

# The Chinese dream

Energy and commodities in an era of change

May 2018

## Trade frictions

US and China compete for economic space

## Vision and strategy

From five-year plans to 2050 – China has a plan

## Leaner industries

Capacity cuts do not mean less production

## Cultural reach

The Belt and Road Initiative will change the geopolitical map of Eurasia

## Gravitational pull

China will need more oil and gas to grow

**S&P Global**  
Platts

[www.platts.com](http://www.platts.com)



# Contents

## May 2018

### Editors

Paul Bartholomew

Senior Managing Editor, Metals

Sebastian Lewis

Head of Content, Greater China

Ross McCracken

Managing Editor, Energy Economist

### Contributors

Abache Abreu, Andre Agapi, Mike Cooper,

Paul Gruenwald, Heng Hui, Derek Ip,

Chris Midgley, Claire Wang, Zhuwei Wang

and Oceana Zhou

### Design and Production

Martina Klančičar

### Digital Content Leader

Mark Pengelly

### Content Project Manager

Carrie Bharucha

### S&P Global Platts

20 Canada Square, 9th Floor

London, E14 5LH, UK

### President

Martin Fraenkel

### Chief Financial Officer

Hywel Thomas

### Chief Operating Officer

Sue Avinir

### Vice President, Global Head of Metals and Agriculture and Co-Head of Content

Sarah Cottle

<b>Foreword</b> .....	4
<i>China to marry fast growth with a greener future</i>	
<b>Executive summary</b> .....	6
<i>Snapshot – China in an era of change</i>	
<b>Trade giants lock horns</b> .....	8
<i>Trade war seen as major threat to global economy</i>	
<b>China's grand plans: priorities and aims</b> .....	10
<i>Beijing's strategic vision stretches decades into the future</i>	
 <b>Video: China's policy challenges</b>	
<i>Watch Sebastian Lewis outlining the opportunities and challenges facing China's policy makers</i>	
<b>Timeline: The evolution of China's energy demand</b> .....	14
<b>Supply-side reform: less is more</b> .....	16
<i>China's heavy industries are emerging leaner and meaner</i>	
<b>Alive and kicking: China hydrocarbon demand</b> .....	20
<i>Rising demand for hydrocarbons appears inescapable</i>	
<b>US and China: energy interdependence</b> .....	26
<i>China revealed as the logical destination for US shale oil exports</i>	
<b>Changing trade flows</b> .....	30
<i>China's crude supplies are increasingly diverse</i>	
 <b>Video: Platts cFlow</b>	
<i>Watch a video showcasing the vessel-tracking capabilities of Platts cFlow</i>	
<b>Clearer skies: China's New Energy Economy</b> .....	32
<i>China constructs a new economy within the old</i>	
<b>Infographic: Hydrocarbons vs The New Energy Economy</b> .....	36
<b>Two birds, one stone: China's E10 mandate</b> .....	40
<i>National E10 mandate poses big questions for Chinese refiners</i>	
<b>Waste matters</b> .....	44
<i>China's environmental policies send waves through global markets</i>	
<b>China's Belt and Road Initiative</b> .....	46
<i>The BRI will fundamentally alter the geopolitical map of Eurasia</i>	
 <b>Video: Beyond the Belt and Road</b>	
<i>Watch Paul Gruenwald discussing the economic and political impact of China's policy approach</i>	
<b>China's commodity exchanges</b> .....	50
<i>China seeks an equal seat at the high table of finance</i>	
<b>Finance and China's 'ecological civilization'</b> .....	54
<i>Stress testing policy impacts reveals potential winners and losers</i>	



For a richer, interactive experience, with videos, infographics and many other features, access the digital version of the *The Chinese dream* special report by scanning the QR code with your smartphone or visiting [www.platts.com/china-report](http://www.platts.com/china-report)

# Foreword



**Sarah Cottle**

*Vice President, Global Head of Metals and Agriculture and Co-Head of Content  
S&P Global Platts*



Use your smartphone to scan code or visit [platts.com/china-intro](https://platts.com/china-intro) to watch Sebastian Lewis outlining the opportunities and challenges facing China's policy makers



Use your smartphone to scan code or visit [platts.com/cflow-video](https://platts.com/cflow-video) to watch a video showcasing the vessel-tracking capabilities of Platts cFlow



Use your smartphone to scan code or visit [platts.com/china-ratings](https://platts.com/china-ratings) to watch Paul Gruenwald discussing the economic and political impact of China's policy approach

## China's green epoch

China is a country of superlatives, of enormous capacities and gargantuan appetites. With an estimated population approaching 1.4 billion and a mid-ranking GDP per capita of \$8,582 in 2017, it cannot be anything but.

Nowhere do the superlatives flow faster than in the commodities sphere. Last year, the country became the world's largest importer of crude oil, overtaking the United States. It is already by far the world's largest producer and consumer of coal, and its natural gas consumption and imports are rising fast.

China's hydrocarbon dependencies embed it increasingly at the center of world commodity trade, to such an extent that changes in its domestic policies reverberate around global markets.

And more so than ever, China is looking outward.

It has chosen to use "soft power" — encapsulated in the ambitious multi-decade Belt and Road Initiative — to consolidate its international supply chains and spread more widely its cultural and economic influence, investing in production capacity and major infrastructure projects abroad from ports to railways and power plants.

This creates demand for its companies, as earlier super-heated rates of growth cool within its domestic economy, and earns development plaudits, as China ties the economic success of its foreign partners to its own, albeit with Beijing the center around which this universe revolves.


China has notably not sought to export ideology, but has maintained its commitment to a state-led economy, pragmatically adopting market structures where they provide more efficient economic outcomes.

But there can be no question that China's economic development has reached an inflexion point.

It has built vast "pillar" industries in coal, steel and refining and become the manufacturing center of the world. It is now rationalizing these pillars, weeding out inefficiencies, improving industrial structures and environmental performance.

It is looking beyond the smokestack industries of the past to emerging technologies, such as cloud computing, renewables, artificial intelligence and robotics, focusing on its growing capacity to innovate and lead. It hopes to take advantage of technological disruption to leapfrog into the future.

Recognizing the vulnerabilities of hydrocarbon dependence, China has become a leader in renewables and electric vehicle manufacture. For each superlative in the fossil fuel arena, another can be found within the new energy economy.



Driven by both local and global concerns, environmental policy is increasingly at the heart of China's industrial strategy and for a simple reason: it stands to benefit most from the "green dividend."

Nonetheless, China's environmental ambitions are, for now, a rapidly-growing but thin slice of a giant fossil fuel economy. As a result, the country will increasingly occupy two spaces; one the gravitational center of trade in hydrocarbons and metals; and second an emergent center of technology based on new, more secure supply chains and manufacturing.

However Beijing chooses to manage these complex and often seemingly contradictory positions, China is entering a new epoch in its development, one that extends far beyond the visions of its inception as the People's Republic of China in 1949.

# Executive summary

**Long-term vision:** In light of the major overhaul of government announced at the CPC's March Congress, a more streamlined, better-managed government should improve policy implementation and enhance Beijing's ability to lead China through the next phase of its economic development.

**Maintaining GDP growth** is a core policy aim. The economy is increasingly consumer-driven, but investment will remain key to maintaining growth. The focus now is on quality over quantity, sustainability and deleveraging. Near-term demand for manufacturing, construction and infrastructure should stay robust, but growth will be slower than in the past. Market mechanisms will be deployed where useful, but the state will continue to play an important role in the economy.

**Supply-side reforms** are removing systemic risk and excess capacity from the country's "pillar" industries, such as steel, coal, refining and petrochemicals. China is lifting the overall quality of its industrial output and improving its energy efficiency and environmental performance. But capacity reductions do not necessarily mean less overall production. Instead, leaner, more competitive industries should emerge capable of producing high-quality products.

**Hydrocarbon demand growth:** Despite China's efforts to develop renewables and improve energy efficiency, oil and natural gas demand is projected to rise, leaving China ever more dependent on imports. Even coal use may increase, if economic growth proves stronger

than expected. China will continue to depend on all forms of energy provision, including nuclear power.

**US-China energy relations:** Despite trade war concerns, US-Chinese energy ties may well strengthen. China's refining sector is the logical destination for the US's growing surplus of light, sweet shale crude. The US is ramping up its LNG exports as China emerges as the world's second largest importer of LNG. The US shale industry can help meet China's growing hydrocarbon demand.

**Improving the environment** will remain a central focus, including the use of supply-side reforms to close inefficient, polluting industrial capacity. As in the very recent past, surprises should be expected – environmental measures announced and implemented that have significant impacts on global commodity prices. China's efforts in this regard will sustain its growing international leadership on climate change.

**Circular economy:** China is at the forefront of the electric vehicle revolution, hoping to take advantage of the technological disruption in the auto industry caused by automation and EVs. In combination with its huge build out of renewables, Beijing hopes to create a more circular economy based on emerging technologies that eventually reduce its rising reliance on imported crude oil and natural gas.

**E10 by 2020:** Beijing's plans to displace oil with ethanol in the country's gasoline pool are highly ambitious as China lacks sufficient domestic ethanol production capacity and the roadmap to implementation is uncertain. In the

short term, the target can only be achieved via ethanol imports, on which Beijing has placed heavy import duties. Longer term, ethanol production capacity should not be a barrier to the mandate's implementation.

**Cleaner act:** China's rejection of other countries' waste marks a turning point in its recycling industry. It opens an opportunity for virgin polymer imports, but longer term the aim is to replace imported waste feedstocks with domestic collection.

**By opening derivatives markets to foreign participation,** China hopes to gain influence over international commodity pricing commensurate with the country's vast appetite for raw materials. In addition, Beijing wants to promote use of the Yuan as an international currency. It is no mean task to challenge the dollar's hegemony and established market structures, but China has had some success with ferrous derivatives. Now, as the world's largest crude importer, its launch of a new crude oil contract open to international investors is timely.

**Behind all this is the Belt and Road Initiative,** a long-term strategy costing trillions of dollars, in which China hopes to create or recreate trade routes, with Beijing at their center. It will do so by the extension of 'soft power', using finance to foster long-term relationships economically beneficial both to its neighbors and itself. The BRI embraces economic, political and cultural dimensions and may prove the most ambitious, far-reaching geopolitical strategy of the 21st Century. It is a reminder that Beijing thinks big and long term.



# Trade giants lock horns

When the world's two largest economies square off over trade, the world braces for impact...



**Paul Bartholomew**

*Senior Managing Editor, Metals  
S&P Global Platts*

The potential trade war precipitated by US President Donald Trump's decision to impose tariffs on steel and aluminum imports into the US has enabled China to take the high ground on global trade.

In his speech at the Boao Forum for Asia in April, Chinese President Xi Jinping avoided overt criticism of the US policy, but talked up the benefits of a multilateral global trading system.

S&P Global Ratings chief economist Paul Gruenwald has identified a trade war between the US and China as the "number one risk in our credit conditions process." World Trade Organization director-general Roberto Azevedo warned a full-scale trade war could have a "severe impact on the global economy."

But, in the eyes of the US, China is the "bête noire" of international trade.

According to Washington, China has stolen US technology and intellectual property and unfairly devalues its currency, giving the country a big advantage in export markets.

Cheap government-sponsored debt has fueled a ramp-up in industrial capacity, particularly for steel, which then spills into global markets, pushing down prices whenever China's domestic demand falters.

China's state-owned companies are unfairly propped up by local governments, meaning they are not subject to the same market-driven factors as their foreign competitors, the US argues.

However, while the Trump administration wants to narrow the US' \$375 billion trade deficit with China, it may have picked the wrong target in signing off on steel and aluminum tariffs of 25% and 10% respectively, following a Section 232 investigation into the impact of these imports on US national security.

While the US is the world's largest importer of steel, China accounts for less than 2% of its total steel imports, although for some Chinese companies the figure is higher: Baosteel sent 4% of its steel exports to the US last year.

Among Asian countries, South Korea and Japan are far larger contributors at 10% and 5% respectively.

South Korea has been granted an exemption, but faces quotas, while a Japanese exemption would limit the impact of the tariffs.

Nonetheless, the fear is that steel will be redirected away from the US and back into Asian markets. S&P Global Platts estimates that up to 1 million mt of Chinese steel could be looking for a



new home, either domestically or offshore, as a result of the US tariff.

The “domino effect” of a more congested Asian steel market could be to force competing suppliers from India, Russia, Turkey and elsewhere to seek out other markets, thereby putting downward pressure on metals prices well beyond Asia.

In response to the tariffs, China complained to the WTO and

threatened to impose retaliatory tariffs on US imports worth around \$3 billion.

Products targeted include seamless steel pipe, denatured ethanol, fruit, nuts and wine, along with aluminum scrap and pork.

It is this “tit for tat” aspect of a trade war that causes market uncertainty; no one knows how far it might escalate.

News of the tariffs and growing trade tensions between the two economic giants spooked global markets, pulling down the US dollar and contributing to a rise in oil futures, which hit their highest levels in years.

Gruenwald said: “Hopefully we can resolve this issue; we don’t want the biggest two economies in the world going into a trade war that’s not only going to affect them, but spill over to the rest of the world.”



# China's grand plans: priorities and aims

Beijing thinks big and long term. It has a coherent development plan which, if successful, will create a new technologically-advanced economic superpower.



**Sebastian Lewis**

*Head of Content, Greater China  
S&P Global Platts*



Use your smartphone to scan code or visit [platts.com/china-intro](https://platts.com/china-intro) to watch Sebastian Lewis outlining the opportunities and challenges facing China's policy makers

- **State to retain key economic role**
- **New focus on emerging technologies**
- **Environmental goals embedded in industrial policy**
- **Bureaucratic structures streamlined**

To outsiders, it can be difficult to understand China's internal processes and objectives.

However, look a little closer and the roadmap for China's development and supporting policies is in many ways hiding in plain sight. Most documents are available on the internet and the more important ones are translated into English.

At the top, the state and the ruling Communist Party of China (CPC) think big and long term. At the 19th CPC Congress — the highest body within the Party which convenes every five years — the CPC's General Secretary Xi Jinping outlined a development plan to 2050.

However, it is the government's 'five-year plan' which tends to get the most attention. This is a development roadmap that sets the high level direction for the next half decade.

## Five-year plan

The five-year plan serves as a framework for officials who use it to draw up specific policies that support the implementation of the plan, and it contains targets by which its success can be measured.

Sector specific five-year plans from key ministries, for example covering oil and gas, are also developed and aligned with the overarching themes and priorities of the master document.

Of course, not everything goes to plan. Competing interests across government mean that policy development can be slow and inconsistent, hindering implementation.

China is a hugely diverse country of 1.4 billion people and the level of development is very uneven. The country is a global leader in mobile technology and payments systems yet has hundreds of millions of relatively poor farmers, and 30 million still living in poverty, which makes governing this vast country extremely challenging.

As a result, on the ground execution of specific policies may differ across provinces and regions, as specific local

circumstances mean the priorities of lower levels of government are not always perfectly aligned with those of Beijing.

In addition, implementation timelines may not go to plan as some policies by virtue of necessity take priority over others.

The “internationalization of the Yuan” for example, while part of the 13th five-year plan, stalled and even reversed in 2016, when the government restricted capital flows to ensure financial stability.

## Long-term vision

Since Xi Jinping became president in 2013, the market has seen more effective decision making and reform of the economy. His leadership of the “Central Leading Group for Comprehensively Deepening Reforms” and the crackdown on corruption have translated into more decisive policies that tackle China’s deep-seated structural problems.

They have also resulted in better policy implementation at both central and local level.

More recently, the major overhaul of government announced at the CPC’s March Congress will streamline government, making it less bureaucratic and more efficient, helping to sideline institutions within the vast state apparatus that were blocking much needed reform.

However, reform in this context does not mean that China will become a market economy more like “the West”. It won’t.

China’s ambitious development program will use market systems where these help the economy run more efficiently, but the state will continue to play an important role within the economy.

## Long-term consistency

There is in fact remarkable consistency in China’s development themes and priorities; reducing poverty, improving agriculture and promoting industrial restructuring have all been key components of the five-year plans for decades.

However, recent changes in emphasis reflect the country’s economic progress.

Two decades ago the priority was establishing pillar industries like petrochemicals and automobiles, as well as the development of light industry and textiles to meet not only the needs of the population, but also to gain much needed export revenue to fund development.

Today, the language and priorities are totally different. The focus is on innovation and becoming a world leader in emerging technologies, such as artificial intelligence (AI) and robotics, as well as upgrading manufacturing so that it meets the standard of developed economies in terms of processes, energy efficiency and environmental protection.

## Innovation and growth

China’s massive fiscal stimulus of 2008-2009, which propped up demand for everything from commodities to industrial machinery, meant that China was little affected by the global financial crisis. However, the crisis revealed that its economic model was inefficient and unsustainable — a fact recognized in the five-year plans issued since 2011.

But it has only been in the most recent five-year plan, and in particular under the leadership of Xi Jinping, that serious moves have been made to transition away from a reliance on polluting

smokestack industries to new drivers of growth, designed to deal with the problems left over from the period of fiscal stimulus, such as over-capacity, excessive inventory and a reliance on debt to support growth.

The Party has promised to double 2010 GDP and per capita incomes to complete the building of a “moderately prosperous society” by 2020. To do this will require average annual economic growth of 6.5% from 2016 through to end-2020. Given the political importance of this goal, it is one target which the government will almost certainly meet.

Last year, the government targeted “GDP growth of around 6.5%, or higher”. The addition of just those two words — “or higher” — led many analysts to raise their growth targets to around 6.7%. In the end, expansion was much stronger at 6.9%, the strongest growth seen since 2015.

This year, the target is simply for “GDP growth of around 6.5%”, suggesting that the economy will not expand in 2018 quite as fast as in 2017.

However, China’s expansion has come alongside a rise in debt which could pose a significant risk to the economy. Guarding against this has been a key focus for the government since the end of 2017.

Overall credit growth is slowing as the government tightens lending. This will likely be negative for commodities like steel and steelmaking raw materials used in capital-intensive sectors like construction.

## Cutting overcapacity and inventory

Xi Jinping’s “supply-side reforms”, which were a key plank of the 13th five-year plan, initially focused more on

## China's grand plans: priorities and aims

reducing low end, inefficient supply than on increasing supply of higher-end products and services.

After years of seeing little reduction in overcapacity across a number of sectors, these policies have been more successful than many imagined in cutting industrial overcapacity and excess housing inventory. While capacity will continue to be removed in the steel and cement sectors, the focus now is shifting to deleveraging and lowering costs and, in particular, tax reform.

A simplified value-added tax (VAT) rate regime and tax cut for small and medium-sized enterprises (SMEs) will support corporate profitability, enabling further restructuring.

### New drivers of growth

What is remarkable over the last two years is the increasing focus on innovation. In particular, the state is placing specific emphasis on technologies like AI as major drivers of

growth; the ambition is, as always, big and long term — China aims to lead the world in AI by 2030.

Related to the push behind AI is the plan to create an 'industrial internet.' The big data created by industry and other sectors will be used alongside AI to optimize and coordinate industrial production and development.

Again, it is likely to be more than a decade before this is fully realized, but the aim is for China's industrial internet to lead the world in key sectors by 2035.

### Made in China 2025

Sitting alongside this is China's industrial masterplan "Made in China 2025", which is designed to upgrade China's manufacturing sector to equal that of developed countries.

The initiative focuses both on developing manufacturing in emerging new sectors where China aims to be a global leader, as well as upgrading the

capabilities of basic manufacturing to make Chinese companies more competitive both domestically and internationally.

China is still very reliant on imports of key industrial components like integrated circuits and high-end engineering components from countries such as Germany, Japan, South Korea and the US.

The plan aims to displace these with domestic production up to a level of 40% by 2020 and 70% by 2025.

However, "Made in China 2025" also targets the development of capability in emerging industrial sectors, including advanced information technology, robotics, rail equipment, biopharma and new energy vehicles.

### Environment

The government has made a big push in recent years towards the more efficient use of coal and its substitution with cleaner sources of energy.



Last year's initiative to move 3 million households in northern China from coal to gas and electricity explains much of the rise in LNG imports seen in 2017.

In some cities, the implementation of the coal ban was effected so enthusiastically that the program ran ahead of the logistics of converting households to natural gas and electricity.

This left some households without heat and the Ministry of Environmental Protection ordered local authorities to relax the coal ban where gas and electricity were not available.

However, while coal has grabbed most of the headlines, the government has also tightened regulations on emissions and pollution across other industrial sectors, and has mandated tighter fuel standards across the country, rolling out the use of lower sulfur fuels.

In 2018, the government is expected to continue targeting emissions of PM2.5

(atmospheric particulate matter with a diameter of less than 2.5 micrometers), as well as NO<sub>2</sub> and SO<sub>2</sub>, encouraging upgrading of industrial facilities, especially in the steel sector, as well as targeting old polluting diesel trucks.

### Opening up

Similar to other policies, China's opening up to the world is not new, but China's external engagement as envisaged in the Belt and Road Initiative (BRI) is a big departure in both scale and vision from the Go Out policy initiated in the late 1990s.

The BRI, which is very much linked to Xi Jinping — he first proposed it on a trip to Kazakhstan in 2013 — has morphed into a grand plan to rebuild the old maritime and "silk road" trade routes that years ago linked Europe and the rest of Asia to China.

While the former Go Out policy was mainly aimed at encouraging Chinese companies to invest overseas, the BRI

envisages China taking a leading role in helping other developing countries via investment in infrastructure and industry. This is designed not only to expand foreign trade, but develop new models and forms of trade with China at their center.

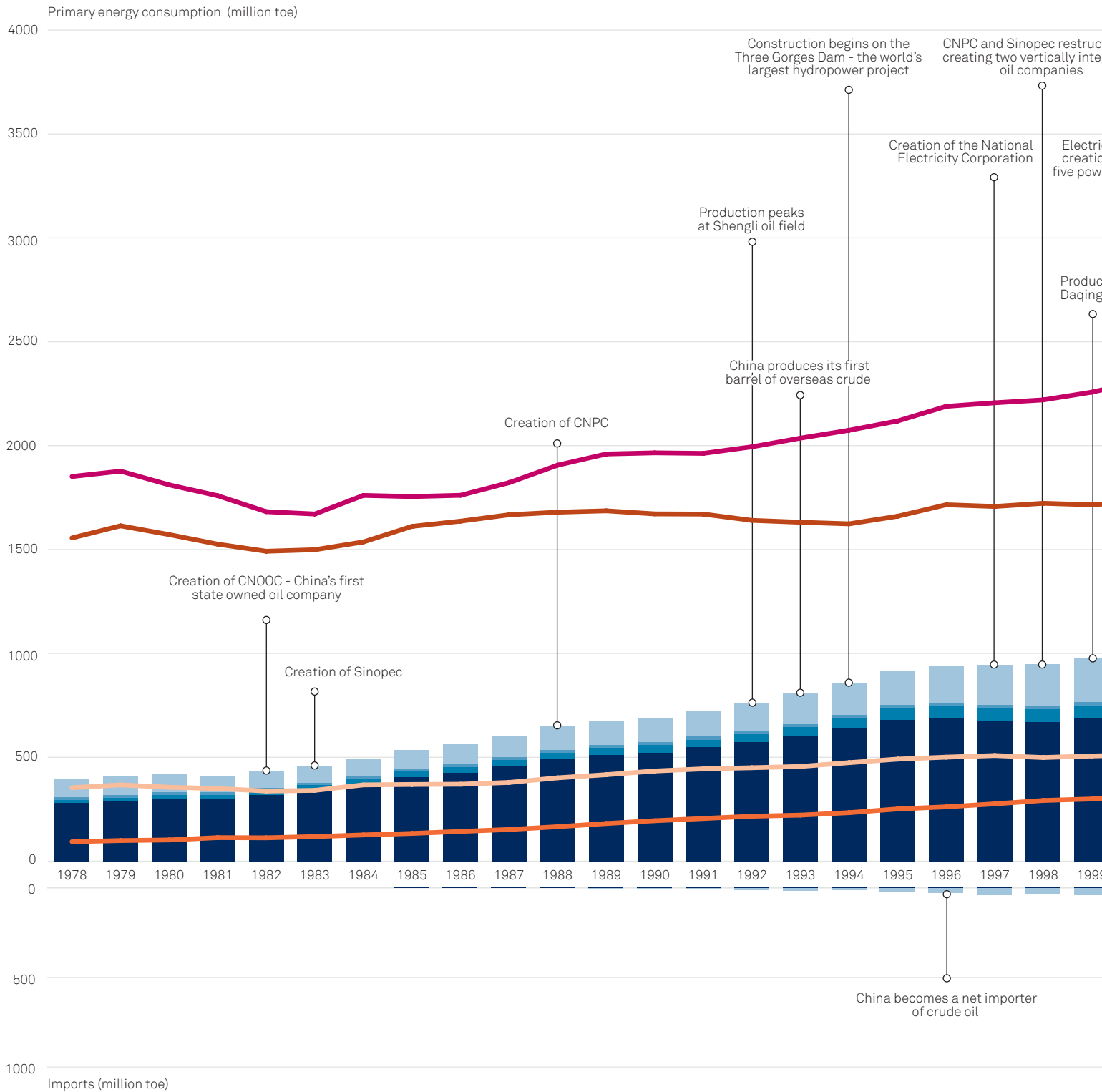
It's a bold vision, but very much in line with Xi Jinping's long-term vision for China to be "a global leader in terms of composite national strength and international influence" by 2050.

Taken as a whole, China's policies present a cohesive, integrated plan, which should take China's development up to a similar level as that seen in North America or Europe, with the visible hand of the state playing a key role in this process.

But over what timeline this can be achieved remains to be seen. If the past is any guide to the future, the next few decades should certainly prove interesting both for China and the wider world.

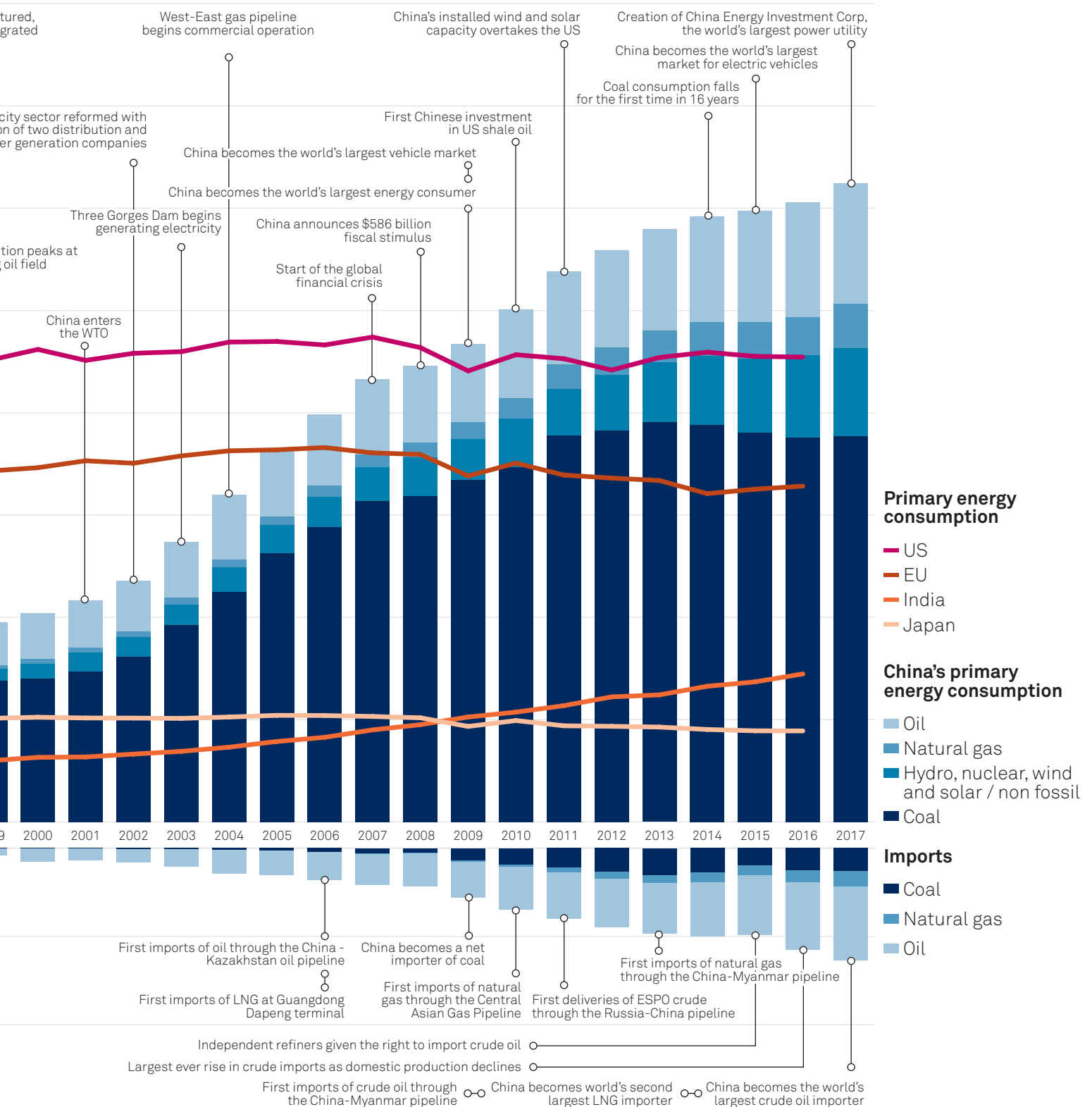


# The evolution of China



Source: NBS, GAC, NDRC, BP Statistical Review of World Energy, S&P Global Platts  
 All data used in creating this infographic are from government sources and official published data

# China's energy demand



# Supply-side reform: less is more

More successful than many had imagined, China's supply-side reforms should produce leaner, more competitive steel and coal industries.



**Sebastian Lewis**

Head of Content, Greater China  
S&P Global Platts

- **Industry restructuring prompts new steel expansion plans**
- **Coal use dependent on economic growth**
- **Construction slowdown key risk for steel demand**

China's supply-side structural reforms have been a major part of the 13th Five-Year Plan 2016-2020.

Aimed at optimizing supply of products and services and thus improving productivity, the policy has had more success than many might have imagined in helping to ameliorate the excesses

and tackle the problems brought about by China's investment-dependent development model.

This was exacerbated by the huge fiscal stimulus of 2008-2009, which showered the economy with cheap credit; from steelmakers to infrastructure projects to real estate developers, if a project needed capital it got it.

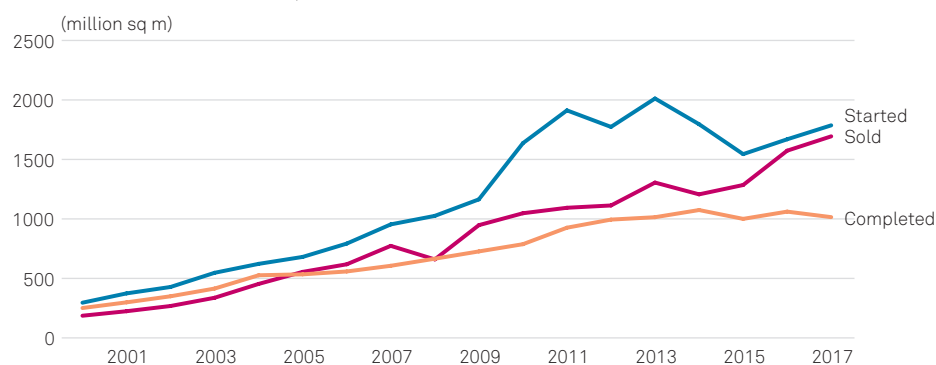
This resulted in a glut of unwanted fixed assets — excess industrial capacity and empty apartments — and on the other side of the balance sheet a huge build up in debt which threatened economic growth.



**Paul Bartholomew**

Senior Managing Editor, Metals  
S&P Global Platts

## FLOOR SPACE STARTED, COMPLETED AND SOLD



Source: National Bureau of Statistics



Against this backdrop the supply-side reforms have reduced excess housing inventory, especially in smaller cities, and removed old, inefficient capacity in the steel and coal industries, which have been the particular focus of government attention.

This has helped improve industrial profitability, lower costs and improve industrial structure, but it would be a mistake to think this means that the coal and steel industries have been cut down to size. If anything, it has made them stronger.

### Out with the old ...

China's steel sector has been plagued by overcapacity for years. Over 2007-2017, official statistics suggest steel production grew by more than 340 million mt, more than the combined output of Japan, India and the United States.

Much of this was commodity steel, the raw material needed to build those infrastructure projects and apartments that would end up being a drag on the national balance sheet.

Oversupply in the Chinese steel industry can clearly be seen from the export statistics. Over 2008-2012, when domestic demand was rising, fueled by the stimulus package, China's exports were under 60 million mt/year.

However, as consumption peaked in 2013 and started to fall thereafter, exports rose, spiking at 112 million mt in 2015, dragging down steel prices across the globe and causing trade friction with major trading partners.

China targeted the removal of 100-150 million mt/year of crude steel capacity during the 13th Five-Year Plan, equivalent to roughly one-tenth of overall capacity.

However, it was the closure of a huge number of unlicensed induction furnaces (IF) in 2016-2017 that really changed the fortunes of the industry.

It is hard to pin down with accuracy how much steel China's IFs produced; small in scale, relying on scrap to produce low grade construction products, they were very inefficient, and operated in the shadows.

Usually unlicensed, and often avoiding taxes, at their height they might have produced anywhere between 40 million and 80 million mt/year.

Over an eight-month period the government shuttered an estimated 140 million mt/year of IF capacity. This saw steel prices rise, especially for commodity construction products.

The beneficiaries were conventional steelmakers which saw utilization and margins increase, as well as mining companies who saw rising demand for iron ore and coal as the scrap-based IFs exited the market.

### ... and in with the new

Perversely, the improved profitability and stronger balance sheets resulting from the capacity eliminations have incentivized mills to embark on a new round of capacity expansions. Around 50 million mt of new electric arc furnace (EAF) capacity was approved in 2017 and another 20 million mt is likely to be approved this year.





Supply-side reform: less is more

### Construction – China's economic bellwether

China's multi-decade process of urbanization coupled with housing market liberalization at the end of the 1990s precipitated a huge real estate boom.

Rather than slowing during the 2008-2009 financial crisis, it picked up speed on the back of Beijing's massive stimulus package.

Real estate is in many respects a bellwether for the Chinese economy. It is a huge driver of demand for infrastructure, which requires cement, plastics and metals, especially steel – and of course energy, not to mention the goods that will fill new apartments and the services they require.

Moreover, because China's banking sector is state controlled, and the banks are the primary source of credit, it is a sector over which the government can exert influence. However, it is also one that can sometimes take on a life of its own in defiance of central government control.

### Taming the beast

China's real estate investment grew from under 6% of GDP in 2000 to a peak of 15% in 2014, with residential housing investment accounting for two thirds of the total. The IMF estimates that around a quarter of China's GDP and a quarter of all loans sitting on bank balance sheets are related to real estate. Land sales are also an important source of revenue for local governments.

The post-financial crisis credit boom saw a huge increase in real estate construction starts across the country, far in excess of sales, while completions continued to grow more or less on trend with rates seen since the early 2000s. However, such was demand that rising prices led to public disquiet in 2011-2012 and again in 2014-2015.

The government tightened credit and enacted administrative measures, for example restricting the purchase of multiple properties, in an effort to cool the sector. This resulted in prices falling and sales volumes slowing, but it didn't stop the rise in unsold housing inventory, especially in smaller third and fourth-tier cities, which had built up over 2011-2015.

Since 2015, the government has made progress in reducing the excess. In smaller cities, the government has shifted the focus of social housing programs from construction to the purchase of existing unsold properties built by developers. Beijing has taken measures to strengthen supervision of financial activities, including non-bank lending, which is likely to constrain credit to the sector.

However, if real estate sales fall significantly, the level of outstanding debt and the collapse in demand in associated sectors poses a significant risk to the economy.

Urbanization will continue, but with nearly 60% of China's population now classified as urban, and the number of people living in rural poverty down from nearly 300 million in 2005 to 30 million by the end of last year, it is not a process that can sustain indefinitely the vigor of the past.

Outside China, the fear for steelmakers is that the Chinese property market will collapse, forcing Chinese mills and traders to export excess steel, bringing down international steel and raw materials prices. A collapse may not be on the cards, but a return to the growth levels seen over the last two decades is very unlikely.

Like IFs, EAFs use electricity and scrap rather than coal and iron ore to make steel. But they are much more efficient, using less electricity per ton, and can produce higher quality products.

Although there may be a reduction in overall net capacity, the true legacy of China's supply-side reforms is likely to be a more efficient, competitive and productive steel industry, capable of making higher quality products.

## Coal rationalization

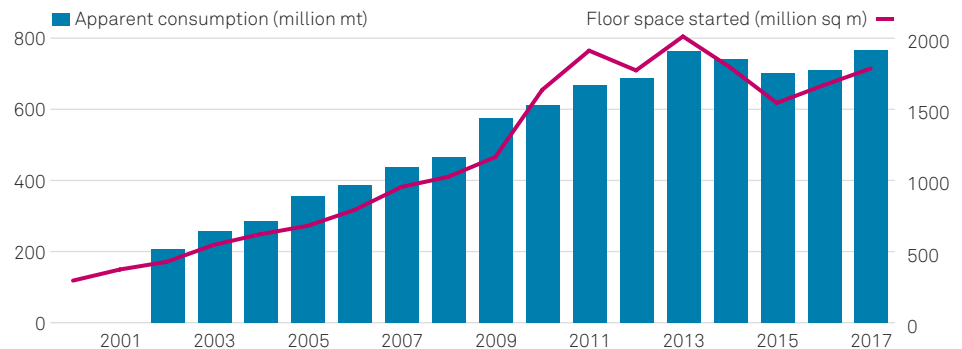
The problems affecting the coal industry are if anything more acute than the steel sector. Seaborne coal prices are formed largely off the back of southeast coast Chinese coal trade, affecting markets worldwide, but because there is little negative spillover in terms of trade frictions, the sector makes fewer waves outside China.

In 2017, China had around 4,000 coal mines, with total capacity of 3.41 billion mt. With only a few large state-owned players, this led to structural oversupply and declining corporate profits. With coal providing around 60% of China's total energy needs, the sector is a systemic risk to the whole economy.

Similar to the steel sector, the government embarked on a program of capacity reductions and state-sponsored vertical integration.

Around a year and a half after a policy document outlined plans to integrate coal miners and electricity generation companies to better match supply with demand, the government approved the merger of state-owned Shenhua Group

## APPARENT CONSUMPTION OF STEEL AND FLOOR SPACE STARTED



Source: National Bureau of Statistics, General Administration of Customs, S&P Global Platts  
All data used in creating this graphic are from government sources and official published data.

Corp., the country's largest coal miner, with China Guodian Corp., one of its largest power companies. The combined entity will likely be the world's largest utility.

Meanwhile, as of this year the government claims to have cut 800 million mt/year of production capacity, achieved by closing smaller, privately-owned mines, especially those with poor safety records and environmental standards.

As well as closing mines, the government also strictly controlled production, allowing mines to operate for no more than 276 working days a year, a huge reduction from their normal 330 days.

This policy saw China increasingly short of coal, driving up prices and imports by as much as 50%. The effects rippled across the global coal market, giving a boost to the fortunes of an industry many had thought in terminal decline.

By the middle of winter, the time of peak coal demand, prices had risen so much that the government was forced

to relax operating restrictions, which saw prices ease, but still remain elevated, compared with the lows of 2014 and 2015, hugely improving the sector's profitability.

The government will probably exceed its target of eliminating 800 million mt/year of inefficient coal mining capacity, and it will stop approving new mines which produce inferior quality, high sulfur, high ash coal, but Beijing's plans also envisage adding around 500 million mt/year of advanced coal mining capacity by 2020.

The supply-side reforms are just as much about improving industry structure and the quality of the coal produced than reducing coal use — at least in the short term.

China will be hugely reliant on coal for years to come and its ability to reduce coal use is heavily dependent on the rate of economic growth. As in 2017, faster growth means a return to higher coal use, despite the construction of huge renewables capacity and the restructuring of the economy away from industry to services.

# Alive and kicking: China hydrocarbon demand

China's hydrocarbon demand is every bit as robust as its renewables industries. A more rapidly growing economy will mean higher demand for all energy sources.



**Ross McCracken**

Managing Editor, Energy Economist  
S&P Global Platts

- **Coal use reductions dependent on economic growth**
- **Chinese LNG imports to converge with Japanese levels in next decade**
- **Oil demand remains on upward trajectory**

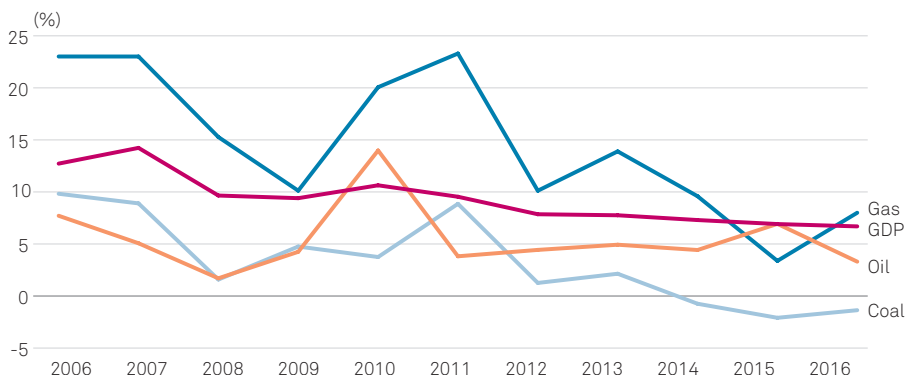
Despite China's ongoing build out of new renewables, hydro dams and nuclear power plants, the country's electricity system and heating remain heavily dependent on coal. New coal-fired generation capacity, although slowing, continues to be added to the system, and

renewables do not always benefit from priority dispatch over other generation sources.

However, restrictions on coal-fired power generation have steadily been tightened. Under the Airborne Pollution Prevention and Control Action Plan 2013-17, no new coal-fired power plants were permitted in three areas: Beijing-Tianjin-Hebei, the Yangtze River Delta and what has recently been named the Guangdong-Hong Kong-Macao Greater Bay Area.

On the supply side, Beijing continues its attempts to rationalize and consolidate

## GROWTH IN CHINA'S HYDROCARBON USE AND GDP



Source: BP Statistical Review of World Energy, World Bank

its giant coal industry, cutting the number of operating mines.

By the end of 2020, the government expects to have a handful of very large coal conglomerates, although, as in the past, measures to control coal mining are likely to prove patchy, with closed mines liable to resume operations, if demand rises.

China's rationalization of its coal industry does not necessarily mean lower coal output. Chinese coal consumption appeared to peak in 2013 at 1,969.1 million tons of oil equivalent, but having fallen to 1,887.6 million toe in 2016, it is estimated to have risen in 2017.

Coal output in December hit a two-year high, according to the National Bureau of Statistics, owing to stronger than expected economic growth and cold weather, combined with a slowdown in the country's northern coal-to-gas switching program, as a result of growing gas shortages and a lack of equipment for conversions.

The upturn in coal demand highlights the sensitivities that govern Chinese coal demand and production, and thus in a large part CO<sub>2</sub> emissions. Chinese coal-fired power plant utilization is around 47%, representing massive spare generation capacity.

Whether this rises depends on the balance between electricity demand growth and construction of other forms of power generation. Stronger economic growth, driven by rising industrial demand or, longer term, the export of power to neighboring countries, would be underpinned by coal generation and thus coal consumption.

### Refining: Beijing gets tough

In 2017, the government tried to curb excess capacity and limit oil product exports, while at the same time approving new refinery projects, creating a glut of oil products in the domestic market.

However, the government also laid the groundwork for a more balanced and sustainable growth path for the industry. Guidelines were issued that focus on capacity expansions, taxation, safety and environmental issues, such as refinery emissions.

This year, the government has strengthened its environmental and tax regulations to weed out inefficient excess capacity. This should remove price distortions from oil product markets and, in turn, allow further deregulation of oil product prices, putting the sector on a more market-orientated footing.

This is consistent with a State Council plan announced in October 2015 to set up market-oriented pricing mechanisms for all commodities by 2020, including the liberalization of gasoline and gasoil prices at an appropriate time.

### Wielding the stick

Two major policy moves have been made this year, which, if successful, have far-reaching implications for China's refining sector.

The NDRC intends to sanction refiners that fail to meet the guidelines unveiled in 2017. Refiners have until early August to rectify any shortcomings or face fines, suspensions, forced shutdowns and possibly prosecutions. The government intends to close any refinery with capacity of less than 40,000 b/d and illegal capacity expansions will be forced to shut. Refiners are also expected to upgrade the quality of their output to improve safety and environmental performance.

The second major policy announcement concerns tax. Independent refiners and blenders have used loopholes in consumption tax rules to avoid tariffs entirely or pay only partial taxes. Given their lack of efficiency relative to the large state refiners, this tax avoidance is critical to their commercial success.

The new regulations require refiners, blenders and retailers to use a special tax reporting system that monitors the entire transaction chain from producers to end-users. This should allow local authorities to collect consumption tax more effectively.

This is expected to remove the cost advantage enjoyed by the independents, making the least efficient commercially unviable. In turn, this will remove price distortions from oil product markets, which will make it easier for the government to further deregulate oil product prices. — *Oceana Zhou*

## Coal-to-gas switching

The backstop reliance on coal can be seen from the problems encountered by the country's "2+26 cities" program instituted last year, which aims to convert millions of households and commercial buildings, such as schools and hospitals, from coal to gas heating, thereby significantly reducing air pollution.

Under its 13th Five-Year Plan 2016–2020, China aims to increase gas use in the energy mix to 10%, from 5.9% in 2015.

The additional gas demand this will create will be met only partially by higher domestic supply, leaving a widening supply gap to be met by imports, both pipeline and LNG.

Again, lofty targets and zealous implementation have seen ambition run ahead of infrastructure.

The 2+26 cities program has been scaled back as a result of inadequate gas transmission and import infrastructure connected to the northern provinces concerned, and a lack of equipment to carry out all of the conversions.

The origins of this plan were stringent reductions in particulate matter concentrations of at least 15% promulgated by the Ministry of Environmental Protection in August 2017 for the October-March period of 2017/18.

The level of conversions prompted a sharp rise in LNG demand, with China's northern LNG terminals operating at full throttle. Chinese LNG imports leaped 47% year on year in 2017 to 37.76 million mt.

The surge in gas demand revealed a number of insights:

- A limited response in terms of increased pipeline supplies, despite significant spare pipeline capacity from both Myanmar and Central Asia.
- A lack of transmission capacity between southern LNG import terminals and northern demand centers.
- A significant under-estimation of the amount of coal that needed to be replaced, re-enforcing other indications that Chinese coal use is higher than reported.
- And, as shortfalls emerged, city gas was the priority, with LNG prices for trucking being allowed to rise sharply to record highs.

## Gas imports

It is clear that domestic gas production, while growing at 7.7% year on year to reach 147.42 billion cubic meters in 2017, is not growing fast enough.

Chinese gas demand is expected to rise 10% to nearly 260 Bcm in 2018 by state-owned company CNPC, after rising 17% in 2016.

The growing deficit can only be met by imports and will require significant new investment in transmission infrastructure. It will also require further investment upstream, notably in Central Asia.

In addition to new LNG terminals planned and under construction, China has projects in place to import 38 Bcm of gas from Russia via the under construction Power of Siberia pipeline

and potentially add 30 Bcm from the 4th Central Asia Line and another 30 Bcm from Russia via the less certain West Siberian Altai project, which would increase total pipeline import capacity to 165 Bcm.

LNG import capacity stood at 108 Bcm in early 2018 and is expected to rise to 122 Bcm by 2022, according to S&P Global Platts Analytics.

However, the rise in gas demand was only partially the result of the conversion program. Recovering industrial activity and higher than expected GDP growth contributed significantly, which again explains why coal use could rise at the same time that environmental regulations seek to curb consumption.

This reinforces the perception that China's ability to meet its environmental goals and increase the proportion of gas in the overall energy mix would be severely challenged in a high economic growth scenario.

## Oil demand

While China may be pursuing a more sustainable economic model, it is also being pulled by the demands of its economy in the opposite direction, a conundrum that is only likely to reinforce the drive behind renewables and electric vehicle (EV) deployment.

Despite having the world's largest fleet of EVs, China's apparent oil demand is forecast to rise 4.6% year on year in 2018 to 12.05 million b/d. This is expected to result in a 7.7% increase in crude oil imports to 9 million b/d, according to CNPC's Economics and Technology Research

### Rising spot LNG trade to stimulate market deregulation

There appears to be only one direction for Chinese LNG imports and that's up.

In 2017, China became the world's second largest importer of LNG, surpassing South Korea. The country's LNG demand is set to nearly double to 67.9 million mt/year by 2023, and its share of the global LNG market is expected to converge with that of Japan within the next decade.

China has so far imported LNG primarily on a long-term, take-or-pay contract basis, going to the spot market mainly in the winter months. However, despite its exceptional demand growth and abundant spot purchases, China's total LNG imports in 2017 remained slightly below the total contracted volume.

This is set to change.

The country's LNG demand is expected to outstrip growth in contracted LNG obligations over the next five years, leaving about a quarter – 17 million mt — uncontracted. This implies much greater reliance on spot trade. Chinese LNG demand will become a major factor in global LNG price formation.

LNG spot prices rather than oil-linked contract prices will also increasingly influence the domestic market. As the government moves to liberalize LNG imports, and the number of active spot market participants grows, the sector will become increasingly competitive.

Beijing has initiated domestic market reforms affecting LNG on three key fronts: boosting third-party access to LNG terminals, liberalizing domestic gas pricing and promoting a trading hub.

Progress so far has been limited, but growing reliance on spot trade will reinforce the need for these reforms to become reality. State-owned companies, which currently dominate trade in LNG imports, will come under mounting pressure to free up terminal and pipeline infrastructure to traders and end-users.

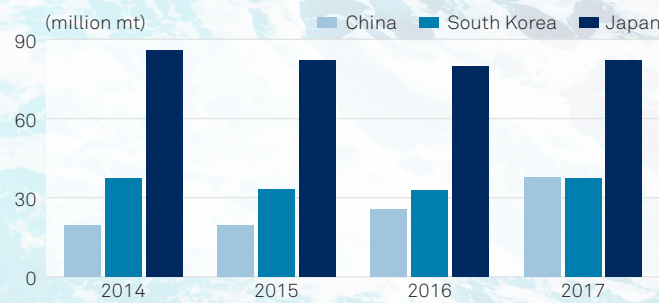
By turning guidelines into law, and setting achievable targets for state companies to allocate capacity, China could boost LNG terminal capacity utilization from about 65% in 2017, lower end-user costs and diversify its LNG supply sources, thereby enhancing security of supply.

In addition, since 2011, the government has linked city gate prices to a basket of competing fuels, including fuel oil and LPG, to ensure gas price competitiveness. But the prices often reflect an extensive time-lag that can span several months for both LNG and pipeline gas.

In November 2016, suppliers and buyers were allowed to negotiate city gate prices within a 20% range of the baseline price for each trade. As exposure to the LNG spot market grows, further steps are expected to make domestic gas pricing more market representative.

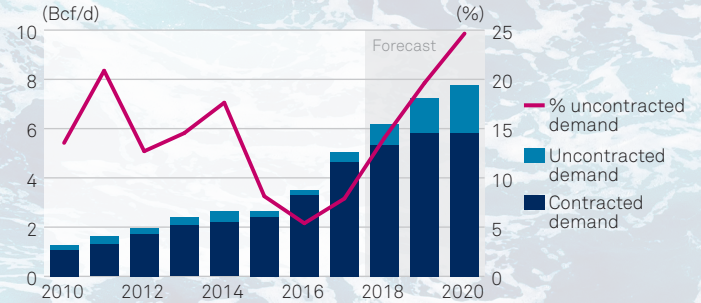
There also ambitions to create a major gas trading hub, centered around Shanghai, which has well-developed regional pipeline interconnections and access to several LNG terminals along the east coast. Progress has been made in encouraging the growth of bilateral trading and increasing the transparency of gas trade in terms of volume and pricing. However, barriers remain as a result of incomplete gas price deregulation and a lack of sales unbundling and third-party access to LNG terminals. — *Abache Abreu*

#### LNG IMPORTS: CHINA MOVES INTO 2nd PLACE



Source: S&P Global Platts Analytics

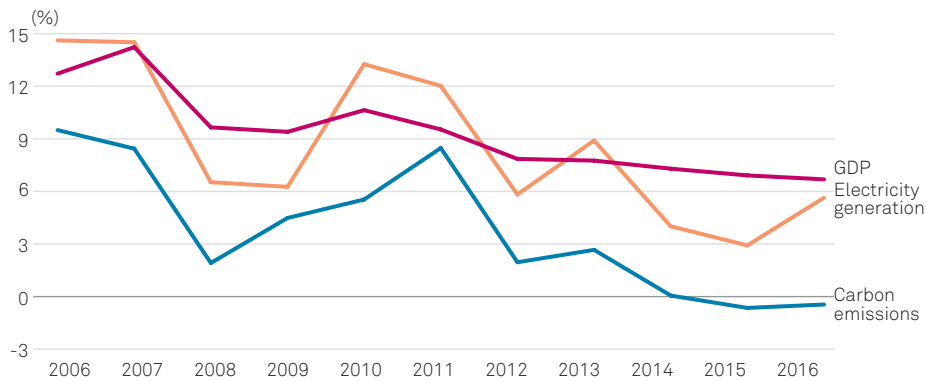
#### CHINA'S GROWING SHARE OF UNCONTRACTED DEMAND



Source: S&P Global Platts Analytics

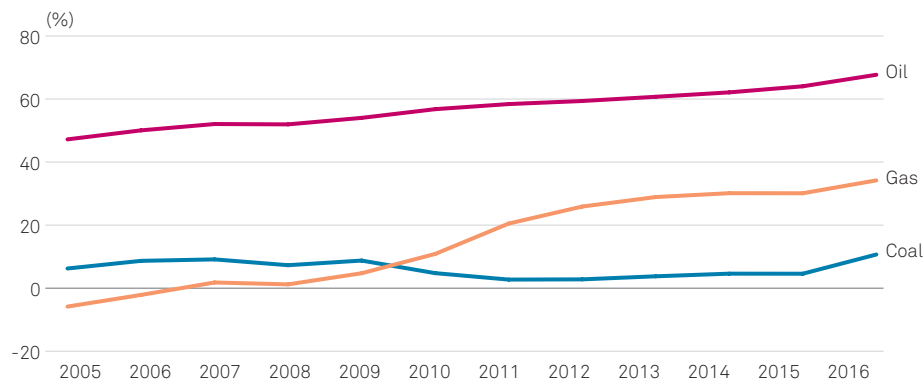
## Alive and kicking: China hydrocarbon demand

### ELECTRICITY AND CARBON EMISSIONS VERSUS GDP



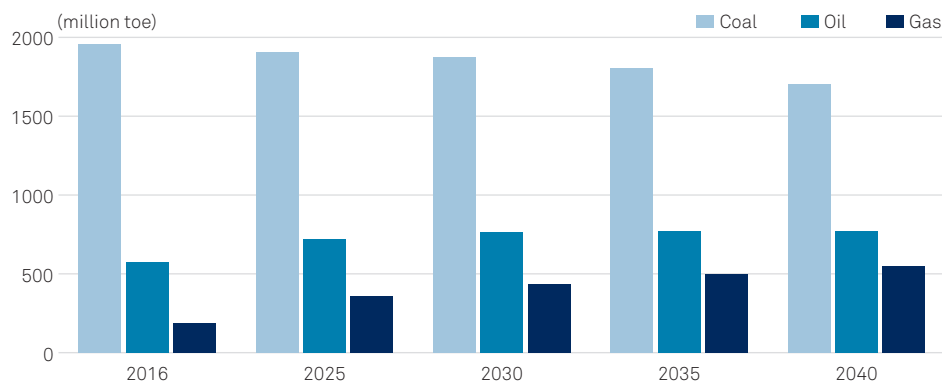
Source: BP Statistical Review of World Energy, World Bank

### IMPORT DEPENDENCY RATIO



Source: BP Statistical Review of World Energy

### HYDROCARBON DEMAND FORECAST



Source: IEA WEO 2017, New Policies Scenario

Institute (ETRI), based on GDP growth of 6.7%. According to ETRI's data, China in 2017 surpassed the US to become the world's largest crude oil importer, with the dependency on imported oil hitting 67.4%.

However, oil product demand growth is expected to rise more slowly than in the past as a result of a number of factors; the growth of New Energy Vehicles (NEVs) – primarily battery and plug-in hybrid vehicles; rising ethanol volumes in the gasoline pool, the construction of a high-speed train network, which will impact aviation fuel demand, and increased vehicle sharing.

This is expected to leave a surplus of oil products for export of about 46.8 million mt, according to ETRI.

Chinese oil demand continues to rise on the back of growing transport needs and demand from non-energy sectors like petrochemicals. NEVs, while expanding quickly, still only displace a small portion of transport oil demand. As a result, a scenario in which overall Chinese oil demand falls remains some way off.

While reduced crude imports, even at the expense of lower refinery utilization, would benefit the economy, in reality, a similar process to coal is likely, rationalizing refining around major conglomerates and weeding out the less efficient independent refiners, while at the same time directing excess capacity towards export markets.

Here China lacks cheap feedstock, but has a geographic advantage lying in the heart of Asia, where oil demand growth is expected to remain strong.



### Quotas for closures: China's refining sector policy timeline

#### 2015

- Eleven independent or "teapot" refiners allowed to import 49.19 million mt/year (987,000 b/d) of crude in return for capacity reductions.
- A total 34.11 million mt/year (685,000 b/d) of capacity is slated for closure.

#### 2016

- Nineteen refiners allowed to import 73.77 million mt/year (1.5 million b/d).
- Independent refiners given quotas to export refined products.
- Eight refiners promise to shut 20.81 million mt/year (418,000 b/d) of capacity in return for 24.58 million mt/year (494,000 b/d) of import quotas.
- China's crude imports rise 13.3% to 7.63 million b/d in the year.
- China's product exports rise 50.3% year on year to 38.2 million mt.
- Illegal trade in quotas and tax evasion becomes rampant and pollution veers out of control.

#### 2017

- Government clamps down on exports by independent refiners without quotas.
- Number of independent refiners allowed to import crude rises to 32. Independents' annual import volumes rise to 101.69 million mt (2.04 million b/d).
- Capacity closure commitments total 61.62 million mt/year (1.24 million b/d).
- Government tightens quota regulation.
- Government stops accepting new crude import quota applications from May 1.
- China's crude imports rise 10.5% to 8.43 million b/d. Oil products exports rise 7.3% on year to 40.1 million mt.
- Government starts to scrutinize consumption tax governance and illegal quota trade. Central government bodies agree to tighten monitoring around the sector.

#### 2018

- Government eases controls on crude imports and refined product exports, but new export quotas withheld.
- Environmental protection fee turned into environment tax effective January 1.
- State Administration of Taxation announces measures to enforce oil products consumption tax payments.
- The National Development and Reform Commission unveils measures to punish refiners failing to meet government guidelines on capacity expansions, environment and safety by early August.

# US and China: energy interdependence

The US shale revolution is set to provide the feedstock for China's next phase of economic development.

**Chris Midgley**

*Global Director of Analytics  
S&P Global Platts*

**Zhuwei Wang**

*Senior Analyst  
S&P Global Platts*

**Sebastian Lewis**

*Head of Content, Greater China  
S&P Global Platts*

Despite increasing rivalry and trade frictions, the world's two largest economies, China and the United States, are becoming increasingly interdependent when it comes to energy. On the supply side, the US shale revolution is reshaping global energy markets, while China is the epicenter of demand growth.

Simply put, China is where demand meets US supply.

S&P Global Platts Analytics forecasts that global liquids production needs to rise from just under 95 million b/d in 2015 to over 105 million b/d by 2025 to meet rising world demand. Much of this supply growth will be light crude, and in particular US light crude, which will account for just over 40% of growth in global crude output over this period.

The increase will come almost entirely from the US' shale plays, using the innovative drilling and extraction techniques developed over the last two decades. The most prolific of these, the Permian Basin in West Texas, will account for most of the growth.

Moreover, significant volumes of associated gas, rich in natural gas liquids (NGLs), will be produced alongside the light crude. The products produced from

NGLs — propane, butane and increasingly ethane — compete with petrochemical feedstocks like naphtha and are used to produce gasoline blending components.

NGLs' role in helping balance global demand for petroleum liquids will be significant. When NGLs are included, US light crudes' share of the increase in global liquids production between 2015 and 2025 rises from just over 40% to just under 50%.

Meanwhile, on the demand side, despite its new focus on environmentally sustainable technologies, China last year still overtook the US to become the world's largest importer of crude. China's crude imports rose 780,000 b/d year on year to 8.43 million b/d, a trend which is set to continue.

Platts Analytics forecasts that Chinese oil demand will rise by more than 4.5 million b/d over 2015-2025, making the country the single biggest driver of global oil demand well into the next decade.

## Sweet versus sour

There are good reasons why US light crude in particular will flow to China.

US refineries are designed to process a slate of crudes from light, sweet (low sulfur) grades to heavier, sourer (high sulfur) grades from the Middle East, Latin America and Canada. US refiners have been able to substitute a significant proportion of imported light crudes, like those from West Africa, with domestic shale oil, but they still need a significant proportion of cheaper, imported medium to heavy sour crudes to run their refineries at maximum efficiency.

This requirement means the US will continue to import heavy, sour crude even as its exports of light crude rise. S&P Global Platts Analytics forecast that by 2025 the US will be exporting more than 4 million b/d of light sweet crude, of which over 2.5 million b/d will go to Asia.

Unlike other large Asian refiners, which are primarily dependent on medium-heavy sour grades from the Middle East, China imports crude from a wide range of countries, including Angola, Russia, Brazil and Venezuela, in addition to imports from the major Middle Eastern oil producers. As a result, it has a crude slate that is both heavier and sweeter than other Asian refiners.

Aside from its vertically-integrated state-owned oil majors, China also has a sizeable independent refining sector, which accounts for more than a quarter of total refining capacity. Given the name “teapots” due to the perception that they were small-scale, with very simple refining units, many of the independents now have a more complex configuration than their name suggests. Many are capable of producing high quality products and petrochemicals.

Once barred from importing crude, they invested in secondary refining units to help them process the heavier crudes and residues like fuel oil that historically

formed the baseload of their refining slate. But, in 2015 restrictions on the independents’ crude imports started to ease. Since then, they have accounted for most of the growth in Chinese crude demand. By March 2018, independent refineries’ crude imports had reached an all-time high of 2.34 million b/d.

They are now able to access lighter crudes, which has allowed them to run their refineries more efficiently and maximize their yield of lighter more valuable products. They have invested in additional processing units to produce the higher quality products like gasoline blending feedstocks that China increasingly needs.

However, as a whole the sector is unable to process high sulfur crudes, owing to a lack of desulfurization capacity. They therefore typically run on a sweeter slate than other Asian refiners.

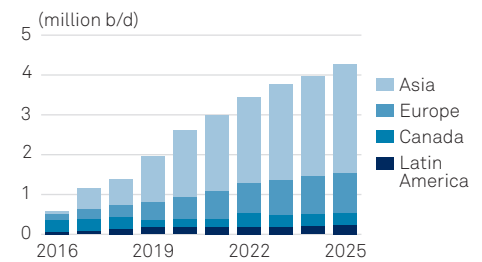
### Light end of the barrel

There are two other factors that make China the natural home for US crude.

First, to cut pollution, the government has mandated the use of much cleaner fuels across the country. Last year, the maximum level of sulfur allowed in both gasoline and gasoil fell from 50 to 10 parts per million. For many of China’s independent refiners, unable economically to remove the sulfur from the crudes they process, sourcing sweeter grades, like those from the US, is the solution.

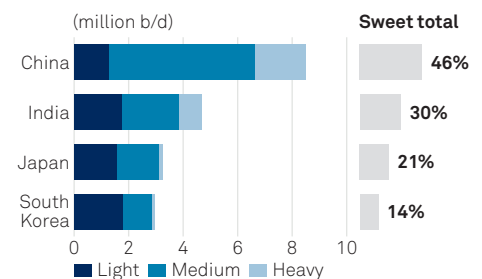
Second, the pattern of Chinese demand is changing as the country shifts from an investment-led economy to one based more on consumption, which will require more gasoline and petrochemicals than it will gasoil and heavy fuel oil. Although

### US CRUDE OIL EXPORTS 2016 - 2025\*



\*Includes condensates  
Source: S&P Global Platts Analytics

### ESTIMATED REFINERY RUNS BY TYPE OF CRUDE, 2015



Source: S&P Global Platts Analytics

middle distillates demand will continue to grow, demand for light products will grow faster.

Shale crudes tend to be paraffinic, with good naphtha and ethylene yields, which make them particularly well-suited for petrochemical feedstock production.

Some of China’s new oil product demand will be met by new complex refineries, like those being built in Dalian and Zhoushan, which will be able to process heavier, sour crudes. But they alone will not be able to meet all new demand, forcing China’s existing refineries to look westwards to source lighter crudes.

In short, the US will optimize its refinery operations by exporting light sweet grades, while China’s refining sector will reach maximum efficiency by importing them.



“C  
continued project  
means energy de  
to continue outstr  
vulnerabilities of th  
factor prominently in  
Belt and Road

— Paul Gruenwald  
S&P Glob

A high-angle, panoramic view of a mountainous landscape. In the foreground, a winding, light-colored road snakes down a hillside covered in dry, golden-brown grass. Below the road, a small cluster of buildings with colorful roofs is nestled in a valley. The background consists of numerous layers of blue-toned mountains, creating a sense of depth and vastness under a clear blue sky.

China's  
ected fast growth  
mand is expected  
ipping supply. The  
his recurring deficit  
n Beijing's ambitious  
Initiative. ”

d, Chief Economist  
al Ratings

# Changing trade flows

Platts cFlow trade flow software reveals how changes in policy and market dynamics have impacted global trade flows.



**Sebastian Lewis**

*Head of Content, Greater China  
S&P Global Platts*



Use your smartphone to scan code or visit [platts.com/cflow-video](http://platts.com/cflow-video) to watch a video showcasing the vessel-tracking capabilities of Platts cFlow

India, China and Japan account for about a third of global crude imports, with China accounting for around half of this total. It is therefore not surprising to see the density of data points on the facing page.

The red points represent vessels carrying Middle Eastern crude, showing a huge flow of crude from the Arabian Gulf to India, through the Straits of Malacca — a narrow channel that represents a potential chokepoint for crude supplies to Asia — and on to China and Japan.

Middle Eastern crude forms the base load for most Asian refiners; around 85% of Japan's crude comes from the Arabian Gulf. China's imports, however, are much more diverse.

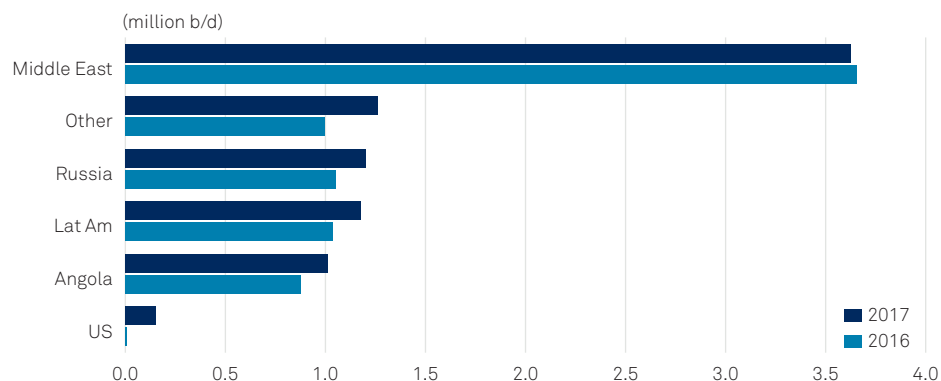
Recent changes in policy and market dynamics have impacted global trade flows.

OPEC produces predominantly sour (high sulfur) crudes. Its decision from the start of 2016 to curb its members' output in an effort to rebalance the oil market has seen the price of sour crude oil rise relative to lighter, sweeter grades.

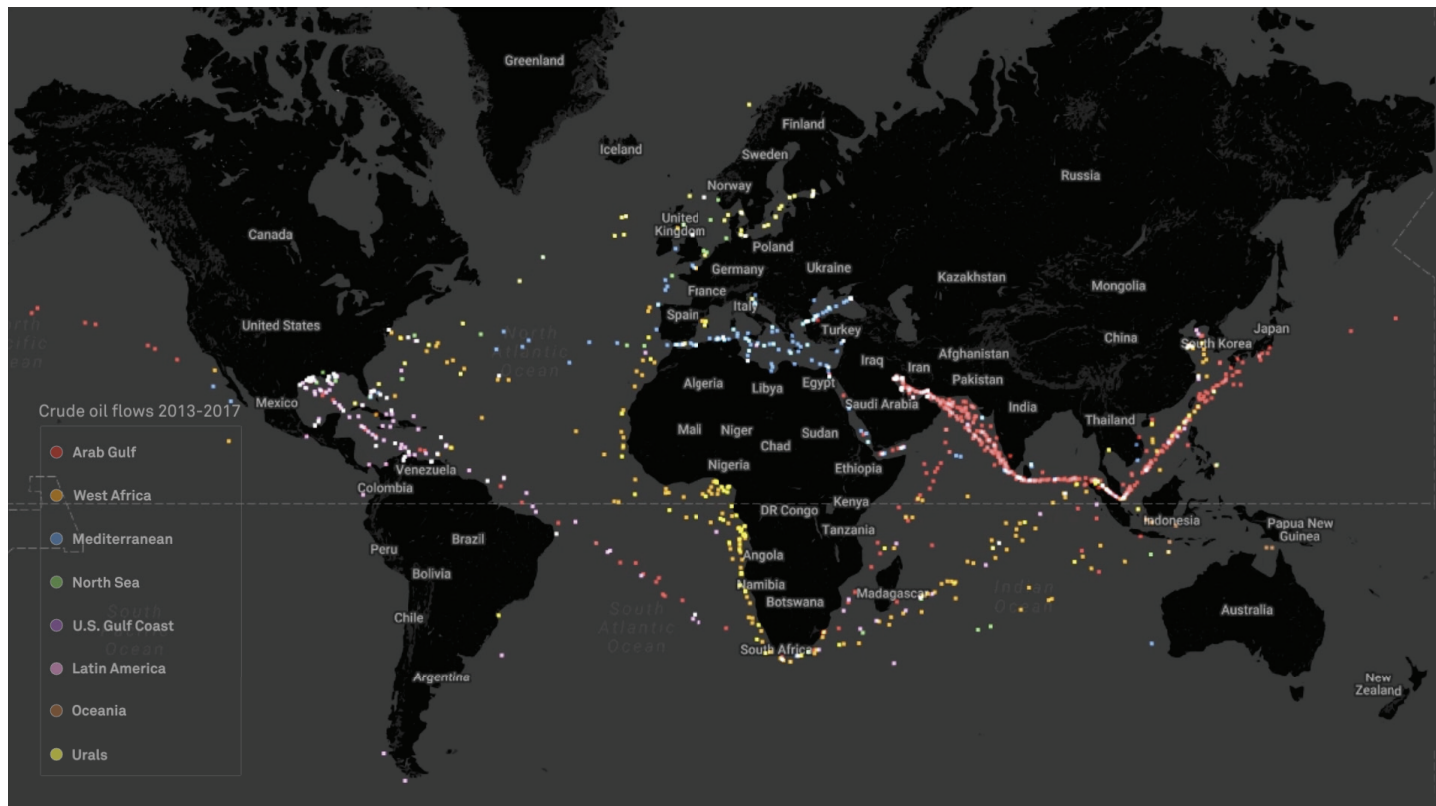
This has resulted in Chinese imports from the Middle East declining with an increase in imports of lighter sweeter grades.

At the same time, Washington lifted its restrictions on the export of US crudes, and the first cargoes set sail a few weeks later. These have gone to more than 30 countries, but the US

## CHINESE CRUDE IMPORTS BY MAJOR SUPPLIER



Source: General Administration of Customs of the People's Republic of China



Source: Platts cFlow

has recently emerged as a crude supplier to China. Total Chinese imports from the US last year were just over 150,000 b/d.

cFlow data shows concentrations of yellow data points around West Africa’s two major oil producers — Nigeria and Angola. The quality of their crudes plays a large part in determining destination.

Nigerian crudes, which are light and sweet, now tend to flow to Europe. Once heavily favored by US East Coast refiners, they have been shut out of the US market by shale oil, which is also light and sweet. Yet imports to the US of heavy crudes from Venezuela and the Arabian Gulf can still be seen.

These are required by US Gulf Coast refiners configured to run on heavier, sourer grades.

Although generally sweet, Angola’s oil is typically heavier than crude from Nigeria. cFlow data indicates that more than 60% of Angolan exports went to China in 2017, making the country the third largest supplier of crude to China after Russia and Saudi Arabia.

China also imports crude from Latin America. Brazil overtook Venezuela as the largest Latin American exporter of crude oil to China in 2017, and the region’s exports to China as a whole are now slightly higher than those from Angola. About a third of Brazil’s crude exports now head to China.

Russia was the largest supplier of crude to China last year.

Around half of this was delivered via the Eastern Siberian Pacific Ocean (ESPO) pipeline into northeast China.

The remainder was mainly ESPO crude loading from the far east port of Kozmino.

These flows eastward have changed the quality of Russian Urals blend, which flows westward by both pipeline and ship, making it sourer and heavier than in the past.

However, cFlow shows that China also received a few cargoes of Urals crude, which travelled all the way from the Black sea.

# Clearer skies: China's New Energy Economy

China aims to create a cleaner, more circular economy, capitalizing on the industrial opportunities that arise from the disruptive transition to low carbon energy provision.



**Ross McCracken**

Managing Editor, Energy Economist  
S&P Global Platts

- **Hydrocarbon economy unsustainable**
- **Renewable technologies play to China's manufacturing strengths**
- **New Energy Economy remains small but growing fast**

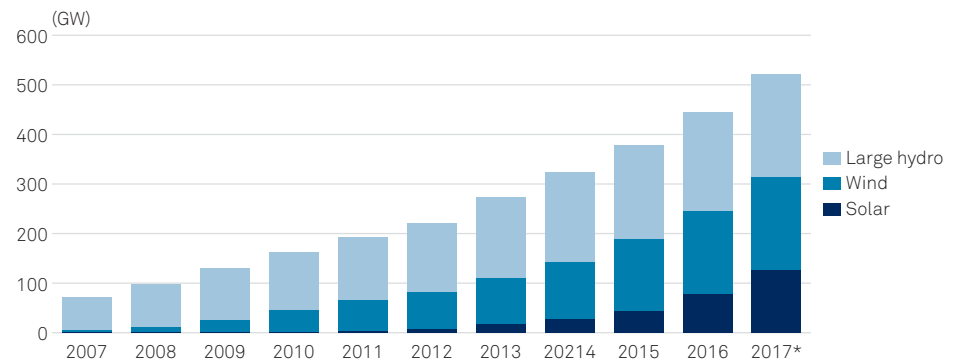
Despite being a major producer of both oil and natural gas, China is a relatively resource-poor country on a per capita basis, and particularly so considering the carbon content of its hydrocarbon resources.

The country's proved reserves of oil and gas per person are less than a

seventh those of the US and China's primary hydrocarbon endowment is emissions-heavy coal. Even here, China is eating through a huge resource at a rapid rate. Its production to reserves ratio for coal is just 72 years.

In combination with the world's largest car market, coal-fired power generation, the direct use of coal for heating, and congested city roads have created acute air quality problems at both the local level, in terms of city air pollution, and the national level, in terms of overall greenhouse gas emissions.

## CHINESE NEW RENEWABLES



\*2017 data solar National Energy Administration, wind Global Wind Energy Council  
Source: IRENA





Moreover, China's dependence on crude oil imports is high and growing. More than two-thirds of its crude consumption was imported in 2017.

Its attempts to reduce the carbon intensity of its hydrocarbon use by switching from coal to gas in heating and from oil to gas in trucking mean its dependence on imported gas is also rising fast.

As a result, China's interests are increasingly drawn into the long and unstable international supply chains on which oil and gas imports depend. Its economy is ever more vulnerable to external price shocks.

At the same time, the acquisition of imported hydrocarbons represents a massive outflow of capital – estimated at some \$165 billion on crude oil alone in 2017.

Even if the carbon intensity of hydrocarbon use can be reduced, rising transport needs still based primarily on oil mean China is effectively paying to import pollution.

Moreover, the provision of cheap energy underpins China's huge manufacturing industries. The country

has undergone, and continues to undergo massive rural-urban migration amid an aging population, which means the number of people of working age is beginning to fall.

As a result, labor costs are rising and Chinese industry needs to become more efficient and more focused on higher value-added goods to compete on world markets. Energy in China needs to remain cheap.

In terms of the troika of energy policy goals – affordability, security and sustainability – the hydrocarbon economy is distinctly sub-optimal for Chinese needs.

### China and The New Energy Economy

It is here – at the intersection between energy provision and industrial production – that China is uniquely positioned to reap the benefits of the “green dividend.”

Renewable resources such as wind and solar are widespread. They are harvested rather than mined, and the need for ‘harvesting’ equipment – solar panels and wind turbines – mean they

are essentially manufacturing industries, and low-cost manufacturing plays to China's strengths.

The benefits are obvious. A Chinese-manufactured solar panel or wind turbine, deployed in China, creates a circular economy in which energy generation is no longer dependent on imports. Jobs and capital stay at home providing demand for an industry that can also sustain major exports.

The electric vehicle (EV) provides similar if not greater benefits. Despite the huge size of its car industry, Chinese manufacturers have never managed to break both a domestic and export market preference for established brands.

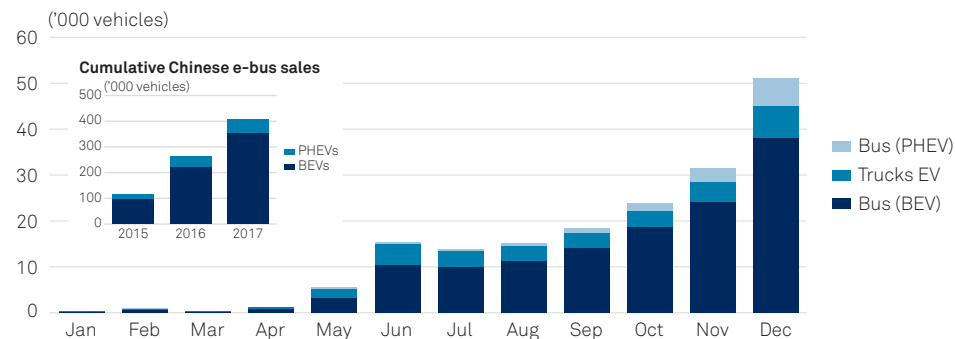
However, the advent of automation and EVs create a disruptive moment in the auto industry's evolution. It is this opportunity that China hopes to grab.

Rather than play catch-up against decades of research and expertise in the development of internal combustion engines, China hopes to gain a lead over its rivals at a moment when the underlying technology of transport is undergoing fundamental change.

Moreover, EVs extend the circular economy from energy generation into transport. As the carbon intensity of China's electricity generation falls, the benefits of EV deployment rise. EVs made in China running on domestically-generated low carbon electricity are a far more attractive economic and environmental proposition than foreign car imports running on imported oil.

- EVs reduce localized urban air pollution, even if the electricity is partially generated from distant coal plants.

### CHINESE E-HDV SALES IN 2017



Source: www.EV-Volumes.com

- They displace imported oil, reducing the oil import bill and exposure to both the price and physical insecurity of international oil supply chains.
- EVs and renewables in tandem reduce greenhouse gas emissions, providing Beijing with a global leadership role in the fight against climate change.
- EVs and renewables create a circular economy based on domestic manufacturing, the export of high value-added goods and domestic energy resources.

### Can it be done?

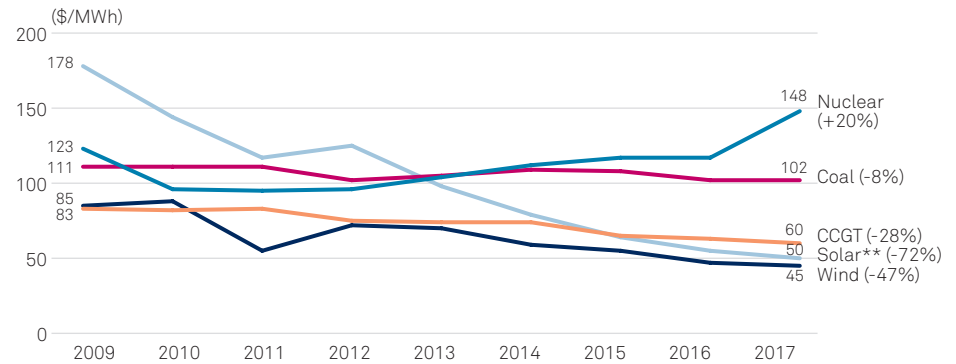
In many ways it is being done, but there are major challenges and potential contradictions.

China installed 19.5 GW of new wind capacity in 2017, nearly three times as much as the next largest country, the United States, bringing cumulative installed capacity to 188 GW. Although the pace of new installations has slipped in the past two years, China's wind additions last year represented 37% of the world total. China hosts 35% of the world's wind capacity, and last year became the third largest installer of offshore wind – a development unique outside northern Europe.

China became the first country in 2017 to pass 100 GW of cumulative installed solar capacity, adding around 50 GW last year alone to bring the total to 126 GW.

Moreover, it is by far the world's dominant force in the manufacture of solar panels and has been so since 2008. China's solar industry is

### ENERGY COST DECLINES - MEAN LCOE\*



\*LCOE - levelized cost of electricity. \*\*Utility-scale, crystalline  
Source: Lazard

increasingly innovative. Trina Solar has achieved the world efficiency record for laboratory scale multi-crystalline-silicon solar cells.

This technology dominates the global market for solar power, making up 70% of global PV production in 2016.

In addition, by almost any measure, China leads the world in road transport electrification. It makes more, buys more and, with 75 different models available in 2017, offers consumers a wider choice of EV than any other country. Chinese EV passenger car sales totaled 579,000 units last year. Add in about 20,000 imports and China accounted for around half of global EV sales.

Chinese manufacturers also have a near total grip — about 90% — on the market for electric heavy-duty vehicles (e-HDVs), selling 198,000 commercial EVs in 2017, about 85% of which were city buses.

The country's lead in e-HDVs represents a promising export platform. Chinese e-buses are being sold around the world to other polluted metropolises. Chinese e-bus and e-truck maker BYD has

established fabrication facilities in Brazil and the United States and expects to start up in Canada this year.

Although the primary focus on gas has been for city gas use and coal displacement in heating, China also leads the world in the use of LNG as a transport fuel. China is estimated to have 300,000 LNG trucks on the road, in contrast to about 2,000 in Europe.

The adoption of LNG and electrification in the heavy-duty vehicle market is of particular significance. Alternative energy HDVs displace much more fuel than passenger EVs because of the high mileage and low fuel efficiency of conventional HDVs.

### Constraints

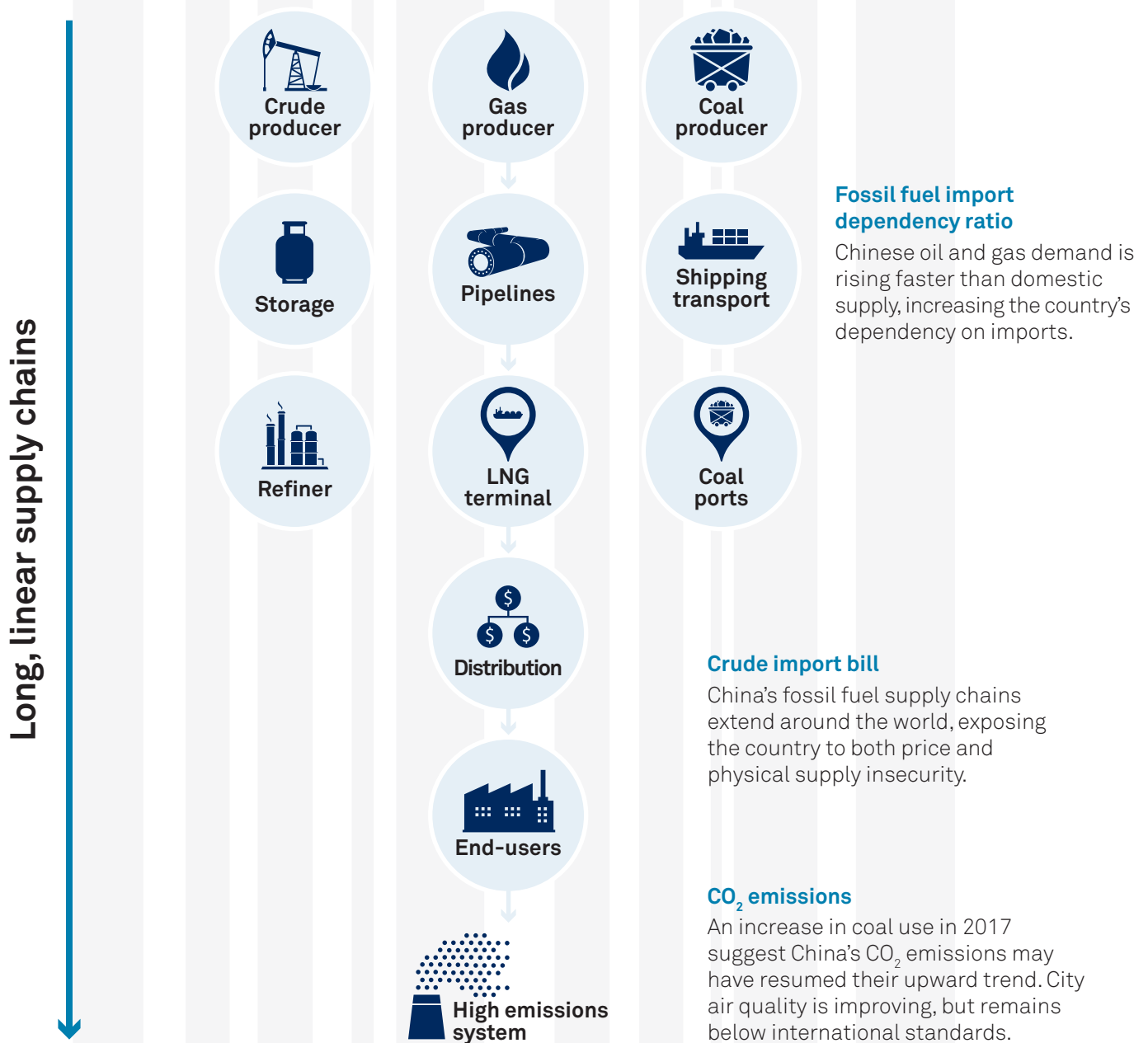
However, all this has to be placed within the context of the huge Chinese economy, one built on hydrocarbon use, and most particularly coal in power generation. The contribution of renewables, excluding hydropower, is significant but still small. Solar generated just 1.1% of Chinese electricity in 2016, wind 3.9%.

# Hydrocarbons vs the M

This infographic contrasts the risks associated with China's current hydrocarbon-based economy

## The hydrocarbon economy: linear

China's fossil fuel economy is linear, depending on long, insecure supply chains based on bulk commodities which are expensive to store. Although strategic stocks have been built, these are essentially just-in-time supply chains, which involve huge and growing outflows of capital, exposed to price and physical supply risk. They are also emissions heavy, contributing to both global greenhouse emissions and local air pollution.

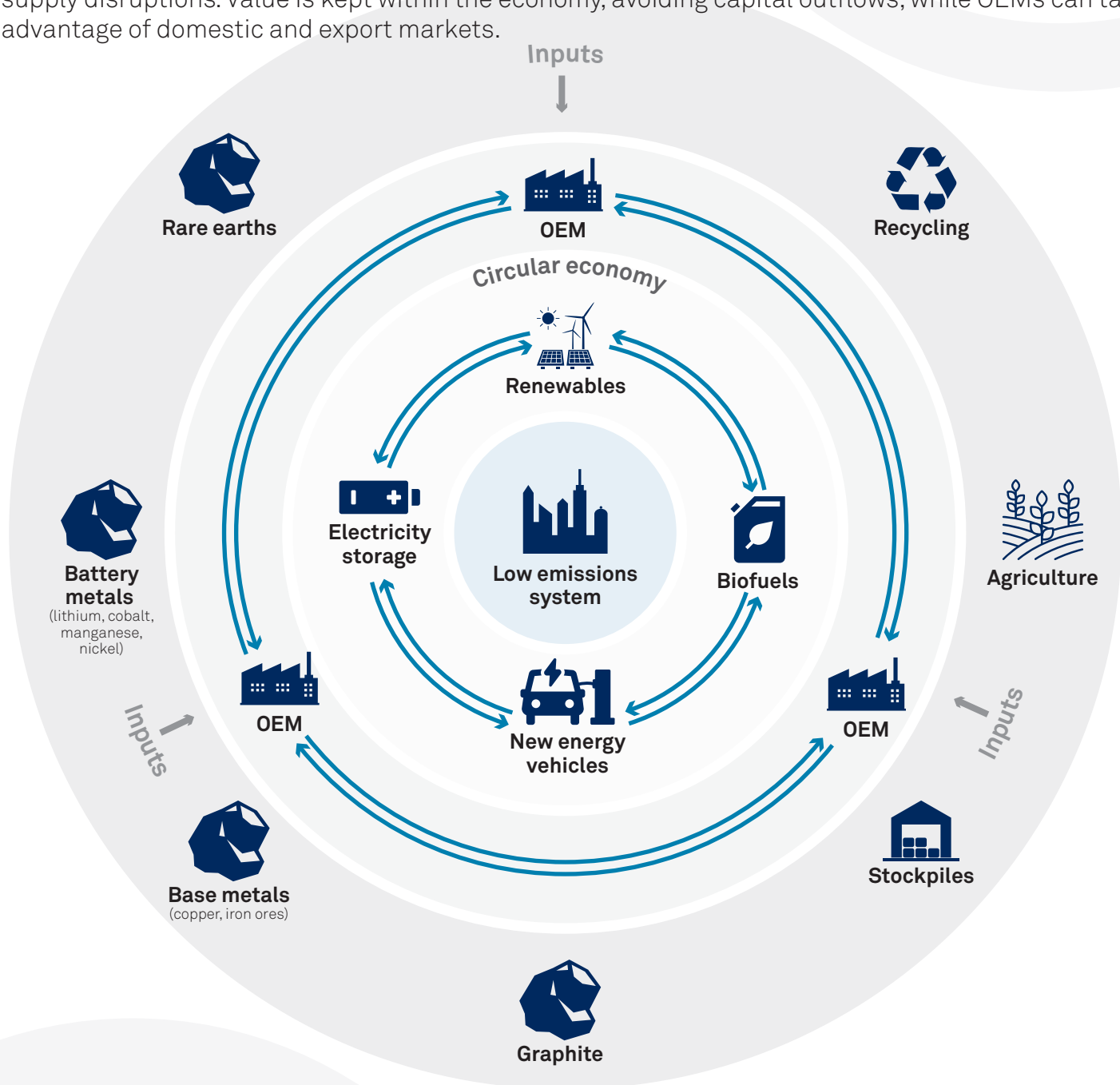


# New Energy Economy

conomy with the opportunities offered by the New Energy Economy

## The New Energy Economy: circular

The New Energy Economy is low carbon and depends on capital equipment made by Original Equipment Manufacturers (OEMs) – i.e. low-cost manufacturing, where China is strong. Strategic stocks are cheap and easy to store. Renewables do not stop operating in the event of raw material supply disruptions. Value is kept within the economy, avoiding capital outflows, while OEMs can take advantage of domestic and export markets.



At the end of 2017, China's growing fleet of EVs displaced less than 150,000 b/d of road transport fuel, as opposed to more than 8 million b/d of imported crude.

EV sales rose rapidly, by 53% in 2017 in comparison with 3% for the vehicle market overall, but EVs still only accounted for just 2.7% of the 28.9 million locally-produced vehicles sold in 2017.

In short, both oil demand for transport and the volume of imported oil is still rising.

## Subsidy bill

China's renewable and EV industries have been developed with significant state support designed to promote environmental objectives. Incentives for EVs, for example, are provided by central and local government. However, as EV sales grow, so too does the subsidy bill.

For EVs, the Ministry of Finance is reforming the subsidy system to remove direct incentives and move to a tradable credit system for vehicle manufacturers and importers by 2019, which incentivizes both EV production and better EV technology, the latter being a measure designed to boost Chinese EV exports.

However, capital in China's state-led system is often deployed inefficiently in a race to build production capability, resulting in overcapacity, bad debts and inevitable periods of industry consolidation.

This has been the case in both China's solar market and its conventional car industry. This leads

to vulnerabilities which can have a big impact on industry expansion, for example the withdrawal or maladministration of subsidies at home, and the imposition of import tariffs on Chinese exports by foreign importing countries.

Moreover, rapid growth creates its own strains, for example in the interconnection of wind and solar to the grid, which has led to high rates of renewables generation curtailment, particularly in northern China, a problem which the National Energy Administration hopes to resolve by 2020.

In addition, the deployment of charging points for EVs is behind schedule. China's urban areas are densely populated and high rise.

Its main cities have a serious shortfall of parking spaces. In some cases, higher penetration of EVs will require substantial urban redevelopment.

## New dependencies

The New Energy Economy also creates new commodity dependencies, notably rare earth metals and the lithium, cobalt and graphene required for battery manufacture.

Winning the race to become leaders in battery manufacture is of critical importance, and China is in some respects better positioned than some of its competitors.

China dominates the production of rare earth elements and has the world's largest reserves. It is the fourth largest producer of lithium and an even bigger processor of lithium-bearing pegmatite. However, China will

become increasingly dependent on lithium imports as battery manufacture expands.

Cobalt is perhaps the biggest insecurity given the concentration of production in the Democratic Republic of Congo, but as with lithium, growing demand for these elements has prompted a large number of new supply projects.

Chinese companies can be expected to play a leading role in agreeing offtake agreements that secure finance for new lithium and cobalt production.

In addition, the New Energy Economy supply chain differs in two key respects from hydrocarbon supply chains.

First, the key components are high value but low volume, making them easy and cheap to store, in contrast to the millions of barrels of oil that make up even a 30-day strategic oil reserve.

Second, they are not critical to the generation of power or movement of people and goods because they are material components not fuels.

China is uniquely positioned to reap the green dividend, based on its manufacturing capabilities. Moreover, as it grapples with the pollution issues caused by hydrocarbon use at home, and the supply insecurities it creates abroad, it is also a country with more than most to gain.

As a result, China is likely to continue the mass deployment of capital in pursuit of ambitious government set targets, while at the same time it tries to eradicate the wasteful inefficiencies this often creates.



# Two birds, one stone: China's E10 mandate

Beijing has embarked on an ambitious program to blend 10% ethanol into the country's gasoline pool by 2020, with major implications for refiners.



**Claire Xiaocong Wang**

Senior Analyst, Asia Analytics  
S&P Global Platts Analytics

- **Short-term lack of capacity to meet E10 mandate**
- **Pricing policy favors regular gasoline consumption**
- **Refiners will have to dump other oxygenates**

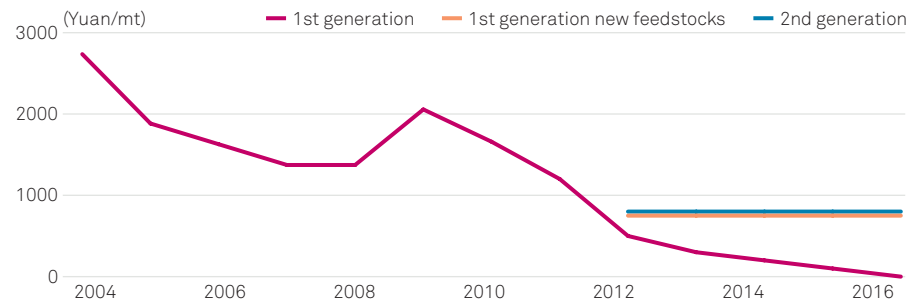
China is rolling out a national E10 mandate, which will see 10% ethanol blended into the gasoline pool, but the timeline for implementation – 2020 – is highly ambitious. China's gasoline demand amounted to nearly 130 million mt in 2017. This implies close to 13 million tons of ethanol a year, if the 2020 target is to be met, but China currently only has the capacity to produce about 2.6 million tons a year.

China does have feedstock. The country has built up an enormous stockpile of corn. This stockpile is estimated at about 230 million tons, 70% of which is unfit for human consumption. It takes 3.3 tons of corn to make 1 ton of fuel ethanol.

Beijing's solution is to “hit two birds with one stone”, increase ethanol production from corn, and mix more ethanol into gasoline to curb pollution.

The policy is expected to be rolled out first in the Beijing-Tianjin-Hebei-Shandong Bohai Sea rim area, as this region has easy access to ethanol supply and acute environmental problems.

## CHINESE SUBSIDIES FOR ETHANOL PRODUCTION



Source: COFCO public report, Government announcement



Initiating pilot schemes before national implementation is typical in China, but there is no guarantee that the program will be extended if the pilot scheme runs into problems.

## Uncertain roadmap

The E10 mandate certainly has high level political support. In September 2017, 15 Chinese ministries, including China's top economic planner, the National Development and Reform Commission (NDRC), jointly issued the "implementation plan on the expansion of biofuel ethanol production and promotion of the use of automotive ethanol gasoline."

Various provincial governments are working on implementation, but this does not mean that a well-planned local roadmap exists.

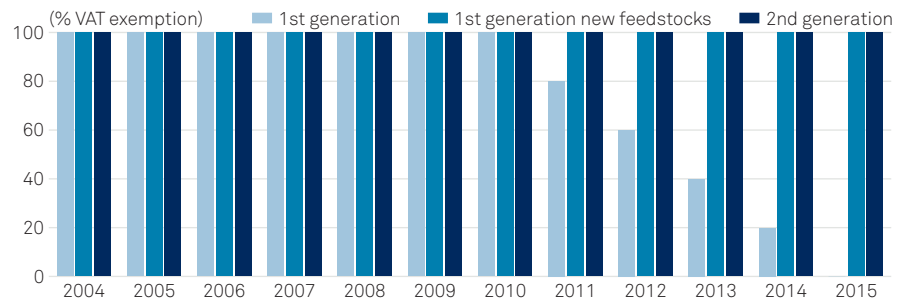
National industrial supporting policies are not yet well formulated and the National Energy Administration (NEA) has summoned think tanks to study solutions to China's ethanol supply deficit and financial subsidy issues.

The E10 mandate is not China's first foray into ethanol for fuel use. China is currently the world's fourth largest ethanol consuming market after the United States, Brazil and the EU. China's fuel ethanol market remains highly regulated.

Ethanol producers are licensed by government, E10 blending and distribution are regulated, and the end markets are designated pilot areas.

Feedstock is the most important cost component for ethanol production, accounting for 80% of the cost. The

## TAX INCENTIVES FOR ETHANOL PRODUCTION



Source: COFCO public report, Government announcement

sales price is regulated and is equivalent to 91.11% of the government regulated conventional gasoline ex-refinery price.

Subsidies for grain-based ethanol were phased out in 2016, but are still provided for non-grain ethanol producers.

Ethanol producers are thus exposed to the margin between corn and gasoline prices. In 2014-2015, ethanol producers suffered heavy losses as corn prices rose and international oil prices fell.

These losses were amplified by reductions in government subsidies.

This profit crunch forced ethanol consumers to look abroad. Chinese imports of denatured ethanol jumped to 350,000 mt in 2015, and advanced to 650,000 mt in 2016.

## Domestic stimulus

However, Beijing wants to encourage domestic production rather than imports. In January 2017, the government increased the import duty on denatured ethanol from 5% to 30%, indicating

its desire to stimulate domestic ethanol production.

Earlier, at the beginning of 2016, the government had ended its nine-year corn stockpiling system. This had been introduced to boost food security and support rural incomes.

However, it also pushed up corn prices and produced huge stocks of aging corn.

A nationwide roll-out of E10 could whittle down China's corn surplus within 5 years, after factoring in gasoline demand growth and assuming that domestic corn is the only feedstock for ethanol production.

In addition, the end of the stockpiling program has seen corn prices fall by at least Yuan 300/mt (\$47.60/mt), causing renewed concern over rural incomes. Directing the corn surplus into ethanol production would help support corn prices while the surplus stocks are drawn down.

## Building capacity

Beijing's ambitions face substantial challenges. In the short term, ethanol production capacity is insufficient to convert enough corn to ethanol.

Two birds, one stone: China's E10 mandate



In addition to the existing 2.6 million mt/year capacity, there is about 1 million mt of capacity under construction that could be commissioned around 2020. Another 2 million mt of capacity is planned.

In the medium to long term, ethanol production capacity should not prove a bottleneck so long as ethanol production remains profitable and demand, driven by the E10 mandate, remains healthy.

However, past pilot programs suggest that the actual market penetration of E10 could be much lower than expected by the government.

Retail sites provide both E10 gasoline and regular gasoline, with the consumer free to choose. Consumers favor regular gasoline because it has a higher energy content, but the price is based on volume and is the same as for E10 gasoline.

The government may address this issue. In recently announced local E10 plans, Shandong and Tianjin both mandated the complete replacement of regular gasoline with E10.

In practice, China's national oil companies, which control 80% of the gasoline retail market, are likely to have higher compliance rates than private retail stations, but some choice for consumers is likely to remain.

## Refinery impacts

The implications of a national E10 mandate are large for the refining sector:

- Ethanol squeezes out the addition of other oxygenates in the gasoline pool,

such as MTBE and FCC light naphtha etherification (LNE).

- Ethanol will improve gasoline composition in terms of olefin, aromatic and sulfur content requirements as a result of dilution.
- E10 use implies a 3.3% reduction in fuel efficiency compared with regular gasoline, which means an offsetting increase in total gasoline demand to achieve the same fuel economy.
- Ethanol-blended fuels only remain stable for a maximum of 90-100 days because of water absorption. This will impact E10 gasoline storage and distribution.
- Additional blending infrastructure will be needed to cope with the rise in ethanol volumes.

Chinese refineries are gearing up to accommodate the national fuel specification transition in 2019 from the China 5 standard to China 6.

The biggest challenge is reducing olefin and aromatics content, while maintaining the same level of octane.

Refiners have long blended MTBE (methyl tertiary-butyl ether) into the gasoline pool to boost octane.

MTBE has been banned in some countries, such as the US, owing to groundwater contamination from underground storage tanks. China's MTBE capacity stood at 19 million mt in 2017.

In addition, some refineries have adopted LNE as a means to reduce olefin content and boost octane. Current and under construction LNE

capacity is estimated at about 5.6 million mt; work on some of the new capacity has now been halted.

Both MTBE and LNE are oxygenates, but the new fuel specification for E10 gasoline mandates no oxygenates shall be added to gasoline components, except for the 10% denatured fuel ethanol.

In addition, ethanol does not contain aromatics, olefins or sulfur and has a high octane number. Adding 10% ethanol will dilute the gasoline pool and improve its composition.

As a result, the octane requirement for other components can be lowered by 1 to 2 points.

However, there are also downsides to adopting ethanol. It has only two thirds the energy content of gasoline.

Fuel economy may slide by about 3.3% when using E10 relative to regular gasoline, requiring a commensurate increase in overall gasoline demand to meet the same fuel economy.

In addition, ethanol blends have a shelf life of only 90-100 days, rather than regular gasoline's several years, which introduces new challenges for storage and distribution.

Pipeline distribution of anhydrous ethanol is not currently possible because it absorbs water from the environment.

As most Chinese ethanol production is located in northeast and eastern China, it will be difficult and expensive to transport it to China's western regions.

# Waste matters

When China sneezes, the world shakes. Beijing’s environmental policies can have profound and rapid impacts on markets worldwide.



**Paul Bartholomew**  
Senior Managing Editor, Metals  
S&P Global Platts

- Chinese virgin polymer demand rises
- Inefficient waste recycling units shut
- Domestic waste feedstock use to increase

In July last year, China notified the World Trade Organization that it would ban imports of “24 kinds of solid wastes, including plastics waste from living sources, vanadium slag, unsorted waste paper and waste textile materials.” The waste had been turned into plastic bottles and other building materials such as carpets and piping.

In essence, China was telling the world: “We’re cleaning up our act and we don’t want your garbage anymore!”

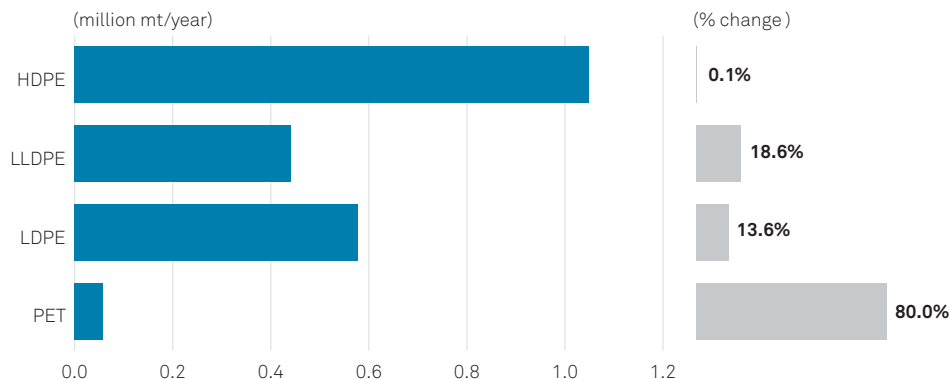
The ban took effect January 1, causing waste to pile up at foreign ports,

particularly in the United States and Europe, as countries that had relied on China as a recycling destination were forced to look for alternatives. China accounted for around 56% of global plastic waste imports in 2016, so it is clear why so many countries have been rattled by the new policy.

However, the loss of this feedstock is likely to boost Chinese demand for virgin polymer, and new polyethylene (PE) capacity is being brought on-stream in places like the US, Middle East and India, all of which are eyeing the Chinese market.

Scrap polyethylene accounted for 1.5 million to 2 million mt of imports in 2017, of which 50-70% was high-density PE (HDPE), and the remainder low-density and linear low-density PE, according to market estimates. Polyvinyl chloride

## CHINA 2018 POLYMER IMPORTS



Source: General Administration of Customs of the People’s Republic of China

and polyethylene terephthalate (PET) imports were around 1.2 million to 1.3 million mt, and polypropylene about 680,000-700,000 mt.

Following the ban, PET sales are tipped to increase by 5-6% in 2018. By mid-February, HDPE prices had risen by \$70/mt to \$1,350/mt CFR China, according to S&P Global Platts data.

### Reforming the recyclers

However, increased demand for virgin polymer could also incentivize new domestic production to come online. Moreover, the ban is designed to reshape China's own recycling industry.

China is weak on recycling its own wastes such as ferrous scrap and plastic. A lack of financial incentives to collect and sort waste, and a fragmented industry comprised mainly of small players, has constrained development. The ban left spare capacity in the recycling industry, allowing the government to close environmentally-substandard operations.

China had around 1,800 plastic waste recyclers, turning over some 11 million mt/year. Most were located in Shandong, Guangdong and Zhejiang provinces along China's east coast. An estimated third of capacity has been closed or idled. Others have had their volume allocations reduced.

But the intention eventually is for China to recycle more of its own waste more efficiently. This would align with Beijing's plan to

develop greener industries, and – as is so often the case with industries the government wants to support — such companies would be likely to enjoy favorable credit terms and other beneficial conditions.

China has taken steps to support its ferrous scrap recycling industry; waste scrap is likely to follow suit. As a result, the rise in polymer import prices is likely — eventually — to be tempered by improved recycling rates of domestic Chinese waste as the government continues to focus on the creation of more environmentally-sustainable industrial activity.

It is a prime example of how Chinese environmental policy impacts markets well beyond the country's own expansive borders.

# China's Belt and Road Initiative

The BRI is a hugely ambitious plan that will take decades to realize. If successful, it will fundamentally alter the geopolitical map of Eurasia.



**Paul Gruenwald**

*Managing Director, Chief Economist  
S&P Global Ratings*



Use your smartphone to scan code or visit [platts.com/china-ratings](http://platts.com/china-ratings) to watch Paul Gruenwald discussing the economic and political impact of China's policy approach

- **Risk/reward trade-off greater for China than other investors**
- **Energy and political security central to BRI concept**
- **Success depends on winning hearts, minds and private capital**

Conceived in 2013, China's Belt and Road Initiative (BRI) aims at nothing less than connecting — or under some interpretations, reconnecting — the Eurasian supercontinent.

This is to be done by land and sea “Silk Roads”, using infrastructure and industry, led at least initially by Chinese official financing.

Many of the specifics of the BRI remain fluid, but it will be a decades-long effort involving dozens of countries, with a cost running into trillions of dollars.

An undertaking of this magnitude has potentially large payoffs, as well as potentially large risks.

Success will ultimately rest on whether BRI projects can win local hearts and minds in the recipient countries, and whether China's initial “seed money” in the BRI will create

credit-worthy projects that attract private sector investment.

Seen in this way, the BRI is arguably the world's largest venture capital (VC) project.

## Concept fluidity

Chinese President Xi Jinping introduced the Silk Road Economic Belt concept in a speech in Kazakhstan in September 2013.

This initial strategic vision was developed further in the ensuing years, converging around regional connectivity and economic integration through the movement of goods, services and information.

This culminated with a report by the National Development and Reform Commission entitled “Vision and Actions on Jointly Building the Silk Road Economic Belt and 21st Century Maritime Silk Road.”

Given its somewhat fluid definition there is some debate as to whether the BRI is a new initiative as opposed to a platform on which to group a collection of existing initiatives.

Whatever the correct interpretation, the ambition and scale are massive.

## Geography and geopolitics

China is bordered by no fewer than 17 countries. Of particular interest to Beijing are the western borders, which abut Central Asian countries once part of the former Soviet Union.

These nations tend to be Islamic and less politically and economically stable than China. They are seen as potential sources of risk, particularly in Xinjiang province in China's northwest.

Engaging these countries economically and connecting them to western China through the BRI serves several purposes:

- It improves economic outcomes in these countries and lowers the risk of tensions spilling over national borders, in effect creating a buffer zone.
- It increases China's sphere of influence. This means achieving better political alignment with neighboring countries, in tandem or as a result of infrastructure and investment projects under the BRI.
- It potentially creates a network of countries that use the Chinese currency, Chinese engineering standards, and where China plays a dominant role amongst competing regional and global powers.

## Energy security

A second driver of the BRI calculus is energy security. China's image as a structural trade surplus economy does not apply to energy, where it runs

persistent trade deficits. Although China had an overall 2017 current account surplus of 2% of GDP, the energy trade balance showed a modest deficit.

Over time, the energy trade balance deteriorates or improves as global energy prices rise or fall, respectively. But the fact remains that China is an "energy short" country, since the energy trade deficit has averaged 3% of GDP over the past decade.

Moreover, China's continued projected fast growth means energy demand is expected to continue outstripping supply. The vulnerabilities of this recurring deficit factor prominently in the BRI.

In physical security terms, there is potential choke point at the Straits of Malacca, roughly where Singapore sits. Around 85% of China's oil imports pass through the Straits of Malacca, as well as about 50% of its gas imports.

Several of the early BRI projects directly address the vulnerability represented by the Strait of Malacca chokepoint:

- The China-Pakistan Economic Corridor is one of the more advanced, and reportedly the biggest, BRI project to date. The corridor involves extensive energy and transport infrastructure projects that will link western China to the port city of Gwadar on the Arabian Sea. Chinese firms are converting Gwadar into a multi-purpose, deepwater port.
- Recently built oil and gas pipelines from the Bay of Bengal traverse Myanmar and terminate in the western Chinese city of Kunming in

Yunnan province, where considerable refining capacity is reportedly being built. Kunming is also the terminus of an extensive rail network for Southeast Asia, parts of which are currently in various states of construction.

- In Central Asia, the BRI envisages upgrading and extending an earlier gas pipeline system built by the Soviet Union. The goal is to tap further Turkmenistan's sizeable gas reserves, as well as Kazakhstan's large oil reserves. The newest pipeline will pass through Khorgos, along the Kazakh border, where China is currently constructing the world's largest dry port.

In addition to supply diversification, another strategy would be to lessen China's reliance on imported fossil fuels. China is moving aggressively in the areas of improving energy efficiency and adopting renewables — in some cases spearheading the technology to do so — but demand for fossil fuels is still expected to rise strongly out to 2050.

## Venture Capital scheme

The BRI can be viewed as a VC fund with a twist.

Getting infrastructure financed and built has been a chronic problem for Asia Pacific. This is particularly true in Southeast and South Asia. The Asian Development Bank (ADB) now estimates that the infrastructure needs of Asia will exceed \$22.6 trillion through 2030, in order to maintain sufficient growth momentum. Over half of this will be for power generation and about one-third will be for transport.

## China's Belt and Road Initiative

More importantly, the ADB sees an infrastructure funding gap – the difference between investment needs and investment levels – of 5% of GDP in the group of countries excluding China. China's gap is 1.2% of GDP.

The funding gap is not an issue of supply and demand. There is no shortage of infrastructure demand in the region, and the potential supply of longer term investors, both regional and global, is also ample.

Pension funds, insurance funds and sovereign wealth funds all seek long-term assets to match their long-term liabilities.

Multilateral development banks including the ADB and World Bank have deep pockets and broad mandates to fund spending on public goods such as infrastructure.

The sticking point has been the risk-return trade-off.

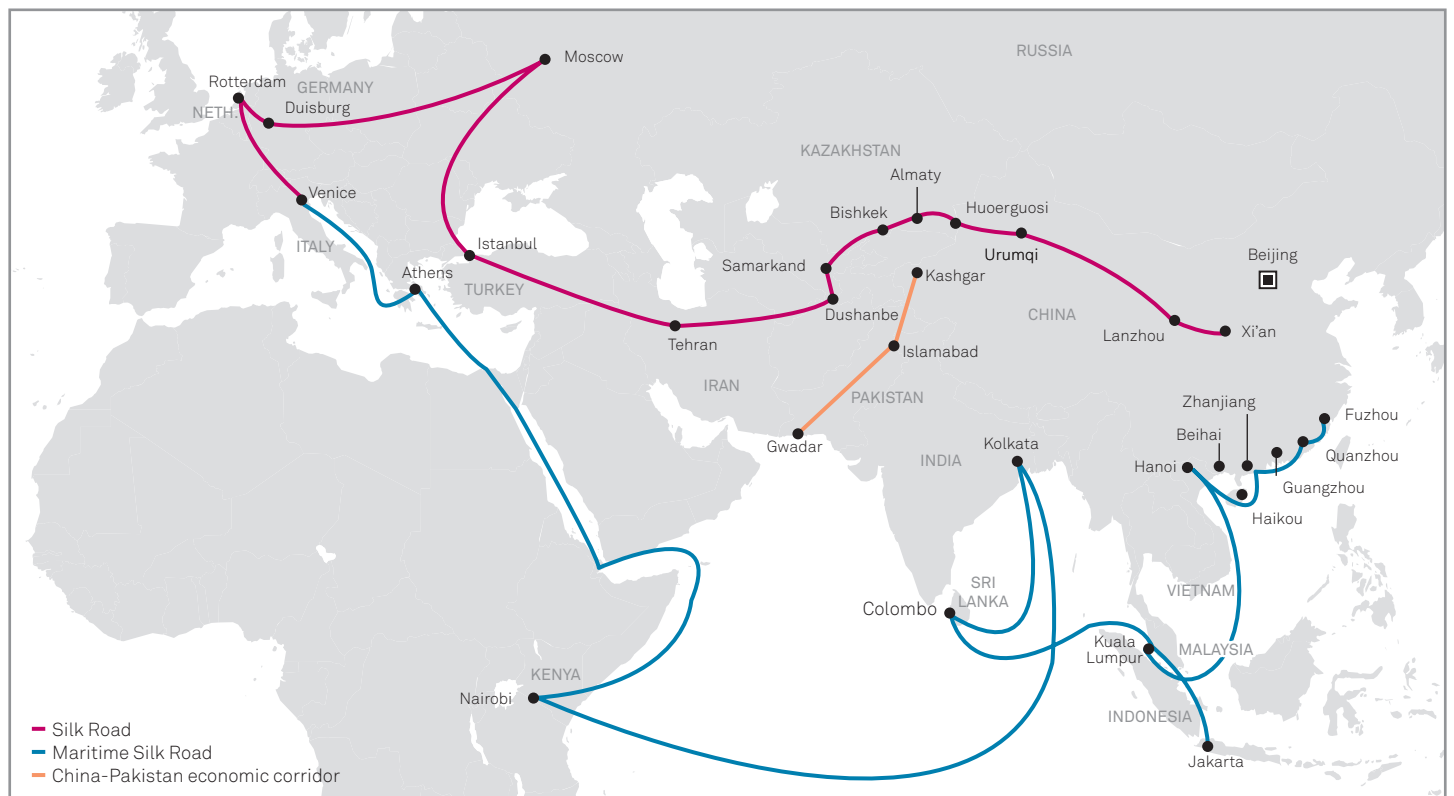
Construction risks, political risks (both policies and expropriation), exchange rate risks, commodity price risks and environmental risks have made creditors hesitant to commit longer-term funds.

As a result, infrastructure demand threatens to remain unmet, and investment and growth will correspondingly suffer.

However, there are a number of factors which suggest a better risk-return trade-off for China than for other creditors:

- **Trade benefits.** BRI projects will likely make the recipient countries more likely to trade with China (and use the renminbi), bringing economic benefits beyond the project itself. The size of markets for Chinese exports would also increase.
- **Energy security.** BRI projects will result in improved energy security for China as sources are diversified, bringing benefits beyond the narrowly defined output of the project. The energy build out will also help develop

## CHINA'S PROPOSED NEW SILK ROADS



Source of Silk Road information: Xinhua



and raise incomes in China's poorer, western provinces.

- **Network benefits.** China's sphere of influence across the region will increase as a result of BRI projects as both economic and non-economic ties increase. This will provide in-network benefits as well as a buffer zone against outside influences.

## Investment returns

The Chinese government develops infrastructure under a build-operate-transfer (BOT) model. Once an agreement (concession) is granted by the host government, the projects are built and financed mainly with Chinese materials and labor.

A Chinese firm then operates the facility, usually for a period of 20 to 30 years, splitting the proceeds with the local counterpart or government. Finally, at the end of the operating lease period, the project is transferred to the host government or entity.

The idea is that the costs of the project, including a target rate of return, can be amortized by payments during the lease period.

This is the intent, but it is not assured.

There are a number of risks being taken by the Chinese project companies, including political risk (including change, or change of view, of the government), technical or construction risk, market risk (inputs prices, interest and exchange rates) and income risk.

Ideally, the outcome is that the cost of the project is amortized and the Chinese project company is able to exit.

In a bad outcome, the project company may be holding an illiquid asset in a foreign country.

The Chinese government is investing seed money to fund infrastructure and industry projects in the target countries.

These target countries are the equivalent of early-stage or emerging firms in VC parlance. The objective is to reap returns from these investments, cash out and exit.

However, in a pure VC model the financier would simply cash out and move on to the next emerging firm. In the BRI model, the Chinese project company would also cash out, but there is a clear expectation of an ongoing relationship between the Chinese government and the recipient country.

## Success measures

Success can be measured in terms of soft power and financial sustainability.

Soft power boils down to winning the hearts and minds of the recipient countries. The objective here is to build a network of commercial and political alliances that will serve China's broader geopolitical aims — regional influence and security.

Measuring this part of the success equation will be difficult since much of it will be behavioral. Building ports, road, bridges and pipelines will be necessary but not sufficient.

Local populations will need at least to feel that they have some say in the Eurasian integration project and that their national identity is being both

respected and preserved. In short, via the BRI, they will need to buy into the notion of a Chinese-led, but not Chinese-dominated, Eurasian block.

Financial success can again be defined along the lines of a venture fund. As projects get up and running, Chinese firms will attempt to amortize their investment under the BOT model. Ultimately, the locals will take control.

The key here is whether the project (and its spinoffs) will have long-lasting value to the recipient country, or will just be seen as an extractive exercise.

The composition of funding in the latter stages of projects will be important as well. Private sector participation will signal that the BRI has created value in the initial stages, and that the risk-return trade-off has improved to the point of being able to attract private capital.

Success will also be determined by how the BRI accommodates or challenges the existing regional powers on the Eurasian supercontinent, as well as the current global superpower, the United States.

Managing these relationships will be a challenge, and this dimension of the BRI challenge should not be underestimated.

The cost of tensions in this area could overwhelm gains generated elsewhere.

Yet, if successful, the BRI will alter the geopolitical map of Eurasia, as well as China's economic and political relations with its neighbors near and far, for decades to come.

*Written in conjunction with S&P Global's China Senior Analyst Group.*

# China's commodity exchanges

China is seeking to gain a role in global commodity pricing commensurate with its demand for raw materials and boost use of the Yuan as an international currency of exchange.



**Paul Bartholomew**

*Senior Managing Editor, Metals  
S&P Global Platts*

- **China's ferrous futures markets influential but volatile**
- **New crude contract has chance of success**

Historically closed to the outside, China is gradually opening up its derivatives trade to foreign investors.

The government's aims are twofold: to improve the interconnectivity between Chinese and international commodity markets, and thus gain more influence over the price China pays for its commodities, and to promote the use of the Yuan in global trade as an alternative to the US dollar.

To this end, the Shanghai Futures Exchange (SHFE) launched in March a crude oil futures contract open to the international community. Iron ore futures, already well established domestically, are expected to be opened to foreign investors later this year.

However, shifting a meaningful volume of international trade onto Chinese trading platforms may prove challenging.

US dollars are the "lingua franca" of international commodity trade,

and international players may display significant inertia when it comes to using futures contracts prices in Yuan.

As with all new crude futures contracts, there are doubts over whether China's will attract sufficient liquidity to make it a useful trading tool. There are also fears of speculative trading behavior causing large and unpredictable price swings, as well as the potential for government intervention.

These factors could impede the uptake of Chinese derivatives by the international community.

## **Irrational exuberance**

China's steel and iron ore futures are widely considered to be a key indicator of Chinese steel market sentiment and have exerted growing influence on physical prices over the past two to three years. This is not surprising given China imports more than 1 billion mt of iron ore annually and produces half of the world's steel.

Rebar futures were launched on the SHFE in early 2009 and the rebar

futures contract is now the most actively traded metals futures contract in the world. With “lot” sizes of just 10 mt, it enabled small players to participate easily.

However, in many Chinese futures contracts, including rebar, all the liquidity is concentrated in one month, typically several months out to avoid the risk of physical delivery.

Owing to the lack of a liquid and well-defined forward curve, they are often seen as an indicator of market sentiment more than as a tool to hedge physical price risk for delivery in the month ahead.

In addition, while large financial players, trading houses and steel companies in China are major users of derivatives, hundreds of thousands of wealthy individuals also participate in rebar and iron ore futures.

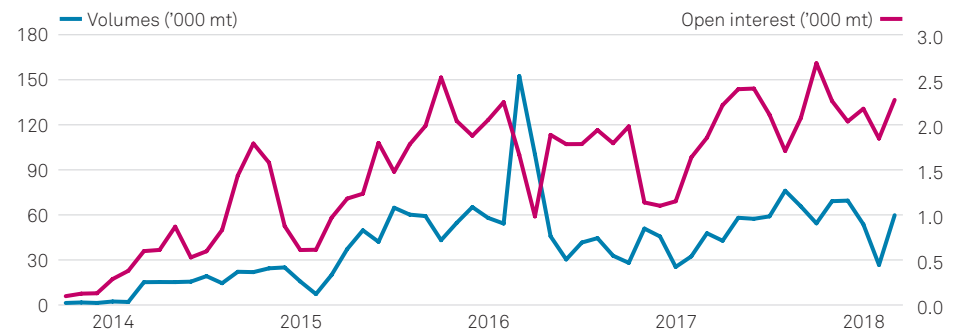
These participants are purely financial players; many entered the market after the abrupt falls in China's stock markets in 2015.

Many observers consider China's rebar and iron ore futures contracts a speculator's haven; a place for day-traders and punters with no physical exposure to gamble hot money, as suggested by the high ratio of volume to open interest.

The market can also be extremely reactive to Chinese government policy announcements, or global events such as fears of a trade war with the US.

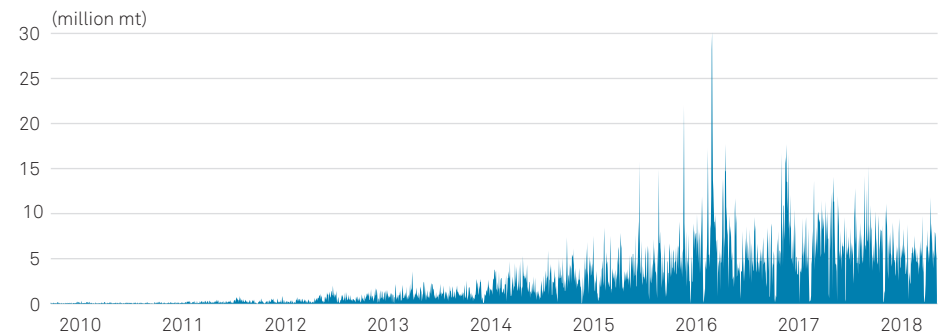
It means that sentiment can play a greater role in influencing prices than supply and demand fundamentals might suggest.

### DCE IRON ORE FUTURES: TRADED VOLUMES AND OPEN INTEREST



Source: DCE

### SGX HISTORICAL IRON ORE SWAPS VOLUMES



Source: SGX

This was seen in early March 2016, when global ferrous markets were stunned by Shanghai rebar futures rising 10% over a couple of days, while the S&P Global Platts 62% Fe iron ore benchmark experienced one of its biggest day-on-day jumps of around \$11/mt.

The excitement was attributed to comments made in Beijing at the National People's Congress – the annual meeting of China's Parliament – about steel production cuts, along with positive noises about the state of the economy.

A week later, few could remember what had provoked the price surges.

### Iron ore futures

Launched by the Dalian Commodity Exchange (DCE) in October 2013, iron ore futures were the next contract to capture the imagination.

Chinese iron ore futures have become the second-largest global metals contract after rebar. Platts estimates that domestic players now trade as much as 2.7 billion mt of iron ore derivatives a month.

Similar to rebar, the most active contract on the DCE trades months forward for fear of physical delivery, while international iron ore traders spend their days monitoring the DCE on

## China's commodity exchanges

their smartphones for cues to settle physical prices.

The DCE is opening up iron ore contracts to international investors, and while futures trading will be priced and settled in Chinese currency, it has added the lure of allowing participants to make deposits in US dollars.

The impact of financialization on the iron ore market has been profound, but critics lament the sharp intraday movements on DCE futures.

Unable to easily access DCE iron ore, international investors manage price risk by hedging, using derivatives hosted on international venues like the Singapore Exchange, where 95% of these volumes are cleared.

### Crude contracts

In many respects, ferrous derivatives are the new game in town, built on the vast steel and iron ore capacity expansions made over the past decade to support China's urbanization.

In contrast, crude oil is a mature market with two long-established financial benchmarks, ICE Brent and Nymex WTI.

In addition to these futures contracts there are also widely-used physical benchmarks like Platts Dated Brent and Platts Dubai, used to price physical cargoes and term contracts around the world.

Onto this stage steps China's new crude futures contract. The contract is hosted on the Shanghai International Energy Exchange, a trading venue owned by SHFE.

Unlike ICE Brent and Nymex WTI, which are light sweet contracts, China's new contract reflects mainly Middle Eastern medium sour grades, which account for 40%-50% of China's total crude imports.

The contract has been long in the making, and, like Shanghai rebar and DCE iron ore futures, it can be physically delivered.

There is currently no Asian crude futures contract with the liquidity of Nymex WTI or ICE Brent. With China now the largest importer of crude, the country hopes its contract will be more reflective of China's supply-demand balance than either.

The ambition is to provide an Asian counterpart of equal standing to ICE Brent and Nymex WTI futures.

However, at least in its early days, the expectation is that it could become an alternative contract rather than a dominant one.

Unlike DCE iron ore futures, the crude contract was designed from the outset to be open to international investors.

Beijing has announced a series of special policies on taxation, foreign currency exchange and bonded delivery to enable and encourage overseas participation.

Others have tried and failed to create a futures contract with enough liquidity to rival Brent and WTI, but with China's increasing influence in global markets, and as the world's largest importer of crude and second-largest economy, this contract perhaps stands a better chance than most of joining Brent and WTI as a financial benchmark.





# Finance and China's 'ecological civilization'

Stress testing the impact of environmental regulation reveals potential impacts on credit quality and identifies both industry segments at risk and those best placed to thrive.



**Derek Ip**

*Senior Analyst, Financial Institutions  
Trucost, part of S&P Dow Jones Indices*

China's interest in becoming an "ecological civilization" has continued to grow since the concept was first articulated by President Xi Jinping in 2013. In 2017, key industrial sectors, such as coal mining, utilities and mining, saw production cut as part of structural economic reforms designed to curb pollution and excessive industrial capacity.

The government's interest in the issue has continued to grow with recent plans to establish a financial system that supports the transition to a more environmentally sustainable economy. China was also instrumental in putting "green finance" on the agenda of the 2016 G20 summit. As a result, Chinese investors are becoming more aware of the risks and opportunities posed by environmental regulation.

Moreover, with over Yuan 18 trillion (\$2.85 trillion) of outstanding credit in 2016, commercial banks in China have played a particularly important role in supporting traditional industries. It is therefore critical for them to understand their exposure as a result of past financing of carbon-intensive activities affected by tighter environmental regulation, as well as developing the capability to assess these risks going forward.

This year the pressure to improve environmental performance has gained further impetus with the launch of two major measures — the environmental tax and carbon trading. Both aim to reduce carbon emissions; both are expected to impose extra costs on regulated sectors, and both should serve to drive investment in low-carbon technologies.

## Scenario analysis

To assess, price and manage the financial risks of new environmental regulation, financial institutions need to have a view on the extent and scope of future policy developments.

Scenario analysis, which is designed to help financial institutions stress test their portfolios against environmental and climate change-related risks, has become more popular internationally since it was endorsed by the Financial Stability Board's Task Force on Climate-related Financial Disclosures (TCFD) in 2017.

Several key investors and financial institutions are now piloting the TCFD framework to assess climate-related risks in a UK-China TCFD pilot program. Having a broader range of market

participants, including banks, institutional investors and insurance companies to stress test their portfolios would raise awareness of these risks and opportunities and provide additional momentum to China's ecological transition.

### Stress testing

In 2017, Trucost conducted two scenario analyses to assess how changes in environmental policies and natural resource scarcity could affect credit risk for Chinese financial institutions. One was a study focusing on the aluminum sector in China. Trucost collaborated with the Industrial and Commercial Bank of China (ICBC), one of the largest banks in China, to apply the findings of its analysis in the bank's internal rating model to understand the likely impacts on credit quality under different scenarios.

Trucost identified several key risk factors relevant to the aluminum sector in China, including environmental regulatory compliance, environmental taxation, emissions trading, water scarcity and abatement costs. There are

many variables that influence how these risks could affect aluminum manufacturers, such as the market price under the environmental tax and trading schemes, and the degree of water scarcity in different regions. This makes it difficult to properly assess and forecast impacts on credit quality.

By defining the likelihood of these developments, Trucost constructed three scenarios to assess financial impacts on a number of sample aluminum assets.

### Material risks

After applying the above scenarios to sample assets in China, the analysis shows that primary aluminum smelting and alumina production are most exposed to environmental risks under all scenarios.

In the high-stress scenario, environmental tax appears to be the most prominent cost, which could add up to nearly 20% of the average alumina price (Yuan 3,065/mt) and 13% of the aluminum ingot average price (Yuan 13,190/mt) in 2016.

### HOW ENVIRONMENTAL IMPACTS COULD AFFECT INVESTOR RISKS

- Environmental impacts**  
Direct operational impacts and indirect impacts from supply chain such as GHG emissions, water use, air pollutions, etc.
- Environmental risks**  
Physical risks (eg. water stress, flood and drought) and transitional risks (eg. regulation and reputation); the channels that internalize impacts into financial costs
- Business risks**  
Financial impacts from environmental risks affect businesses' revenue, expenditure, asset values and so on
- Investor risks**  
Investment risks from the business risks experienced by investors

Source: Trucost

The potential for significant additional costs from environmental regulations on Chinese smelters is similar to the experience of their EU peers. A study published by the Centre for European Policy Studies indicated that EU smelters bore an additional average cost of 8% of the aluminum market price owing to EU environmental regulations over 2002-2012. China's new emissions trading scheme is similar to the EU's, so their experience could be indicative for the impact of emissions trading on Chinese smelters.

### RELEVANT RISK FACTORS AND SCENARIOS TO THE CHINESE ALUMINUM SECTOR

Risk factor		2017 scenario (no regulatory changes)	Low stress scenario	High stress scenario
Environmental tax		No tax	Implemented at the lower end of the proposed rate; remains constant over time	Implemented at 10 times the proposed rate (the upper limit); remains constant over time
Abatement cost (as CAPEX)		As estimated in the Guidance on Energy Saving and Emission Reduction of Nonferrous Metals Industry by the Ministry of Industry and Information Technology		
Emissions Trading System (ETS)		Yuan 30/mt CO <sub>2</sub> e; increases gradually to Yuan 60 by 2030; 100% free permit allocation	Yuan 65/mt CO <sub>2</sub> e; increases gradually to Yuan 130 by 2030; 100% free permit allocation	Yuan 100/mt CO <sub>2</sub> e; increases gradually to Yuan 200 by 2030; 100% free permit allocation
Revenue at risk	Energy standards	At current level	4% efficiency increase for existing build by 2025	4% efficiency increase for existing build, 8% increase for new build by 2025
	Water scarcity and water cap policy	Low water stress scenario from the World Resources Institute (WRI) for that province	Medium water stress scenario from WRI for that province	High water stress scenario from WRI for that province

Source: Trucost

## Opportunities

The results also show that opportunities exist from these transition scenarios. Secondary aluminum smelting, which relies on recycling post-consumed aluminum scrap as input material, has a minimal internalized cost in all scenarios of regulatory change given its much less energy-intensive production process and, thus, is exposed to less risk.

In fact, many jurisdictions see secondary smelting as an important way to meet rising aluminum demand, while

minimizing growth in the sector's greenhouse gas emissions. Aluminum smelters around the world have also started to view aluminum scrap as a strategic raw material to help minimize their environmental footprint and reduce operational costs.

While primary aluminum is most exposed to financial risk resulting from potential changes in regulations, the results also show that the most energy efficient assets may benefit from market-based environmental regulations. Trucost's research identified several assets in China that are operating with a much lower

greenhouse gas intensity than the cap likely to be allocated under an emissions trading scheme.

This is the result of active abatement by large Chinese smelters in recent years, which saw China's average energy intensity per unit of aluminum output become the lowest globally. Through selling surplus permits, some smelters may be well ahead of their peers in reducing exposure to hidden costs resulting from possible changes in regulation.

## Aluminum sector

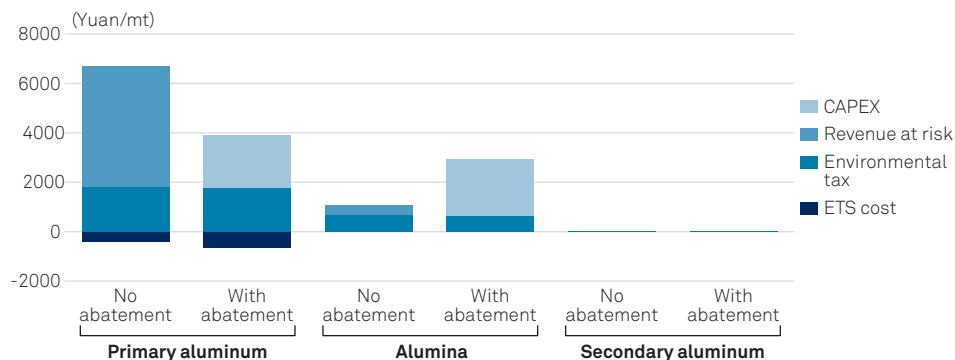
These risks and opportunities highlight the importance of financial institutions assessing their corporate customers' resource efficiency performance at the very beginning of the credit approval process.

Following this research, ICBC has stress-tested their credit to the aluminum sector against one of the most important risk factors identified in the study – the implementation of a nationwide environmental tax in 2018.

The wide range of taxable items covered in this policy makes it difficult for financial institutions to quantify their exposure.

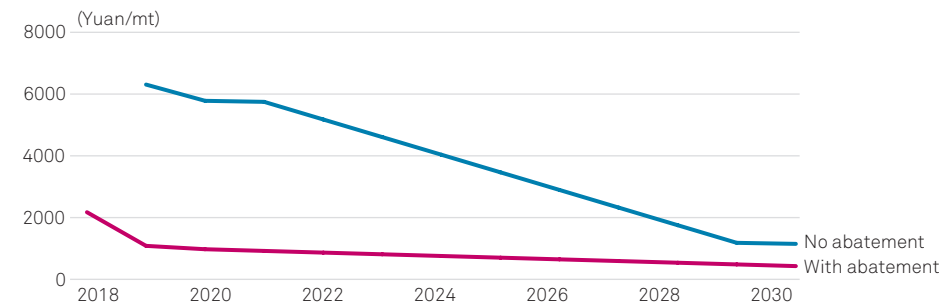
The combination of Trucost data and the ICBC credit risk-rating model has allowed ICBC to understand more materially the impact of emissions trading and the environmental tax on aluminum companies in China in terms of probability of default and changes in internal credit rating. This will inform ICBC's approach to risk management and capital allocation in the future.

### ESTIMATION OF INTERNALIZED COST IN HIGH STRESS SCENARIO FOR SELECTED ALUMINUM ASSETS



Source: Trucost

### COMPARING THE ESTIMATIONS OF INTERNALIZED COST FOR A SELECTED PRIMARY ALUMINUM SMELTING PLANT IN CHINA



Source: Trucost



The low-stress scenario assumed that the environmental tax would be implemented at the lower end of the proposed rate and remain constant across provinces over time.

Trucost's analysis of the sector in general suggested the following:

- The lower end of the legislated range of rates, which is likely to be implemented in the early years of the policy, could have minor impacts on the quality of loans made by ICBC in the aluminum industry. Only a small number of corporate credit ratings were downgraded. This low materiality is mainly due to the stringent requirements ICBC has on resource efficiency and sewage treatment in the credit approval process.
- The highly rated companies in ICBC's portfolio are more resilient to the additional costs imposed by the environmental tax. Any change in the probability of default among these companies is minimal, as they are often leading enterprises with strong operating performances, strong resources and significant market share. These fundamentals are key to their resilience to environmental tax and other risks.

China's continued drive towards ecological civilization means that financial institutions active in the country will benefit from greater clarity in assessing environmental risks, particularly regarding investments in high-impact industrial sectors such as aluminum.

While there are significant risks hidden in the supply chains, opportunities are equally open to financial institutions and corporate borrowers able to capture key energy and resource efficiency opportunities in their operations.



# Add Insight

In a world that's increasingly complex, competitive and fast moving, businesses need to stay a step ahead to succeed. As China enters a new era in its development, the country's policy direction has never been more important for the commodities industry to understand.

This report brings clarity and transparency to the market with detailed examination of the landmark Belt and Road Initiative and includes sections on key raw materials, global trade, the New Energy Economy, plastic waste and commodity exchanges.

We know that although data is key to decision making, information alone isn't informative. Our in-depth analysis of the challenges facing China's policy makers will provide the insight needed to make business decisions with conviction.

S&P Global Platts provides unparalleled knowledge and experience which has already helped customers in 190 countries interpret fluctuations, uncover new commercial opportunities and gain a competitive edge.

This report helps readers understand how China's rapidly developing position will affect the global commodities market and how S&P Global Platts can help you achieve your growth ambitions.

Find out more at [platts.com/insights](https://platts.com/insights).

---

**S&P Global**  
Platts



For more information, please contact the Platts office nearest you:

#### **NORTH AMERICA**

##### **New York**

2 Penn Plaza, 25th Floor  
New York, NY 10121-2298, USA  
P: +1-800-PLATTS8 (toll-free)  
P: +1-212-904-3070 (direct)

##### **Boston**

225 Franklin Street, 14th Floor  
Boston, MA 02110, USA  
P: +1-800-752-8878  
P: +1-617-530-8300

##### **Denver**

1800 Larimer Street, Suite 2000  
Denver, CO 80202, USA  
P: +1-720-264-6600

##### **Hightstown**

148 Princeton-Hightstown Road  
Hightstown, NJ 80021, USA  
P: +1-800-PLATTS8 (toll-free)

##### **Houston**

Heritage Plaza  
1111 Bagby Street, Suite 2200  
Houston, TX 77002, USA  
P: +1-800-PLATTS8 (toll-free)

##### **Pittsburgh**

424 South 27th Street, Suite 306  
Pittsburgh, PA 15203, USA  
P: +1-412-431-4370

##### **Washington, D.C.**

1200 G Street NW, Suite 1000  
Washington, DC 20005, USA  
P: +1-212-904-3070

#### **LATIN AMERICA**

##### **Buenos Aires**

Tte. Gral. Juan D. Perón 346,  
6th Floor  
(C1038AAH) Buenos Aires, Argentina  
P: +54-11-4121-4810

##### **São Paulo**

Av Brigadeiro Faria Lima  
201 21st Floor  
São Paulo – SP Brasil – 05626-100  
– Brazil  
P: +55-11-3818-4100

#### **EUROPE, MIDDLE EAST AND AFRICA**

##### **London**

20 Canada Square  
9th Floor, Canary Wharf  
London E14 5LH, UK  
P: +44-20-7176-6111

##### **Dubai**

DIFC, The Gate Precinct  
Building 1, Level 05  
P.O. Box 506650  
Dubai, UAE  
P: +971-4-372-7100

##### **Moscow**

Business Center  
Mokhovaya  
4/7 Vozdvizhenka Street  
Building 2, 7th Floor, 125009  
Moscow, Russia  
P: +7-495-783-4141

##### **Stavanger**

Øvre Holmegate 1  
4006 Stavanger  
Norway  
P: +47-51-89-06-66

#### **ASIA-PACIFIC**

##### **Singapore**

12 Marina Boulevard  
#23-01 Marina Bay  
Financial Centre Tower 3  
Singapore 018982  
P: +65-6532-2800

##### **Beijing**

Suite 1601, 16/F Tower D  
Beijing CITC  
A6 Jianguo Menwai Avenue  
Chaoyang District  
Beijing 100022, China  
P: +86-10-6569-2929

##### **Hong Kong**

Unit 6901, Level 69  
International Commerce Centre  
1 Austin Road West  
Kowloon, Hong Kong  
P: +852-2841-1035

##### **Shanghai**

33/F Shanghai Plaza  
138 Huaihai Road (M)  
Shanghai 200021, China  
P: +86-21-5110-5488

##### **Tokyo**

Marunouchi Kitaguchi  
Building, 28th Floor  
1-6-5 Marunouchi  
Tokyo 100-0005, Japan  
P: +81-3-4550-8300

##### **Melbourne**

Level 45, 120 Collins Street  
Melbourne  
VIC 3000, Australia  
P: +61-3-9631-2000