

IHS ENERGY



17 JUNE 2015 | SHANGHAI

LIFE AFTER THE SUPER CYCLE

GLOBAL ENERGY MARKET VOLATILITY & OVERSUPPLY IN CHINA

International Manganese Institute Annual Conference

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Key Messages

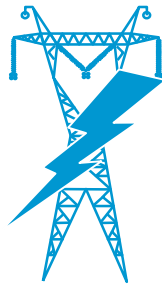
- The global energy industry is going through profound changes, with oversupply being the short-term key word.
- But demand continues to grow at a brisk pace, particularly in emerging markets, requiring continued supply-side investment.
- Economic deceleration and environmental concerns are similarly leading to energy oversupply in China, specifically pressuring coal.
- Globally, electric power tariffs will continue to differ by region depending on local power market structure and industry policies. In many cases, lower fossil fuel prices aren't translating into lower power tariffs.
- In China, the drop in coal-fired power cost will largely be offset by the growth of higher-cost supply sources like renewables, keeping average cost of generation relatively stable in China as a whole.

Global Energy: A Turning Point

Energy industry at a turning point

Electricity cost still differs by region:

Lower prices for fossil fuels offering room for rate decline, but renewables could offset the drop in certain markets



New math for global oil

With little potential for demand to rebound in a significant way, it is now OPEC vs US production



Rapidly changing global energy landscape



Collateral damage for gas

Declining CAPEX spend by the upstream will lead to project delays or cancellations

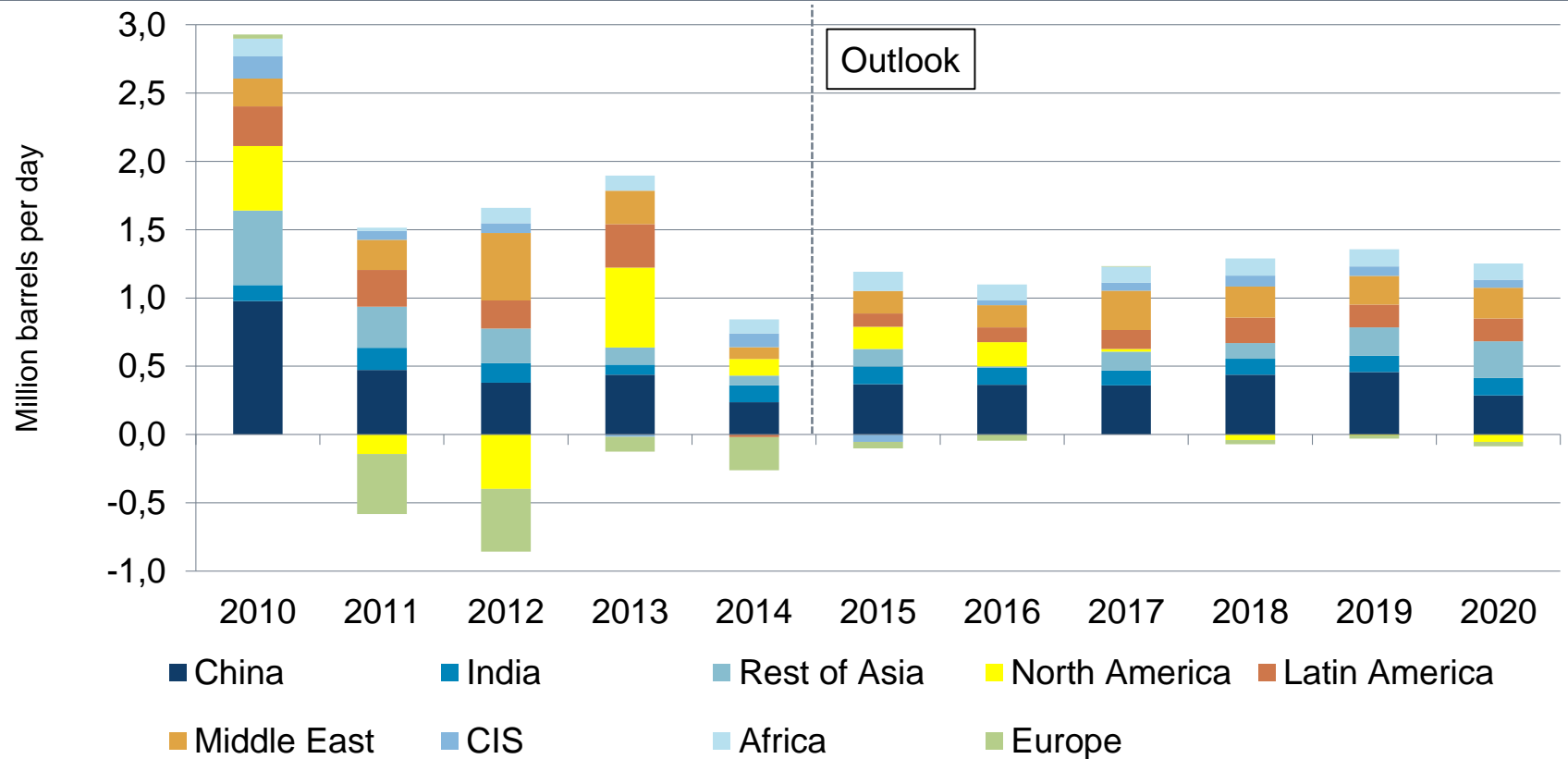
Coal facing headwinds:

Sluggish demand from emerging economies and rising global environmental concerns are negatively impacting coal demand



Global oil demand is expected to recover somewhat but not to levels of the past decade as driven by China

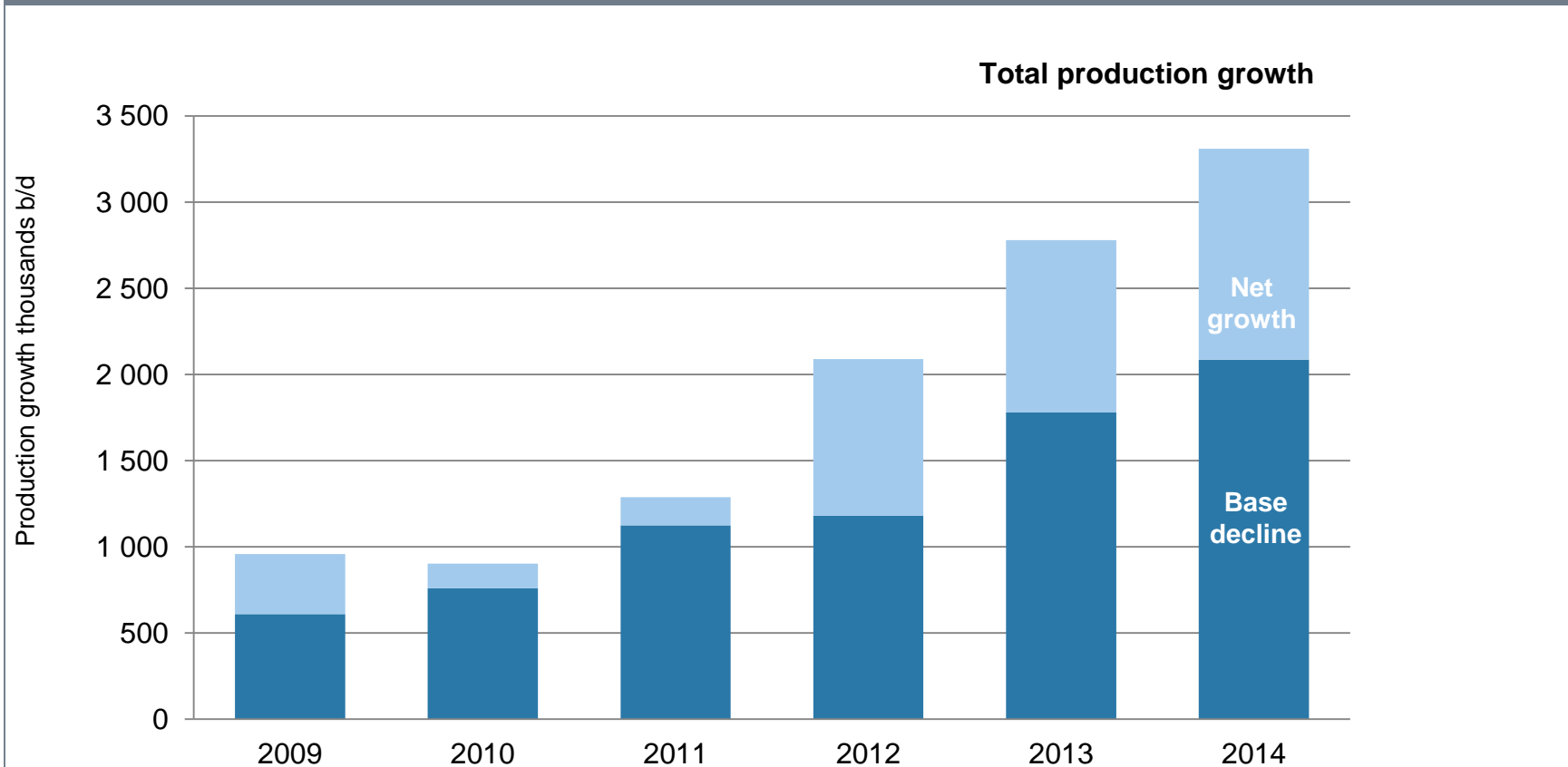
Annual change in world oil demand: IHS planning scenario



Notes: Demand includes LPG and biofuels.
Source: IHS, IEA, EIA

US production unlikely to fall significantly this year as producers continue to improve drilling efficiency

US total new crude production brought online annually: 2009–14

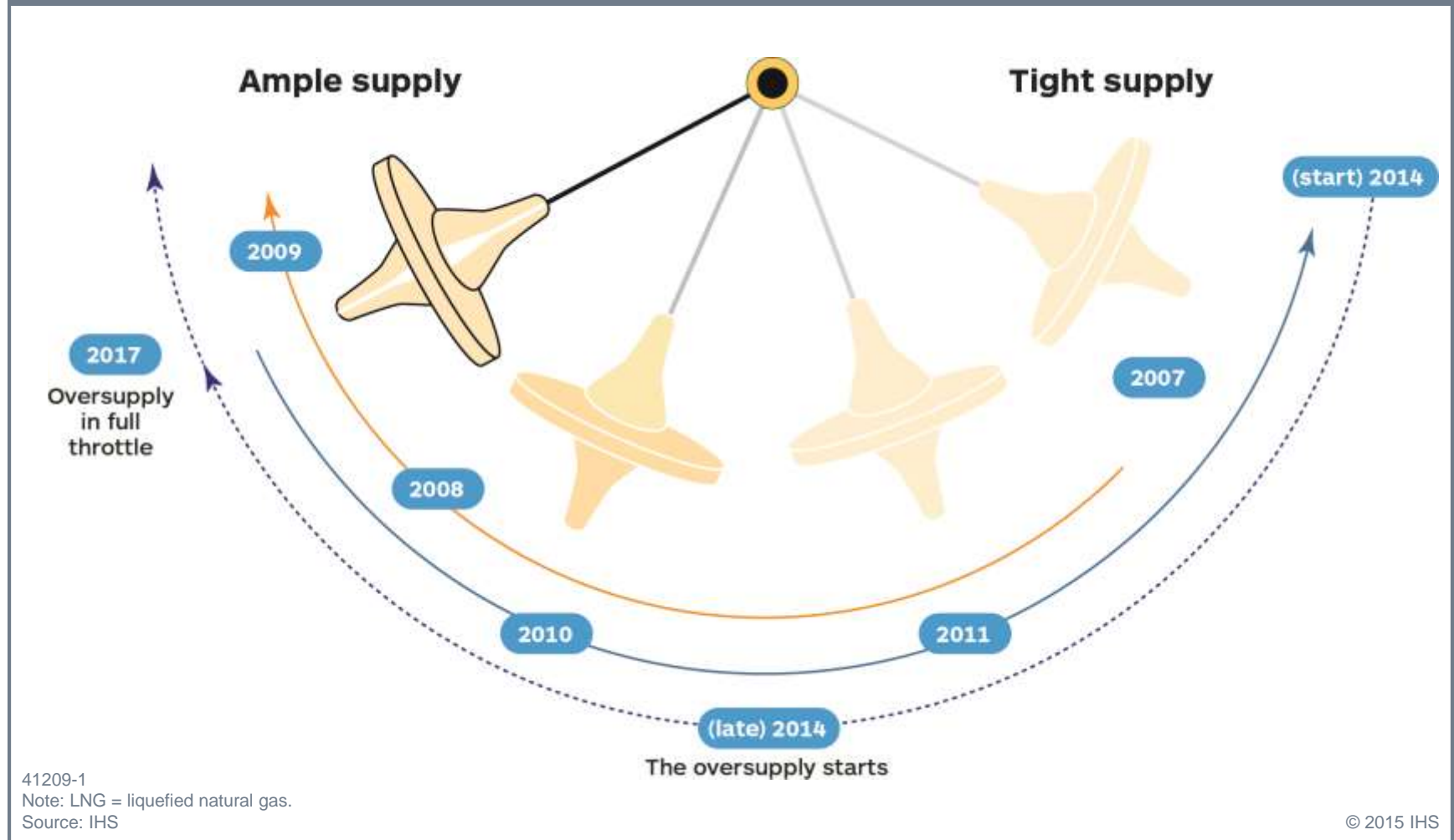


Source: IHS Energy, EIA

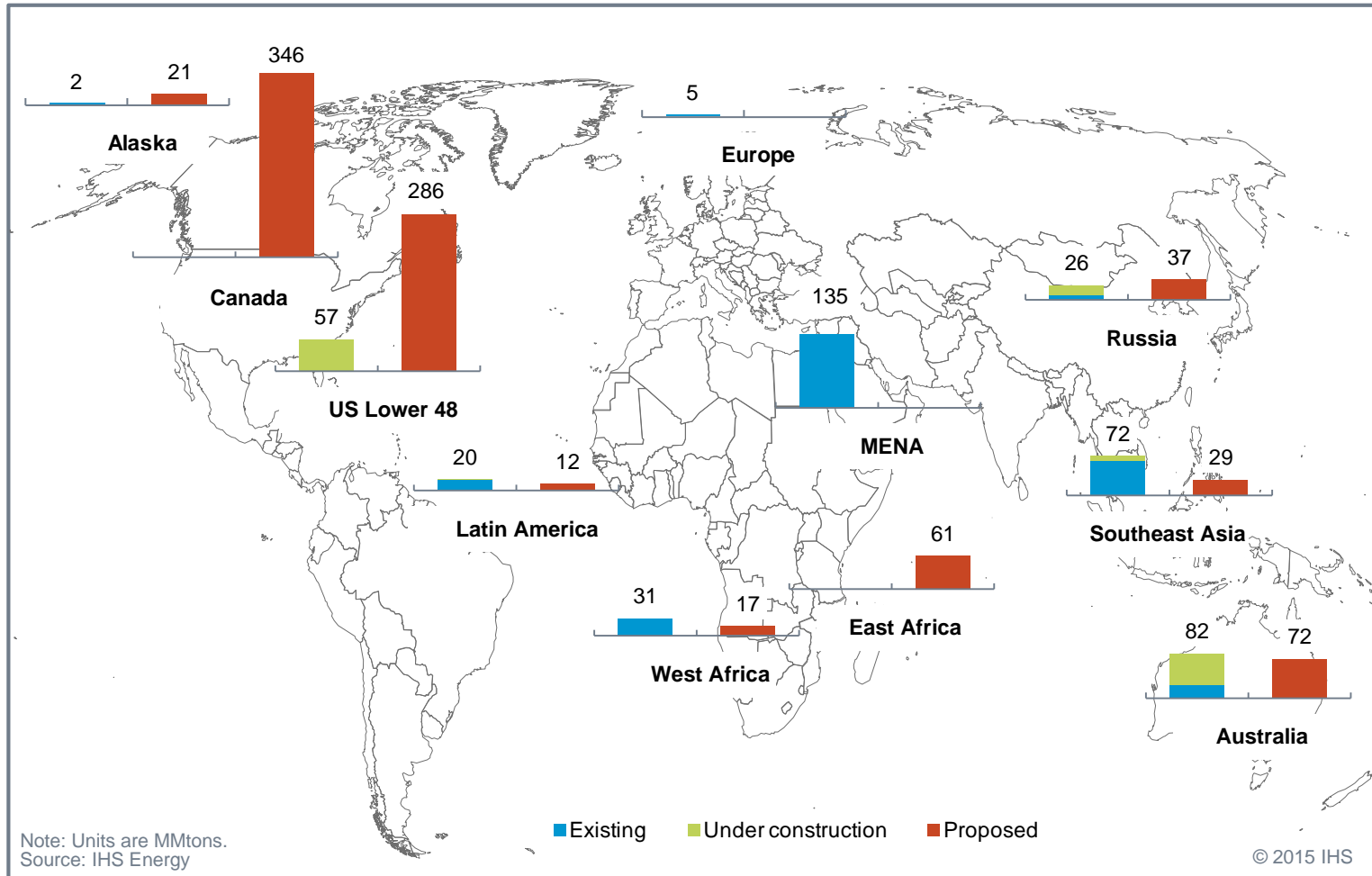
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Global gas: The LNG market pendulum swings back

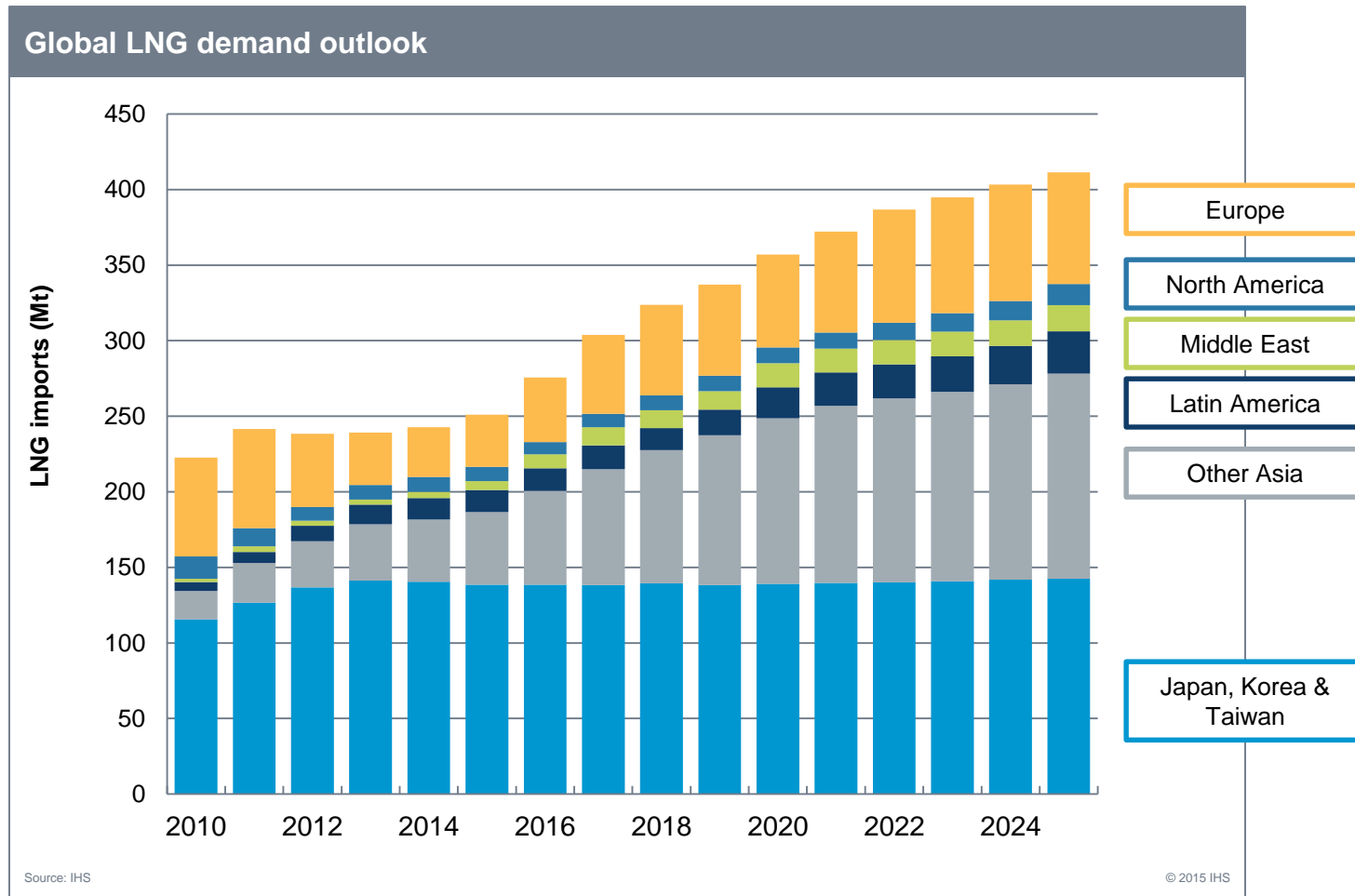
LNG cycles before and after Fukushima



LNG projects: Enough capacity already sanctioned to increase supply by 50%...how much more to come?

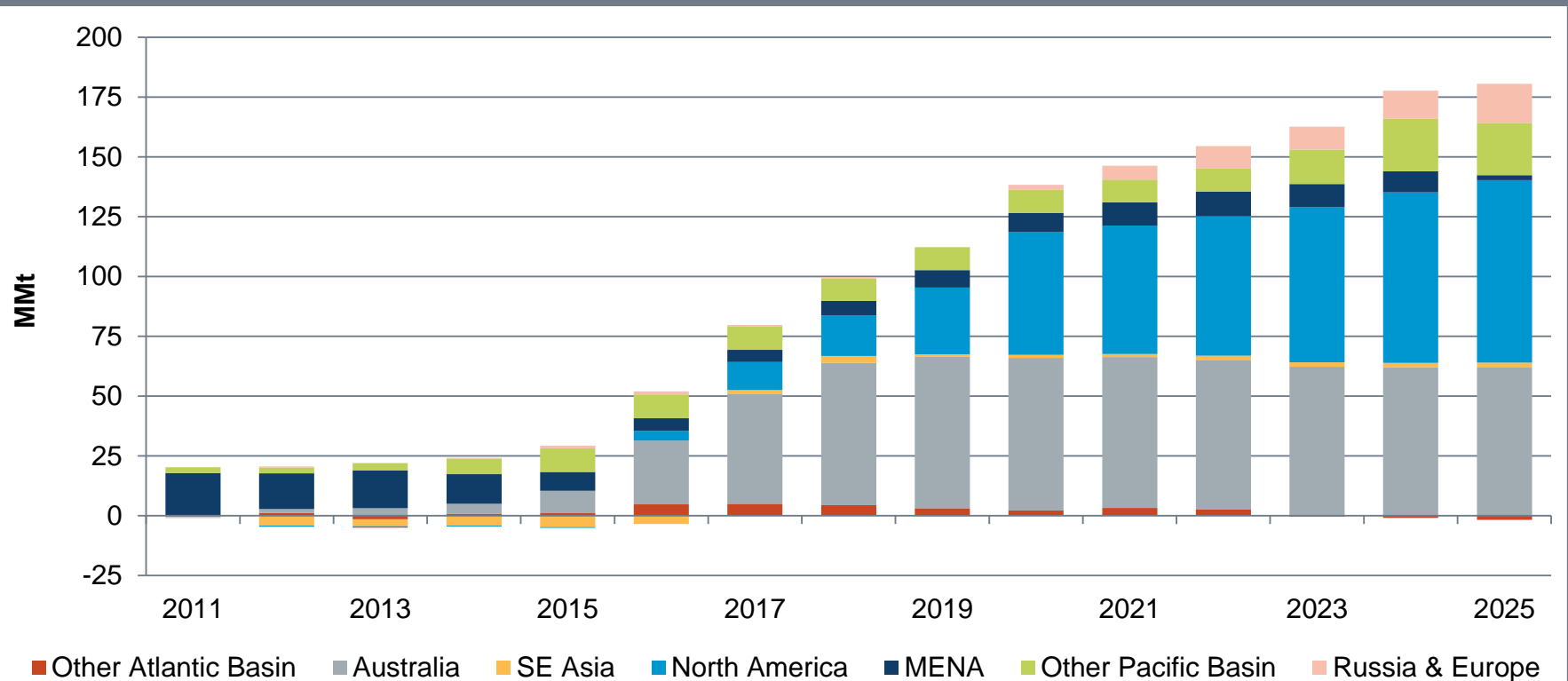


Asia beyond JKT expected to drive LNG demand growth over the next decade



Supply outlook: North America dominates new capacity, but opportunity remains for strong integrated projects

Incremental global LNG supply relative to 2010

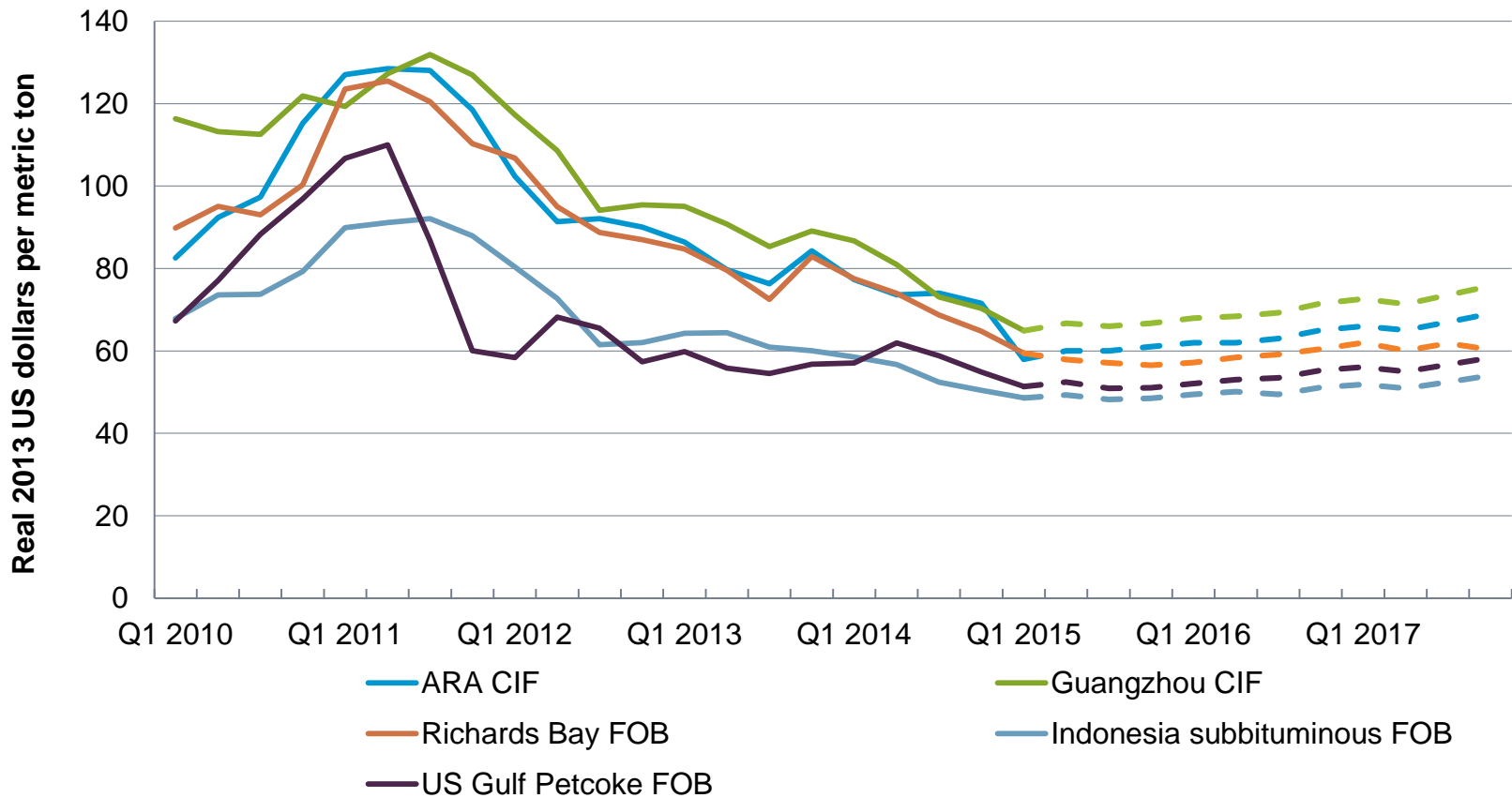


Source: IHS Energy

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Coal: Prices have been dropping for four years

Prices to remain weak in the short term

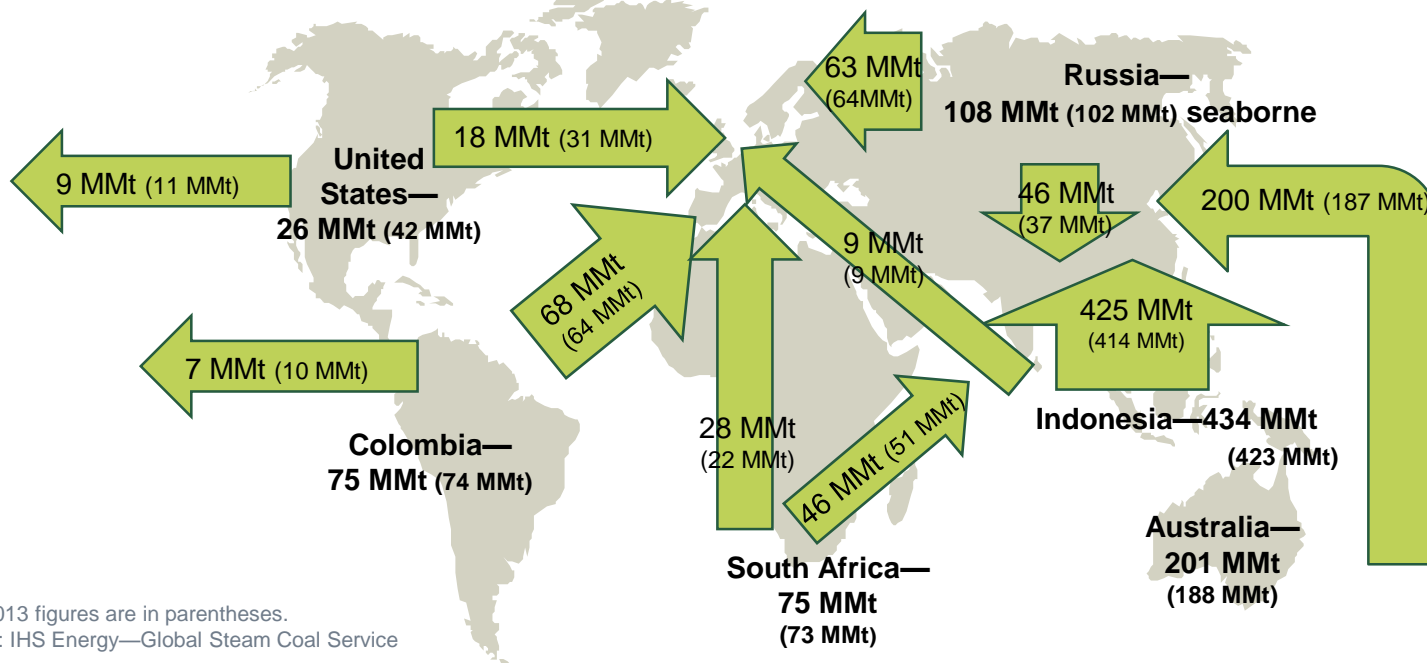


Source: IHS Energy

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The global steam coal world—2014

Global seaborne coal flow (2014) [Parenthese indicate 2013 volumes]

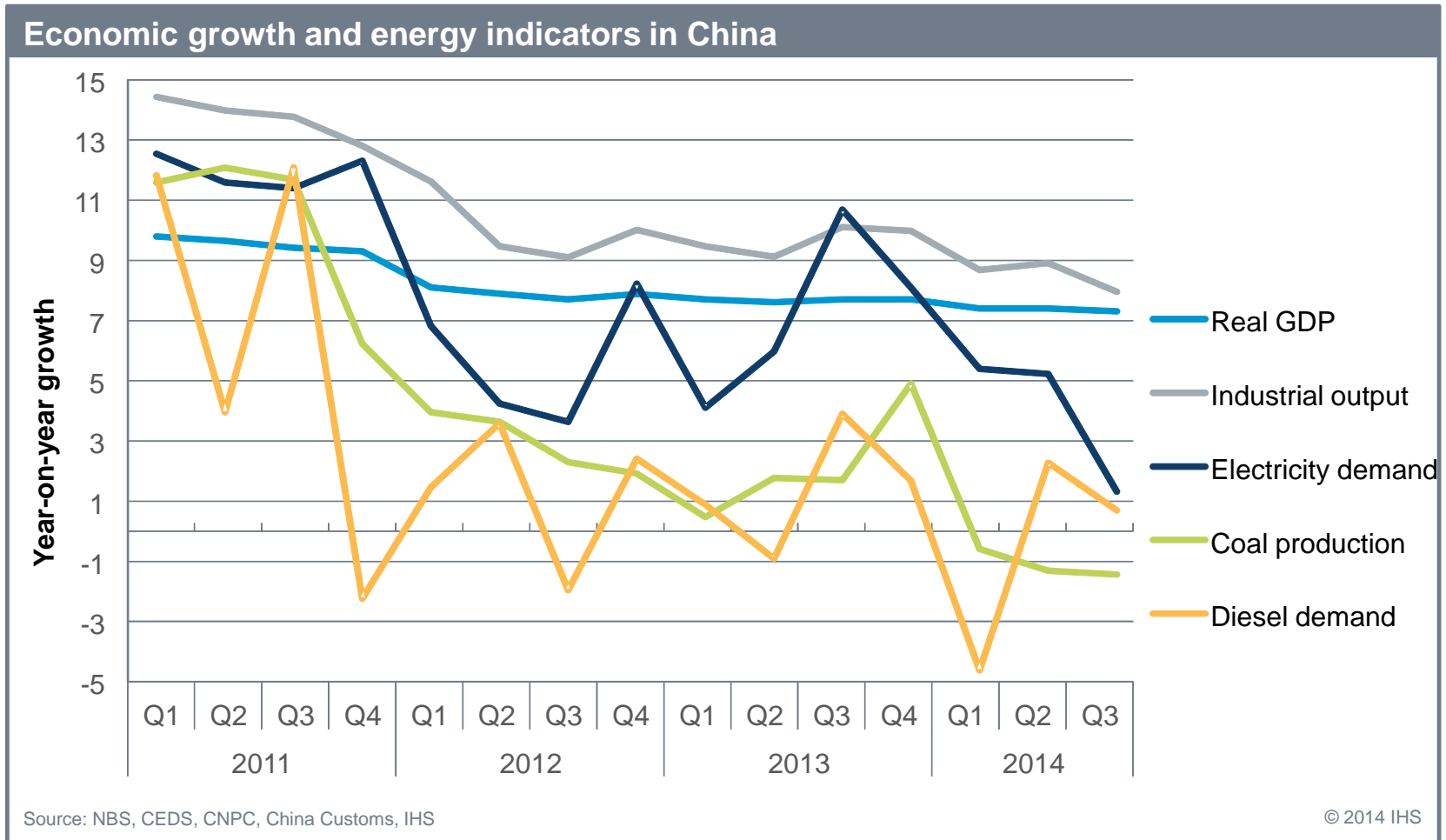


*The 2013 figures are in parentheses.
Source: IHS Energy—Global Steam Coal Service

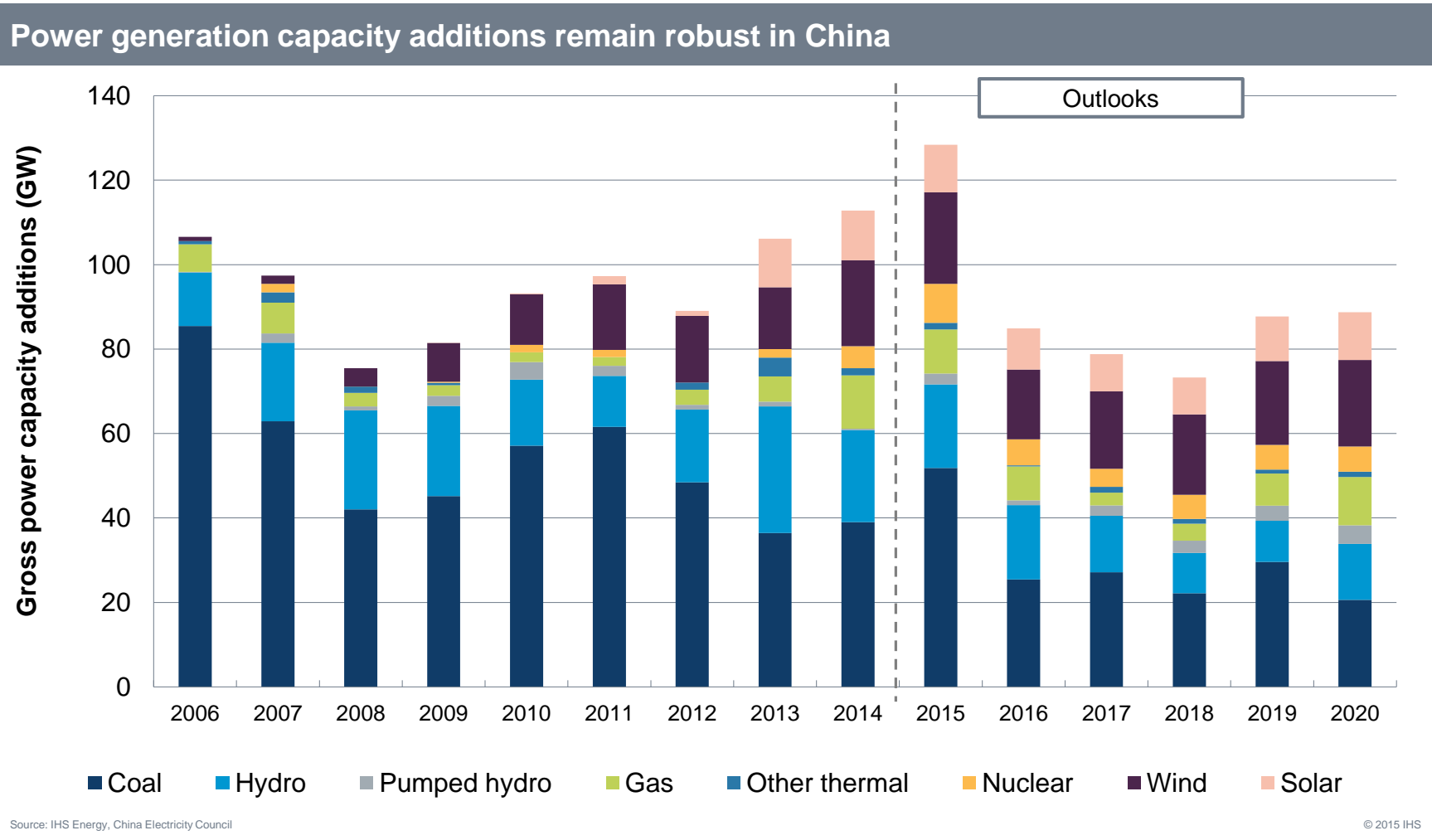
Total 2014 seaborne trade volume = 979 MMt
Atlantic market volume = 216 MMt
Pacific market volume = 743 MMt

Oversupply in China

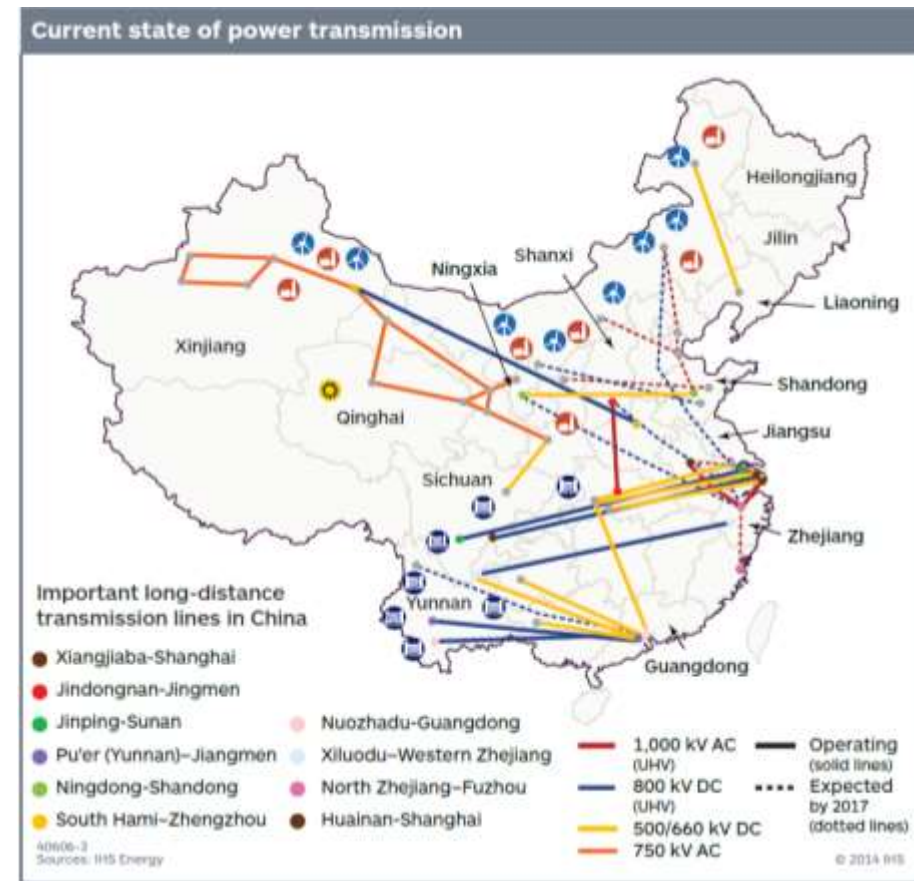
Deceleration in growth confirmed in demand for key energy sources, including electricity



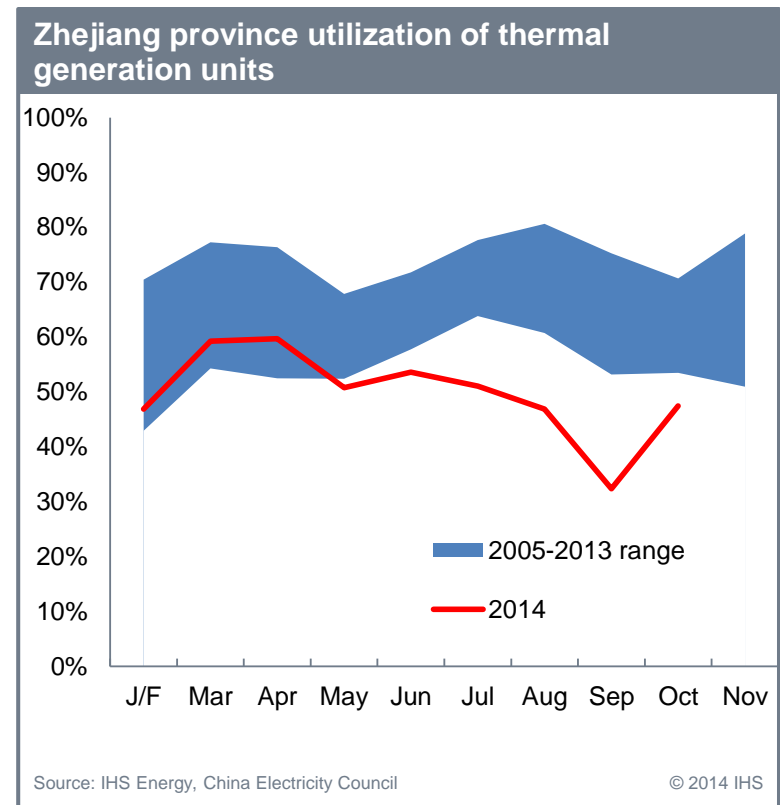
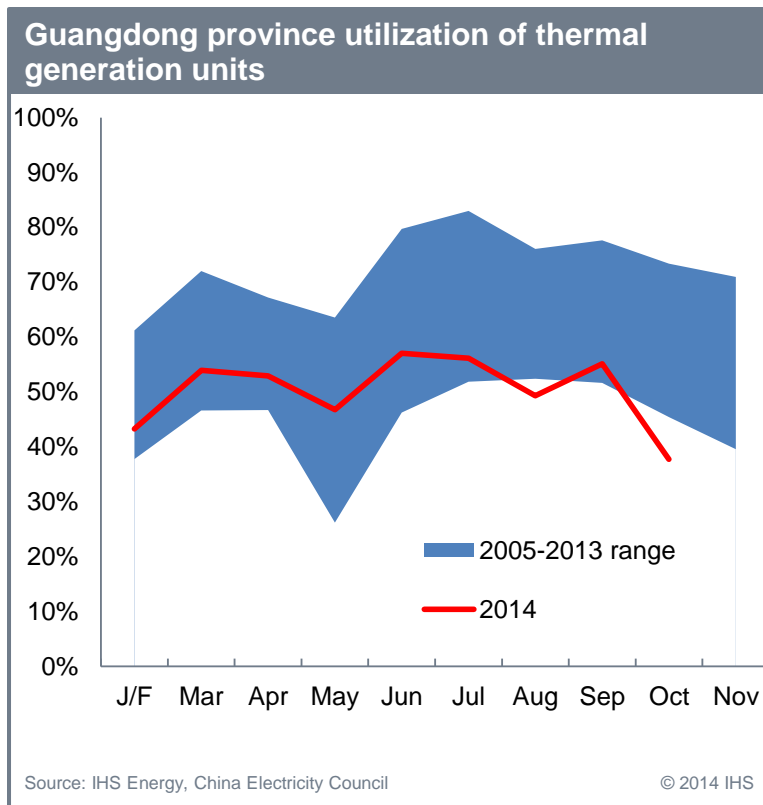
Strong pipeline of new projects will increase oversupply of capacity this year and next



UHV transmission continues to transform China's power supply



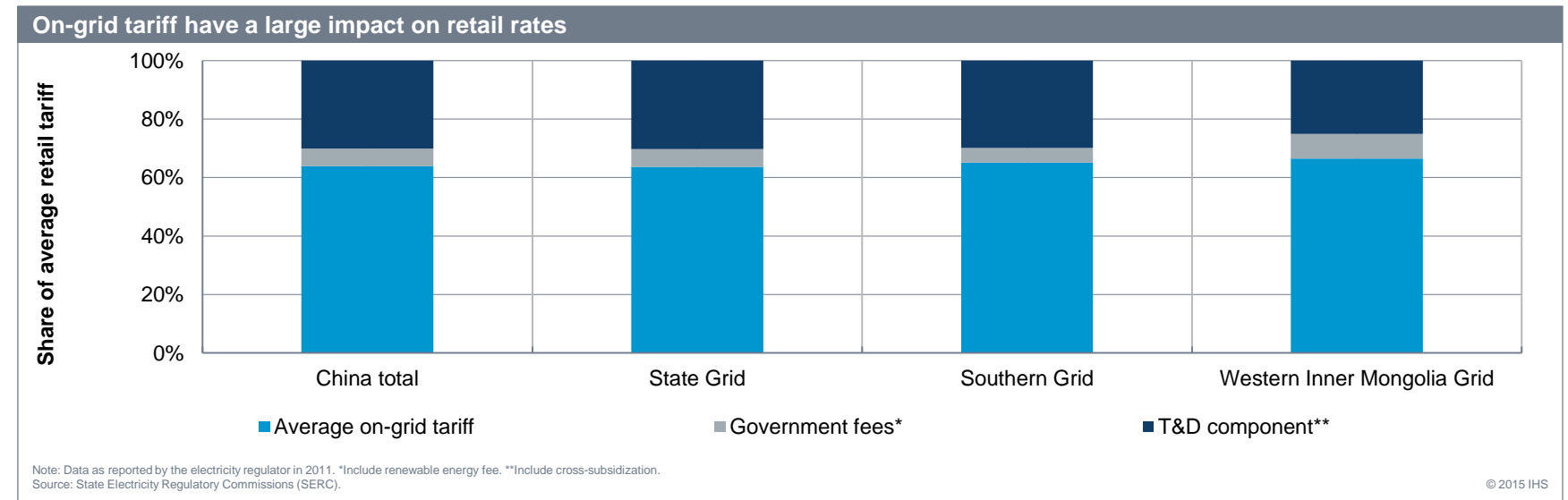
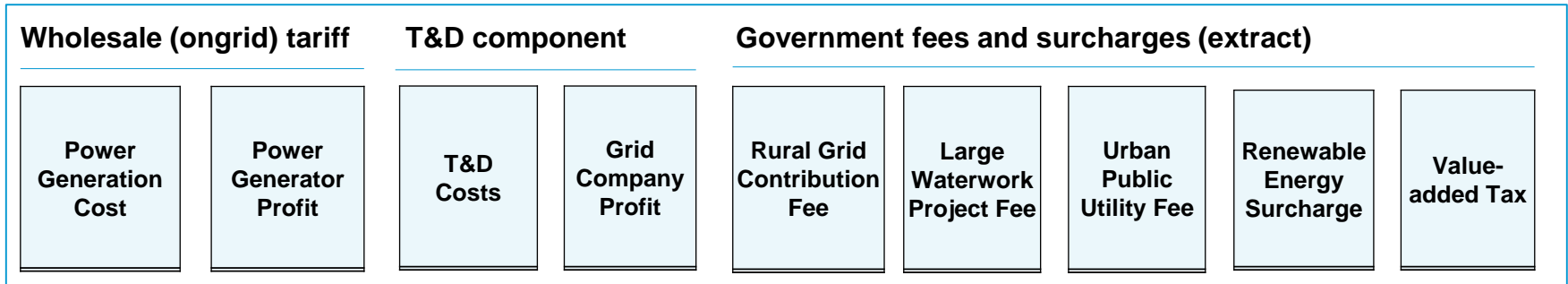
Coal-fired power is squeezed out of the generation mix as a result of oversupply and environmental policy



China Power Price Outlook & Global Comparisons

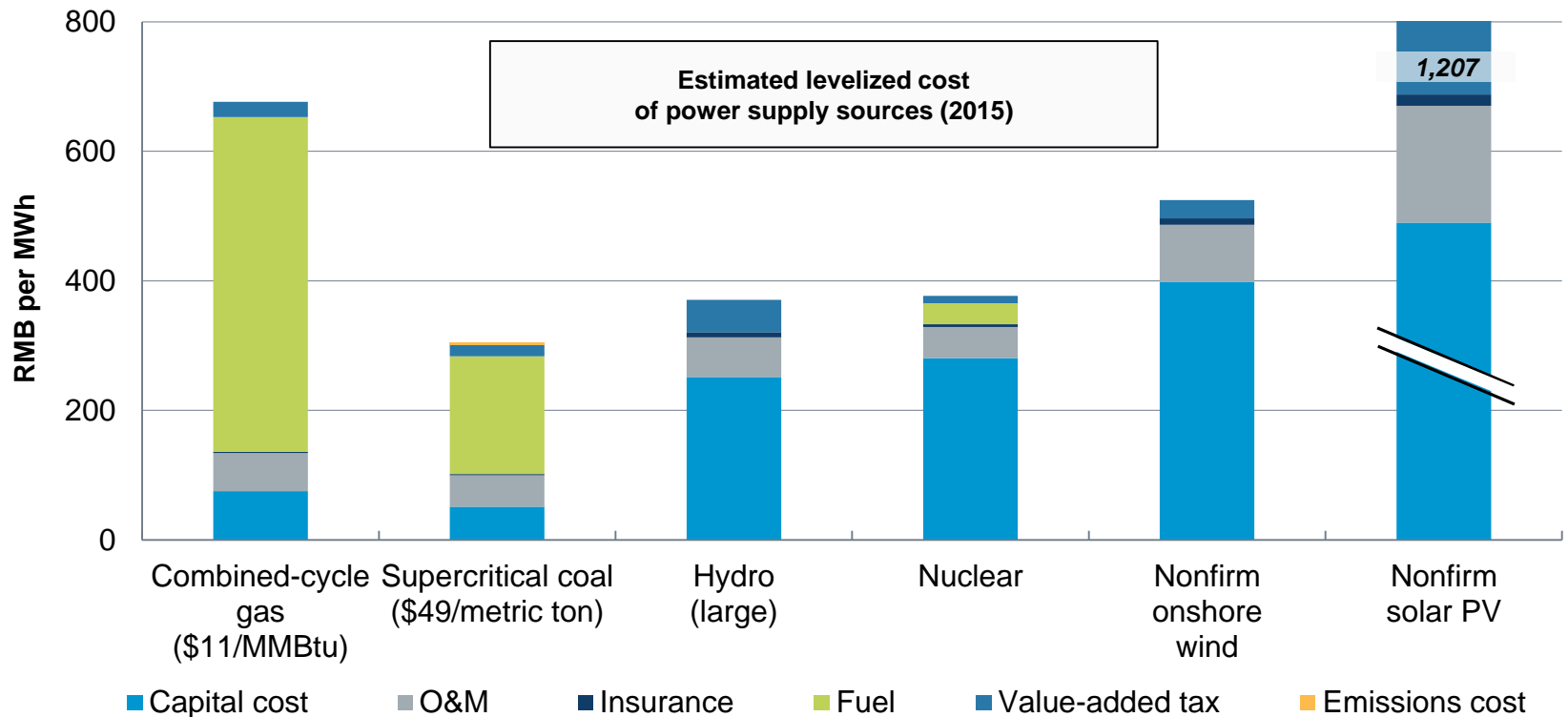
Power tariff levels in China: Ongrid (wholesale) tariff and cost of power generation as critical factors

Retail electricity tariffs in China include several components:



Power generation cost is a key determinant of power tariffs in China

Power generation cost in China differs greatly by technology and fuel

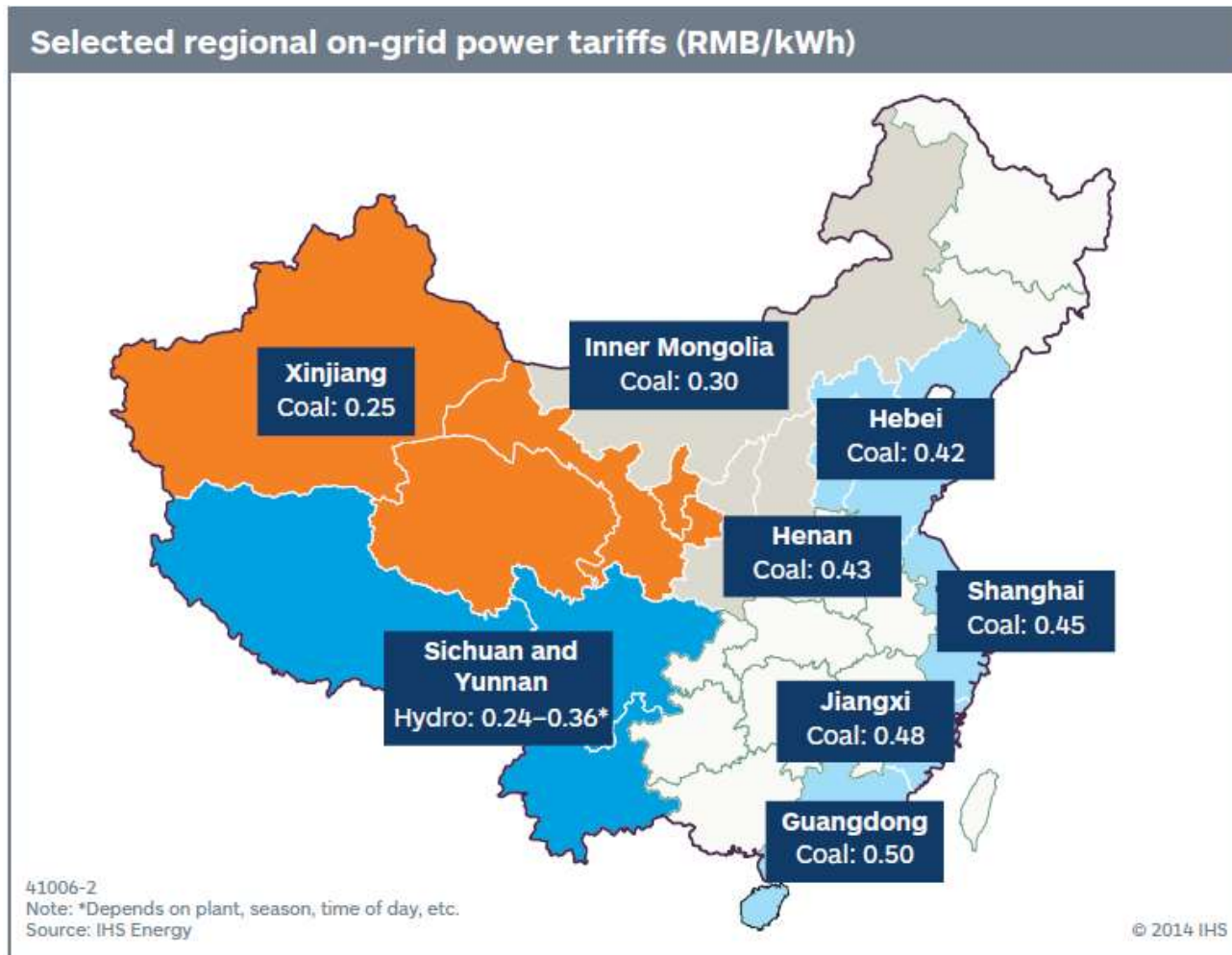


Note: "CCGT" refer to combined cycle natural gas turbines (excluding heat generation); "nonfirm wind" and "nonfirm solar PV" do not include costs related to grid integration of intermittent renewable; CCGT: RMB 2,895 per kW capex, 40% utilization. Coal: RMB 3,367 per kW capex, 60% utilization. Hydro: RMB 10,000 per kW capex, 38% utilization. Nuclear: RMB 20,000 per kW, 90% utilization. Onshore wind: RMB 8,300 per kW, 23% utilization. Solar PV: RMB 8,300 per kW, 15% utilization.

Source: IHS Energy

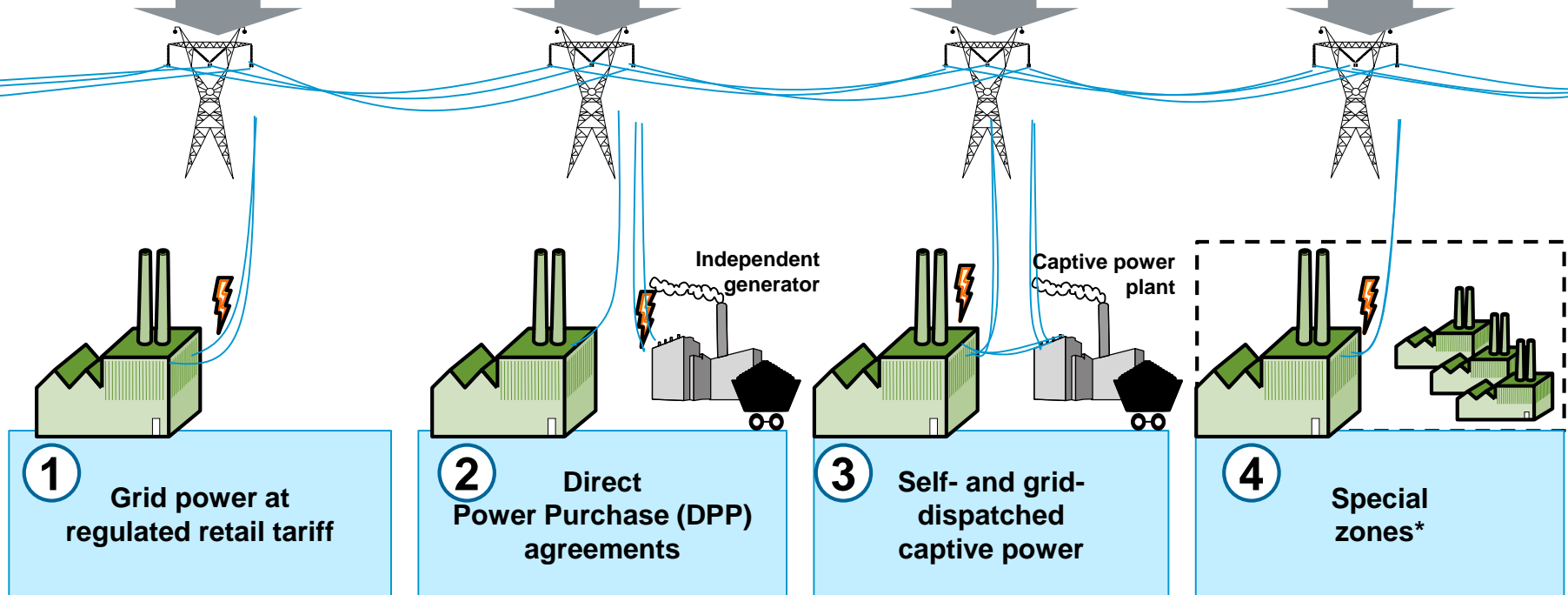
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Regional differences in wholesale tariffs reflect heterogeneous resource endowment



How will power market reforms impact the four models of power procurement in China?

Central and local-level policies



1 Grid power at regulated retail tariff

Buy electricity from the local grid company at the retail tariff.*

2 Direct Power Purchase (DPP) agreements

Power tariff directly negotiated between end users and power producers, with grid charges regulated by central government.

3 Self- and grid-dispatched captive power

Self-dispatched: Directly use electricity generated by own captive power plant, either off- or on-grid.

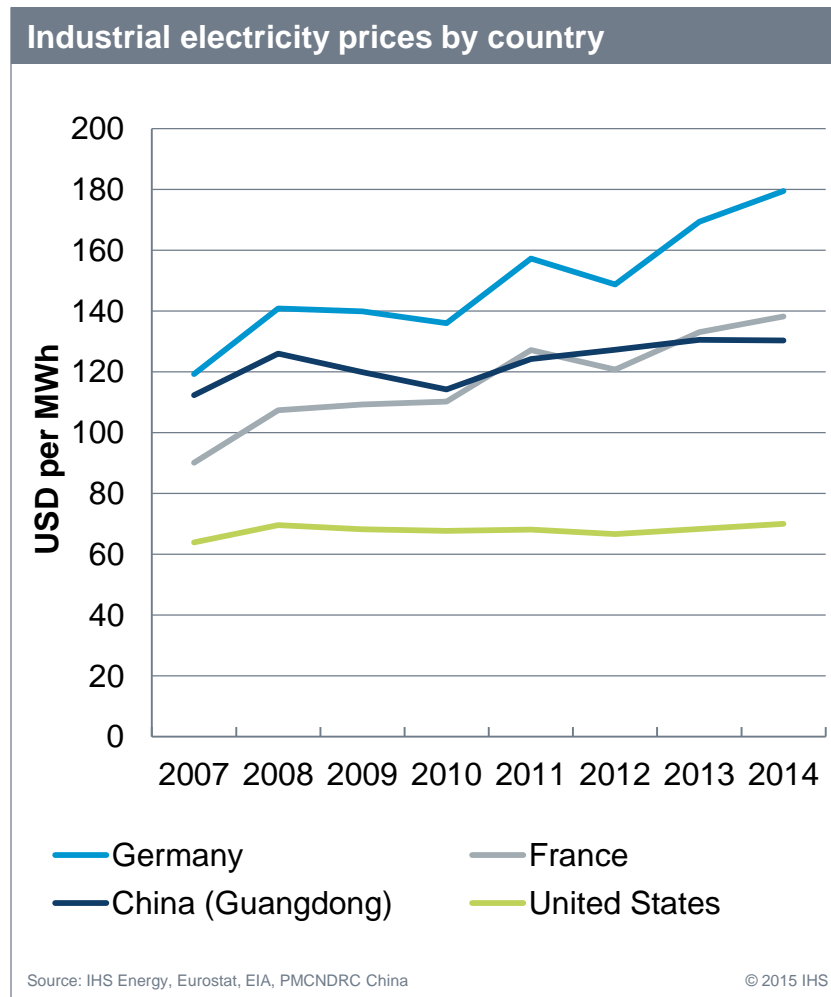
Grid-dispatched: Sell captive power plant output to the grid and buy back power needs from the grid.

4 Special zones*

Industrial parks provide incentives for tenant companies including favorable electricity tariffs.

*Special zones include general and dedicated industrial parks, economic development zones, free trade zone and other areas where local incentives may be offered.

Industrial electricity tariffs are influenced by a variety of factors, many of them local/regional in nature

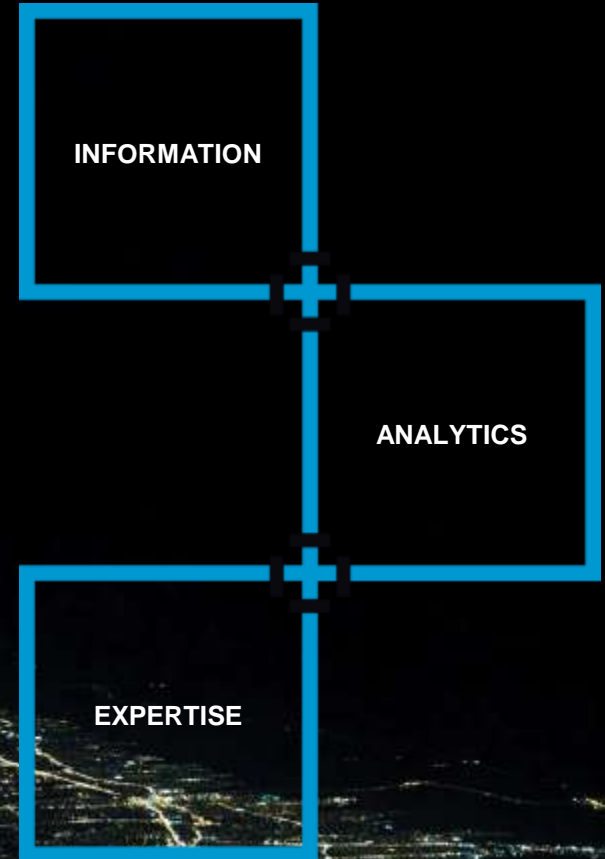


- Fuel mix of a country tends to have a large impact on retail rates
 - Germany: renewables
 - United States: gas
 - France: nuclear
- Local industrial policies and subsidies often distort the rate formation process
 - China: cross subsidies
- Electric power remains a local business – it is critical to have local insights when making procurement decisions.

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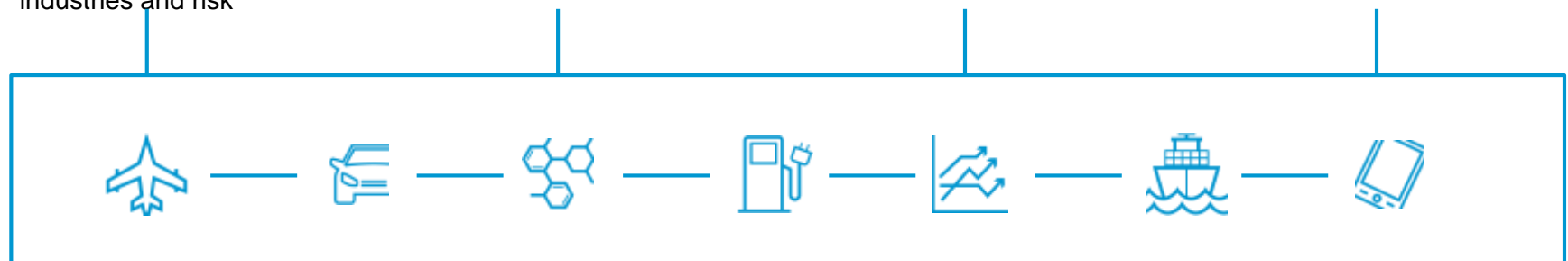
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