

17 January 2019

Copper outlook

China stimulus boosting demand

China has received a large amount of pessimistic sentiment due to the perceived weakness in the economy from a slowdown in Industrial Production and slowing GDP growth. We believe that China has gone through a planned and necessary set of reforms in 2017 and 2018 and will emerge out of this self-imposed reform chrysalis into a period of infrastructure growth focused on two key dates: 2021 and 2022; the 100th year anniversary of the founding of the Communist Party of China in 2021 and President Xi's 10th year in office in 2022.

- ◆ **Economy:** The Chinese government understands that debt concerns would stand in the way of positive long-term development so enacted reforms in 2017 and 2018, which make it harder for companies and individuals to borrow unnecessarily on perceived investment trends. This has resulted in c.\$59bn of debt being wiped off in 2018 due to P2P platform closures.
- ◆ **GDP growth:** Whilst GDP growth for 2018 was lower than expectations, a figure of c.6.6% is still outstanding and demonstrates China's continued development. China's target for 2019 is 6% to 6.5%, demonstrating positive growth. China has earmarked \$202bn of local government level debt funding for new infrastructure projects and \$125bn for railway projects in 2019.
- ◆ **The US-China Trade War** has delayed some projects, adding to the poor PMI data for December 2018 (49.4). Important to note is that the Chinese government's official PMI figure has not dropped below 49 for the last 10 years, and this is unlikely to change. We expect improved PMI figures for January, and failing that March, depending on the speed of stimulus.
- ◆ **Infrastructure spending:** 2018 saw a China copper growth figure of c.5%-6% – well above most analysts' expectations – although this figure did not materially impact the global copper price for the second half of 2018 due to the Trade War.
- ◆ **Copper price not driven by fundamentals:** Traders are finding copper 'untradeable' currently due to the red metal not being driven by fundamentals since mid-2018. Once any positive outcomes from trade talks between the US and China are firmed up then we think this, combined with improved China PMI data, will start a copper run. Supply dynamics for 2019 look stretched, especially with El Niño potential.
- ◆ **Our top four copper picks for 2019 are: Asiamet, SolGold, MOD Resources and Central Asia Metals.**

Metals & Mining

Companies featured in this report

Company	Mkt Cap	Rec
Asiamet	£46.9m	Buy
Central Asia Metals	£411.8m	Buy
MOD Resources	£36.0m	Buy
SolGold	£678.5m	Buy
Aurubis	€2.1bn	N/C
Boliden	Kr57.7bn	N/C
Umicore	€8.9bn	N/C
5N Plus	C\$253.4m	N/C

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Copper 2019 investment thesis

Copper is entering an interesting phase. We see copper as a standout medium to long-term investment driven by:

- ◆ **Rising demand from infrastructure growth in China (PPP projects implementation accelerating), new technologies and the 'green revolution';**
- ◆ **Changing market dynamics, largely from China developing its commodity usage methodology and global economic jockeying;**
- ◆ **Stretched supply from successive underinvestment at the mine level and higher disruptions forecast in 2019 due to extreme weather from El Nino**

We believe that China is about to go into a major growth and regenerative phase that will be copper dependant, which, combined with predicted supply shortfalls, should support rising copper prices above \$3/lb (c.\$6614/t) in the long term.

So what? How to position

From a UK-listed copper-exposed equities point of view, we like:

Explorers

To gain maximum exposure from a SX/EW development/exploration stage asset, our top choice is:

- ◆ **Asiamet: target price of 23p, implied return of 395%.**

To take advantage of premiums placed upon (low-cost), high grade, low impurity concentrate and greater potential returns from greenfield development, our top pick is:

- ◆ **MOD Resources: target price of 52p, implied return of 259%.**

To take advantage of maximum returns from an early stage greenfield exploration story invest in:

- ◆ **SolGold: target price of 41p, implied return of 11%. Note that SolGold's potential return is c.130%-430% when upside is taken into account.**

Producers

To gain maximum exposure from a SX/EW producer, our top choice is:

- ◆ **Central Asia Metals: target price of 325p, implied return of 37%.**

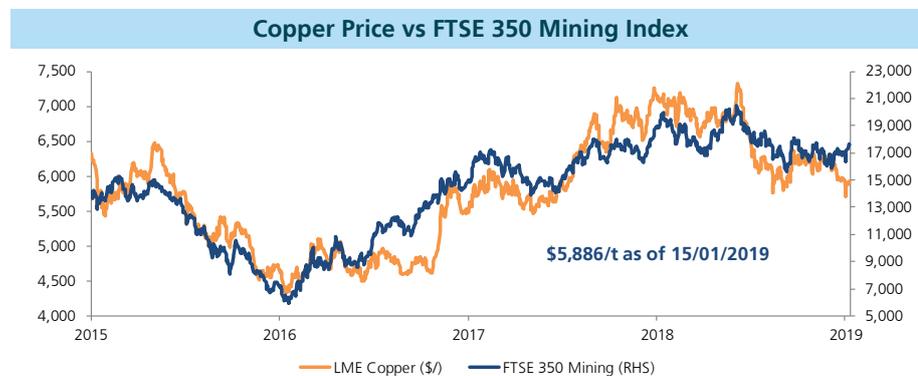
We think that recyclers/smelters are currently cheap and we see value in smelters/recyclers that are capable of processing complex concentrates/scrap, especially: **Umicore, Aurubis, Boliden, and 5N Plus.**

Why copper and why now?

Copper has had a mixed 2018, with high prices in H1 followed by lows in H2 caused by recent geopolitics, and a sell-off, leading the price to fall 18% between June and September 2018. 2019 will be a very interesting year for the red metal: supply/demand dynamics, China's copper demand and the increased risk from natural disasters in South America due to El Niño affecting production all adding to the copper story.

2018 was prophesised as a year of deficit mainly due to the 30+ wage negotiations planned for Chile and Peru, where roughly c.40% of world-mined copper originates. **These wage negotiations have gone smoothly and this, combined with Trade War fears led to a sell-off and the market losing faith in copper, despite a consensus forecast deficit for 2018E.**

Traders are finding copper 'untradeable' currently due to the red metal not being driven by fundamentals since mid-2018. Once any positive outcomes from trade talks between the US and China are firmed up then we think this, combined with improved China PMI data, will start a copper run.



Source: Bloomberg.

China accelerating infrastructure development

There are many signs highlighting our bullish view. We believe China is accelerating into a phase of infrastructure development, which was planned to kick-off in H2 2018; however, the Trade War led to a slowdown and project delays. China has gone through a recent period of shadow banking (see the China section for full details) and local government debt reform, largely around the highly publicised Public-Private-Partnership projects, which currently stand at a value of **US\$2.5tn**. The projects have not had momentum until recent reforms have given central government greater control at local government levels to enable quicker implementation of suitably 'vetted' schemes that the Chinese government deem will help to grow their long-term plans: targeting around moving between 150 million and 200 million of the rural population to lower-tiered cities by 2025, and with a wider focus on two key dates ahead: **2021, the 100th anniversary of the Communist Party, and 2022, President Xi's 10th year in office.**

China changing the market dynamics

Market dynamics are constantly changing due to Chinese environmental reforms and trade wars. China has announced plans to ban all scrap imports by 2020, which has the potential to change world copper scrap supply/demand dynamics and provide opportunities for processors/fabricators outside of China, as China uses c.3.5Mt of scrap each year.

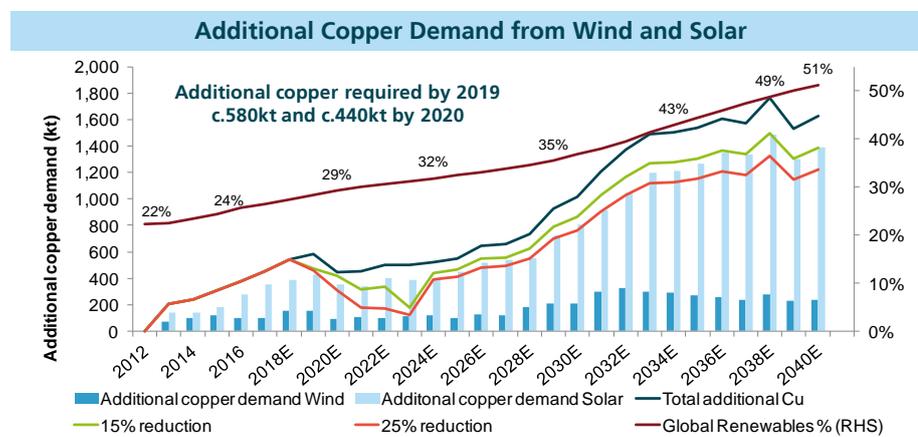
Looking at China, pre-empting the banning of Category 7 scrap (c.60%-70% of scrap imports by tonnage, not copper content as they grade c.14% on average) has led to a higher demand of direct melt material blister/anode (imports are up c.13% 2017 versus 2016) and copper cathode to replace the direct melt scrap that will be banned from import. Roskill estimates that September's net imports of cathodes and alloys were over 370kt, up 39% year-on-year. Concentrate demand has increased too (c.2% 2017 versus 2016). 2018 saw increased demand for concentrates, blister and anode to feed smelter demand due to reduced scrap levels; a record monthly high of 1.93Mt of concentrate was recorded in September 2018.

The Category 7 ban came into effect in December 2018, and a Category 6 ban will be in full force by June 2019. This will have large ramifications, as Category 7 scrap has a low copper content (less than c.20%), whilst Category 6 scrap has a higher copper content of c.75%. Removal of this higher content copper may lead to an increased demand for copper cathode, and potentially lead to a premium on copper cathode.

China appears to be moving into a model whereby it imports more smelter products and less refined copper. Additional smelter capacity is being added in China between 2018 and 2021, scrap bans are limiting imports of scrap and other waste products and refinery capacity is being added – c.90% from electrolytic refineries. **China seems to be encouraging internal production of refined metal and increasing internal recycling levels.** On both the supply and demand side, we have near, mid and long-term drivers.

Demand from the 'green revolution' and electric vehicles (EVs)

We forecast additional copper demand to be created by renewable energy (especially solar) in the near to mid term, and from electric vehicles in the long term.



Source: Arden Research and Bloomberg New Energy Finance.

Stretched supply at the mine level

Supply dynamics look to be one of the main drivers for copper prices over the next few years, with underinvestment from a sustained downturn creating an environment with not enough projects coming on stream to meet predicted demand and extreme weather events in the near term may impact production over 2019.

Project delays are expected due to the more complex nature of new operations, which are largely moving underground. On top of these factors, social issues due to community mismanagement and/or environmental issues can cause operations to be shut down or workers/communities to strike/force shutdowns. South American operations are especially prone to striking and this can influence supply, and increase the yearly disruption allowance, around 5% on average. Grasberg is planning only

200kt of production (1.2Mt was planned for 2019). Supply disruptions were unusually low in 2018, and we forecast a disruption of between 6% and 8% for 2019.

Production disruptions: El Niño, 2019 has a current probability of El Niño at 60%-65%. El Niño, a warming of ocean surface temperatures in the eastern and central Pacific that typically occurs every few years; last occurred between 2015 and 2016. Depending on the severity of the phenomenon, countries in the northern part of South America are likely to experience lower rainfall as a result and also warm and very wet weather months in April–October, causing major flooding, mainly across the West coast.

Droughts could impact countries such as Brazil, Colombia, and Ecuador that heavily rely upon hydroelectric plants to generate power. Chile and Peru are likely to be affected with potential for more extreme weather events leading to flooding and landslides. The potential of El Niño in 2019 poses downside risks to mining production and each respective country's mining industry value, Fitch reports. **This, in turn, provides upside risks for commodity prices in the short term and for the year.**

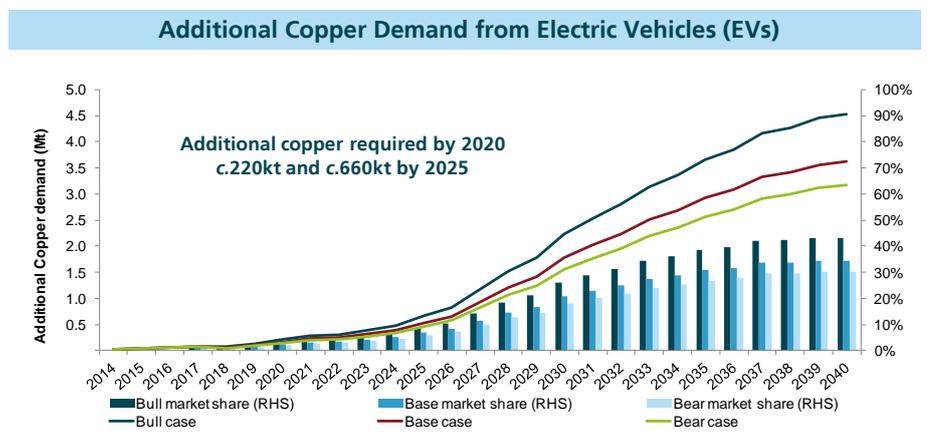
The last El Niño in 2015/2016 saw extreme weather causing project shutdowns and operational disruptions. **In 2015 a supply disruption of 1.33Mt, c.7% of mined production for the year, was recorded.**

Treatment Costs /Refining Costs (TCs/RCs) charged by smelters/refiners are governed by concentrate availability and quality of concentrate. These key charges are bellwethers to the state of concentrate supply in the market. Recycling is becoming increasingly important, especially as China is learning how to manage its commodity usage more efficiently. The importance of scrap should not be overlooked as the impact of copper scrap disruptions can alter the price/supply of copper such as in late 2016 when copper price gains were dampened by a flooding of scrap into the market.

The copper market looks to be in deficit for 2018 and 2019. Despite this, prices have not changed much since September 2018. Traders are finding copper 'untradeable' currently due to the red metal not being driven by fundamentals since mid-2018. Once any positive outcomes from trade talks between the US and China are firmed up then we think this, combined with improved China PMI data, will start a copper run. Supply dynamics for 2019 look stretched.

Our view is that copper prices will rise in 2019, and maintain these levels and then rise again into 2021. There are a few small caveats to that, but in times of copper price rises, most firms linked to the red metal show significant share price gains.

However, some are more equal than others. The companies we believe will offer superior returns compared with the rest are: Asiamet, SolGold, MOD Resources and Central Asia Metals, covered in the next section.



Source: Arden Research and Bloomberg New Energy Finance.

So what? How to position

To gain maximum exposure from SX/EW and/or invest in a development/exploration stage asset, our top choices are:

- ◆ **Asiamet: target price of 23p, implied return of 395%;**
- ◆ **Central Asia Metals: target price of 325p, implied return of 37%.**

To take advantage of premiums placed upon (low-cost), high grade, low impurity concentrate and greater potential returns from greenfield development, our top pick is:

- ◆ **MOD Resources: target price of 52p, implied return of 259%.**

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Catalysts:

- ◆ **Asiamet: feasibility study due in Q2 2019;**
- ◆ **Central Asia Metals: full-year results due in April 2019;**
- ◆ **MOD: feasibility study in Q1 2019;**
- ◆ **SolGold: preliminary economic assessment due Q1 2019.**

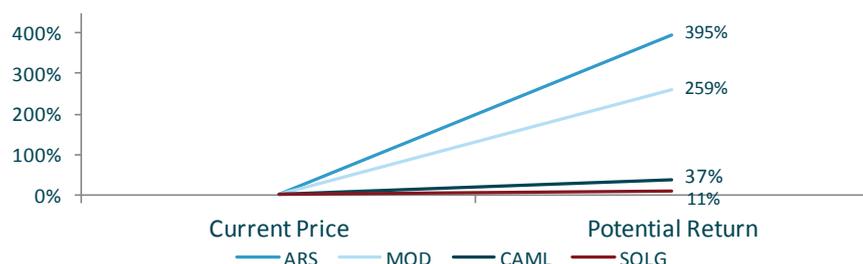
To take advantage of by-product upside and the ability to charge high TCs (due to the complex concentrate/scrap processing ability), **we see value in smelters/recyclers which are capable of processing complex concentrates/scrap** (Important to note is that if smelter capacity outstrips concentrate supply and refinery capacity then TCs will trend lower and RCs higher):

- ◆ Umicore (not covered);
- ◆ Aurubis (not covered);
- ◆ Boliden (not covered);
- ◆ 5N Plus (not covered).

All move with the rising tide

Most copper companies will see an uplift with rising copper prices. In this piece, we recommend the stocks that you should aim for and the ones that are not going to take.

Selected Companies' Current Prices and our Target Prices/Returns



Source: Arden Research. Share price data correct as of 16 January 2019.

Copper view for 2019

Smelter and refinery availability is key for 2019 as that will govern refined output, not concentrate availability, which is currently not in short supply but may be if Grasberg maintains its proposed 200kt output rather than 1.2Mt originally planned. Supply disruption potential is heightened for 2019 due to El Niño (current potential at 60%-65%), which could cause extreme weather in South America with flooding and landslides affecting production from Chile and Peru, like in 2015. But important to note is that if smelter capacity outstrips refinery capacity then TCs will trend lower not higher. **Smelters/recyclers that can deal with complex concentrates/scrap are important, as they will be able to demand a premium for their TCs and benefit from by-product metal credits.** Copper concentrate producers with low impurity high-grade concentrates will attract a premium and may be able to negotiate significantly lower TCs/RCs compared with others.

SX/EW capability may add a premium to miners (with low impurity ore) as China needs more metal for direct melt in smelters due to reduced direct scrap input. Also, SX/EW producers may be able to benefit from important by-product credits coming from elements like gold, silver and tellurium in the anode sludge/crud. Tellurium is playing an increasingly important role due to the growth of renewable energy.

Excess smelter capacity is likely to cause reduced TCs and inefficient operations to close down, cleaning up old polluting smelters, in line with China's environmental aspirations, which may lead to lower growth in smelter capacity than planned.

Refineries may be able to continue charging higher RCs until further capacity is added. Refined copper output is forecast to grow in China alongside a decline in South American refined output.

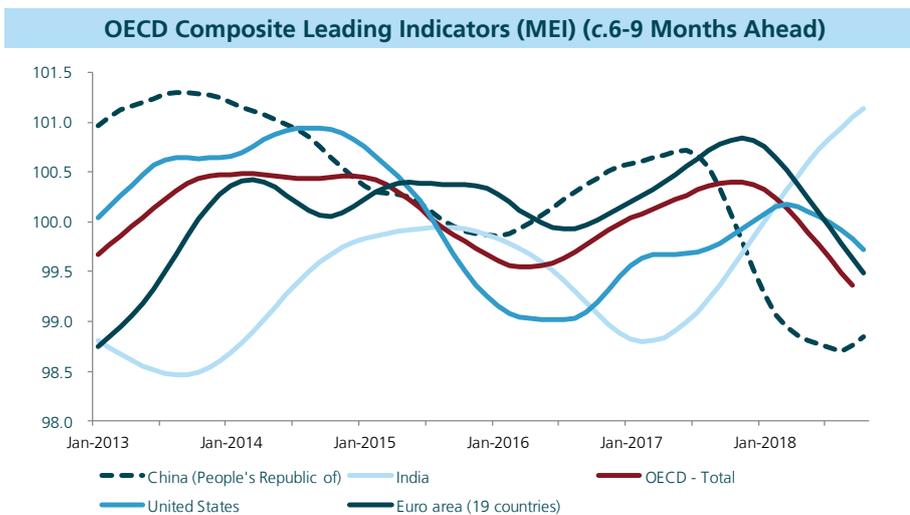
Refined copper balance over 2019 will be more sensitive to changes in SX-EW and blister/anode supply volumes, mine concentrate supply disruptions and internal scrap supply in China due to imposed import restrictions on US scrap and higher copper content scrap than 2018.

More scrap may be processed and refined outside of China due to the potential 100% scrap bans by 2020, which will lead to a requirement for capacity to process scrap outside of China. In the near term the 25% duty applied to scrap imported from the US has caused market disruption and increased demand for refined material to use instead of scrap for direct melt application in secondary smelters. In the absence of US material, the General Administration of Customs of China (GACC) records reportedly indicate Chinese buyers are turning more often to suppliers in Japan and Hong Kong.

China

China is, by a margin, the largest consumer of copper in the world. Copper is widely used in machinery and products that are essential to develop infrastructure and economic growth. A country with high levels of economic growth will have a high demand of copper. Consumption growth is directly geared to GDP, implying that the slowdown of the Chinese economy will have a negative impact on copper demand and the copper price. **The demand growth we forecast stems from a structural change resulting from two key dates in the Chinese political calendar, and is independent of GDP growth in China.**

While China is a risk, we believe low per capita consumption rates in other emerging markets (EMs) will substantially buffer any slowdown in China.



Source: OECD, January 2019.

OECD Composite Leading Indicators shifted to the right due to Trade War

The OECD Composite Leading Indicators provide early signs of growth or a slowdown in economic activity (six to nine months ahead is the targeted time period) and is taken from a wide variety of data to indicate changes in the world’s economies. The chart above shows positive predicted movement for India in 2019 and the beginning of an uptick for China in Q1/Q2 2019.

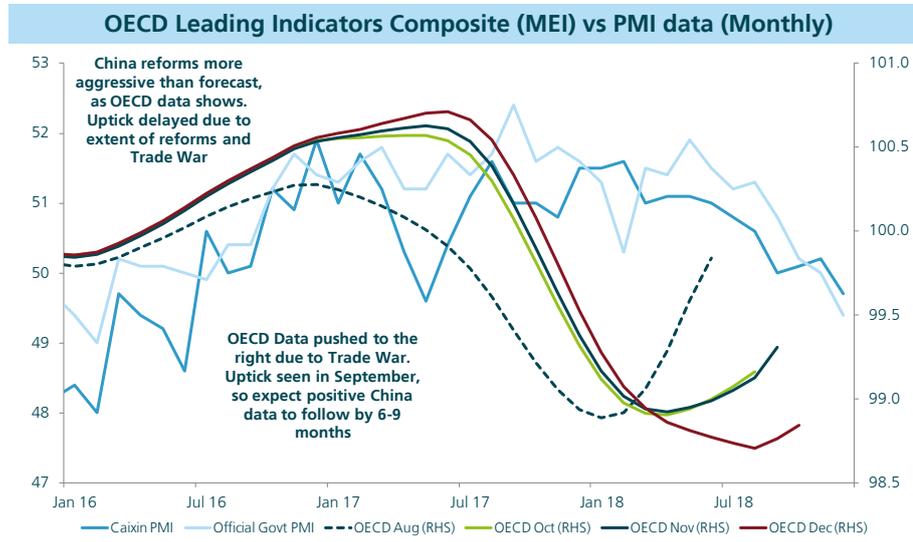
Demand driver from PPPs reaccelerate post reforms

Our view is that China will focus on its current infrastructure programme, largely to help with the relocation of c.150 million and 200 million people from the rural economy to the urban environment by 2025.

The December meeting of the Central Economic Work Conference (CEWC) in Beijing, a meeting of top Chinese officials chaired by President Xi Jinping, agreed that China must eventually rely on its home market alone for future prosperity. As part of this process, the conference reiterated an older goal that China must “urbanise” 100 million citizens by 2020 (source: SCMP, Dec. 2018). Infrastructure projects have been delayed due to extreme cold weather in some provinces and the Trade War, but are now set to accelerate to help stimulate the economy. Regardless, China is focusing on two key milestones in 2021 and 2022, which will ensure that the current infrastructure build-out goes smoothly. **These two milestones lie ahead: the 100th year anniversary of the founding of the Communist Party of China in 2021 and President Xi’s 10th year in office in 2022.**

Bottom-up support from realignment of local governments

Local level governments in China have been restructured to enable the completion of infrastructure projects and to cut down on local government debt through cutting out investment in substandard Public-Private-Partnership (PPP) projects. There is a new focus now on superior PPP projects and state grid build-out for increased electrification, **both of which are highly copper intensive.**



Source: AASStocks, and Caixin PMI last data December 2018. OECD last data October 2018.

New stimulus package to counter negative Trade War impacts

China to speed up US\$202bn of local government bond issues. The State Council approved a 2019 quota for new local government bond issuances of RMB1.39tn (c.US\$202bn), enabling local authorities to start issuing debt from January, 2019 ahead of the usual schedule, the state-owned Xinhua News Agency reported at the end of December 2018.

Finance Minister Liu Kun said that some of the advanced bond issuance funds will be used to fund key projects, local media reported. Local governments will issue RMB810bn (c.US\$118bn) of special bonds and RMB580bn of general bonds at the start of 2019. The full quote for 2018 was RMB1.35tn for special bonds and RMB830bn for general bonds, meaning there may be the capacity to inject further capital throughout 2019 if required (source: South China Morning Post, 31 Dec. 2019).

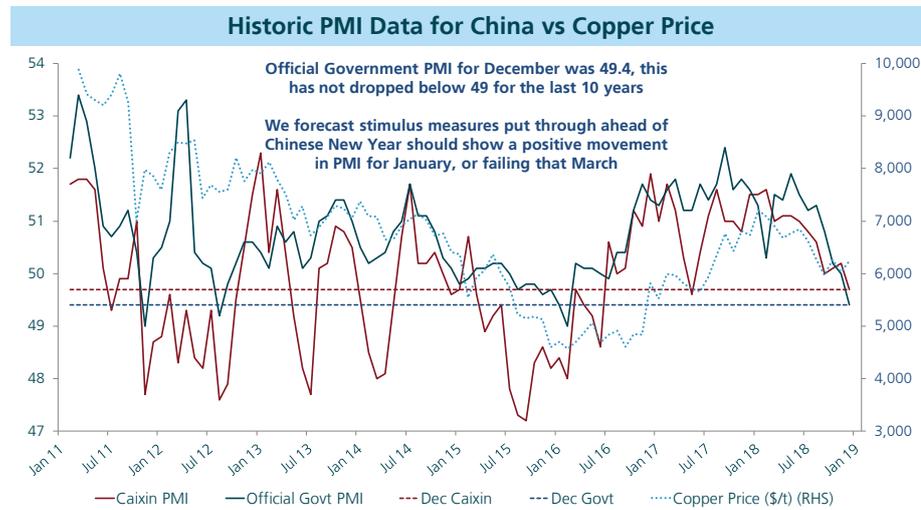
Bank reserves cut by US\$117bn in stimulus measures. China’s central bank will inject US\$117bn into the banking system by cutting the share of deposits that commercial banks must hold in reserve, the latest effort to boost lending and halt a sharp slowdown in the economy.

The People’s Bank of China would cut the required reserve ratio (RRR) by 1 percentage point, with the cut divided into two stages of 0.5 percentage points, each effective on 15 January 2019 and 25 January 2019, the PBoC said on its website in early January.

But the central bank said it would partially offset the RRR cut by not renewing loans to commercial banks through the PBoC’s Medium-term Lending Facility (MLF) that are scheduled to mature during the first quarter. That net impact would be a cash injection of RMB800bn (US\$117bn), the PBoC said in an accompanying statement.

US\$125bn rail projects approved. China approved more than US\$125bn of rail projects in the past month, in steps designed to counter a slowdown in its economy.

The National Development and Reform Commission, China’s top planning agency, has approved urban rail projects in eight cities and regions with a total of RMB860bn (US\$125bn) since 5 December 2019, according to official statements.

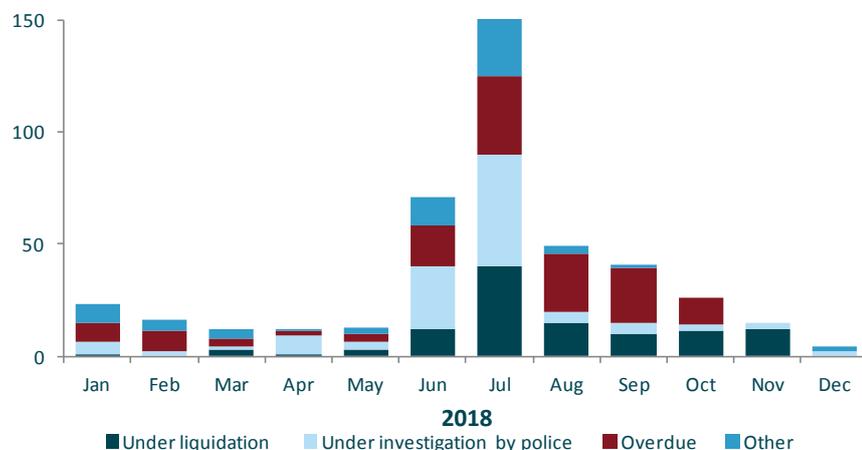


Source: AASTocks, and Caixin PMI last data December 2018

Clean up – streamlining the process; shadow banking reforms

The government has put through reforms to restructure the shadow banking sector and has tried to cut down on SME ‘zombie’ companies. For example, the government has cut down the number of companies that can tender for state grid contracts from hundreds to only c.50. Lending has become harder, raising the rates for substandard projects and substandard companies, in turn cutting down on ‘zombie’ companies that don’t make enough money to service their debts. The majority of these companies are SMEs where the social impact is limited, while party-controlled courts still face strong incentives to keep larger companies operating rather than rule them insolvent. China has restructured local governments so that more members are directly linked to state government. This ‘purge’ has potential to make the economy more efficient and, in our view, will speed up tendering processes and the electrical grid build-out.

Hundreds of P2P Platforms Have Collapsed in China in 2018



Source: FT, December 2018.

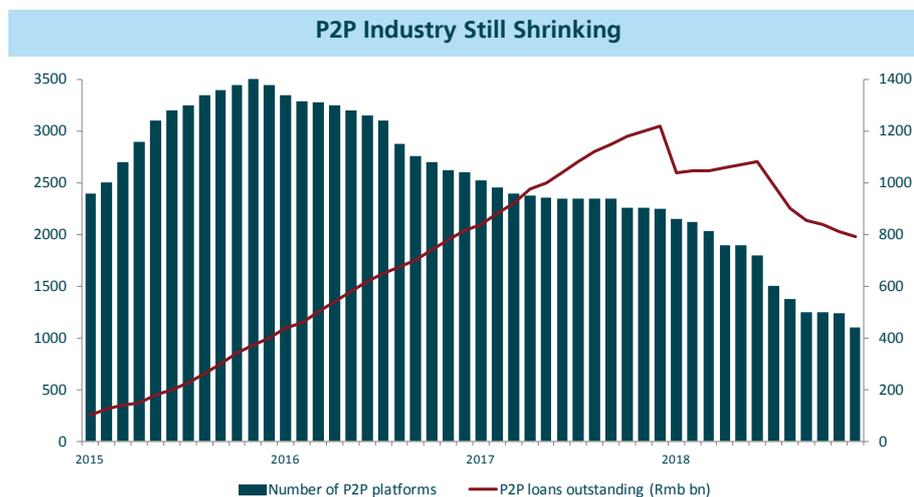
A crackdown on China’s RMB62.9tn (US\$9tn) shadow banking industry is easing concerns about the potential systemic risk of the country’s banks to the global financial sector. Risk in China’s shadow banking sector has decreased, recently. The Basel-based Financial Stability Board has lowered China Construction Bank, China’s second-largest bank and one of the world’s largest lenders, to the bottom tier of its list of “globally systemically important banks”. The shift for CCB has been attributed to a clampdown on China’s shadow banking sector that kicked off in 2017, according to Fitch Ratings, although risks remain high.

The shadow banking industry consists of off-balance-sheet funds provided by banks and other financial institutions. The funds are lent at rates higher than standard bank loans, often to companies without ready access to the conventional banking sector (Source: *FT*, Nov 2018).

The Chinese government was first alerted to the risk posed by shadow banking in 2015, following a series of noisy protests and even citizen arrests by middle-class investors. In April 2017, Chinese president Xi Jinping declared that “financial security is an important part of national security”. Since the reforms were enacted in 2017, peer-to-peer (P2P) lenders have collapsed. Outstanding peer-to-peer loans in China topped RMB1.2tn (c.US\$177bn) in Q1 2018, before sliding to about RMB800bn (c.US\$118bn) as hundreds of P2P platforms shut, according to a report on the sector by Moody’s. Most of China’s more comfortable middle-class citizens would rather swallow their losses than risk arrest. Instead of protests, the reckoning this year has taken the form of belt-tightening and painful family conversations (source: *FT*, Dec. 2018).

More than 2,000 lending platforms have gone under since the industry peaked in 2015, with just over 1,000 still operating, according to Wangdai Zhijia, an industry tracker.

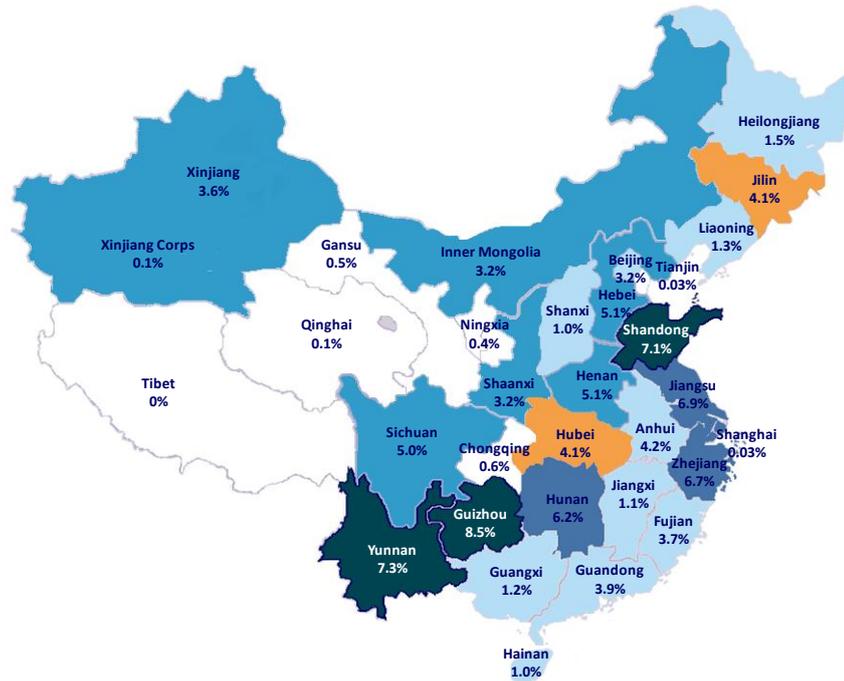
As few as 200 firms may eventually be left standing, said Jackson Cheung, co-founder and chief executive of Youxin Financial, Renrendai’s parent (source: *FT* Jan. 2019).



Source: *FT*, December 2018

The Chinese government’s scrutiny of local government debt and PPPs intensified in 2018, with the launch of new measures to curb hidden debt growth by means of PPPs. A source said to *Yicai* that a notice issued by the finance department of a provincial capital in China has required that medium and long-term spending for PPP be categorised as hidden local government debt. According to the source, the move signals a heightening of local PPP scrutiny amidst broader efforts by the Chinese government to curb hidden debt growth, and a reduction in fee-based PPPs in the future (*China Banking News*, August 2018).

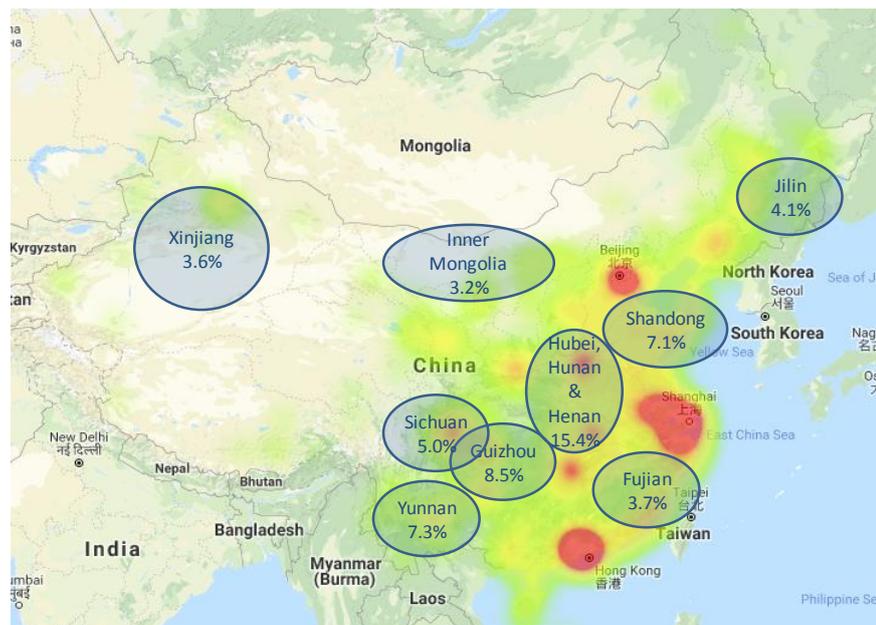
Total China PPP Projects at Construction Value Split by Region (June 2018)



Source: Arden Research, 2019.

The Chinese central government has already launched measures to crackdown on the use of PPPs by local governments to covertly raise debt. Disagreement persists, however, over whether medium and long-term government spending responsibilities that are part of PPP should be categorised as hidden debt (*China Banking News, August 2018*).

China City Tier Heat Map and Construction Stage Value Split (June 2018)



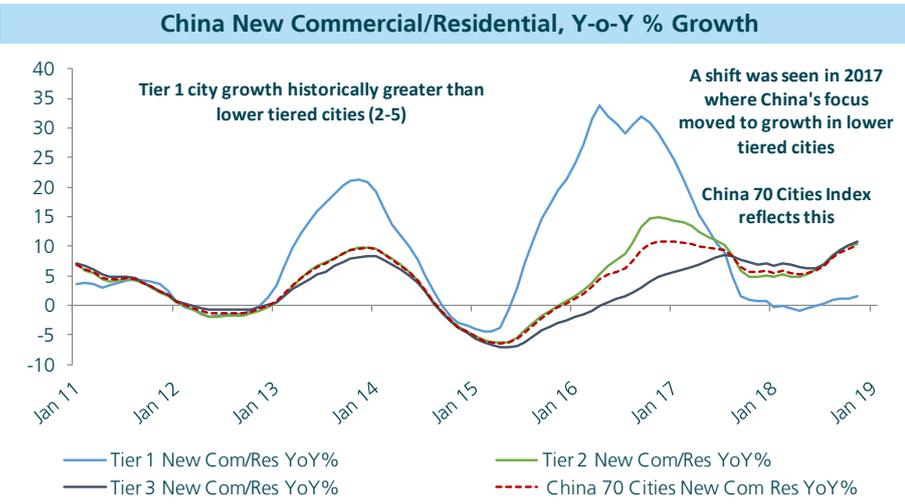
Source: Arden Research, 2019. Note: Heat map created with the following weightings: Red = High Point Score 32 points - 1st Tier Cities. 16 points - New 1st Tier Cities. 8 points - 2nd Tier Cities. 4 points - 3rd Tier Cities. 2 points - 4th Tier Cities. 1 point - 5th Tier Cities

The PBOC was guided in H2 2018 to push money into the starved SME sector after the 'purge' of substandard companies, which, in turn, will help with this new push at a grass roots level.

Chinese growth of lower-tiered cities – iron first then copper

The Chinese economy is recovering strongly and real estate and construction are looking good, according to China specialist Simon Hunt (SHSS). House prices in lower-tiered cities (Tier 3-5) are rising due to increased demand from the rural population, but prices in Tier 1 cities are falling. Growth is focused on lower-tiered cities and also moving more of the rural population to the urban environment. Volumes are up and prices are dropping in China's larger cities, leading to the desired outcome for the government. The chart below shows clearly that historically Tier One city growth has dominated, but that in 2017 a shift from Tier One to Tiers Two and Three was seen, where growth for those cities continued to grow and overtook Tier One city growth. The China 70 Cities Index is in line with Tier One and Two growth, highlighting the government's move to focus on lower-tiered cities for the next stage of development.

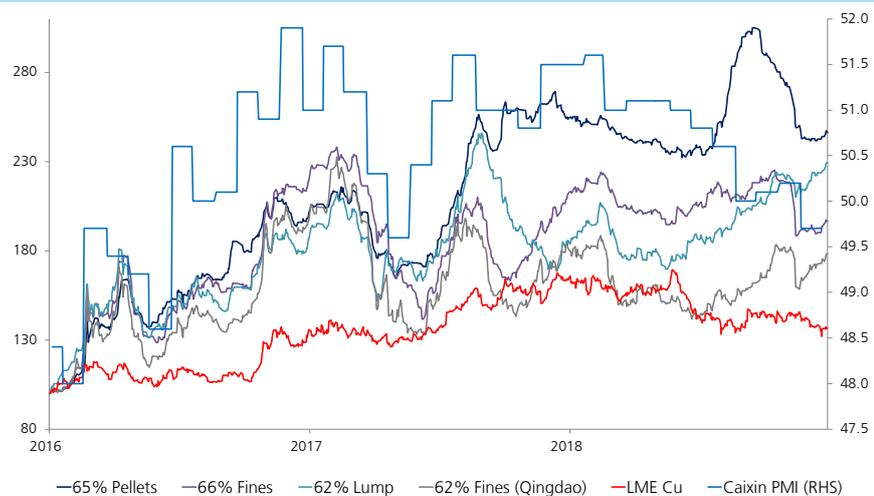
The graph below highlights the direct link between the Caixin China Manufacturing Purchasing Managers Index (PMI), previously known as 'HSBC China PMI', and the iron ore price. Comparing the Caixin PMI data with the OECD Composite Leading Indicators (MEI) data and the movements in iron ore prices, we expect a pick up in the Caixin PMI reading towards the end of Q1 2019. Construction is picking up in China and we expect continuing rises in iron prices for H1 2019. The iron ore price has risen 31% for 62% lump (preferably used in steel making, due direct feed application into furnaces and lower pollution source than fines) since June 2018 and, in the same period, copper (LME copper) has dropped 18%. **Copper prices are usually correlated to iron ore prices as both are key indicators on the state of construction, and both are needed at different stages in construction. Copper price gains can lag iron ore gains depending upon the availability of refined copper in China.**



Source: CEIC Data, last data June 2018.

China is trying to use more iron-based scrap, 2018 saw a rise in imports of higher grade iron products as they are easier to combine with scrap and have less impurities – another key focus for China moving forwards in its pollution reduction plans.

Caixin PMI vs Iron Ore (2016 to the Present)



Source: Bloomberg Data, last data January 2019.

The Caixin PMI is produced by Caixin-IHS Markit and the official PMI is produced by the government of China – a score of above 50 demonstrates expansion in both. Government PMI data is typically more positive than the private Caixin PMI data, which is taken from monthly replies to questionnaires sent to purchasing executives in over 500 mainly small, private businesses and manufacturing companies. The government has a much bigger sample size of 3,000 companies – by far the bulk of which are state-owned enterprises (SOEs). Both give different accurate views, but the private survey gives the truer sentiment of factory floors that are not protected by the state.

Two important milestones are ahead: the 100th year anniversary of the founding of the Communist Party of China in 2021 and President Xi's 10th year in office in 2022. A growth surge before these important dates could be highly probable and would explain the current reforms, including environmental policies and China's 'Blue Skies' policy.

Credit reforms and tax cuts – stabilising

China has undergone a period of shadow banking reform, which can be clearly seen in PPP project financing. Loans are harder to get and loans for riskier projects have considerable interest fees attached (between 10% and 30%). The clean-up of the shadow banking sector was designed to cut out 'zombie' companies profiteering from the relaxed lending for PPP projects. Now the sector has been cleaned up, local governments have been reshuffled with a greater link to regional governments, helping to streamline the PPP process and to stop local governments using PPP projects' status nefariously. The flow of PPP projects has increased dramatically in the last 18 months. The number of projects being vetted has risen 40% Y-o-Y (between September 2017 and September 2018). The State Council approved a 2019 quota for new local government bond issuances of RMB1.39tn (c.US\$202bn), enabling local authorities to start issuing debt from January to help stimulus measures for projects that need funding.

Chinese banks in various parts of the country raised their home loan rates in 2018 as the central government stressed the need to contain the real estate market and stymie risk. Figures provided by Rong 360 (a Chinese provider of customised financing and loan services) indicate that 11 out of 29 banks monitored in the Beijing region have raised their first home loan rates to 5% above the benchmark

rate, while for 14 banks the premium is 10%. Rates for second home loans in Beijing are currently running between 10% and 20% above the benchmark. At the opposite side of the country, in Shenzhen, 13 out of 21 banks monitored have lifted first home loan rates to 10% above the benchmark, with 2 asking for a 20% premium, while in the mega-city of Shanghai 13 out of 30 banks charge a premium against the benchmark for first home loans.

The hefty premium for home loans demanded by Chinese banks is part of the efforts by the government to contain elastic demand and demand for second homes.

Tax reforms are speculated to be on the agenda for later in the year: personal tax cuts to limit the impact the current level of mortgage debt has on the bottom half of the population, and corporate tax cuts to help capital flows into PPP projects.

Chinese PPP – finally moving to implementation

Governments have used Public Private Partnerships (PPP) contracts worldwide as a tool to develop and manage public infrastructure and services, with the underlying goal of providing the best service at the lowest cost. The World Bank ‘PPP Reference Guide 2.0’ provides a broad definition of PPP: a long-term contract between a private party and a government entity for providing a public asset or service in which the private party bears significant risk and management responsibility, and remuneration is linked to performance.

In China, whether or not a PPP project provides value for money is measured by a VFM (Value for Money) evaluation. The approach and techniques of VFM evaluation contain both qualitative and quantitative aspects to determine the reduction of the project life cycle cost, optimize risk allocation and improve the operational efficiency of a PPP project. How to quantitatively determine the appropriate share of the private sector involvement, the proportion of risk transfer, charge to users (user-pay or user-fee) and the project duration becomes an important issue, since the result of decision-making should ensure not only that the public sector pays the lowest PPP project cost, but also that the private sector could obtain an expected return (*Liu, 2018*).

The goal of the private sector in entering into a PPP is to profit from its capacity and experience in managing businesses (utilities in particular). The private sector seeks compensation for its services through fees for services rendered, resulting in an appropriate return on capital invested.

There is no agreed definition of PPPs but they generally involve the following:

- ◆ Relatively long contract periods on different aspects of a planned project, often for around 25 to 30 years, and sometimes even longer;
- ◆ Financing comes, in part, from the private sector, but requires payments from the public sector and/or users (user-fees or user-pay) over the lifetime of the project;
- ◆ The private partner participates in the design, completion, implementation and funding of the project, while the public partner concentrates primarily on defining the objectives and monitoring compliance with these objectives;
- ◆ An attempt to distribute the project risks between the public partner and the private partner, according to the respective ability of the parties to assess, control and cope with them.

PPPs involve either a partnership between a public entity and a private entity based solely upon a contract, or the establishment of a project company involving both the public and private sector within a distinct entity.

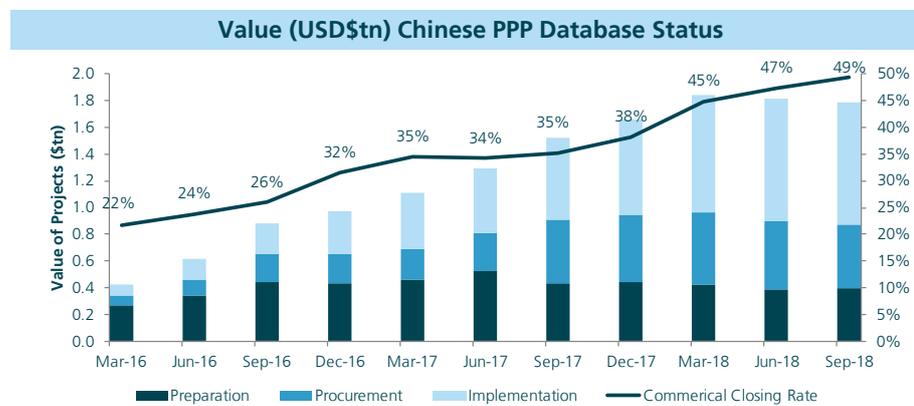
Chinese PPP projects fall under five categories of stage: identification, preparation, procurement, implementation and transfer stages.

PPP projects fall under two categories: total (in the PPP library) or demonstration projects.

Chinese PPP implementation – a huge driver

Chinese Private/Public Partnerships are in their third batch of projects, and entered a period of accelerated implementation in 2017 following China reorganising its regional and local government structure to allow swift processing of suitable projects.

PPP implementation in the management database as a whole saw an increase from 35% (2,388) in September 2017 to 49% (4,089) in September 2018, an increase of \$304bn from \$615bn to \$919bn, demonstrating the increased ability for the Chinese government to push forward supported/approved PPP projects. Of these 4,089 projects, 1,860 were at construction as of end Q3 2018, a c.46% construction rate.



Source: China PPP Centre (CPPPC).

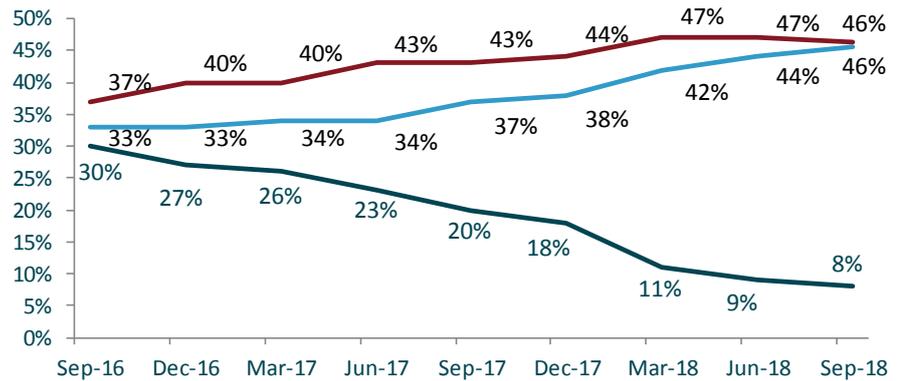
PPP project reforms – through the trough

The Chinese government has put PPP reforms in place, which has removed projects that were abusing the PPP model, and raised finances through the PPP model incorrectly and, as such, a decrease was seen in PPP projects over H2 2017 and 2018, largely targeting projects at the identification stage which do not meet certain criteria.

As of September 2018 there were 8,289 projects in China's PPP library database (at the Preparation, Planning and Implementation stage). During H2 2017 and Q1 2018 c.1,700 projects were removed (RMB1.8tn, US\$260bn) and a further c.2,000 projects (c.RMB3.1tn, US\$190bn) are under review. This was after a clean-up operation to cut down the excessive number of PPP projects in the library, with a focus to get rid of the poorer-quality projects. This is related to the fact that financing has become more difficult and expensive. While banks were previously willing to provide large volumes of capital at low rates for PPP projects, the E20 Research Institute's tracking of PPP financing costs points to a sharp increase since the start of 2018.

The E20 Research Institute found that while the cost of a loan with a maturity of five or more years for high-quality PPP projects was around 10% either above or below the benchmark rate in 2017, by the start of 2018 this figure had risen to between 10% and 30% above the benchmark. In addition to greater cost, Chinese banks have also become increasingly reluctant to provide financing for PPP projects, given that so many are at risk of suspension (*China Banking News, May 2018*).

Chinese PPP Funding Splits for Projects at Implementation Stage



Source: China PPP Centre (CPPPC).

PPP funding splits – government to fund the gap, de-risked

There are three payment mechanisms: government payments, user charges and Viability Gap Funding (VGF). Government payments are commonly seen in public facilities and public service projects for which the government pays directly for the products and services. User charges are commonly used in projects that have charging bases and the operating income can completely cover the investment cost and provide reasonable gains to the private party. For VGF projects, the government would offer some economic subsidy to cover the gap between the user charges and the investment cost plus reasonable gains that come from the projects.

The project revenue risk and usage risk results from numerous risks and are reasonably allocated between the private party and the government. The government bears the risks relating to land acquisition, project approval and permits and political risks, and the private party bears the risks in financing, project investment and financial management, design, construction, operation and maintenance, approval and insurance. The *force majeure* risks are reasonably allocated between the parties.

The funding split for PPP projects has changed since September 2016, with a greater percentage coming from the government and viability gap funding (VGF), c.46% and c.46% of projects respectively as of September 2018. The total value of government and VGF funding is 34.4% and 58.9% respectively, with the larger bulk of the value in VGF showing the greater requirement for gap funding.

This is important to note as China has raised government-backed spending on these projects due to the increased reform in debt raising and has thus decreased the risk/percentage applied to user-pay (user-fees), reducing this from c.30% in September 2016 to c.8% in September 2018. **This will reduce the risk as seen from a private investor point of view, increase the potential return available, show that the government is taking the majority of the risk and stimulate more private investment.**

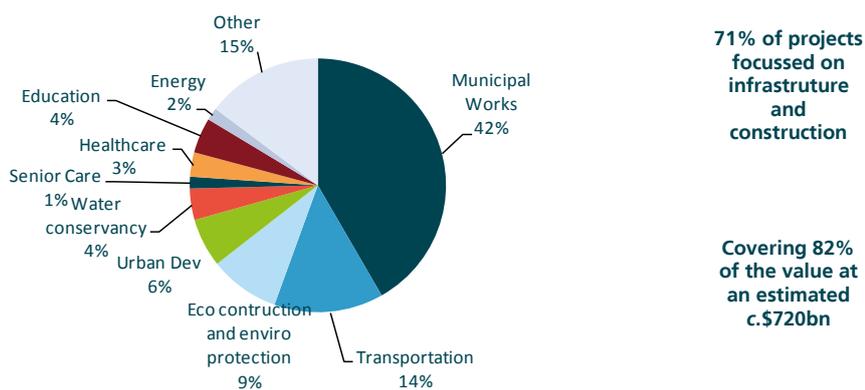
VGF is the funding gap, which is apparent in a project, and this is filled by government subsidies. So, in effect, the Chinese government is now funding c.93% of the PPP projects in the implementation phase to push through the infrastructure projects that the state deems of suitable quality.

The split of these projects in implementation stage (commercial closed) is below (3,668 as at June 2018, of which 1,684 at construction) and, as can be seen, it is heavily focused upon municipal works (c.42%), transportation (c.14%),

ecological construction (c.9%) and urban development (c.6%), all of which are very metal intensive. These areas account for c.71% of total projects at the implementation stage and c.82% of the value at c.US\$720bn. The dramatic increase in implementation rates leads us to believe that metal demand may see an uptick once the impact of these projects has been realised. The split between the total project types at Implementation stage (June 2018) is shown below.

As of September 2018, 1,860 commercial closed projects (at the implementation stage) have started construction – c.46% of the total 4,089 commercial closed projects.

Chinese PPP Projects at Implementation Stage Split as at June 2018



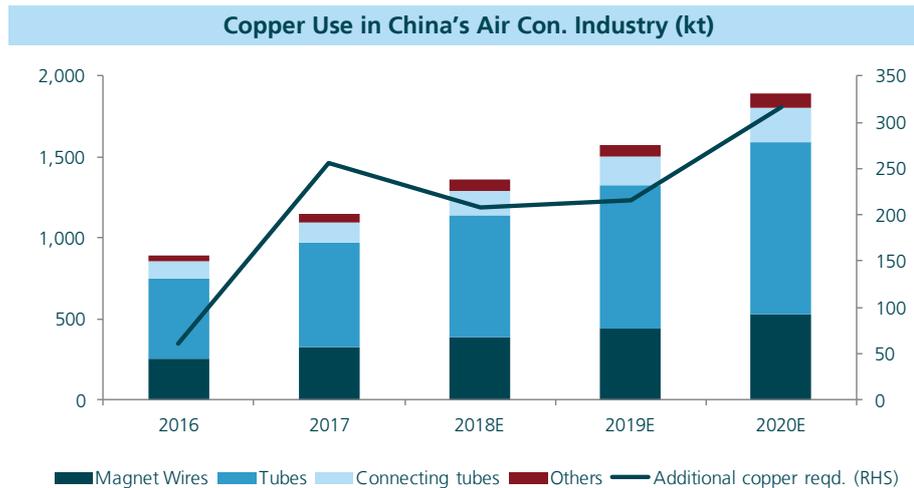
Source: China PPP Centre (CPPPC).

White goods replacement in China

The air conditioning sector, which uses copper tubing, has seen growth in China. In 2017 the growth of air con. manufacturers in lower-tiered cities (Tiers 3-5) grew from between 30% and 100%. The replacement cycle for white goods in Tier 1 to 5 cities is coming around, and a study was conducted on Tier1 to 5 cities, 68% of respondents replied saying they were planning on replacing their air-conditioning unit within the next one to two years (source: SHSS). The rise in replacement rates is coming about due to air con. becoming cheaper and more efficient, and trends in worldwide temperatures moving even higher such as recent record worldwide temperatures seen in July and August 2018.

Air con. production was up 21% in 2017 and domestic sales were up 34%. Air con. sales was up 24% in H1 2018 and production was up 16%; exports were down slightly due to the Trade War, but were still up 6% overall.

This market could add an additional 200kt of copper demand in 2019. If the survey was accurate then air conditioning demand could account for a material demand increase in copper.

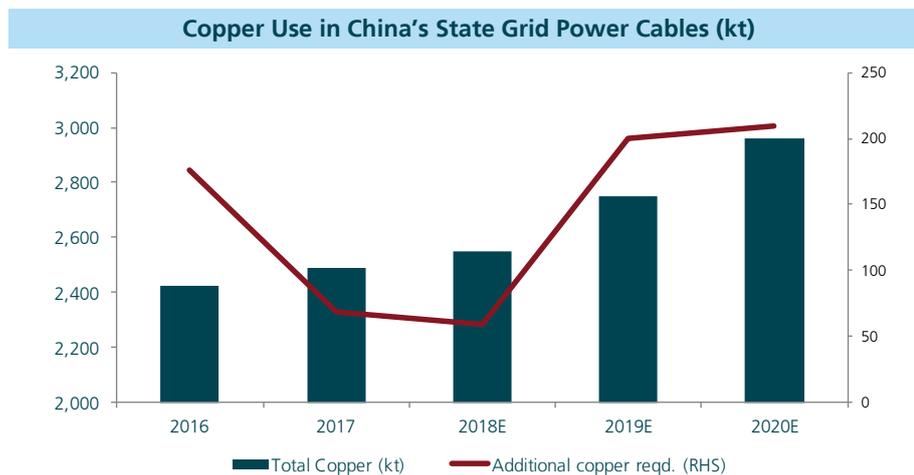


Source: SHSS, August 2018.

Power cable growth – State Grid build-out

A return to copper cabling has been seen in China due to a lower Cu/Al ratio, governmental guidance and a preference for greater efficiency, which is seen in copper cabling. This is positive for copper due to the current national grid build out and it is likely that this will add to the demand story, **potentially requiring an additional c.200kt by 2020.**

In 2017, the State Grid (SG) planned to invest RMB465.7bn (US\$68bn) in the power grid but actually spent less, a fall of 2.2% compared with 2016. This year's plan was to increase investment by just 2.8%. Slower growth has been due largely to restructuring the State Grid and to ensuring that the company is not abusing its privileges (source: SHSS, 2018).



Source: SHSS, August 2018.

Chinese environmental policies – blue skies

China's new Environmental Protection Tax came into force in January 2018. The tax replaces the Pollutant Discharge Fee, which has been in place since 1979; this fee had a number of loopholes, which businesses identified and exploited.

Analysts argue that the new laws will have a major impact on the mining and minerals industry. The law only targets enterprises and public institutions that discharge listed pollutants directly into the environment. It does not target greenhouse emissions.

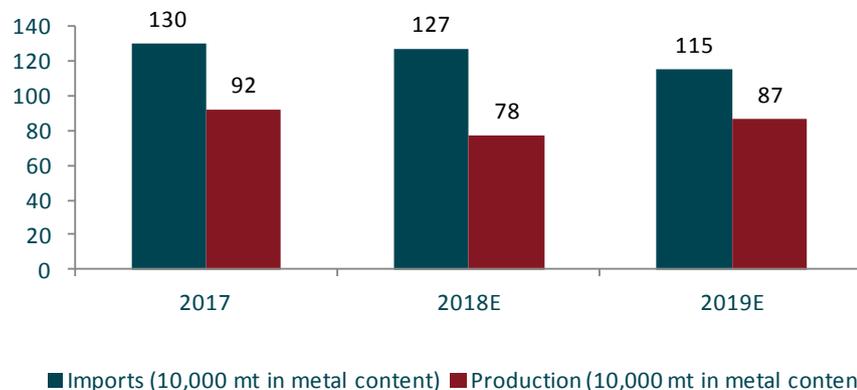
The rates of the law are:

- ◆ CNY1.2 per unit of air pollution;
- ◆ CNY1.4 per unit of water pollution;
- ◆ CNY5-1000 per tonne of hazardous waste.

According to the Ministry of Environmental Protection (MEP), miners will be forced to treat more than 85% of their waste water.

In the case of copper, copper mining generates large amounts of waste rock that, when exposed to air and water, can lead to acid rock drainage, which can flow into nearby water streams. Moreover, the refining process produces air pollution and requires a great amount of energy, which contributes to greenhouse gas emissions. According to the International Institute for Sustainable Development, by consuming copper scrap the environmental impacts of copper production could be reduced by up to 75%.

SMM Data: China's Imports, Production of Copper Scrap



Source: SMM, January 2019.

Ban on low-quality copper scrap – pollution crackdown

Chinese authorities imposed a ban on low-quality copper scrap at the end of 2018 – defined as “Category 7”(up to c.20% copper content). **Antaike, a Chinese research house, has estimated that Category 7 copper scrap might have accounted for between 60% and 70% of the 3.35 million tonnes of total scrap imports in 2016, roughly 300kt of copper.** The decrease in Category 7 scrap imports may lead to a greater generation of scrap within China, which is a natural evolution for an industrialising country. This measure is part of China’s efforts to shift away from the treatment of lower-grade materials and build on the “green fence” initiative.

China has now said that Category 6 scrap (c.75% copper content) will be categorised as restricted from July 2019. Category 7 was categorised as a restricted import through 2018 and this reduced the proportion of it in overall scrap imports from 52% in 2017 to 16% in 2018. This led to a jump in Category 6 scrap to 84% (see chart below) (source: Shanghai Metals Market, Dec. 2018).

China is considering a complete ban on imports of solid waste (including all metal scrap) by the end of 2020, the country’s State Council said on Sunday June 24 2018 in its latest anti-pollution policy document.

A reduction in higher grade scrap may lead to an increased demand for copper cathode if China does not manage to mobilise sufficient scrap generation from within the country. In this case, **cathode premiums may increase.**

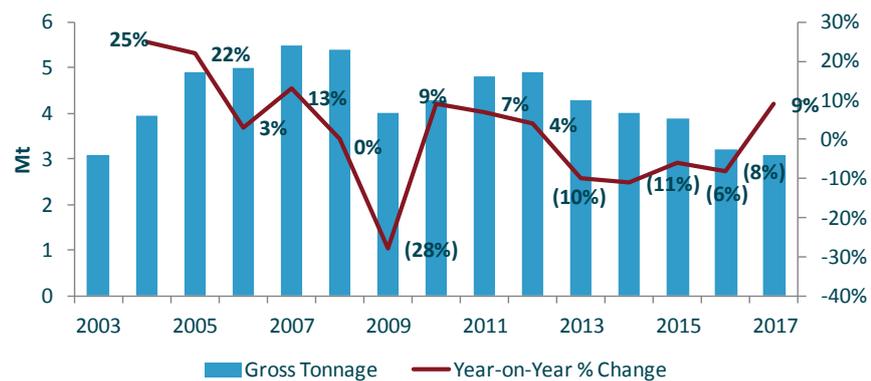
SMM Data: China's imports, production of copper scrap



Source: SMM, January 2019.

The proposed goal marks a new threshold for the nation in its long-term strategy to enforce stricter environmental regulations, develop a more circular economy and advance its domestic recycling.

China's Copper Scrap Imports (2003-2017)



Source: China's General Admission of Customs.

The 'Belt and Road' initiative

As a roll out from China's national rail plan, developments have been made for the country's 'Belt and Road' initiative. The Belt Road comprises a continuous network of highways, railways, ocean routes and ports, with plans to expand over 68 countries and several continents; this is equivalent to accessing 65% of the world's population and 40% of the global GDP as of 2017. It is estimated that this will cost in total between US\$4tn and US\$8tn, and aims to create the world's largest platform for economic cooperation including policy coordination, trade, financing, social and cultural cooperation. Further, it is reported that funds for the megaproject are established, stemming from the likes of the Asian Infrastructure Investment Bank, the World Bank and the Bank of China to name but a few (source: Bloomberg & Visual Capitalist). Although the project is post-concept and agreement meetings are under way with governments involved, there will inevitably be a surge in demand for a great range of resources as construction planning commences. Resources will include construction equipment, road materials, electrical equipment materials, contractors and labour.

Given the various industrial projects and trends in clean technology, it appears clear that a strain on global copper supply will most likely be a problem, as opposed to a weakening in demand caused by the aluminium-copper substitution, which has seen a reduction due to a push for increased efficiency by the Chinese government.

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