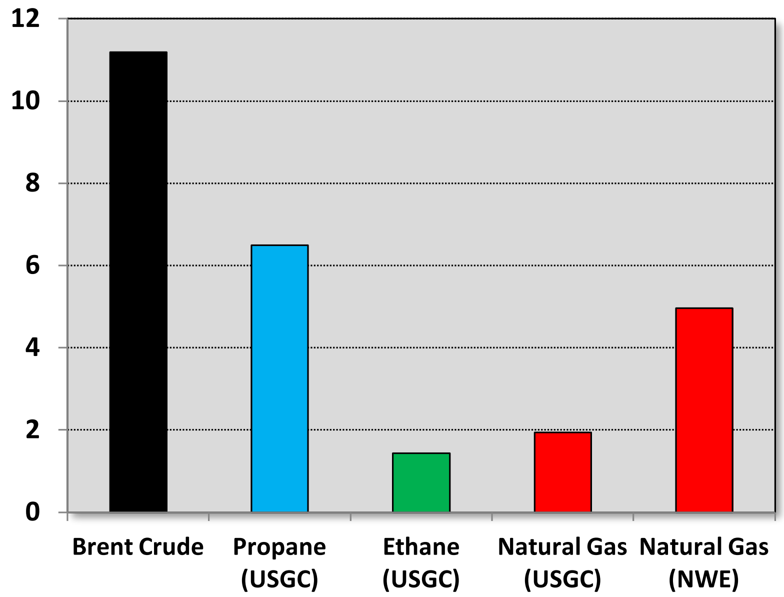




The oil price collapse of the second half of 2014 has also rippled through the natural gas and NGLs industries…

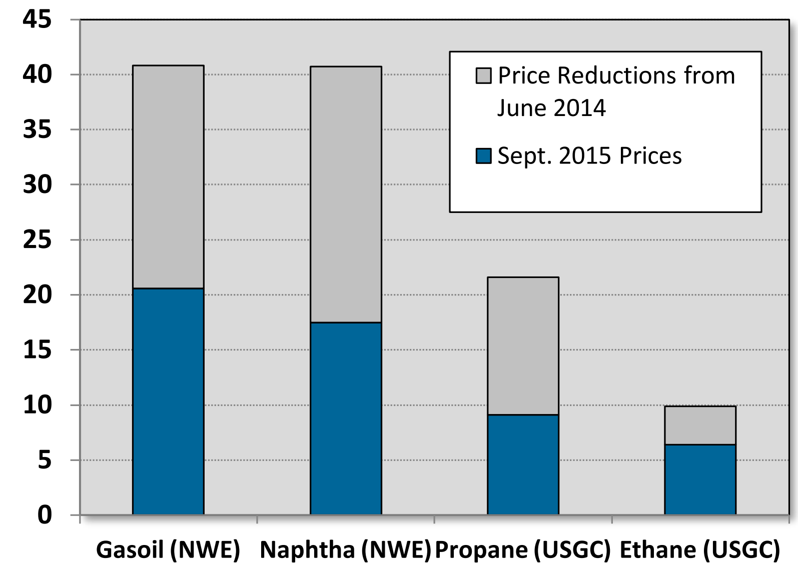
Declines in Energy Raw Materials Prices from June 2014 to Sept. 2015

(in $/MMBtu)



Price Changes for Chemical Feedstocks

(in US cents/pound)

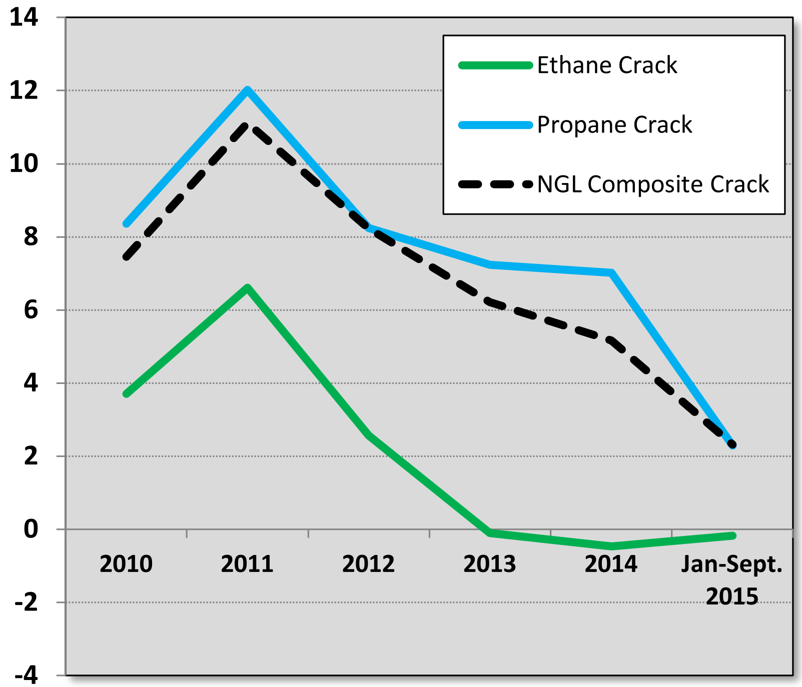


…though the greatest reductions in feedstocks costs have been for heavy liquids plants

U.S. ethane prices have been at rejection values for 3 years, a trend which will continue, enabling a sustainable export trade to Canada and eastward

U.S. NGL Cracks over Spot Natural Gas Prices

(in $/MMBtu)



- Substantial volumes of U.S. ethane will continue to be rejected, despite the start-up of new C_2-based PC plants in the East and Gulf Coasts
- Pipeline exports of U.S. ethane to Eastern and Western Canada began in 2014
- The infrastructure to liquefy, transport and receive cryogenic ethane in Northwest Europe (and India) is readying, with shipments commencing shortly from the East and Gulf Coasts

Ethane Buyer	Plant(s)	Contracted Ethane Volumes (KBD)
Ineos	Rafnes Grangemouth	45 10
Borealis	Stenungsund	26
SABIC	Teesside	44
Reliance	Jamnagar	73

Low crude is a two edged sword. There is significant benefit in the US and elsewhere . . .

- US much more competitive from a feedstock standpoint
- With increasing oil and gas production exports become attractive
  - Fracking has yielded substantial volumes of NGLs
  - The surplus of ethane could lead to increased exports
    - Especially of interest in Europe
      - Concerns about accelerated depletion of oil and gas reserves in Saudi Arabia, including the Ghawar field which accounts for +/- 60% of its production
      - Evaluating options
        - Cryogenic facilities and transport are in development, as noted earlier
        - Ineos has bought 12 North Sea gas fields ($750 million) to “help its UK petrochemical assets to have ongoing access to competitive energy”.
  - Momentum building to lift ban on US oil exports

. . . but there have also been less positive impacts . . .

- Decrease in active/operating rigs has cost jobs in much need regions
  - Impacted suppliers as well, and supporting services and organizations
  - Decline in demand for oil field chemicals
- EP&C firms are seeing a growing number of contracts cancelled and opportunities completely disappear
- Questioning investments being made or already underway based on advantageous fracking economics (built around much higher crude prices)

. . . and driven rapid change in the landscape for bio-based materials

- More emphasis on specialty/performance chemicals vs. chemical intermediates
  - Rivertop – water treatment vs. adipic acid
  - Amyris – personal care/cosmetics/food with farnasene derivatives
  - Verdezyne -- DDDA vs. Adipic acid
  - Solazyme focus on food and personal care
- VCs have little patience and even less money
- Strategic investors are diverging in terms of approach
- Chemical strategic investors are backing off
  - BASF – acrylic acid with Cargill; TDCC – acrylic acid with OPX
- Ag based fermentation strategic investors are doubling down with investments in newer companies or distressed assets
  - ADM with Rennovia; Cargill with OPX, Rivertop

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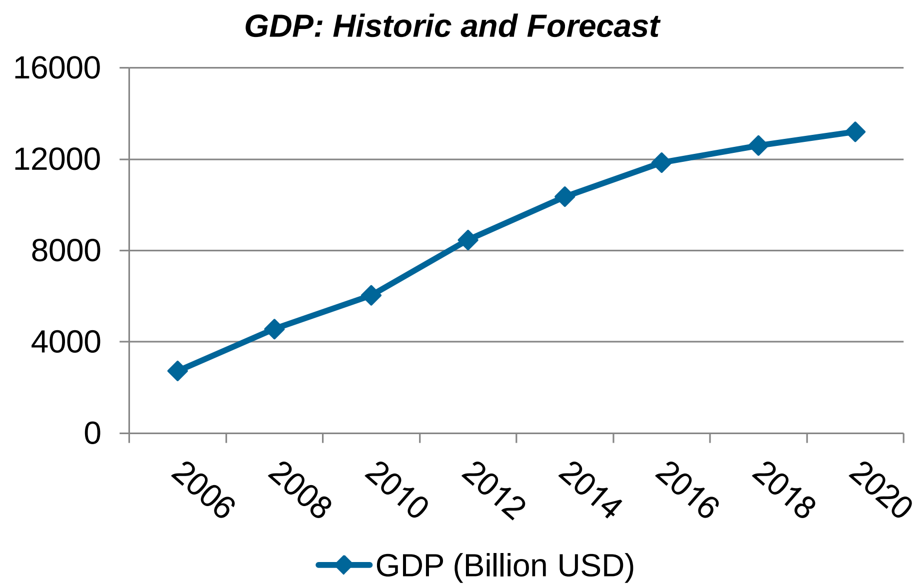
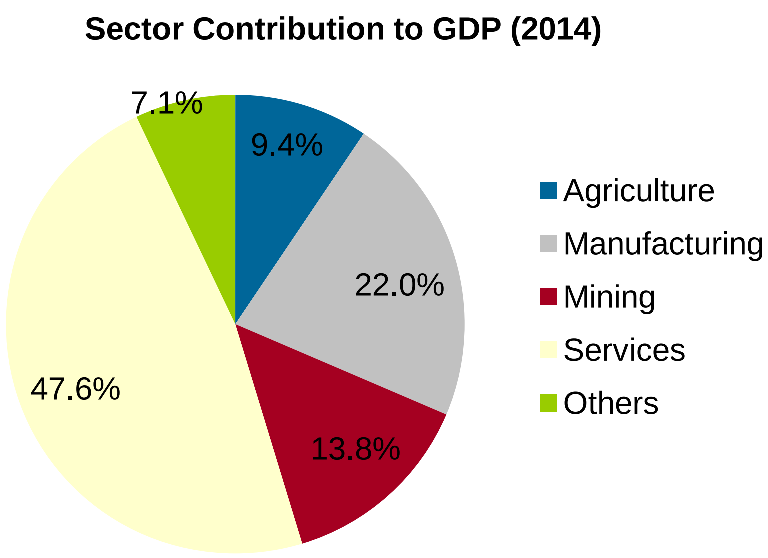
GDP growth was 7.4% in 2014, the lowest in ten years



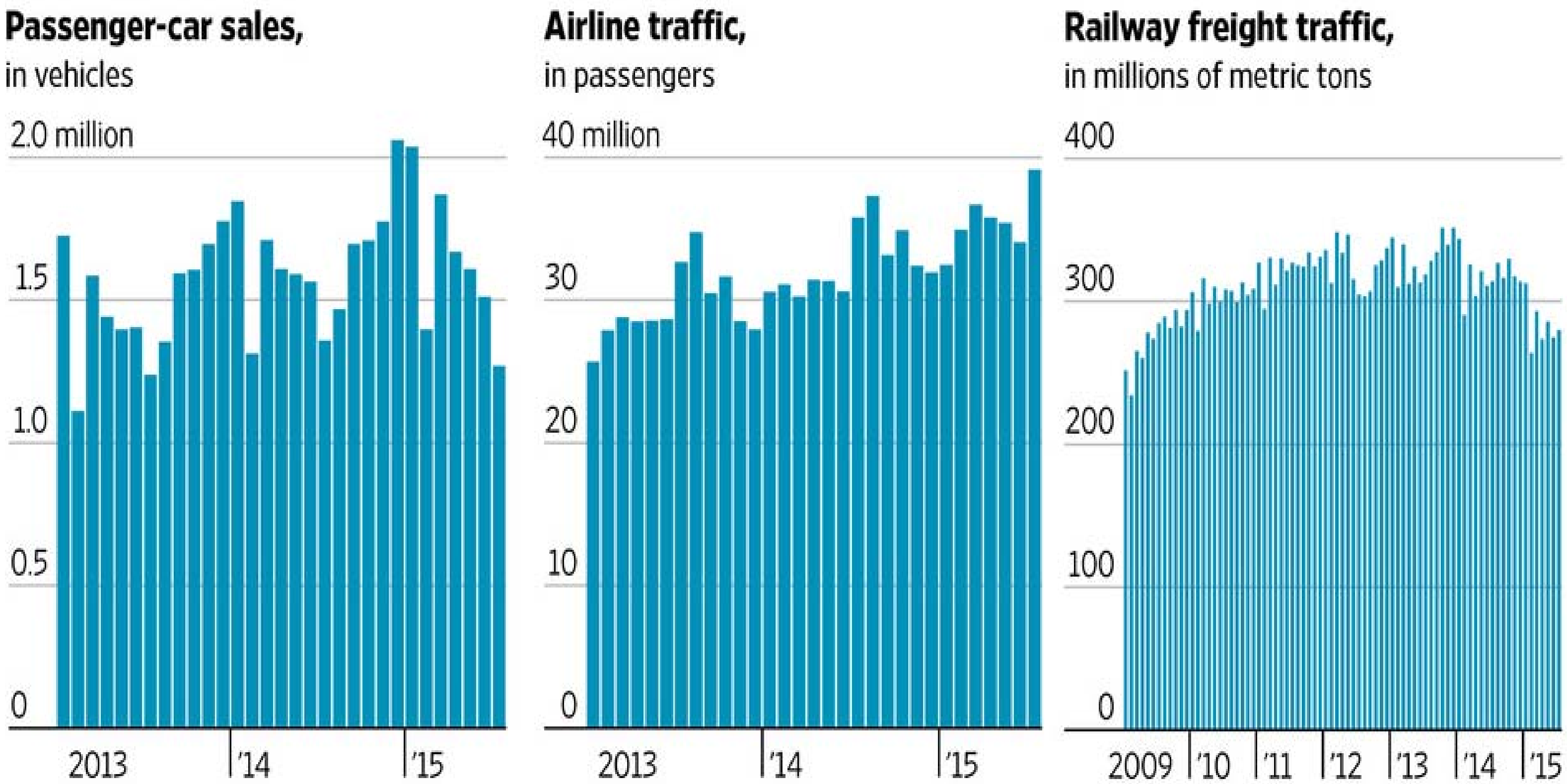


China's economic growth is slowing down, but in a controlled fashion, with the country now heading down a more sustainable path

- Chinese economy is expected to decelerate further in the near future with the government now focused on moderate but sustainable growth
  - China's GDP is expected to grow +/- 7%annually in 2015, 2016 and 2017, compared to double digits in the past
  - China remains a dynamic market full of opportunities despite growth shifting into a lower gear, especially since the country is seeking to improve the quality of its economic and social development
  - This is the 'new normal', an age where China's growth rate will be modest and a more mature economy will reorient itself away from an investment-led model to one that focuses on consumption and services

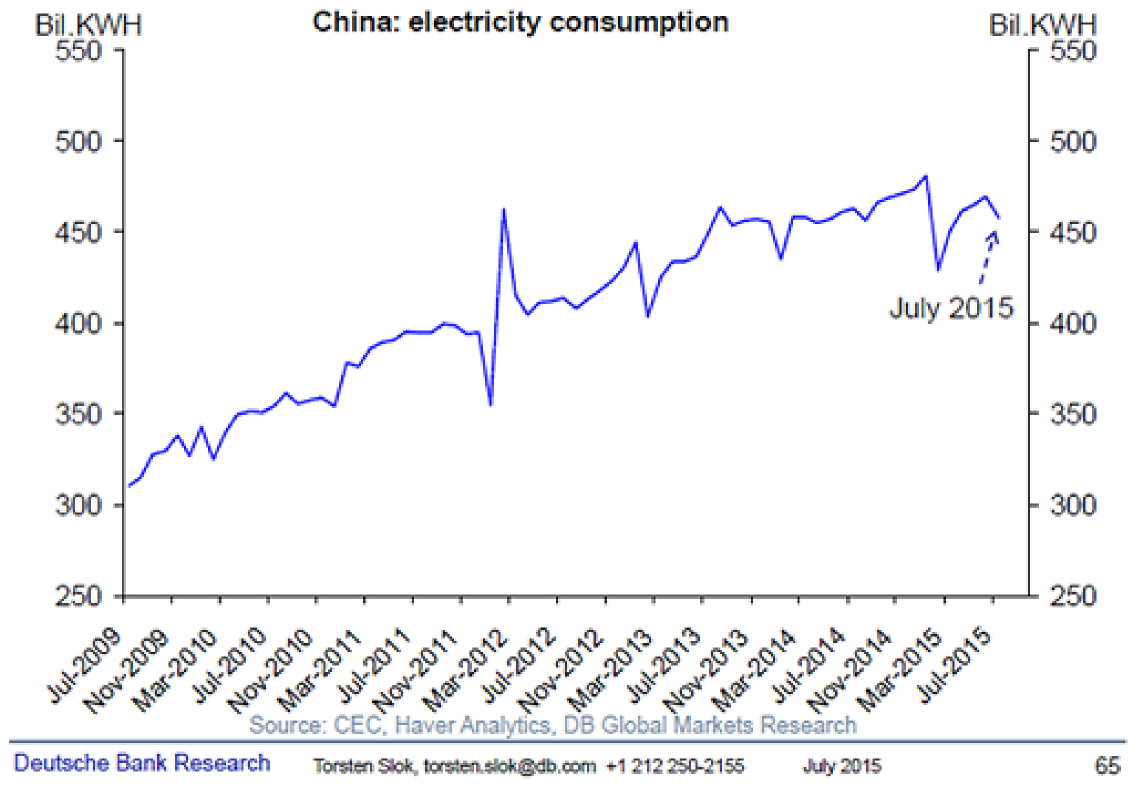
- A key point to understand is that SOE's are not purely economic organizations; they have social functions and objectives as well
  - They may not always be efficient and competitive operations
  - But they employ a lot of people
  - Clearly could be more competitive, but then social stability will suffer

Mixed signals from various indicators have clearly shown the economy is in transition



Sources: China Association of Automobile Manufacturers (car sales); Civil Aviation Administration of China (airline traffic); China Railway Corporation (freight traffic)

Electricity data appeared to have indicated that the industrial growth has slowed, but the economy is not falling off a cliff

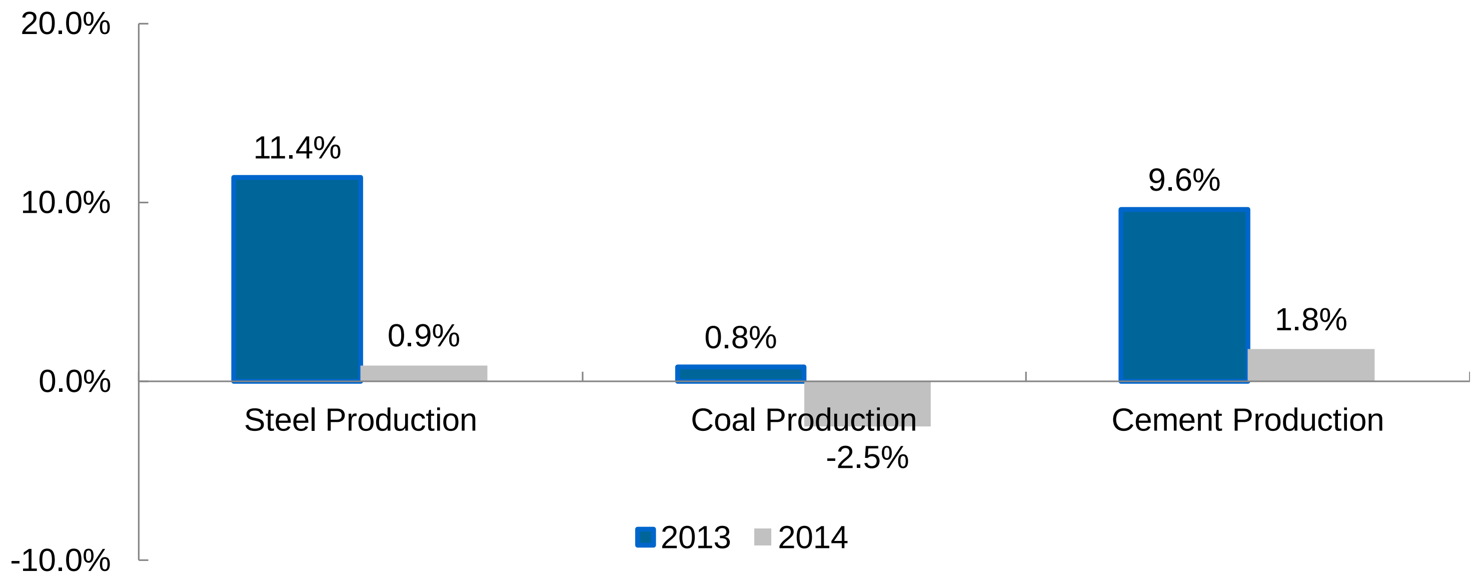


The central bank, the People's Bank of China, devalued the currency by a cumulative 4.4% against the US dollar in August 2015

- Many analysts suggested that the move was designed to make Chinese exports more competitive.
- The recent devaluation is unlikely to bolster the economy significantly given it is the exchange rate catching up with its actual market value after having been fixed for much of the last year
- A overlooked angle to the central bank's play is China's desire to get the yuan into the IMF's reserve assets known as special drawing rights (SDR).
- Joining the other currencies would validate that the yuan has become an international currency and as such the currency like the others would be 'freely usable,' and their values are generally determined by market forces.
- The IMF will not decide on the yuan's inclusion until next year
- Should that happen, the bank's devaluation of the yuan could be viewed key in getting it viewed as a qualified candidate for the SDR

Growths in such heavy industries as steel, coal mining and cement have also struggled in 2014

Growth Rates of Select Industries, 2013 vs. 2014



China, already the world's biggest chemical market, is on a trajectory over the next decade to become an even larger but much more competitive one

- China's economic expansion has slowed, but the country remains the most important growth market for most—if not all—global chemical companies
- International companies have a strong hand to play in China
  - Not only will the country continue to be a major importer of commodity chemicals over the next decade, but international companies also have the more sophisticated products that will be needed in the coming stages of China's economic development
- Chinese companies are increasingly trying to step out of low-profit commodity segments and climb up the technology ladder to more sophisticated sectors, as well as enjoying many home-player advantages in the more competitive environment
- One testimony to the growth models that international companies have been employing in China is that these companies have by and large escaped the worst effects of the slowdown
- Different sectors of the chemical industry have shown very different levels of attractiveness and international companies have tended to be relatively selective about the segments they have chosen to participate in, and this has paid off
- But for Chinese companies, the fast demand growth of the past decade has encouraged a wave of "me too" investments that, with the slowdown, have led to overcapacity not only in commodity sectors like methanol and polyvinyl chloride but even in some specialties sectors such as vitamins, depressing profitability

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So if we look forward where oil prices are headed or how effective the moves made by China will be is anyone's guess.

- There is a view – albeit somewhat controversial – that the US will drive the global chemical industry due to its technology leadership and increasingly advantaged cost position
  - Even if you disagree, the sentiment of most interviewed for this presentation are positive about the outlook for the US chemical industry, less so for Europe
- While often viewed as a competitive threat, China will continue to be an important market for chemicals
- Most companies looking outside their regions/country markets for growth – depending on home country/market it might be exports, but more likely M&A
  - Chinese and Indian companies making significant bets overseas
  - Though such majors as BASF and Dow are looking at portfolio restructuring to spur growth and performance, geographic expansion is also an important strategic option
    - China and Africa are especially of interest to Dow – who is seeking to increase sales in Africa by fivefold

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One other factor impact dramatically impacting the chemical landscape is the influence of activist investors/hedge funds,

- Much more so in US than Europe or elsewhere
  - APC – Pershing Square/William Ackman
  - Ashland - Jana/Barry Rosenstein – exited Ashland holding in May 2015
  - Dow –Third Point/Daniel Loeb
  - DuPont – Trian Management/Nelson Peltz
  - Lubrizol – Berkshire Hathaway/Warren Buffet
- This is a discussion for another day

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