Commodity Market Study: Update (October 2018)

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Abstract

The aim of this report is to provide an update on the main export commodities: coal, copper, gold and iron ore market. This study mainly highlights demand and supply factors influencing the world and Mongolian market, since the January 2018 commodity market study update.

Keywords:

coal, copper, gold, iron ore, market demand, market supply, commodity prices

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COMMODITY MARKET STUDY

Update report II

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COMMODITY MARKET STUDY

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COAL

The aim of this report is to provide an update of the coal market since the last update published in January, which included news and data up until October 2017. Similar to the previous update, this report will be mainly highlighting factors influencing the Mongolian coal market.

There are two kinds of coal: thermal, which is used in generating electricity, and coking coal, also known as metallurgical coal, which is used in the steel-making process. As most Mongolia coal exports are coking coal, a large portion of this report will focus on coking coal rather than thermal, also known as steam coal. Similar to the previous update the report is divided into three sections – demand side, supply side, and price of coal – which is overviewed for world market and then, the Mongolian market specifically.

Table 1. Forecasts of metallurgical coal import (left) and export (right), Mt

Year	2017	2018f	2019f	2020f
EU 28	41	44	46	47
Japan	50	51	51	52
South Korea	32	36	37	37
China	70	68	68	68
India	48	58	63	69

Year	2017	2018f	2019f	2020f
Australia	173	189	199	201
Canada	28	26	27	27
US	50	50	46	45
Russia	23	24	25	26

Source: Department of Industry, Innovation and Science

The tables above illustrate updated import and export volumes of metallurgical coal in million tonnes (Mt) from 2017 to 2020. These forecasted volumes of imports and exports provide a glimpse of the supply and demand for coking coal. From there, price of coking coal will be determined. After these three sections, the Mongolian coking coal market will be examined, with a focus on China as demand is mainly derived from there.

Once the coking coal market demand, supply and price are analyzed, a brief overview of the thermal coal market will be provided near the end.

In the thermal coal section, we will briefly cover the demand and supply side before presenting price forecasts. Most part of the section will be focused on Mongolia thermal coal. Demand for Mongolian thermal coal is mainly derived from domestic consumption and exports to China.

Table 2. Forecasts of thermal coal import (left) and export (right), Mt

Year	2017	2018f	2019f	2020f
Asia	761	790	785	774
China	188	186	178	171
India	152	160	162	164
Japan	142	146	144	143
South Korea	110	116	110	105

Year	2017	2018f	2019f	2020f
Australia	200	197	200	202
Colombia	82	80	81	83
Indonesia	374	377	371	367
Russia	151	154	156	160
South Africa	76	76	77	77
US	33	50	49	47

Source: Department of Industry, Innovation and Science

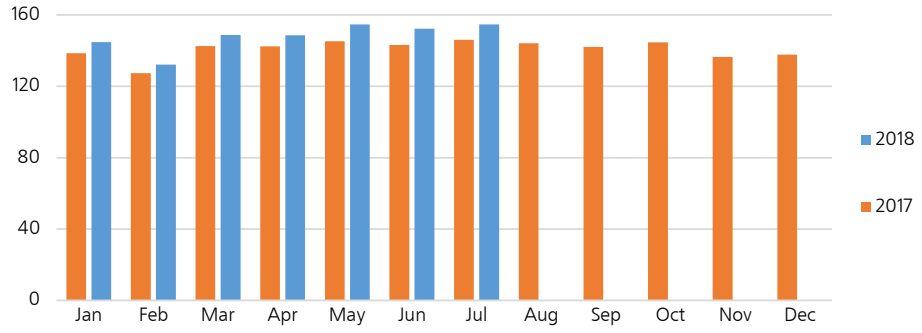
WORLD MARKET

DEMAND SIDE

To produce 1,000 kg of crude steel in a basic oxygen furnace, 1,400 kg of iron ore and 800 kg of metallurgical coal is needed. Thus, steel production output levels are a good indicator of coking coal usage and demand.

World steel production increased in the first seven months of 2018, driven by global economic growth, high steel prices and margins and robust production in China. Crude steel production, for the 64 countries[1] who report to worldsteel, was 154.6 Mt in July 2018, an 5.8 percent increase compared to July 2017. Crude steel production levels have been slightly higher in 2018 relative to 2017.

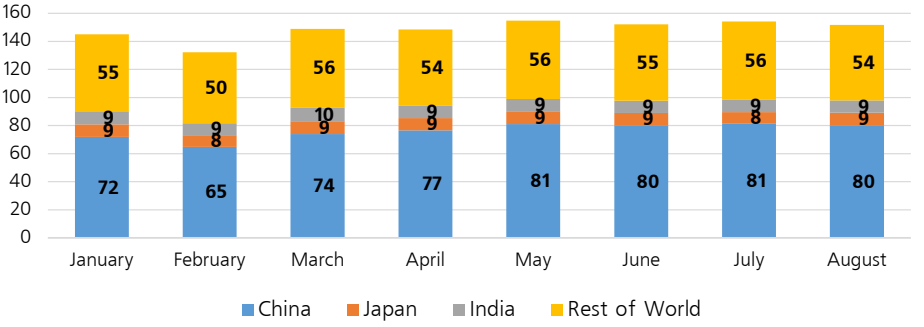
Figure 1. World crude steel production, Mt



Source: World Steel Association

World crude steel production was 1,691 Mt in 2017, an increase of 5.3 percent compared to the previous year. EIU forecasts production to increase to 1,699 and 1,692 Mt in 2018 and 2019, respectively. The increase in production output in 2018 is expected to be boosted by stronger production in other Asian regions and developed markets such as the EU and the US while Chinese forecasts are relatively weak.

Figure 2. 2018 monthly crude steel production by country, Mt



Source: World Steel Association

[1] The 64 countries accounted for approximately 99% of total world crude steel production in 2017

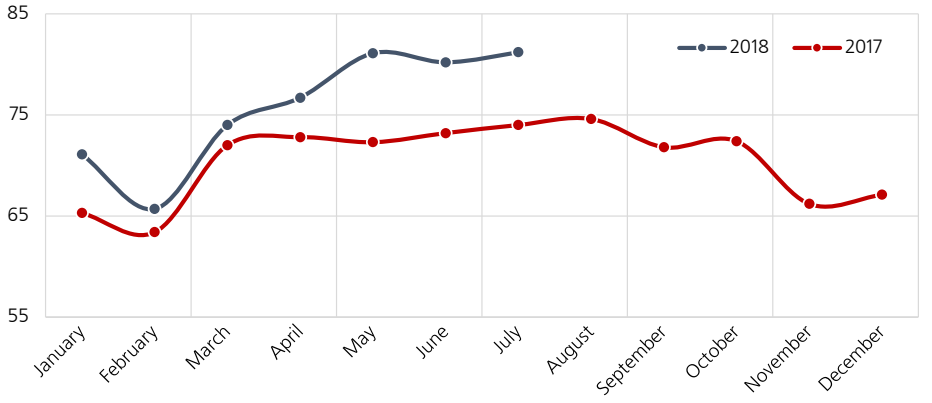
World Steel Association forecasts global steel demand will reach 1,616.1 Mt in 2018 and 1,626.7 Mt in 2019. Chairman of the worldsteel Economics Committee commented that "In the next couple of years the global economic situation is expected to remain favorable with high confidence and strengthening recovery of investment levels in advanced economies. Benefiting from this, steel demand in both developed and developing economies is expected to show sustained growth momentum with risks relatively limited. However, possible adverse impact from rising trade tensions and the probable US and EU interest rate movements could erode this current momentum" in the April 2018 Short Range Outlook.

China

China remains the driving force behind global steel production and consumption. China's crude steel production was 831.7 Mt in 2017, which was 49.2 percent of world production. The 5.7 percent increase in crude steel production from 2016 to 2017 was due to mild government stimulus which provided some boost in the construction sector, which uses 50 percent of steel produced.

In 2015, the Chinese government committed to reducing steel production by 200 Mt annually until 2020; since then, government officials have announced that China has already reduced annual output by 150 Mt. Additionally, last year, the government shut down a number of induction furnace capacities with an output of 120-140 Mt per year. These measures have had a significant impact on the availability of steel, increasing utilization rates more than 80 percent – which contributed to the increased steel prices in 2017 and consequently, increased output by other mills.

Figure 3. China's crude steel production by month, Mt



Source: Fenwei Energy

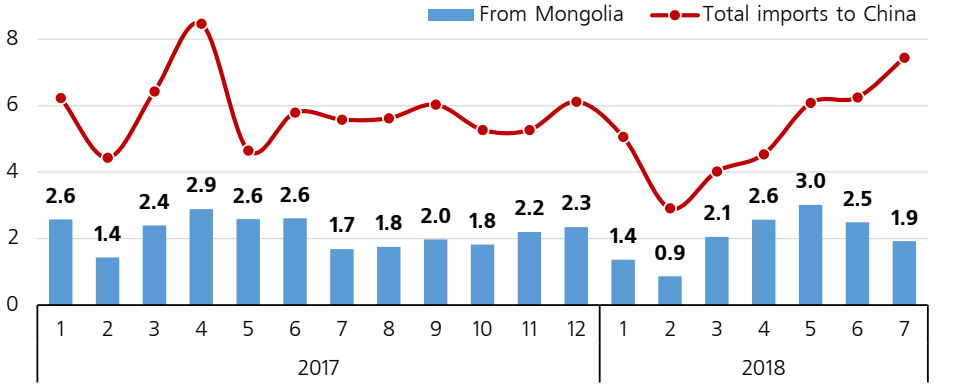
The Chinese government measure to cut production capacities by 50 percent in 28 cities from 15 November 2017 to 15 March 2018 in order to improve air quality has had a minor impact as other Chinese regions have increased their output especially as steel prices are elevated. Within the first seven months of 2018, China has produced 530 Mt of crude steel. Production levels will continue to be slightly above 2017 levels for the rest of the year in the absence of pollution controls and as steelmakers take advantage of currently high profit margins.

Fenwei projects production of crude steel in 2018 will be 856 Mt, 2.9 percent increase. EIU experts forecast the growth in Chinese steel production will be weaker in 2018 relative to

2017, around 0.5 percent, as the government increases their measures to reduce steel output to fight air pollution. Worldsteel forecasts that steel demand in 2018 will be flat and then contract by 2 percent in 2019. Chinese steel production is forecasted to taper off as construction activity slows down, stricter environmental policies[2] are enforced and supply-side reforms are implemented. There are also threats of escalating protectionist policies by the United States Administration which pose a risk to major steel exporters. Chinese production is continuing to gradually shift towards electric arc furnace steelmaking and higher scrap utilization in basic oxygen furnaces as mandated by the government.

Despite a slight growth in steel productions, China's coking coal imports have declined. Import demand for coking coal has been weighted down by high seaborne coking coal prices, which has encouraged steel producers to draw down on stocks or use more competitively priced domestic coal. The use of higher quality iron ore in Chinese steel mills, which allows for the same volume of output to be produced with less coal input, may have also contributed to the dampened demand. Demand for coking coal was 516 Mt in 2017 and is forecasted to decline to 512 Mt in 2018 and 510 Mt in 2019.

Figure 4. China's coking coal imports by month, Mt



Source: Fenwei Energy

As China's domestic coking coal supply[3] maintained a slight growth while demand is expected to reduce in 2018, demand for imported coal are also expected to fall in 2018. In 2017, total coking coal imports was around 70 Mt and as of the first seven months of 2018, imported coking coal is 36.3 Mt while imports are estimated to be 63.7 Mt in 2018. China's imports of coking coal are expected to recover briefly as steel production accelerates; however, beyond 2018, imports are forecasted to gradually decrease as steel output declines and use of high-grade iron ore increases.

Japan and India

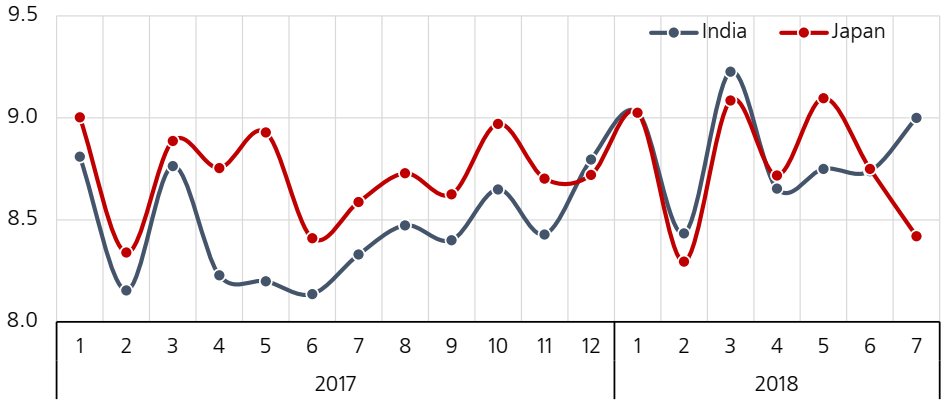
Japan produced 104.7 Mt of crude steel in 2017, down by 0.1 percent compared to 2016. In 2017, Japan's share of world crude steel production was 6.2 percent. As of the first seven months of 2018, Japanese production of crude steel is 61.4 Mt, a slightly lower volume compared to the same period in 2017 of 60.9 Mt. Steel production is forecasted to grow modestly in the short-term, supported by a rebound in capital expenditure, export

[2] Detailed environmental policies implemented by China is in the sections below
[3] More information about China's supply of coking coal is covered below

growth in the automobile and manufacturing sectors, and demand from 2020 Olympics-related projects.

Japan's import of coking coal declined in the first quarter before rebounding in April. Imports of coking coal are forecasted to grow modestly in the near future; however, the US steel tariffs, from which Japan is not exempt, present a risk to its future trade.

Figure 5. India and Japan's monthly crude steel production, Mt



Source: Fenwei Energy

India's crude steel production for 2017 was 101.4 Mt, up by 6.2 percent and made up 6 percent of world crude steel production. The 6.2 percent growth was due to increased capacities and lower inventories. Indian steelmakers have been able to reap the benefits from the minimum import prices (MIPs) introduced in 2016.

In the first seven months of 2018, India produced 61.8 Mt of crude steel. The EIU forecasts that India will see a 5 percent increase in steel outputs in 2018 while the Department of Industry, Innovation and Science expect a 6.5 percent growth in 2018, overtaking Japan as the world's second largest steel producer in 2018. The higher production will be driven by the ongoing expansion of steel-making capacity, rapid urban population growth, substantial government investment in infrastructure, housing and urban development and the expansion of the manufacturing sector. Beyond 2018, India's crude steel production is expected to surge even more, growing 6.7 annually to reach 123 Mt in 2020, representing 7.1 percent of world production.

Driven by the ongoing expansion of India's steel sector, India's imports of coking coal increased substantially in the year to date. This growth in imports of coking coal is expect to continue into the future as India has a limited domestic production of coking coal, and could overtake China as the world's largest importer of coking coal by 2020 when imports are forecasted to reach 69 Mt. India's import of coking coal was estimated to be 48 Mt in 2017, and is forecasted to be 58 Mt in 2018, an increase of almost 20 percent.

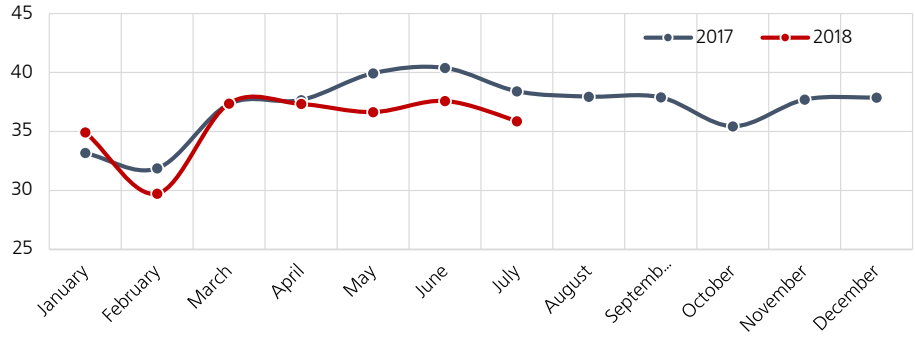
SUPPLY SIDE

World production of coking coal in 2017 was 1,102 Mt. This forecasted to increase by 2 percent in 2018 before declining slightly beyond 2018. World trade in coking coal is forecasted to grow by 5.1 percent in 2018 to 334 Mt, driven by a recovery in Australian exports and strong global steel output. Then growth will slow to 2.7 percent in 2019 and 0.9 percent in 2020.

China

China's supply of washed coking coal was 445.7 Mt in 2017. In 2018, from January to July, supply stands at 249.5, down 3.6 percent compared to the same period last year. However, domestic washed coking coal output is estimated to reach 452 Mt in 2018.

Figure 6. China's washed coking coal supply by month, Mt



Source: Fenwei Energy

Due to environmental and safety inspections, productions of coal mines are being affected which has led to a lower supply growth than expected. Thus, as supply remains relatively stable and demand reduces in 2018, the supply-demand gap shifts from tight balance to a slightly loose balance.

Table 3. China coking coal supply-demand, Mt

	Washed coking coal output	Net imports	Total supply	Demand	Supply–demand gap
2016	444	58	502	534	-32
2017	446	68	514	516	-2
2018f	452	62	514	512	2
2019f	453	60	513	510	3

Source: Fenwei Energy

The main driving force behind decreasing imports and demand are environmental restrictions and inspections implemented to combat air pollution while economic growth and investments slowdown in China. Some of the environmental policies active during the first half of 2018 are:

- November 2017-March 2018: Action plans to comprehensively control air pollution in Beijing, Tianjin, Hebei, and the surrounding areas during autumn and winter of 2017-2018
- April 2018-June 2018: Shanxi Provincial Environmental Groups to carry out "reviewed inspections" in some cities and counties
- June 2018-July 2018: Central Environmental Inspector Groups to conduct "reviewed inspections" and will station in ten provinces including Hebei, Henan, Inner Mongolia and Ningxia for one month

- 2017-2018: Rectifying illegal docks and regulating lightering operations; by the end of 2020, all waterborne lightering operation on the Yangtze River Jiangsu Section will be banned
- 2018-2020: Three-year Action Plan to Protect the Blue Sky

The State Council released a three-year action plan to improve air quality on 3 July 2018 called the "Three-Year Action Plan to Protect the Blue Sky." According to the plan, emissions of sulfur dioxide and nitrogen oxide should decline at least 15 percent from 2015 levels by 2020 and cities with low air quality standards should see their PM 2.5 density fall at least 18 percent. The rate of days with good air quality should reach 80 percent annually and percentage of heavily polluted days should decrease by 25 percent or more from 2015 levels. Also, coal's proportion in primary energy consumption mix shall fall to below 58 percent by 2020 and coal mines, washing plants and railway coal-loading stations with substandard environmental measures shall cease or cut production during specific periods.

The efforts will be focused in Beijing, Tianjin, Hebei, and the surrounding "2+26" cities as well as an additional eleven cities[4] and four provinces[5] and city in the Yangtze River Delta area.

However, most domestic production of coking coal is not exported but rather used in the domestic Chinese market. China's supply of coking coal merely indicates the volume of imports to be expected. And as the supply-demand gap has been increasing, net imports will likely continue to decrease in the future, especially as demand is being dampened by stringent environmental policies.

Australia

In 2017, Australia's share of world coking coal exports was 54 percent. Of the 184 Mt produced in 2017, 177.2 Mt was exported. Queensland's coal – thermal and metallurgical – exports grew 38 percent in 2018. Following weather-related disruptions (Cyclone Debbie), prices of both thermal and metallurgical coal recovery sharply due to strong demand from China.

While production grew by 6.7 percent year-on-year to 49 Mt in the first quarter of 2018, exports were affected by weather-related disruptions and rail and port maintenance work. Production is expected to increase by 2 percent in 2018 and 9 percent in 2019 to 204.6 Mt. The increase in production forecasts is supported by ramp up of QCoal's Byerwen mine and BHP's Blackwater and Caval Ridge Southern Circuit projects, which have annual production capacities of 10 Mt each.

Potential capacity losses from proposed changes to the maintenance schedule of Aurizon, the rail network operator of the Central Queensland Coal Network (CQCN), due to enforced cuts to its revenue, present a risk to future supply. In September, the Queensland Competition Authority was expected to make a final decision on whether Aurizon will need to charge 1 billion AUD less for maintenance than it asked for over the next four years. However, a decision has been delayed at Aurizon's request. Aurizon may also have to trim, by 100 million AUD annually, charges to coal miners for operating and maintaining the four-network CQCN system.

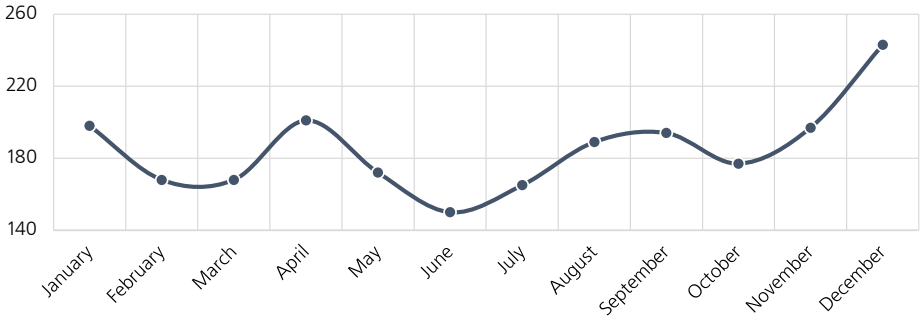
[4] Lvliang, Jinzhong and Yuncheng in Shanxi Province, Luoyang and Sanmenxia in Henan Province, Xi'an, Xianyang, Baoji, Tongchuan, Weinan and Yangling Demonstration Zone in Shaanxi Province
[5] Shanghai, Jiangsu, Zhejiang, Anhui

Australia's export volumes are forecasted to grow from 182 Mt between 2017 and 2018 to 200 Mt between 2019 and 2020, reflecting a recovery after Cyclone Debbie in 2017 and modest growth from new capacity.

PRICE

In 2017, coking coal prices saw two increases – the first was in April when Cyclone Debbie hit Queensland, damaging the major railways carrying coal to ports; the second was in December, when there were delays in shipments from Dalrymple Bay, a coal terminal in Australia. In the third quarter of 2017, a number of mines in Australia declared force-majeure due to floods; the sharpest increase in price was when Anglo-American mines announced the force-majeure circumstances at German Creek in October[6]. These increases were also triggered by the limitations on coking coal production in China.

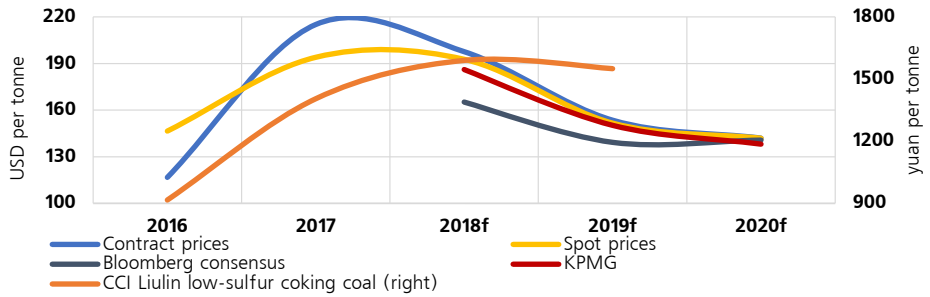
Figure 7. Coking coal price in 2017, USD per tonne (FOB, Australia)



Source: Singapore Exchange LTD, Economist Intelligence Unit

Coking coal spot price declined significantly from mid-March to late-April as a result of subdued import demand from China. Prices rebounded in mid-June as demand from Asia, excluding China, increased and concerns over supply shortages emerged.

Figure 8. Coking coal price[7]



Source: Department of Industry, Innovation and Science, Fenwei Energy, Bloomberg, KPMG

Spot price of coking coal is forecasted to decline from an average of 193 USD per tonne in 2018 to 148 USD per tonne in 2020. Softer demand from China is expected to be

[6] This mine produces 1.8-1.9 Mt of coking coal quarterly

[7] Contract price assessment for high-quality hard coking coal and spot prices are hard coking coal FOB Australia east coast ports

underpinned by a gradual decline in steel output. However, growing demand elsewhere in the world, particularly India, and relatively constrained growth in global supply, are expected to provide some support to prices such that it remains above 2016 levels.

The CCI Liulin low-sulfur price index averaged at 1,602 yuan per tonne during January to July; the annual price is projected to average at 1,590 yuan per tonne in 2017. Chinese and international coal prices trends tend to be consistent with a slight volatility observed in international coal prices. The Development and Reform Commission (NDRC) introduced nine measures in May to stabilize coal prices to a reasonable range. The measures mainly target thermal coal but affects coking coal prices slightly. The nine measures include raising output, lifting capacity, adding transport capacity, advocating long-term contracts, increasing clean energy, adjusting inventories, reducing coal consumption, enhancing supervision and promoting joint operation of coal and power.

Overall, coking coal price is expected to be relatively high in 2018 due to supply disruption and concerns related to the Aurizon situation and increasing demand from India. However, these high prices will likely taper off as demand from China dampens amidst environmental policy implementations and declines in steel outputs.

MONGOLIAN MARKET

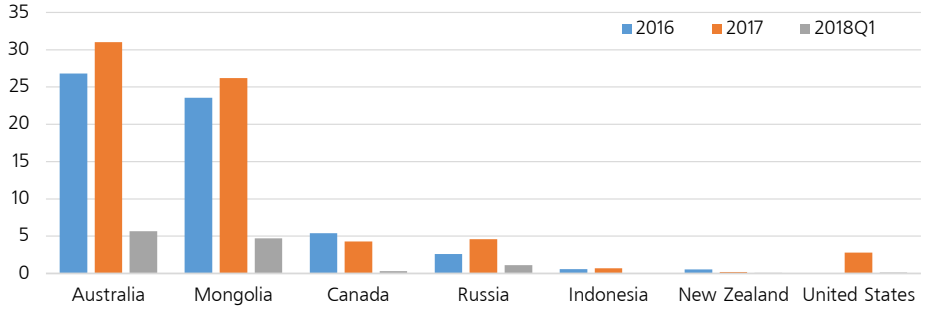
Generally, Mongolian export income is mainly driven by commodity export revenue generated by the mining sector. In 2017, coal, copper concentrate, gold, iron ore and zinc concentrate were the top five exports of Mongolia alongside crude oil.

In 2011, during its peak time, coal represented 47 percent of total exports and in 2017, it made up 37 percent of Mongolia's total exports. However, Mongolia's share of world coking coal exports was 8 percent in 2017, fourth after Australia, United States, and Canada.

DEMAND

Demand for Mongolia's coking coal is largely dependent upon the Chinese market. As covered in the sections above, China's imports of coal are expected to decrease over the next few years as steel productions decline. Related to crude steel production, China has been shifting towards using more electric arc furnaces as environmental policies increasingly become more stringent. Additionally, the use of high-quality iron ore and increased use of scrap steel will decrease the demand for coking coal even further in the future. However, in 2017, Mongolia exported 26.2 Mt of coking coal to China, easily taking the position of second largest importer of coking coal to China to account for around 37 percent of imports. Australia, China's main coking coal importer, exported 31 Mt in 2017.

Figure 9. China's coking coal import by origin, Mt



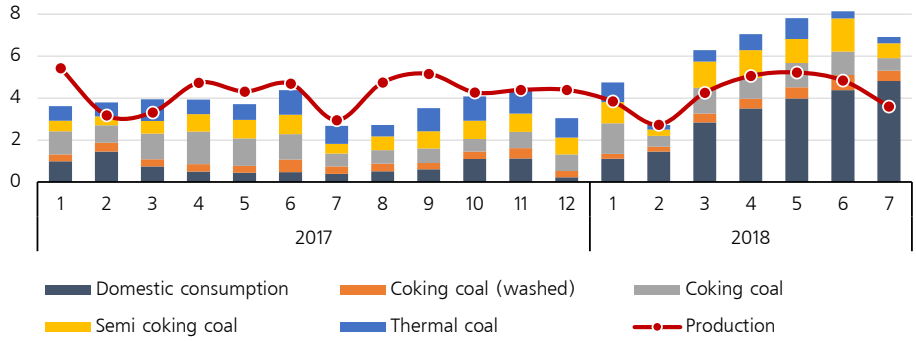
Source: Fenwei Energy

As of the first quarter of 2018, the volume of coking coal imported from Australia and Mongolia are pretty close, 5.6 Mt and 4.7 Mt, respectively. Amidst high coking coal prices, China has increasingly looked at its domestic market to supply its coking coal demand with its competitive pricing. Some of the hindrances in Mongolia's path in overtaking Australia as the largest importer of coking coal of China are transportation costs and the fact that most coal exports from Mongolia is unwashed. However, measures to improve infrastructure and quality of coal has gradually been increasing over the years.

SUPPLY

The total annual production capacity of Mongolian mining companies is approximately 45 Mt. These capacities will hopefully increase in the future as mining companies and the government improve mining related infrastructures in Mongolia, especially in the transportation sector.

Figure 10. Mongolian coal export breakdown, Mt



Source: Mineral Resources and Petroleum Authority of Mongolia

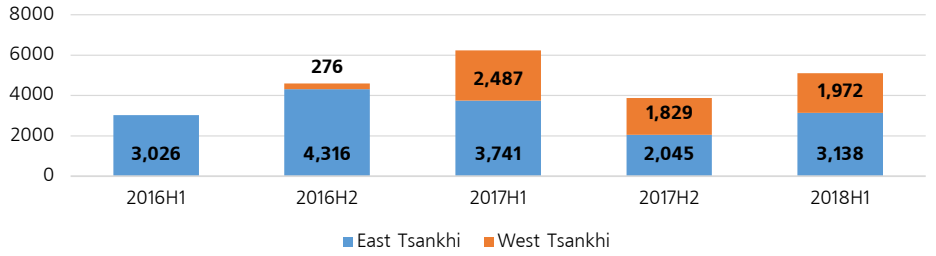
Mongolia's exports of coking coal declined by 27 percent year-on-year in the first quarter of 2018. Exports to China continues to be affected by ongoing transportation bottlenecks at the border as customs authorities implemented new policies to address the smuggling of other products. However, there are plans to construct a new route, parallel to the current one, which should relieve the congestion pressures.

Erdenes Tavan Tolgoi

Erdenes Tavan Tolgoi JSC (ETT) is a state-owned company which operates one of the largest reserves of high-quality coking coal, Tavan Tolgoi. Currently, operations are only in the Tsankhi area with exports made through the Gashuunsuhait – Gants Mod border into China. Since inception of company, 40 Mt of coal has been produced over the years and they are working towards producing 65 Mt of coal for their midterm plan of 2019-2021.

The current annual production capacity of ETT is 13 Mt. In 2016, total coking coal production in the East and West Tsankhi mines was 7.6 Mt and 10.1 Mt in 2017. As of the first half of 2018, ETT's coal productions are 5.1 Mt. In 2016, ETT exported 7.65 Mt of coking coal and 8.39 Mt in 2017. As of August, 7.42 Mt out of the planned 10 Mt has been exported.

Figure 11. Erdenes tavan tolgoi coal production, thousand tonnes



Source: Erdenes Tavan Tolgoi

ETT plans on increasing its operations by improving its infrastructure such as railroad, paved road, power and water supply projects. These projects are expected to be finance by capital raised through domestic and international IPOs.

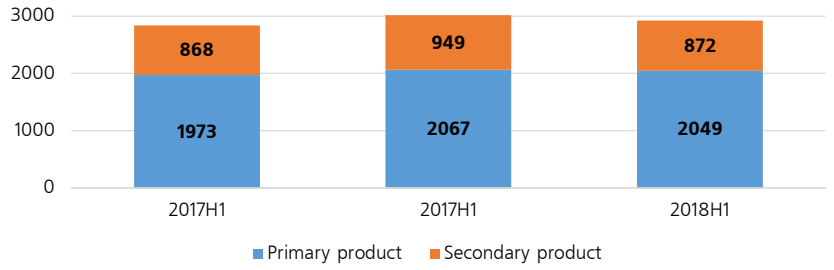
Currently, 21 percent of ETT is owned by the Mongolian citizens, 78.9 percent by the state and 0.1 percent by local entities. After an IPO, 30 percent of the company will be offered through the stock exchange and the previous stakeholders: the states, citizens, and local entities will own 55.25, 14.75, 0.05 percent, respectively. ETT hopes to complete the IPO in the second quarter of 2019. Several government resolutions have been made to support the IPO process and other planned projects. For instance, Government Resolution No. 242 was established to intensify the Tavantolgoi - Gashuunsuhait railroad project. Under the resolution, "Tavantolgoi Railroad" SPV will be established with state interest not less than 51 percent to construct the base infrastructure for five years and ETT will raise capital to finance parts of the railroad project through off-take agreement.

As of now, the annual capacity of the Gashuunsuhait road is 18 Mt, the border crossing at Gashuunsuhait -Gants Mod is 15-18 Mt, and railroad is 18 Mt. The construction and completion of the paved road which is parallel to the current road will increase capacity up to 30 Mt annually.

Mongolian Mining Corporation

The Mongolian Mining Corporation (MMC) operates two open-pit coking coal mines: Ukhaa Khudag and Baruun Naran deposits in Umnugobi province of Mongolia.

Figure 12. MMC processed coal, thousand tonnes



Source: Mongolian Mining Corporation

In 2017, MMC produced 8.3 Mt ROM coal from both Ukhaa Khudag and Baruun Naran. After the ROM[8] coal was processed, it resulted in the production 4 Mt of washed coking coal as a primary product and 1.8 Mt of washed thermal coal as a secondary product.

In the first half of 2018, MMC produced 8.3 Mt ROM coal (3.6 Mt from Ukhaa Khudag and 0.7 Mt from Baruun Naran) and after processing, 2 Mt of washed coking coal and 0.9 Mt of washed thermal coal was produced. MMC is one of Mongolia's major washed coking coal producer, which has allowed it to maintain its competitive position in exporting coal to China.

However, one of the inefficiencies the company faces is the border bottleneck. In the first half of 2017, the daily average of all coal trucks crossing the border was 1,152 trucks. Since then, it has decreased significantly to 650 in the second half of 2017 and 687 in the first half of 2018. In July and August of 2018, coal transportation was disrupted from time to time due to temporary closure of roads from heavy rains and flooding. Despite the occasional bottlenecks, MMC has increased its transportation capacity to 450 double trailer trucks. Of the additional 150, 100 were delivered towards the end of 2017 and the remaining 50 were delivered during the first half of 2018.

Nariin Sukhait mine

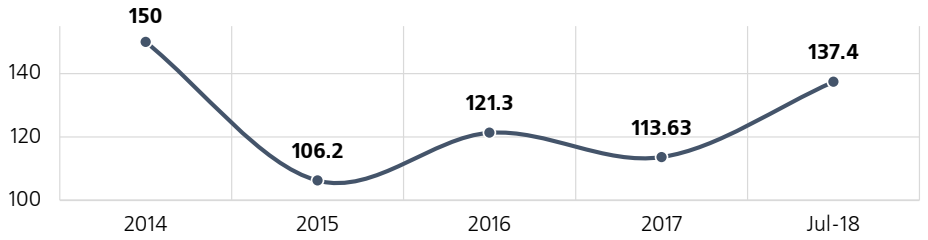
Four companies operate at the Nariin Sukhait mine: Mongolyn Alt Corporation LLC (MAK), South Gobi Sands LLC, the local subsidiary of South Gobi Energy Resources Inc (which is a subsidiary of Ivanhoe Mines Inc), Usukh Zoos LLC and a joint venture between Mongolia and China called "Quinhua-MAK-Nariin Sukhait" LLC.

Both MAK and South Gobi Sands finished the construction of a coal washing plant, which have annual capacities of 1 Mt and 2 Mt, respectively. The Ususkh Zoos washing plant is expected to be completed next year. With the ability to wash its coals, Mongolia's coking coal exports will become more attractive for China as part of their environmental policy push is for higher quality coal with low ash and sulfur content. By increasing capacities of coal washing plants and transportation, Mongolia is positioning itself to become one of China's major coking coal importers.

PRICE

Mongolian price of coking coal tends to follow world market trends – world market prices increase, Mongolian prices also increase – however, Mongolian prices tend to be relatively lower than world prices.

Figure 13. Average price of coking coal on world market, USD per tonne



Source: Mineral Resources and Petroleum Authority of Mongolia

[8] Run-of-mine (ROM) coal consists of coal, rocks, middlings, minerals and contamination. The ROM coal is usually delivered from the mine to the coal preparation plant to be washed.

Other aspects which makes estimates and forecasts of Mongolian coking coal prices difficult is that every coal mine export different qualities and processed coal and contract prices tend to be confidential and fixed for at a certain rate which is different for every contract.

THERMAL COAL

The largest importers of thermal coal are China, India and Japan; together they take up 47 percent of world imports. The largest exports are Indonesia and Australia whose share of world export is 36 and 19 percent, respectively.

DEMAND SIDE

China

China is the world's largest thermal coal importer, having imported 188 Mt in 2017. During the first three months of 2018, thermal coal imports surged. The strong demand for coal-fired power was due to hotter than usual weather and low reservoir levels, which has limited hydro power output. Also, China's own coal outputs have been subdued as a result of environmental checks and rail maintenances. The strong growth in thermal coal imports during the first half of 2018 is not expected to continue as coal imports are constrained by import quotas placed. Due to a strong performance in the first half of the year, most of the quota has already been utilized. Imports of thermal coal are forecasted to decrease steadily over the next couple of years as higher domestic coal production substitutes import.

The demand for power generation coal is expected to increase due to rapid development of electrification and economic growth. However, China is also working to improve air quality and put a cap on coal consumption by replacing coal with non-fossil fuels. This could decrease coal consumption in the near term and even more so in the long-term.

Policy changes remain the driver of China's coal markets and the key risk in the outlook for thermal coal imports. Recent policies include the sporadic banning of imports of coal to certain ports and measures to cool domestic thermal coal market. These measures include targeting domestic spot prices below 90 USD per tonne, boosting long-term contracts to 200-300 Mt, and increasing supply from key thermal-coal producing provinces (Shanxi, Inner Mongolia, Shaanxi) by 250 Mt this year.

India and Japan

India and Japan imported 152 Mt and 142 Mt of thermal coal in 2017, respectively. India's coal imports are expected to grow marginally as growth in consumption outpaces domestic supply growth. Japan's thermal coal imports are forecasted to rise slightly in the second half of 2018 and fall modestly in 2019 and 2020 as nuclear reactors restart.

India's thermal coal imports grew by 22 percent year-on-year in the first quarter of 2018 before declining by 6.5 percent in April as a result of a government directive to divert Coal India's supply to utilities. The expansion of the domestic coal industry faces a number of infrastructures, regulatory and environmental challenges; however, government policies remain focused on self-sufficiency. Recent policy changes allowed private companies, rather than only state-owned mines, to commercially mine coal. In the long-term, higher domestic production could possibly decrease import demand.

Japan's imports of thermal coal remained mainly stable over the first four months of 2018. In May 2018, the Japan's Ministry of Economy, trade and Industry released a draft update to the Basic Energy Plan, which was approved by the Cabinet in July. In the plan, the 2030

target energy mix states that coal will account for 26 percent of power generation, a slightly lower level than coal's share of power generation in 2017 of 31 percent. This emphasizes Japan's continued dependence on coal as key source of power.

SUPPLY SIDE

Thermal coal export volumes are forecasted to remain relatively steady over the next couple of years.

Indonesia

Indonesia exported 374 Mt of thermal coal in 2017, reaffirming its position as the largest exporter of seaborne thermal coal. Adverse weather conditions have affected the loading and production of Indonesia's coal exports.

Indonesia holds around 3 percent of the world's known coal reserves, most of which are on the islands of Kalimantan and Sumatra. Most production and exports come from Kalimantan which has several large river systems to enable a relatively cheap and readily accessible infrastructure system to the seaborne market. As most coal exported from Indonesia is transported down rivers on barges to transshipment points on the coast, where it's loaded onto seagoing vessels, it is highly susceptible to weather impacts, specifically flooding and drought, which can severely limit mining and barge movements.

Additionally, Indonesian thermal coals tend to have lower energy content than Australian coal. In some markets, notably Japan, South Korea, and Taiwan, prefer higher energy content coals for power generations as less is required per unit of power generated, and have been boilers built on Australian coal specifications.

Exports are forecasted to remain steady over the next couple of years as production growth is limited by shortage of equipment. However, there are some uncertainties for the outlook of Indonesian thermal coal exports as the government tries to balance supply security against the risk of dampening incentives in exploration and investment activity.

Australia

In 2017, Australia produced 433 Mt of black coal. Of this, 40 percent was metallurgical coal exports and 46 percent was thermal coal exports and only around 14 percent was thermal coal for domestic consumption. Thermal coal exports in 2017 was 200 Mt, making Australia the second largest exporter of thermal coal globally after Indonesia (392 Mt). Japan is the largest importer of Australian thermal coal, accounting for over 40 percent in 2017, while China is the second largest (21 percent).

Australia produced around 254 Mt of thermal coal in 2017 and this output volume is expected to remain relatively stable in the near future. However, in the future there is room for expansion as Australia's coal exploration expenditures pay off. The MACH Energy's Mount Pleasant mine is expected to commence operations later in 2018, contributing up to 7.5 Mt of output annually. Also, in May 2018, the Queensland Government called for tenders to explore more then 520 square kilometers in the Bowen, Surat and Galilee Basins for coal, which is likely to support further growth in the sector. Until production levels increase, the volume of export is forecasted to stay around 200 Mt annually.

Mongolia

As seen in Figure 9 above, 10.7 Mt of thermal coal was exported from Mongolia in 2018. From January 2018 to July 2018, 4.1 Mt has been exported, which compared to the same period in the previous year is 1.8 Mt less. The main destination of these coal exports is to

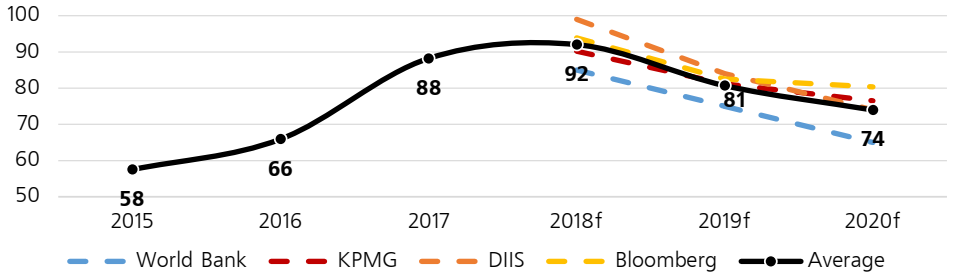
China. However as mentioned above, the volume of coal exports to China was substantial in the first half of the year and thus, exports in the second half of the year will likely be less, which means thermal coal exports from Mongolia will also likely decrease in the upcoming months until the end of the year.

Some of the goals undertaken by the NDRC is to stabilize the coal market and promote mid and long-term coal contracts. The expected results of this incentive are prevention of energy shortage, stabilization of coal prices and relieve apprehensions about future development. Thus, one of the ways in which Mongolia can maintain its coal trade relationship with China is by establishing more mid and long-term contracts. Cooperation between Mongolia and China would also ensure more stable sources of revenue for Mongolia, which is the kind of stability that is greatly needed in Mongolia as revenue and foreign direct investment into Mongolia is currently highly dependent on spot prices of mineral commodities.

PRICE

Thermal coal prices have been supported by strong demand from Asia and constrained supply. Prices rebounded from early weakness to finish down modestly in the second quarter of 2018.

Figure 14. Newcastle thermal coal forecast, USD per tonne



Source: World Bank, KPMG, Department of Industry, Innovation and Science, Bloomberg

The World Bank expects coal prices to average 85 USD per tonne in 2018, down from 2017, as inventories are replenished and consumption is curtailed. The Department of Industry, Innovation and Science forecasts spot prices to increase in 2018 to 99 USD per tonne before declining gradually as import demand growth slows relative to supply. Both China and India are expected to increase domestic thermal coal output.

CONCLUSION

World coking and thermal coal trade are generally comprised of a few key players like China, Australia, Indonesia, India and Japan.

Coking coal prices experience volatility due to supply disruptions like Cyclone Debbie in Australia in 2017 and the railroad maintenances this year. Whenever Australia experiences disruptions in supply or transportations, prices tend to experience a slight upward shock. Previously, China was the main importer of coking coal but this may change in the future as environmental policies are enforced. China's goal to combat air pollution has shut down inefficient mills and ramped up domestic production at major mills while also slowly starting the transition to electric arc furnaces. These measures have increased steel production as Chinese mills operate efficiently and in a more environment friendly way. However, the coking coal demand is being also addressed domestically as China implements number of policies to stabilize the price and quality of coal. As this trend continues, demand for imported coking coal will decrease. But as of now, the lag in Chinese demand is gradually being filled by increasing demand for coking coal in India. Thus, coking coal price forecast are expected to decline and stabilize around 140 USD per tonne in 2020.

Thermal coal prices experienced a slight increase in 2018 as demand from China was more than usual. China experienced hotter than average temperatures, weak hydro power production and limited domestic growth in its supply, which drove up import demand. This paired with constrained supply, is increasing price of thermal coal up to 92 USD per tonne in 2018. While productions of thermal coal remain level, exports are being affected by challenges in weather and transportation. The import quota placed by China on thermal coal is part of the government's incentive to support consumption of domestic production and to fight against pollution, which is dampening China's overall demand for imported thermal coal. As for other countries, they have been slowly shifting away from coal-fired power generation to cleaner energy sources. However, as coal is a cheap and easy alternative, during shortages of power, due to offline nuclear reactors or low production of hydro power or other reasons, import demand for thermal coal tends to increase. Thus, thermal coal price is forecasted to decline to 74 USD per tonne in 2020.

Mongolian coal export volume in 2018 is similar to 2017, which was considered very high as demand from China drove up export volumes as well as prices. Some of the challenges to coal exports are transportation constraints and limited infrastructure. Lack of sources of funding for planned projects continue hindering improvements to infrastructure which could increase the annual capacity of export routes via road, paved roads and railways. In addition to this, bottlenecks at border control continue to persist during peak seasons and remains unresolved. Thus, in order for Mongolia to increase its coal exports, it needs to improve its infrastructure and increase cooperation with China to address these issues

COPPER

WORLD MARKET

DEMAND SIDE

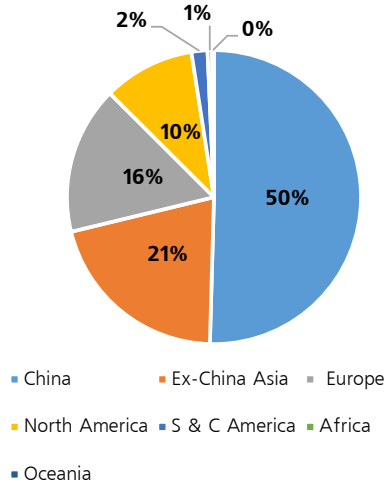
Copper is a key input of the construction, infrastructure, and manufacturing sectors. These sectors are an integral part of the economy and as such, higher copper demand is an indication of economic growth. In other words, the higher the economic growth rate, the more copper is consumed.

In 2017, total global refined copper usage was 23.4 Mt, exhibiting stable usage compared to the prior year. On a regional basis, Asia accounted for 70.5 percent of total demand. Of this, Chinese demand constituted over 50 percent of total demand alone, accounting for about 11.8 Mt. The United States, the second-largest refined-copper user, consumed about 1.8 Mt of copper, accounting for 7.6 percent of the global total demand. Among other major copper consuming countries, the apparent refined copper usage increased in India and Japan but declined in the United States, Germany and South Korea.

Table 4. Global demand for refined copper, thousand tonnes

Year	2017				2018	
Quarter	I	II	III	IV	I	II
Global Total	5647	6069	5922	5757	5627	5938
North America	606	602	547	549	579	584
USA	465	461	422	421	434	428
S & C America	187	180	144	107	90	114
Europe	900	1012	1020	883	908	974
Germany	1176 (whole year)				299	299
Asia	3909	4236	4164	4188	4012	4225
China	11790 (whole year)				2824	3011
Japan	998 (whole year)				243	257
India	486 (whole year)				141	117
Oceania	11	3	6	12	12	12
Africa	34	35	41	18	27	30

Figure 15. Copper demand on regional basis as of 1st half of 2018, percent



**Due to the data unavailability, China, Japan, India and Germany copper demand is not disaggregated by quarters*

Source: Bloomberg

As of the first half of 2018, global total copper usage was 11.6 Mt, a 1.3 percent decrease versus a year earlier. However, according to a report by Wood Mackenzie, the growth of the global economy is expected to drive a modest 2 percent increase in copper consumption in 2018. This is expected to increase to 2.2 percent in 2019. The main drivers of this growth in consumption are not only Chinese economic growth but also economic growth in emerging economies such as India. Another significant driver is the electric vehicle sector which has been gaining traction amidst increased concerns about environmental, social, and community impacts.

As defined by DBS, global copper consumption is entering a new growth phase driven by an "electrifying society." Currently, consumers all around the world are increasingly concerned about environmental issues and climate change. More and more consumers are choosing environmental friendly goods and services and considering renewable energy in their purchasing decisions. In particular, transition to electric vehicles from combustion engine vehicles is generating a huge demand for copper.

According to the APS, internal combustion engines use 23 kilograms of copper while hybrid-HEV electric vehicles require 40 kilograms, hybrid-PHEV vehicles 60 kilograms, and battery-BEV electric vehicles 83 kilograms of copper. Thus the global copper demand for electric vehicles is expected to increase by a factor of almost ten (global copper demand for electric purpose was 185 thousand tonnes in 2017) according to the APS.

China

China consumed 11.8 Mt of copper in 2017 and 6.8 Mt in the first half of 2018. Based on final usage, 45 percent of the total usage was for power, 15 percent for air conditioning and refrigeration, 10 percent for electricity, 5 percent for machinery, 15 percent for property and the remaining 10 percent was used for other purposes.

Chinese demand for refined copper is expected to be strong in both the mid and long term. The implications of the growth are as follows:

In 2017, China led with a per capita copper usage of 8.2 kg, a level comparable to the levels recorded by developed economies during their fastest rate of development, with a GDP per capita of 8830 USD. Meanwhile, major developed countries such as the US and Japan hit peak copper consumption from 1991-2010, averaging a copper consumption per capita of 11.5kg, with an average GDP per capita of 29000 USD. According to industry analysts, the Chinese per capita copper usage peak will exceed the historical peak level of other economies.

- As a part of the recent environmental policy, the Chinese government exempted electric and hybrid vehicles from the 10 percent purchase tax. The tax exemption was due to end in 2017 but the government of China has extended this exemption until 2020. The Chinese government has also started to subsidize new models of electric vehicles.
- Future Chinese limitations on scrap metal could also lead to greater copper concentrate and ore imports. For instance, in 2017, according to Trade Map, Chinese copper concentrate and ore imports have increased by almost 25 percent versus the previous year. Meanwhile, the restriction on scrap metal will drive up refined copper imports as well.

Overall, copper industry analysts forecast that Chinese refined copper usage is expected to increase by an average of 3.1 percent in the upcoming decade and that China will remain the dominant global user.

World demand (excluding China)

The major copper users ranked after China are the US, Japan, Germany and South Korea. In 2017, Ex-china global usage was 11.7 Mt, up 0.7 percent versus a year earlier mainly due to increased demand from Japan and Brazil. Meanwhile, ex-China demand for refined copper in the first half of 2018 was 5.7 Mt.

According to copper industry analysts, ex-China usage is expected to reach around 11.7 Mt in 2018, driven mainly by demand from the US and India. US copper demand is expected to go up due to expected production growth in the electric vehicle industry in addition to Trump's proposed infrastructure package. India will also be a major driver of global copper demand growth, supported by strong economic growth and the government's "Made in India" campaign, which is aimed at and has been successful in boosting the growth of India's manufacturing sector. Increased global demand for electric vehicles is also expected to drive up the global demand for refined copper in upcoming decades.

SUPPLY SIDE

Mining production

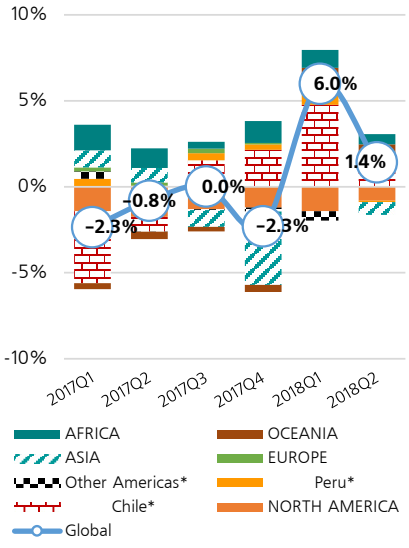
Overall, 2017 was an unpleasant year for the top global copper miners. Supply disruptions due to strikes at the Chilean Escondido and Peru's Cerro Verde mines, the Indonesian government's temporary ban on exporting copper concentrates as well as the fact that no new major copper projects were begun in 2017 were the main factors that contributed to the decrease in production. In addition to this, US, Canadian and Mongolian copper concentrate production decreased as a result of lower ore grades.

In 2017, the total global mine production of copper was 20.2 Mt, a 1.3 percent decrease compared to 2016. On a regional basis, copper mine production declined by 9.9 percent in North America, 4.1 percent in Asia, and 7.3 percent in Oceania. On the contrary, in comparison to the 2016, South and Central Asian, European, and African mine copper production grew by 0.2 percent, 2.3 percent, and 11 percent respectively (Table 5).

Table 5. Global mine production, quarterly, thousand tonnes

Year	2017				2018	
Quarter	I	II	III	IV	I	II
Global	4717	5071	5191	5196	5000	5144
N.America	665	662	658	639	598	621
S & C America	1853	2040	2169	2294	2083	2121
Chile	1192	1330	1439	1540	1417	1415
Peru	537	611	624	645	568	607
Europe	423	429	436	427	427	442
Asia	1004	1150	1142	1039	1042	1112
Oceania	238	239	234	242	267	267
Africa	535	551	552	554	583	581

Figure 16. Copper production decomposition on regional basis, Y-o-Y change, percent



**To highlight the top miner's impact, we divided South & Central America into Chile, Peru and others.*

Source: Bloomberg

Figure 16 illustrates the year-on-year changes in copper mine production by region. The decrease in the first half of 2017 was mainly driven by the decline in Chilean, US, Canadian

and Australian production whereas the contraction in the second half was caused by the decline in Asian mine production. On the other hand, in the first half of 2018, global copper mine production was equal to 10.1 Mt, up 1.4 percent in comparison to the same period of the previous year (Bloomberg). Year-on-year change in mine production in the first and second quarter of 2018 was 6 percent and 1.4 percent respectively.

Chile

Chile, the top copper producing country in the world, has the largest copper reserves in the world with an estimated 170 Mt of copper as of 2017, and constitutes more than one fourth (25 percent) of global copper mine production each year. Of the top 20 copper mines in the world, 8 mines (including Escondido, the world's largest copper mine) are located in Chile.

According to Bloomberg, Chile has mined 5.5 Mt (2.5 Mt in the first half and 2.9 Mt in second half of 2017) of copper in 2017, down 1 percent in comparison to prior year, due to the strike at the Escondida mine and as a result of bad weather. On the other hand, in the first six months of 2018, consolidated copper mine production was equal to 2.8 Mt, an increase of 0.3 Mt year-on-year. According to BMI Research projections, Chilean copper production is expected to increase by 2 percent in 2018.

Escondida: According to BHP Billiton, which owns 57.5 percent of the Escondida mine in Chile, a 44-day workers strike lasting from February to late March, in addition to severe weather in early June resulted in a 7.8 percent decrease in production. As a result, the Escondida mine produced 903 thousand tonnes of copper in 2017, an estimated 16 percent of total Chilean mine production (Reuters, 2018). Of this, 583 thousand tonnes of copper were mined in the second half as production resumed and the Los Colorados Extension project concentrator began operations in September 2017. As a result of the new Los Colorados concentrator, Escondida production rose to 630 thousand tonnes of copper in the first half of 2018. Production attributed to the new concentrator in FY2018 as of June 30 was 208.9 thousand tonnes of copper. Additionally, factors such as the expansion of an existing desalination plant and leaching process improvements are likely to support further production growth and offset the significant decrease in average concentrate head grade. For instance, according to the mining plans published by Escondida, copper production in FY2019 is expected to be between 1,120 and 1,180 thousand tonnes by June 30. On the other hand, according to BMI Research, limited water resources may require major investment and could cause higher costs in the long term.

Codelco: Codelco is the world's largest copper producer, engaging primarily in the exploration, development, and extraction of copper ores and by-products as well as the processing of ore into refined copper and the international sale of refined copper and by-products. Codelco is 100 percent owned by the Republic of Chile and controls approximately 7 percent of the world proven and probable copper reserves (Codelco, 2017). In 2017, the copper production of Codelco's nine mines increased by 0.8 percent up to 1842 thousand tonnes of copper. In the first half of 2018, consolidated copper mine production increased by 2.8 percent in comparison to the same period of the prior year.

Although Codelco's production increased in the last half of 2017, the average ore grade decreased from 0.70 to 0.67. However, Codelco is striving to produce slightly more than 1.7 Mt of copper in 2018, counterbalancing decreasing ore grades The company is planning to increase its productivity by 18 percent by the end of 2018. Additionally, Codelco is planning to invest 39 billion USD over the next 10 years to expand the shelf life of its aging facilities (Reuters, 2018).

Table 6. Copper mine productions of mines owned by Codelco, thousand tonnes

Mines	2017H1	2017H2	2018H1	Y-o-Y Δ%
Chuquicamata	116	215	137	18.1
Radomiro tomic	152	167	178	17.1
Mina Ministro Hales	113	102	97	-14.2
Gabriela Mistral	60	63	50	-16.7
El Teniente	219	245	225	2.7
Andina	112	108	101	-9.8
Salvador	27	35	26	-3.7
El Abra (20 percent)	18	20	22	22.2
Anglo American Sur (49 percent)	35	35	40	14.3
CODELCO Total	852	990	876	2.8

Source: Codelco, 2017

Peru

Peru holds 81 Mt, roughly 13 percent of the world total, in copper reserves. In 2017, the country recovered its position as the second-largest producer of copper. Of the top 20 mines, 4 mines are located in Peru. In 2017, the national output increased by 2.7 percent, reaching 2.39 Mt, accounting for 12 percent of total global copper output. Meanwhile, in the first half of 2018, copper mine production was estimated at 1.2 Mt. A key driver of the growth in production was attributed to the Cerro Verde mine's improvement in productivity and copper grade.

Cerro Verde: According to Wood Mackenzie, Cerro Verde was ranked third in terms of copper output in 2017. The Cerro Verde[9] expansion project, which began in September 2015, achieved capacity operating rates in early 2016. The project expanded the concentrator facilities' capacity from 120 thousand tonnes of ore per day to 360 thousand tonnes of ore per day. Cerro Verde's expanded operations benefit from its large-scale, long-lived reserves and cost efficiencies (Freeport-McMoran, 2018). According to the Freeport-McCoran annual report, in the fourth quarter of 2017, the Cerro Verde mill complex operated above the design capacity of 360 thousand tonnes of ore per day, and in March 2018, set a record of 469 thousand tonnes of ore in a 24-hour period (Freeport-McMoran, 2018).

The Peruvian government has also set a goal to increase its copper production by 30 percent by 2021 in order to keep its position as the second largest copper producer in the world.

Not only due to the aforementioned goal but in order to take advantage of higher copper prices, a number of exploration projects have been gaining traction across the country. In particular, two mining companies working on the Antakori and Pinaya projects, currently the largest projects in Peru, have already declared that they plan to continue to focus on exploration activities near the major existing project locations.

[9] 53.36 percent is owned by Freeport-McMoRan. As of the end of 2017, total copper reserves are estimated at 25.6 billion tonnes with an average ore grade of 0.37.

Asia

The main players of the Asian copper market are China (33 percent of total Asia output as of 2018H1), Indonesia (19 percent), Kazakhstan (18 percent) and Mongolia (7.4 percent). In 2017, copper mine production in China, Indonesia and Mongolia decreased, leading to an overall decline in Asian copper production. However, production surges in Kazakhstan have partially compensated for this decline.

China: In 2017, China ranked third in copper mine production, producing 1.8 Mt of copper (9.2 percent global total copper mining output and 42.9 percent of Asian copper output), down 2 percent compared to 2016. The decrease was mainly due to the lower ore grade. In the first six months of 2018, China produced 705 thousand tonnes of copper (Bloomberg, 2018). According to a report published by BMI Research, Chinese copper miners are likely to remain committed to investing in copper deposits abroad to secure access to high-grade, low-cost materials. Chinese copper mine production growth is expected to slow down in the future due to the refineries' preference for imported copper concentrates. Importing is an attractive option due to the higher ore grade, made more financially viable due to currency depreciation in Chile and Peru and low shipping costs.

Indonesia: Indonesia's copper mine production declined from 727 thousand tonnes in 2016 to 650 thousand tonnes in 2017. This decrease was mainly due to the Indonesian government's temporary ban on the export of copper concentrate, which lasted for 12 weeks from January 12 till April. The CEO of Freeport-McMoRan said that "For each month exports are banned, Grasberg[10] output is reduced by 35 thousand tonnes of copper" (Reuters, 2017). As of the first half of 2018, production has recovered and an estimated 408.5 thousand tonnes of copper were produced. The recovery of the Grasberg mine's operations and higher ore grades are expected to further support mine production in upcoming years. The Grasberg mine's underground ore bodies are expected to produce large-scale quantities of copper and gold following the transition from open-pit mining in early 2019.

North America

Due to a decrease in ore grade, North American mining production decreased moderately in 2017. For instance, US copper mine production decreased by almost 11 percent as a result of lower grades. Reduced mining rates in early 2017 when copper prices were lower as well as poor weather conditions also contributed to lower production. Canadian and Mexican mine production decreased by 17 percent and 1.5 percent respectively. This decline in mine production continued into the first half of 2018 with North American copper mine production decreasing by 9 percent year-on-year, dropping to 1.2 Mt. According to BMI Research forecasts, the decline in North American mine production will continue in the mid-term. In particular, US annual mined copper production is expected to be stable around 1.2 Mt in 2018 and 2019.

Africa

In the last six quarters, African copper mine production continuously increased and reached 2.2 Mt in 2017, an 11 percent increase versus the prior year, and accounted for 10.9 percent of total global mine production. The growth in production continued into 2018, with production estimated to equal 1.2 Mt in the first six months of this year. In 2018, production also benefited from the re-starting of temporarily closed mines in the DRC and Zambia. It also benefitted, to a lesser extent, from several new projects and expansion

[10] The second-largest mine in the world

streams. In particular, the recovery of the Katanga mine in the DRC will be a key driver of African output in 2018 and 2019. After 2019, new projects such as the Kamao mine, expected to rank within the top three reserves in the world, and the Kipushi mine are expected to drive growth.

Short-term outlook of global copper mine production

Overall, global copper mine production is expected to increase in 2018 by about 3 percent due to the recovery in production of the top mines in Chile and Indonesia as well as due to the re-starting of mines in the DRC and Zambia (ICSG, April 2018). In addition, copper miners' efforts to lower costs and increase productivity are the main factors that contribute to further industry production growth. In 2019, mine production is expected remain flat at 2018 levels. Copper ore grade declines in North America, Argentina, and Mongolia are likely cause a decline but new planned projects will offset the expected declines.

However, in the long-term, the copper mine industry will need significant investment in order to maintain its sustained production level. For instance:

- Availability of power and water: The mining industry can have severe detrimental effects on the local ecology and lead to a scarcity of water and power. As such, miners are asked to prioritize operating in an environmentally friendly manner. According to such requirements, in January, Codelco and BMW announced the 'Responsible Copper Initiative', aimed at improving the commitment to ecological and social responsibility in the copper industry. In the future, miners will increasingly need to switch to seawater, instead of depleting scarce freshwater sources, and increase renewable energy use, leveraging Chile's significant solar and wind power capacities. This initiative will require a significant investment from miners.
- Copper ore grade decline: Grade decline has already been encountered by some countries. The average world copper ore grade is projected to decrease down to 0.53 by 2025. To compensate for the decline, copper miners are seeking new deposits around the world.
- Labor negotiation disputes: About 32 labor contracts at copper mines are due for negotiations in 2018. This is the highest number since 2010. Labor disputes during the negotiation process may incur high losses for miners.

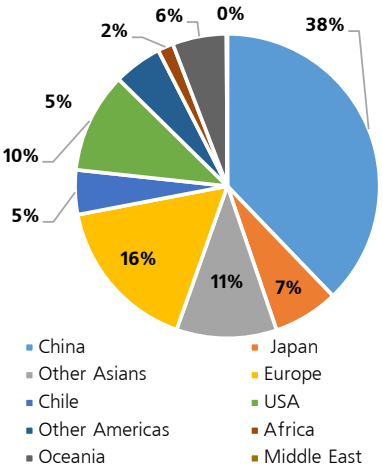
Refinery production

In 2017, global refinery production of copper was 23.4 Mt, a 0.4 percent increase from 2016. Meanwhile, in the first half of 2018, refinery production was 11.7 Mt. On a regional basis, refinery production increased in China, the top refinery producer, by 453 thousand tonnes or 5.4 percent, and in India by 10.2 percent. On the other hand, this increase was partially offset by refinery production decreases among the top global refinery producers after the US. In particular, refinery production decreased in Chile (-7 percent), Japan (-4.2 percent) and the US (-13.9 percent) (Bloomberg, 2018). In terms of production methods, the electrolytic method (from concentrate) accounted for 67 percent, the SX-EW method constituted 15 percent and the remaining 18 percent of refinery production was from secondary production (recycled).

Table 7. Global refinery production, thousand tonnes

Year	2017				2018	
Quarter	I	II	III	IV	I	II
Global Total	5732	5897	5898	5871	5874	5805
North America	496	451	432	414	474	448
USA	300	259	258	235	283	267
S & C America	761	804	788	771	708	760
Chile	558	608	619	646	603	638
Europe	975	1019	1016	976	966	966
Asia	3107	3219	3246	3297	3276	3180
China	2133	2224	2251	2281	2207	2199
Japan	375	375	387	351	398	410
Oceania	96	118	110	77	97	97
Africa	285	273	291	318	334	334

Figure 17. Refinery production on regional basis as of 1st half of 2018, percent



Source: Bloomberg

Short-term outlook of global refinery production

According to the ICSG, global refinery production is expected to increase by 4.3 percent and 0.6 percent in 2018 and 2019 respectively. Furthermore, the average annual growth rate is forecasted at 3 percent in the upcoming 5 years. The major factors to the growth are:

- Increased availability of copper ore and concentrate: Mine production is expected to increase by 3 percent in 2018. The recovery of top miners and pending new projects are likely to drive the availability of copper ore and concentrate up.
- Global refinery capacity is expected to grow by an average of 2.6 percent annually, reaching 31.1 Mt by 2022. The major contributor is China, which has several pending smelting projects available to produce 1.7 Mt of refined copper. Meanwhile, India's Vedanta plans to double its smelting capacity.
- Increased availability of scrap allowed world secondary refined production to increase, most notably in China, last year. However, China's restriction on scrap imports, which is estimated to remove 500 thousand tonnes of copper supply from overall world supply, is expected to decrease secondary refinery production in China. This is expected to cause a 2 percent decrease in China's 2018 refinery production, though new projects could help offset this decrease in production.

Refined copper balance

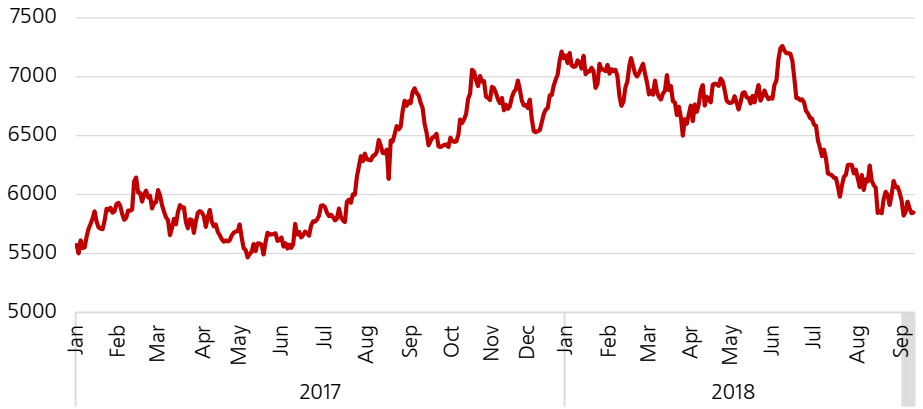
In 2017, the refined copper balance was 1.6 Mt according to data collected from Bloomberg. Furthermore, although refined copper supply is expected to increase, demand is expected to grow at a faster rate. Thus, industry analysts have predicted a possible structural shortage in copper, expected to occur in late 2019. According to Bloomberg, the market is likely to be balanced in 2020 and in a deficit of 120 thousand tonnes of copper in 2021.

PRICE

Since the third quarter of 2017, copper prices continued to rise, reaching a four-year high of 7261.8 USD per tonne on 8th June 2018. The supply disruption due to strikes at several large mines, bad weather conditions, and US President Donald Trump's promise to invest more in infrastructure pushed the price of copper up in 2017.

In the first half of the 2018, the growth in copper price continued as a result of increased demand generated by emerging economies and global economic growth. However, the growth rate has since slowed down due to the recovery of production of the top mines. Since the beginning of the third quarter of 2018, price has dropped due to supply growth, concerns of a slowdown in China's property sector as well as due to the US-China trade war. Prices fell below 6000 USD per tonne by the end of the third quarter of 2018.

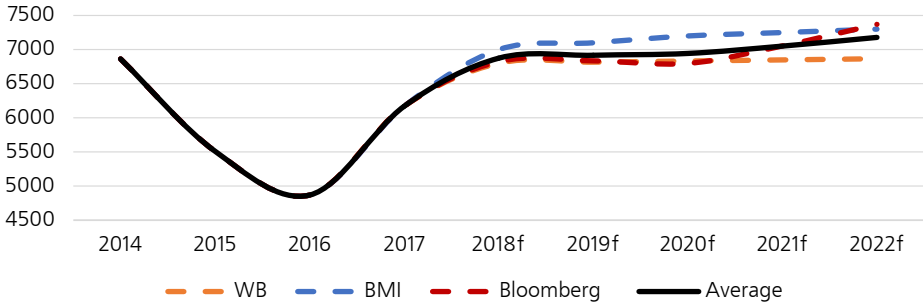
Figure 18. LME copper price, USD per tonne



Source: London Metal Exchange Copper

However, industry analysts forecast that the the current copper price decline is temporary and the strong demand for copper and upcoming deficit will increase the price again. The copper price is expected to increase up to about 7200 USD per tonne by 2022.

Figure 19. Price projection, USD per tonne



Source: World Bank, BMI Research, Bloomberg

According to BMI Research forecasts, copper prices are expected to increase up to 7300 USD per tonne by 2023. Uncertainty over the outcomes of various disputes between the US and key trading partners will keep a cap on prices and presents a major downside risk

to the forecast. In the long term, prices are expected to grow as a result of China's power and construction sector in addition to growing world demand for electric vehicles.

On the contrary, the World Bank expects copper price to average around 6800 USD per tonne, increasing to 6883 USD per tonne by 2023. The upcoming expected structural deficit in 2019 due to the strong world demand fueled by electric vehicles, global economic growth as well as the growth in refinery and mine production will be the main factors that affect price growth.

While the Bloomberg forecasts show that copper price is expected to be stable around 6800 USD per tonne until 2020 and beyond the 2021 the price is expected to increase and reach 7370 USD per tonne by 2022.

MONGOLIAN MARKET

DEMAND SIDE

Demand for Mongolian copper is determined on the domestic side by demand from the construction and manufacturing sectors and on the export side by demand from foreign smelters and refineries.

Domestic demand

The local demand for copper is supplied by Erdmin Co.Ltd (hereafter expressed as Erdmin) and Achit Ikht Erdmin Co.Ltd (hereafter expressed as Achit Ikht) products as well as imported products. Most of the local demand is generated by the construction and infrastructure industries. Thus the local demand is highly dependent on economic growth as the driver of production in the construction and infrastructure industries.

In 2017, Mongolian imports of refined copper decreased by 13 thousand tonnes, dropping to 114.8 thousand tonnes, with a value of 1.6 million USD. The key factors that resulted in lower demand in 2017 can be attributed to the economic growth slowdown since 2014, FDI decline and the mortgage loan program freeze. Since 2016, the Ministry of Finance limited the aggregate size of the subsidies given to finance mortgage loans leading to a slowdown in growth in the construction sector. However, under the IMF's Extended Facility Program, which was first implemented in 2017, the Mongolian government is committed to transferring the mortgage loans on the Bank of Mongolia's balance sheet to the Government of Mongolia. Furthermore, the government is planning to support mortgage loans with a certain level of subsidization in the future.

In the first half of 2018, Mongolia imported 87 thousand tonnes of refined copper, up 47 percent from 59 thousand tonnes in 2017. Economic recovery, as highlighted by the 6.3 percent GDP growth observed in the first half of 2018, and mining sector developments were the key factors behind this growth.

Positive economic growth projections and increased FDI inflow are expected to drive up the local copper demand. For instance, according to the latest IMF forecast, Mongolian economic growth is expected to be stable around 5 percent per annum until 2023. FDI inflow into major mining projects such as Tavan Tolgoi and Oyu Tolgoi will also have a positive effect on the domestic infrastructure and construction sectors' production as well as on copper consumption.

Copper export

Refined copper: Erdmin and Achit Ikht exported a combined 15.6 thousand tonnes of refined copper valued at 75 million USD in 2017. Of this, 99.7 percent was copper cathode

and alloy. In the first six months of 2018, the two companies exported 0.7 thousand tonnes of refined copper, valued at 46.8 million USD, exhibiting a 17 percent year-on-year decrease.

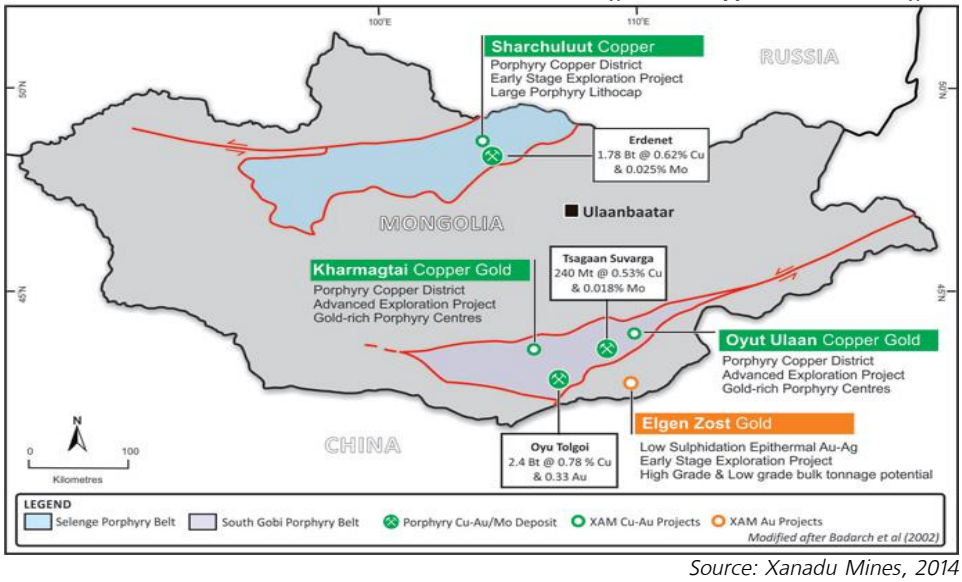
Copper concentrate: Foreign demand for Mongolian copper can be measured by copper exports. The entirety of Mongolian exported copper concentrate goes to China, making Mongolia the third-largest copper concentrate exporter to China. According to the Mongolian Customs Office, Mongolian exports of copper concentrate decreased by 114.8 thousand tonnes, or 7.3 percent, to 1447 thousand tonnes in 2017. However, the average border price increased by 85.3 USD and the total value increased by 5.4 million USD. In the first half of 2018, copper concentrate export increased by 0.8 thousand tonnes year-on-year, reaching 733.7 thousand tonnes. The average border price increased by 338.6 USD, reaching 1,432.0 USD in 2018H1 from 1043.5 USD in 2017H1. As a result of the price increase, copper concentrate export value in the first half of 2018 reached 1014 million USD, an 8 percent increase year-on-year.

In 2017, the Chinese government's environmental policy negatively affected demand as numerous old smelters and refineries in Northern China were shut down. However, as mentioned above, Chinese demand for copper concentrate will be strong in the mid and long term due to the government's ban on the import of copper scrap, increased electric vehicle demand and strong economic growth. Thus Chinese demand for Mongolian copper concentrate will be strong in the mid and long term.

SUPPLY SIDE

By the end of 2017, Mongolian total copper reserve was estimated at 53.6 billion tonnes. In 2017, about 163 Mt of copper reserves in the western and central parts of Erdenet mine were registered. Currently, the Oyu Tolgoi and Erdenet mines are operational while other copper projects, highlighted in figure below, are in the exploration phase. (Appendix 1)

Figure 20. Copper mines in Mongolia



Source: Xanadu Mines, 2014

Refined copper

In 2017, Erdmin and Achit Ikht, the only two producers of refined copper in Mongolia, produced a total of 16 thousand tonnes of copper cathode, exporting 15.7 Thousand tonnes. Achit Ikht produces copper cathode utilizing SX-EW technology and exports all of its output to Chinese copper refineries, whereas Erdmin produces not only copper cathode but also copper wire products and supplies the copper wires to the domestic market. Erdmin has been producing electric copper wires since 2007 and sells its products through its company stores in Ulaanbaatar and Erdenet.

Copper concentrate

Copper concentrate is one of the major exporting commodities of Mongolia. In particular, copper concentrate export revenue constitutes almost 30 percent of total Mongolian export revenue per annum (Mongolian Customs Office, 2017). The Oyu Tolgoi and Erdenet mines are the main supplying center of copper concentrate in Mongolia.

In 2017, Mongolia produced 1317.1 thousand tonnes of copper concentrate, exhibiting a 128-ton decrease in production in comparison to 2016. The decrease was mainly due to the Oyu Tolgoi ore grade decline and underground development. Whereas in the first six months of 2018, total copper concentrate production was 653.7 tonnes, up 1 percent from the previous year.

Table 8. Copper concentrate production, thousand tonnes

	2017H1	2017H2	2018H1
Total production (by metal content)	647.4	582.9	653.7
Here of :			
1. OT mine	347.0	375.4	356.1
OT- Average concentrate grade	21.7	21.9	21.9
OT – (Cu)	75.3	82.1	78.2
2. Erdenet	300.4	207.5	297.6
(Cu)	69.1	49.8	71.4
Total export	732.9	745.0	714.3
Here of :			
1. OT mine	372.2	352.1	383.1
OT- (Cu)	76.7	72.6	80.4
2. Erdenet	360.7	392.9	331.2
(Cu)	83.0	94.3	79.5
Balance of concentrate	-85.5	-169.2	-85.5

Source: OyuTolgoi Quarterly Report, Mineral Resources and Petroleum Authority of Mongolia

Oyu Tolgoi: In 2017, Oyu Tolgoi's open pit production continued to set records and the underground project progressed according to plan, moving towards becoming the third-largest copper mine in the world (Turquoise Hill, 2018). In particular, the materials mined from open pit reached 105 thousand tonnes, displaying a growth of 15 percent, the largest since 2015. Throughout 2017, open-pit mining focused on Phase 6, which contained low-grade ore, as well as the continued stripping of Phase 4. Stockpiled ore was also processed during the year.

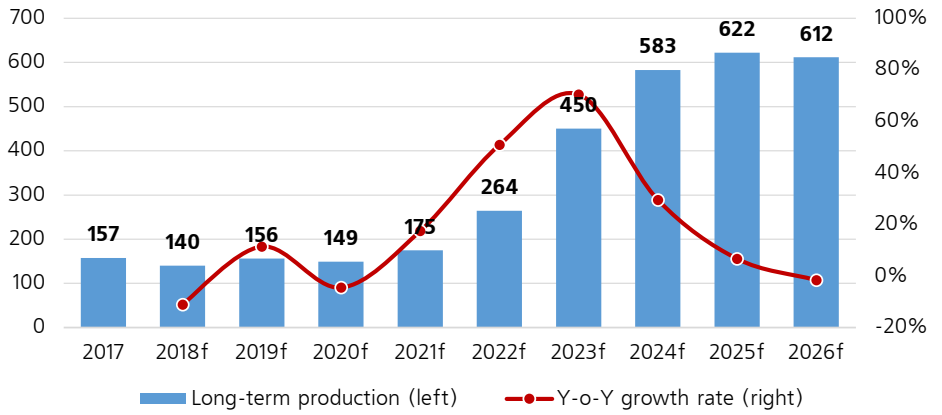
According to Turquoise Hill, Oyu Tolgoi is projecting to produce 125 thousand tonnes to 155 thousand tonnes copper in 2018. Open-pit operations are expected to mine in Phase

6 in early 2018 and Phase 4 throughout the year. As of the first half of 2018, Oyu tolgoi has mined 71.4 thousand tonnes of copper or performed almost 50 percent of its plan and under the Oyu Tolgoi underground development plan, the shaft 5 ventilation system was fully completed.

Meanwhile, a tax dispute arose between Oyu Tolgoi and the Mongolian Tax Authority in 2018. On January 16 2018, the Mongolian Tax Authority announced the result of an investigation by the Swiss Office of the Attorney-General that declared that Oyu Tolgoi avoided 155 million USD in taxes between 2013 and 2015. Rio Tinto disputes that Oyu Tolgoi has paid all taxes and charges required under the 2009 Oyu tolgoi Investment Agreements and has announced that if they cannot reach agreement with Government of Mongolia in 60 days, it will take the tax dispute to international arbitration. Due to the tax dispute, a power plant agreement, made between Oyu Tolgoi and the National Power Transmission Grid of Mongolia, was cancelled in February 2018.

Turquoise Hill forecasts that 80 percent of Oyu Tolgoi's mine value resides underground and that once completed the underground expansion will drive up copper production and more than triple (340 percent up) current production by 2025, when production is expected to peak. The underground mine also has higher metal grade ore and no waste rock. For example, in the case of open pit mining, in order to produce 29 kg of copper, 17 tonnes of material is dug and mined and of this, 12 tonnes of waste is produced while the remaining 5 tonnes of ore is transported to a processing plant. On the contrary, in the case of underground mining, 1.7kg of mined materials will mined and all of the mined material will be transported to a processing plant in order to produce 29 kg of copper.

Figure 21. Long term copper production projection of Oyu Tolgoi mine, thousand tonnes



Source: Turquoise Hill

According to Ergo Strategy, the current open pit mine and underground expansion has mineral reserves that will provide ore for the next 40 years of mining and Oyu Tolgoi is expected to be a key driver of the Mongolian mining sector in the near and long term.

Erdenet: According to the Erdenet, they process 26 Mt of ore and produce 530 thousand tonnes of copper concentrate on average per year. The Mongolian Copper Corporation purchased 49 percent of Erdenet mine from Russia in 2016 and the mine is currently 100 percent Mongolian owned. However, the Government of Mongolia is currently making efforts to take full control of the Erdenet mine by buying the 49 percent owned by MCC

for about 400 million USD. MCC announced that they are considering international arbitration against the government appeal.

Tsagaan Suvarga: Tsagaan Suvarga Mountain is located in the territory of Mandakh soum, Dornogobi. The Tsagaan Suvarga deposit contains 250.3 Mt of ore reserves. Of this, 1.6 Mt is copper while 66.1 thousand tonnes is molybdenum. The deposit is 7.5 times smaller than the Erdenet deposit and 26.8 times smaller than Oyu Tolgoi's deposite (Mongolian Mining Journal, 2017). Initially, the project's production was expected to begin in Q3 2014. However, in Q1 2013, construction was halted and production is expected to start in 2019.

Short term outlook of Mongolian copper supply

According to the Government Budget Plan, copper concentrate production is expected to be 1.36 Mt, an increase from the 1.2 Mt produced in 2017. On the other hand, BMI Research forecasts copper mine production will increase by 4 percent and 15 percent in 2018 and 2019 respectively. Oyu Tolgoi is expected to be the key driver of growth in upcoming years. However, new projects, which are in the exploration and construction phases, are also expected to support production growth in long term.

However, there are some potential risks which could harm the country's investment climate. Negative factors such as increased government intervention, unclear tax regulations and revenue distributions, as well as weak economic conditions with high public debt and low fiscal discipline could cause lower foreign investment in the mining sector.

CONCLUSION

Since the third quarter of 2017, copper prices have continued to rise, reaching a four-year high of 7261.8 USD per tonne on 8th June 2018. This was mainly due to supply disruptions and US President Donald Trump's promise to invest more in infrastructure. However, since the beginning of the third quarter of 2018, the price has dropped due to supply growth, concerns of a slowdown in China's property sector as well as due to the US-China trade war. Recent price projections from industry analysts were in line with the projections made in previous reports. The copper price is expected to increase in upcoming years and beyond due to strong worldwide demand and constrained supply. According to the projections the average price of copper will reach 7179 USD per tonne by 2022.

Global copper demand was flat during 2017 and decreased slightly in the first half of 2018 due to lower demand from China. According to Wood Mackenzie, the health of the global economy is to drive a modest 2 percent acceleration in copper consumption growth in 2018. Copper consumption is then predictable to grow to 2.2 percent in 2019. In addition to Chinese economic growth, economic growth from emerging economies such as India is expected to generate greater copper demand. Another significant source of demand is the "Electrifying society" phenomenon described above which has been gaining traction and is concerned with environmental, social, and community responsibility.

Supply disruptions due to strikes at the Chilean Escondido and Peru's Cerro Verde mines, the Indonesian government's temporary ban on exporting copper concentrate as well as the fact that no new projects were started led to a 1.3 percent production decrease in 2017. However, in the first half 2018, supply disruptions at the world's top mines were fixed and production increased by 1.4 percent year-on-year. According to industry analysts, global copper mine production is expected to increase in 2018 by 3 percent and remain flat in 2019. On a regional basis, production in Chile, Peru and the DRC are likely to grow whereas forecasted production decreases in Mongolia, USA and Canadian are expected to partially offset the growth.

Refined copper production remained essentially unchanged in 2017 and in the first half of 2018. According to the ICSG, global refined production is expected to increase by 4.3 percent and 0.6 percent in 2018 and 2019 respectively. Increased availability of copper ore, concentrate, and scrap, as well as refinery capacity expansions are estimated to push up refinery production. Although the refined copper supply is expected to increase, demand is anticipated to grow at a faster rate. Thus, industry analysts have predicted a possible structural shortage in copper, expected to occur in late 2019.

For the Mongolian market, anticipated economic growth is expected to increase local demand slightly. The Chinese demand for Mongolian copper concentrate is also likely to be strong in the mid and long term due to the government's ban on importing copper scraps and overall increasing electric vehicle demand. On the supply side, refined copper production is expected to be flat whereas copper concentrate production is expected to decline due to the grade decline of Oyu Tolgoi in short term. However, in the long run, production is expected to increase noticeably due to the Oyu Tolgoi underground mine development as well as the Tsagaan Suvarga and other new mining projects.

GOLD

WORLD MARKET

DEMAND SIDE

World demand for gold in the first half of 2018 fell by 6 percent compared to the same period last year (World Gold Council, 2018). Gold demand is made up of demand for jewelry, investment, technology and reserve assets by central banks. Of this, jewelry and investment make up the majority of world demand for gold.

Table 9. World gold demand, tonnes

	Jewelry	% of total	Investment	% of total	Technology	% of total	Reserves	% of total	Total
2017H1	1035.8	49.6	711.8	34.1	160.3	7.7	178.6	8.6	2086.6
2018H1	1031.2	52.6	570.1	29	165.4	8.4	193.3	10	1959.9
Y-o-Y Δ%	0		-20		3		8		

Source: World Gold Council

Jewelry

Gold demand for jewelry is the largest subcategory of gold demand and is dominated by Chinese and Indian demand, the largest and second largest consumers of gold for jewelry respectively. Gold demand for jewelry in the first half of 2018 remained largely unchanged from the same period of the previous year (World Gold Council, 2018). This is in line with our previous prediction that jewelry demand will remain sluggish as Indian demand contracts after increasing sharply in first half of 2017. In particular, Indian demand decreased by 12 percent and 8 percent respectively in the first and second quarters of 2018 compared to the same time last year (PTI, 2018). This decrease is attributed in part to inflated demand in 2017 as people bought gold ahead of the introduction of the Goods and Services Tax (GST) in July 2017 and due to higher domestic gold prices as the Indian rupee fell 8 percent this year despite global gold prices declining (GFMS, 2018). Additionally, while Indian demand increased with the wedding season and the Akshaya Tritiya festival, this did not offset suppressed demand and was then followed by Adhik Maas, an inauspicious time in India in which major purchases are discouraged, which further dampened gold demand (World Gold Council, 2018).

Table 10. Chinese and Indian gold jewelry demand, tonnes

	2017Q1	2018Q1	Y-o-Y Δ%	2017Q2	2018Q2	Y-o-Y Δ%
India	99.2	87.7	-12	161	147.9	-8
China	175.6	187.8	7	137.6	144.9	5

Source: World Gold Council

However, while gold demand for jewelry fell in India, the second largest consumer of gold for jewelry, the decrease was offset by an increase in demand from China, the world's largest consumer, where gold demand for jewelry increased by 7 percent and 5 percent in the first and second quarters of 2018 as compared to 2017 (World Gold Council, 2018). This marks a departure from the declining trend China has exhibited since demand peaked in 2013 (GFMS, 2018). This shift is attributed to a change in the domestic gold industry of

China as it moves away from focusing purely on gold content and traditional designs towards more innovative, modern designs and an improved shopping experience targeted at the younger generation (World Gold Council , 2018).

As for other countries, the decreased demand in the Middle East following a new VAT[11] on gold jewelry was offset by modest increases in demand by the US and Europe (World Gold Council, 2018).

Looking forward, while Indian demand may increase in the second half of 2018 as the rural population buys gold for upcoming festivals, this increase is unlikely to offset the decreases in the first half of the year (Jadhav, 2018). On the other hand, the Chinese focus on consumer wants and the shift towards a more consumer-driven economy should result in increased jewelry demand in the near future (World Gold Council , 2018). As jewelry demand excluding India and China are stable as a whole and are not expected to drastically impact future demand, future gold demand growth for jewelry is expected to be minimal but positive with China leading the way (GFMS, 2018).

Investment

Gold for investment, consisting mainly of exchange traded fund products (ETFs) and bar and coin, saw the largest shift in demand, exhibiting a 20 percent decline in the first half of 2018 in comparison to the same time last year. This is in line with the ongoing trend of decreased demand for investment following its peak in 2016. As bar and coin demand remained stable with a 0 percent year-on-year change in 2018Q2, the drastic decline in investment was due to changes in demand for ETFs (World Gold Council, 2018). Peaking in 2016 amidst geopolitical instability following the US elections in 2016, demand for ETFs has continuously fallen since, reaching 33.83 tonnes in 2018Q2, exhibiting a 46 percent decrease from its 62.51 tonne value in 2017Q2 (World Gold Council, 2018).

The attractiveness of gold as an investment is based on several key factors, most notably perceived economic outlook, geopolitical stability, interest rates, and the value of the USD. Therefore, the value of gold as an investment is largely reliant on the state of the US economy.

In terms of geopolitical stability and economic outlook, according to the Global Economic Policy Uncertainty Index (GEPU index), a measure of perceived political uncertainty, the GEPU has declined from an average of 245 and 177 in the first and second quarter of 2017 to 133 and 171 in the first and second quarter of 2018 (Economic Policy Uncertainty, 2018). This seems to suggest that despite destabilizing political events including the Italian elections, tensions with North Korea earlier in the year as well as the escalating trade war between China and the US, overall geopolitical uncertainty is lower as sentiments about the US economy seem more positive (GFMS, 2018). Additionally, according to the IMF's July World Economic Outlook Update the US economy is expected to strengthen in the short term as previously forecasted, though trade issues are expected increase the US current account deficit and widen global imbalances (IMF, 2018). In light of these more optimistic sentiments, people are turning away from gold as a stable investment, choosing to invest in alternatives with higher returns.

The USD has also been increasing in value, with the price of gold falling in turn, highlighting the negatively correlated relationship between gold and the USD (Hecht, 2018).

[11] In January 2018, the UAE government imposed a 5 percent VAT on most goods and services. In light of dropping demand, with some sources stating that gold sales dropped 50-60 percent y-o-y in 2018Q1, the government has repealed the VAT for gold and diamonds. However, this reversal is only at the wholesale level, meaning consumers are still burdened with the VAT on gold and precious metals

Additionally, in terms of interest rates, while the US Federal Reserve decided against increasing the interest rate this past August, it has signaled that there will be continuous raises in 2018, with the Chairman of the Federal Reserve emphasizing the expanding US economy and unemployment and inflation rates within its target levels (El-Erian, 2018). These likely increases will make other forms of investment more attractive and dampening overall demand for gold for investment.

Looking forward, as gold investment levels seem to have normalized since 2016, it is unlikely that it will dramatically drop in the future. Still, depressed prices and the attractiveness of other investments don't bode well for gold, though gold for investment remains an option against the USD and underlying geopolitical tensions. As such, continuing into 2018, demand for gold for investment is expected to remain sluggish.

Technology

Gold technology demand grew in the first half year of 2018 by a modest 3 percent. The bulk of this growth was due to increased demand from the electronics industry, with particular increases from the memory and wireless sectors (World Gold Council, 2018). While technology may not be the largest contributor to overall gold demand, it's still a viable sector that has displayed consistent growth for the last 7 quarters. Gold in technology naturally faces issues of substitution as gold is a more expensive component compared to other metals. Typically, gold is used to coat connectors and contracts and for bonding wiring, though in many of these uses, producers have been trying to replace using gold with copper (Chou, 2018). This dampened the demand for gold in the electronics sector, but is likely to make a reversal as the memory and wireless sectors become more prominent. Gold is used in the new 5G infrastructure expected to launch in the US, China, Japan, Korea and Taiwan, as well as in the automobile industry in electric and autonomous driving cars. Gold also plays an important role in 3D sensors, used in the VR and smartphone industry for face recognition (Chou, 2018). As the technology industries mentioned above are on the rise, the demand for gold is expected to rise in conjunction as a viable substitute for gold has not yet been found.

Another industry which could lead to large shifts in gold demand is the polyvinyl chloride (PVC) industry. PVC is a widely used synthetic plastic that employs the use of high concentrations of mercury. With the health risks associated with mercury as well as the Minamata Convention on Mercury established by the UN's Environment Program in August 2017, there have been efforts to change the way PVC is produced. One possible alternative is to use gold, which doesn't have the negative effects associated with mercury and can also be recovered later after the production process (Haandel, 2018). The PVC industry is dominated by China and would require a very significant amount of gold upfront to convert production away from mercury, however after this initial investment, the recovered gold can be then used for other end-products (Haandel, 2018). It is hard to tell whether China will revamp its PVC industry though international pressure along with its recent commitments to environmental sustainability may help. Regardless, after a few sluggish years at the beginning of the decade, technology is a growing, albeit small in comparison to industries such as jewelry, industry to boost gold demand (Keel, 2018).

Reserves

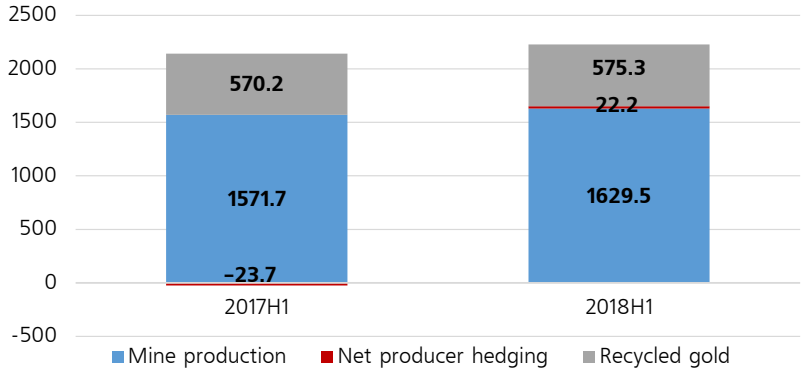
Reserves increased by 8 percent in the first half of 2018, going from 178.6 tonnes in 2017H1 to 193.3 tonnes in 2018H1. This is in line with our previous expectation that gold remains an attractive way to diversify central bank reserves. As in 2017, these increases were mainly driven by Russia, Turkey and Kazakhstan. In Russia's case, buying gold is a way for its central bank to diversify away from the USD amidst rising geopolitical tensions

gold, though its rate of buying was slightly lowered (World Gold Council, 2018). Kazakhstan also continued its 68-month gold buying streak, increasing gold reserves as a buffer against geopolitical and macroeconomic risks (Astana Times, 2018). On the other hand, there were a handful of countries reducing their central bank reserves, exhibiting a total decrease of 11.9 tonnes with the largest contributor being Venezuela (World Gold Council, 2018). However, this decrease was offset by purchases from the aforementioned countries. Moving forward, reserves are expected to increase as Russia, Turkey and Kazakhstan seem committed to their strategic gold buying policies and the underlying uncertainty and political risk driving these policies are unlikely to be alleviated continuing into 2018 and 2019.

SUPPLY SIDE

Total world supply increased by 5 percent in the first half of the 2018, going from 2118.2 tonnes in 2017H1 to 2227 tonnes in 2018H2. This increase is largely attributed to increased mining production, in addition to a shift away from net producer de-hedging. Recycled gold also increased modestly in the first half of 2018.

Figure 22. World gold supply, tonnes



Source: World Gold Council

Mining Production

Mining production, which makes up for the majority of gold supply, increased by 4 percent year-on-year. This increase was the due to combination of decreased output from countries such as China, South Africa and the US offset by increased gold production from Canada, Indonesia, and Russia (World Gold Council, 2018).

In China's case, the government's strict environmental policies which led to series of nationwide inspections led to the closure of older gold mines and thus hurt the country's gold production. The Chinese government also withdrew some mining rights and its changes to royalty changes also dampened gold production (Christensen, 2018) As a result, according to the World Bureau of Metal Statistics (WBMS), Chinese gold production fell by 5 percent in the second quarter of 2018 compared to the same time last year.

Meanwhile, one of South Africa's oldest gold mines, the Tautona mine has been operating at a loss for the past couple of years, putting pressure on Anglogold Ashanti. Eventually Anglogold Ashanti announced that it decided to put the mine on care and maintenance, stopping gold production in September 2017 (McKay, 2017).

Table 11. Gold production by country, tonnes

Rank	Country	2017H1	2018H1	Y-o-Y Δ%
1	China	188.3	179	-5
3	Russia	123	141.9	15
4	United States	106.4	94.2	-11
5	Canada	73.8	81.2	10
10	South Africa	60.4	52.9	-12
14	Indonesia	34.3	38.3	12

Source: World Bureau of Metal Statistics

Additionally, Sibanye-Stillwater also decided to close down the Cooke gold mine due to high operational costs. These closures negatively affected South African gold production, with output dropping 12 percent in the first half of 2018 compared to the first half of 2017. There are also ongoing wage negotiation disputes with 3 South African unions currently in talks with Harmony Gold, Village Main Reef, AngloGold Ashanti and Sibanye-Stillwater. These negotiations, if ineffective, could lead to strikes that would further damped gold production into 2019 (Reuters, 2018).

According to data collected from the WBMS, US gold production declined by 11 percent year on year. This decrease also due to maintenance and mine closures (World Gold Council, 2018). Kinross Kettle River's Buckhorn mine closed according to pre-mining plans, with the reserves completely depleted. While Kinross has promised to undergo intensive rehabilitation efforts in order to restore the area around the mine, the closing of a mine will not doubt negatively affect the economy of the area and reduce future US gold production (Department of Ecology News Release, 2018).

However, overall worldwide gold production remained positive, with overall production increasing by 4 percent year on year as falling production in several countries were offset by increasing production from others (World Gold Council, 2018). For instance, according to WBMS, Indonesia's gold output grew by 12 percent in the first half of 2018 as compared to the first half of 2017. This was largely due to a recommencement of gold production of the Grasberg mine following a conflict between the Indonesian government and Freeport-McMoran that led to the mine's temporary closure.

Despite this good news, the future of the Grasberg mine is still shaky. After extended negotiations, Freeport-McMoran and the Indonesian government seem to have settled on the Freeport-McMoran and Rio Tinto selling its shares of the mine to the state owned Inalum, in line with the President's policy to exert more local control over Indonesia's natural resources (Sipahutar, 2018). While the deal hasn't been finalized, it is expected to be completed soon. This, in addition to the Grasberg mine's dwindling pit reserves mean that the mine will not only shift ownership but also need to start developing underground operations that will greatly diminish production in 2019 and 2020. Production is expected to increase again in 2021 following underground development but in the near future, the production of both gold and copper are expected to be negatively affected (Bochove & Farchy, 2018).

Another contributor to increased gold production in the first half of 2018 has been from the Brucejack, Rainy river, and Moose river projects in Canada. Canadian output saw a 10 percent increase in gold output in the first half of 2018 compared to the same period last year. For the Brucejack mine, as the production ramp-up was completed, gold production

reached a steady state, increasing production from its diminished 2017 volumes (Pretivm, 2018). As for the Rainy River mine, commercial production began in October 18, 2017 with overall gold output increasing as the relatively new project continued production (Jamasmie, 2017). Despite this however, the Rainy River mine has underperformed expectations, a combination of mining construction capital expenditures surpassing expected costs by 300 million USD as well as operating results that fall below the mine's initial feasibility study (Arendas, 2018). If the mine continues to underperform, it is expected that gold output will be lackluster in the near future, with high all in sustaining costs and low gold prices making it difficult for the operating New Gold to make a profit (Arendas, 2018).

Russian output in the first half of 2018 displayed a 15 percent increase in production compared to the same period last year. This increase is largely attributed to its Natalka mine which began commercial production in 2017. The mine boasted a 23 percent output increase in the second quarter of 2018, with the launching of its new mill also aiding processing (Webb, 2018). The mine is currently operating at above 90 percent of its capacity and its ramp-up is expected to be completed in the second half of 2018 (Webb, 2018). Future output is therefore expected to increase as output ramps up and the upgrades in management and control systems are expected to increase production efficiency.

Going into 2019, the production of gold is likely to remain elevated as the projects mentioned above continue to increase output. Additionally, the project pipeline for gold looks positive due to output growth from smaller miners (World Gold Council, 2018). Beyond the next few years however, as production costs increase due to costlier raw materials and a stricter adherence to environmental and social needs, if the price of gold remains low and a significant investment in gold exploration to find new reserves aren't made, the general trend for gold production looks bleak (World Gold Council, 2018).

Net producer hedging

In terms of net producer hedging, 32.2 tonnes of gold were hedged in 2018Q1 while 10 tonnes of gold were de-hedged in 2018 Q2 (World Gold Council, 2018). Gold hedging is mainly used to lock in a price for future gold production, a measure used by mining companies to secure against gold prices dropping in the future. This shift from hedging to net-hedging in 2018 Q2 is therefore related to lower gold prices in the second quarter of the year. While it mentioned in the previous report that higher gold prices discourage hedging as companies can lose out on income if gold prices continue to rise while companies have already committed to a lower price, the same is true for lower gold prices. Lower gold prices mean that mining companies cannot lock in a profitable price for future gold production, reducing the desire to create new hedges. As such, lower gold prices in the 2018 Q2 led to net-hedging.

However, as previously stated, gold hedging is still practiced by companies to manage cash flow and debt by securing future production prices. For example, before the price of gold dropped, Acacia Mining bought 2 million USD worth of options for 120,000 ounces of gold (3.4 tonnes) at 1,320 USD per ounce while the company continued to be in a risky situation with the Tanzanian government (Sanderson, 2018). In general, there seems to be no long-term trend for gold hedging, rather than hedging strategically, companies seem to hedge tactically, focusing only on gold price changes in order to finance specific projects (World Gold Council, 2018). Looking forward, if the price of gold continues to be lackluster, net de-hedging is expected though a certain level of hedging will always remain in order to secure large mining projects.

Recycled gold

Recycled gold in the first half of 2018 was marginally higher than in the first half of 2017, displaying a slight increase from 570.2 tonnes in 2017H1 to 575.3 tonnes in 2018H1 (World Gold Council, 2018). This increase was mainly due to increased gold recycling in Turkey and Iran. This was largely due to the drastic drop in both currencies, a fact that made domestic prices of gold higher, raising incentives to recycle gold. Despite the Turkish central bank's efforts to buy gold in order to stabilize the economy, the Turkish lira continued to drop in the first half of 2018, bolstering gold recycling (Samson & Blitz, 2018). Likewise, US sanctions have also amplified economic weaknesses in Iran that dropped its currency (Reuters, 2018). For the rest of the world, particularly in Europe and the US, gold recycling remained stable as low domestic prices damped gold recycling (World Gold Council, 2018). In upcoming years, gold recycling is expected to remain stable as potential increases in recycling due to domestic currency collapses in certain countries are likely to be offset by lower USD gold prices.

PRICE

In addition to the investment factors mentioned earlier in the report, gold prices are determined by overall gold demand and supply. Gold demand, as mentioned above, is expected to be modestly positive, with jewelry and central bank reserves expected to be stable, with slight increases as a possibility. The demand for gold for technology looks very positive while the converse is true for short term demand for gold as investment.

On the supply side, overall supply is dominated by mining production which looks positive in the near term as the increases in production in countries such as Russia and Canada are expected to continue. The drop in production of countries such as China and the US were also expected and the overall project pipeline for gold looks promising.

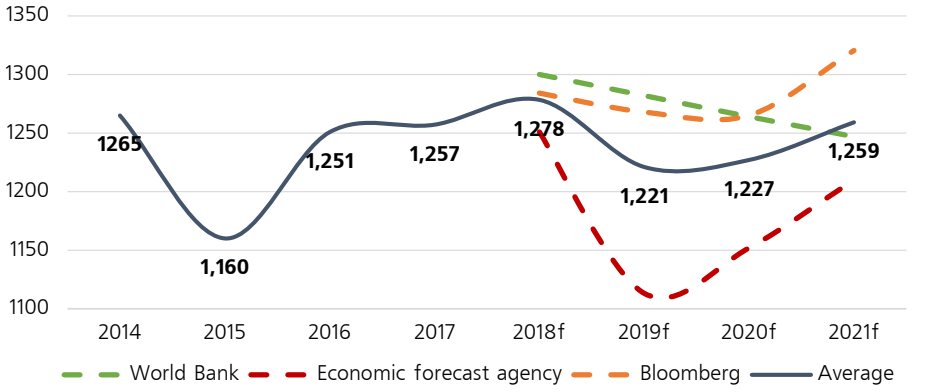
In light of these demand and supply outlooks, the price of gold going into 2019 is expected to fluctuate around the 1230 USD mark, according to an average of forecasts by the World Bank, Economic Forecast Agency and Bloomberg.

Long term prices for gold remain mixed, with Bloomberg price forecasts remaining positive with the price of gold expected to exceed 1300 USD in 2021. On the other hand, the price forecast by the Economic Forecast Agency is largely negative, with the average price of gold in 2019 dipping close to the 1100 USD mark, and remaining low despite an expected increase. As for the World Bank, gold prices are expected to steadily decrease from a high of around 1300 USD in 2019 until it reaches around 1250 USD in 2021.

Despite these ranges of prices, it is important to note that despite shifting circumstances, gold prices are usually relatively stable as highlighted by how little the price of gold fluctuated in 2018 despite the ongoing trade war between China and the US. For example, in 2017, price volatility was its lowest in 20 years, with the day to day move within a range of 2.5 percent (Turner, 2018). This price stability has continued on into 2018, assuaging fears of a big price drop.

The price for Mongolian gold is determined by the worldwide price for gold as the Bank of Mongolia purchases gold at London Bullion market price.

Figure 23. World gold price forecasts, USD per ounce



Source: World Bank, Economic Forecast Agency, Bloomberg

As such, while the worldwide price of gold is expected to remain in the mid-1200 USD range, the price of Mongolian gold is effected by the exchange rate of our domestic currency. As the USD strengthens, the domestic price of gold might increase as the Mongolian tugrik weakens in comparison.

MONGOLIAN MARKET

DEMAND SIDE

Mongolian demand is determined by gold export levels and local consumption. In particular, purchases by the Bank of Mongolia play the largest role in determining Mongolian demand for gold.

Table 12. Local gold export

	2017H1			2018H2			Change (2018/2017)		
	Volume (tonnes)	Value (mln USD)	%*	Volume (tonnes)	Value (mln USD)	%*	Value (tonnes)	Change	%*
Non-monetary gold	4.471	180	6%	3.432	144	4%	-36	-20%	-1%

Note: % - Contribution to total growth;*
Source: Bank of Mongolia

In the first half of 2018, Mongolia exported 3.43 tonnes of gold, earning 144 million USD. This is a drop from the first half of 2017 where Mongolia exported 4.47 tonnes of gold valued at 180 million USD. This is a 20 percent decrease in value compared to the same time last year with the export of gold's contribution to total growth decreasing by 1 percent. Amidst this decrease however, the Bank of Mongolia purchased 11.5 tonnes of gold in the first half of 2018, exhibiting a 5 percent increase from the same period last year, reaffirming the Bank of Mongolia's commitment to the Gold-2 program (Bank of Mongolia, 2018)

As mentioned in the previous commodity report, the Gold-2 program is a nationwide program implemented by the government aimed at increasing Mongolian gold production. In line with this program, the Bank of Mongolia aims to buy 20-25 tonnes of gold each

year from 2017-2020. In order to boost gold purchases, the Bank of Mongolia has begun the "National Gold to the Fund of Treasures" campaign. This campaign, which will run from June 4th to October 30th, aims at increasing gold reserves by encouraging businesses to sell their gold to both the central bank and to commercial banks. The campaign is working to promote and disseminate relevant information on and streamline the gold selling process.

The Bank of Mongolia hopes that through the program, not only will Mongolia's gold reserves increase but that the cooperation between government and non-government entities will improve. In order to better execute the campaign, on August 27, the Bank of Mongolia organized a discussion with government agencies such as the Ministry of Mining and Heavy Industry, the Mineral Resources and Petroleum Authority of Mongolia, the General Intelligence Agency of Mongolia, the National Police Agency and the General Customs Agency (Bank of Mongolia, 2018). The discussion concluded that it was necessary to foster better inter-organizational cooperation to combat illegal gold smuggling, the creation of a rural gold deposit center to facilitate local gold deposits, the creation of an integrated database for buyers, and the extension of the lower gold royalty tax of 2.5 percent until 2024 (Bank of Mongolia, 2018).

Additionally, according to a government resolution signed on September 5, a precious metal testing laboratory under the direction of the Mongolian Agency for Standard and Metrology's Precious Metals Assay Inspection Department is slotted to open in Darkhan-Uul in the central region and in Bayankhongor in the western region. The laboratories are expected to begin operations in October, bringing with it advantages such as increasing gold supply, streamlining the selling process, and offering the opportunity to sell gold based on real metal content (Bank of Mongolia, 2018).

These efforts are expected to aid the Bank of Mongolia in fulfilling their goal of increasing gold purchases from their 2017 levels by 10 percent. As the Bank of Mongolia purchased 20 tonnes of gold in total in 2017 (Bank of Mongolia, 2018), the highest in recent years, if their goals are met, the bank is expected to increase purchases to around 22 tonnes of gold in 2018. Overall, the demand for gold is expected to increase as the Bank of Mongolia takes actions to implement the Gold-2 and the "National Gold to the Fund of Treasures" campaign.

SUPPLY SIDE

According to the Mineral Resource Authority of Mongolia, Mongolian gold production excluding Oyu Tolgoi production has grown 4.1 percent in the first half of 2018 compared to the same period last year. Additionally, Oyu Tolgoi production also increased, going from 1.4 tonnes in the first half of 2017 to 2.6 tonnes in the first half of 2018.

Table 13. Mongolian gold production, tonnes

	2017H1	2018H1	Y-o-y Δ%
Gold production /except OT /	6.7	6.9	4.1
Oyu Tolgoi production	1.4	2.61	86.3

Source: Mineral Resource Authority of Mongolia, OT website

This increase is the result of, not anticipated in the 2016 technical report published by Oyu Tolgoi, was the result of the mine splitting its Phase 4 production into two section, 4A and 4B, while bringing production forward (Jamasmie, Massive Oyu Tolgoi mine to more than double gold production in 2018, 2017). According to Oyu Tolgoi's investor presentation

thousand ounces or around 7.4 tonnes (Oyu Tolgoi, 2018). This almost doubles its previous expected production of 4.4 tonnes. Oyu Tolgoi is expected to continue Phase 4 grade production with production increasing sharply in 2020 and 2021, forecasted to reach 11.3 and 13.5 tonnes respectively. Production is then expected to fall again in 2022, ramping up until it reaches its peak in 2025 with a forecasted production of 19 tonnes of gold (Oyu Tolgoi, 2018).

However, though underground expansion is going according to plan, Oyu Tolgoi still faces substantial problems. One of these is a claim by the Mongolian government for 155 million USD in unpaid taxes. After extended discussions between both parties with no resolutions, Oyu Tolgoi decided to file a notice of dispute under the Investment Agreement, meaning that should there still be no resolution, the disagreement will be resolved via international arbitration (Ard Capital, 2018). Amidst these allegations, the Mongolian government cancelled the Southern Region Power Sector Cooperation Agreement which was a comprehensive energy plan for the South Gobi region that would provide domestic energy to run the Oyu Tolgoi mine (Edwards, 2018). Oyu Tolgoi must now find a Mongolian energy source within 4 years to power its underground mine. One option is the Tavan Tolgoi power project which is underway with construction of the plant ready to begin (Edwards, 2018). However, Oyu Tolgoi has reservations that the Tavan Tolgoi power plant will be fully functional within 4 years, citing limited funding and a lack of a lead investor as concerns (Oyu Tolgoi, 2018). As such, the company is looking towards building its own power plant within 4 years and has entered into agreements with several Chinese contractors to offer bids for the construction of a power plant (Webb, Oyu Tolgoi in deals with Chinese contractors for power station, 2018). While this will address Oyu Tolgoi's energy concerns, it is important to note that the cost of constructing a power plant has not been included in the 5.3 billion USD investment previously calculated by the company for its underground mine development (Oyu Tolgoi, 2018).

In addition to Oyu Tolgoi, there are several ongoing gold projects. Most notable are the Erdene Resource Development and Xanadu Mines gold projects. Erdene Resources Development recently announced in May 2018 that the resource estimates for its Khundii gold project which includes the Bayan Khundii and Altan Nar deposits have been increased after extensive testing. According to the company, Altan Nar deposit's indicated and inferred gold equivalent resources have increased by 208 percent and 172 percent respectively since its initial 2015 technical report (Jamasmie, 2018). Currently, the Khundii gold project has 21.3 and 18.2 tonnes of measured and indicated gold at an average grade of 2.3 grams per tonne and 3.7 grams per tonne respectively, as well 8.2 tonnes of inferred gold at 1.8 grams per tonne, and 10 tonnes of gold at 5.2 grams per tonne (Erdene, 2018).

As for Xanadu Mines, which owns the Kharmagtai, Red Mountain, and Yellow Mountain mines, its recent drillings at Kharmagtai Mine revealed that the mine contains much more copper and gold deposits than previously stated in its March 2015 mineral resource report which measured 2.2 million ounces or 62 tonnes of gold (Proactive Investors, 2018).

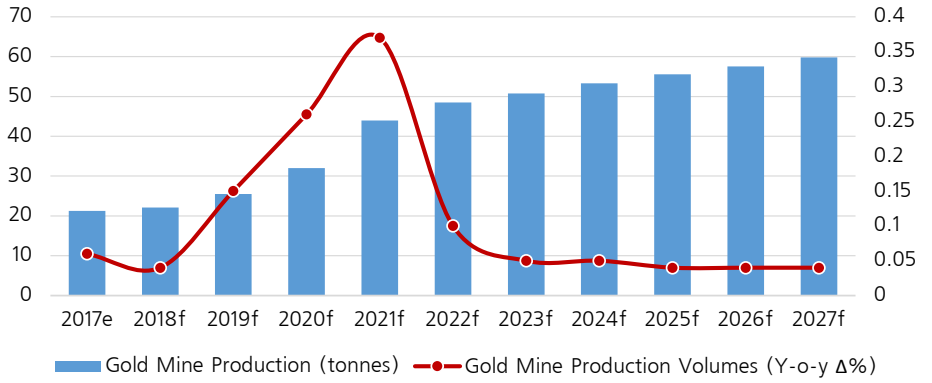
Other gold projects include the Altan Tsagaan Ovoo project owned by Steppe Gold which successfully made an IPO on the Toronto Stock Exchange. According to Steppe Gold, first gold production was initially expected 2018Q4 though due to unforeseen circumstances, the production date has been pushed back and the company is now trying to complete site construction by the end of 2018 (Steppe Gold, 2018).

On the other hand, Centerra Gold's Gatsuurt gold project, mentioned in our previous report, is facing issues concerning 4 licenses that the Mongolian courts deemed have been granted by breach of law by the Mineral Resources and Petroleum Authority of Mongolia (MRPAM). The licenses are to be revoked and it is uncertain if MRPAM will appeal the

decision or if Centerra Gold will consider international arbitration, putting the project at standstill for now (Mongolian Mining Journal, 2018).

Despite this, the future of Mongolian gold production looks bright according to the BMI Research of Fitch Group company, who forecasts that production will increase from 22 tonnes in 2018 to around 60 tonnes by 2027 (BMI Research , 2018).

Figure 24. Mongolian gold production forecast



BMI Research estimated forecast. Source: USGS, BMI Research calculation

In terms of gold resource reserves, according to the Mineral Resources and Petroleum Authority of Mongolia, local gold reserves calculated in the first half of 2017 and 2018 are shown in the table below.

Table 14. Local gold reserves

Gold reserves	Measurement	2016H1	2017H1	2018H1
Quartz vein gold	Mt	32	2.1	15.9
Placer gold	tonnes	4.4	1.2	2.2

Source: Mineral Resource and Petroleum Authority of Mongolia

Compared to the first half of 2017, quartz vein gold reserves increased 7 fold, while placer gold reserves almost doubled. Despite the large leap, it is important to note that these results are still significantly smaller than the first half of 2016. Additionally, this increase may in part be due to recalculation of the Bayan-Airag gold deposit though detailed information has not been published by the Mineral Resources and Petroleum Authority (MRPAM, 2018).

However, on a more optimistic note, the increase may also be attributed to the amendments made to the Law on Minerals that regulate how new mining and exploration licenses are issued. The law was adopted by parliament on November 10, 2017 with the first mining tender evaluations using the new process taking place in April 2018 (Aminaa, 2018). These changes, which were designed to help ease the application and registration process for obtaining a mineral exploration license, include the local community in the decision process and increase the overall interest in continued mineral exploration in Mongolia, coupled with the increase in the amount of land available for mineral exploration bolstered mineral exploration in Mongolia in 2018 (Salem, 2018). Additionally, in August the government approved of the coordinated of the areas of Mongolia eligible for exploration. The approval of the coordinates brings with it announcing tenders for around

8.5 million hectares of land, about 5.56 percent of Mongolia's total territory, that does not overlap with already licensed, special needs or protected areas (Unurzul, 2018).

In addition to more exploration policies that are necessary to bolster Mongolia's gold reserves, during the 7th Mongolia-Kazakhstan Intergovernmental Commission's meeting, both countries agreed to set up a gold refinery, with details concerning investment, funding and location to be decided through Cabinet meetings at a later date (Batchimeg, 2018). The Bank of Mongolia is expected to raise issues at the meeting on the rights to selling the refined gold in the world market and the Minister of Mining and Heavy Industry mentioned that Kazakhstan's practice of keeping its refined gold as central bank reserves should also be initiated in Mongolia (Minex Forum, 2018). Should the plans for the gold refinery be implemented according to plan, production is expected to increase as value is added through the refining process and for the Bank of Mongolia's gold reserves to increase in turn.

CONCLUSION

In summary, world gold demand decreased by 6 percent in the first half of 2018 in comparison to the first half of 2017. This decrease was due to a fall in demand for gold for investment as demand for jewelry remained constant and demand for investment and reserves increased. Though gold for investment remains the second largest component of world demand for gold, boasting a demand of over 500 tonnes in the first half of 2018, this is a far cry from its peak of 1057.4 tonnes in the first half of 2016. Jewelry demand, the largest component of world demand, remained constant as increases in demand from China were offset by a decrease in Indian demand caused by domestic currency weakness and the inauspicious period of Adhik Maas. Increases in demand for technology were bolstered by demand from the memory and wireless sector while central bank reserves increased as Russia, Turkey and Kazakhstan continued to purchase gold. In 2019, the demand for gold is expected to increase slightly as jewelry demand is expected to grow marginally, led by increased demand from China. Demand for gold for technology and central bank reserves are likewise expected to increase as growth in the technology sectors that utilize gold seem robust and the the countries that buy gold for central bank reserves continue to be committed to their buying policies. While gold investment is expected to decrease as the US economy continues to grow, some investment is always expected to exist as a buffer for ingoing geopolitical instability.

Gold supply, determined by mining production, net producer hedging and recycled gold increased by 5 percent in the first half of the 2018 compared to the first half of 2017. This increase was spearheaded by a 4 percent increase in gold mining production, the largest component of gold supply. This increase was a mixture of resumed operations as previous conflicts were resolved as well as increased production from new gold operations. Recycled gold increased due to currency weaknesses in countries such as Turkey and Iran while there was a general shift away from net producer de-hedging. Moving forward, the outlook for the supply of gold is positive as mining production is expected to continue to modestly grow in the short term. While this may change in the long run, in 2019, gold production growth is expected to be positive.

The world price of gold is expected to hover around the mid 1200 USD mark as overall supply is expected to outstrip overall demand marginally. While some global instability persists, continued positive perceptions of the US economy is expected to damped demand for gold as a buffer against instability as investments are focused towards more lucrative options. As a result, gold prices may remain lower though gold prices are also known to be especially stable. In Mongolia's case, as Mongolia is a price taker for gold, domestic prices are fully determined by the international price of gold and the exchange rate. As such, if the world price of gold is stable, if the tugrik weakens, the domestic price of gold will rise in turn.

As for Mongolian supply and demand, the demand for gold is expected to increase as the Bank of Mongolia continues to adhere to the Gold-2 program, implementing campaigns and organizing discussions with relevant stakeholders to ensure that it meets its 2018 goal of increasing gold purchases by 10 percent from 2017. Mongolian supply also looks positive as Oyu Tolgoi's underground development is proceeding according to plan and the gold reserves of other projects have increased in light of more exploration drilling. Legal changes to the procurement of exploration and mining licenses are also expected to increase Mongolia's gold reserves in the near future. While political instability is always a risk and Oyu Tolgoi's power situation may result in complications, Mongolian demand and supply look positive going into 2019.

IRON ORE

This section is intended to identify the main changes in the iron market since the last update. The report consists of four parts: global iron ore demand and supply, price and the Mongolian market.

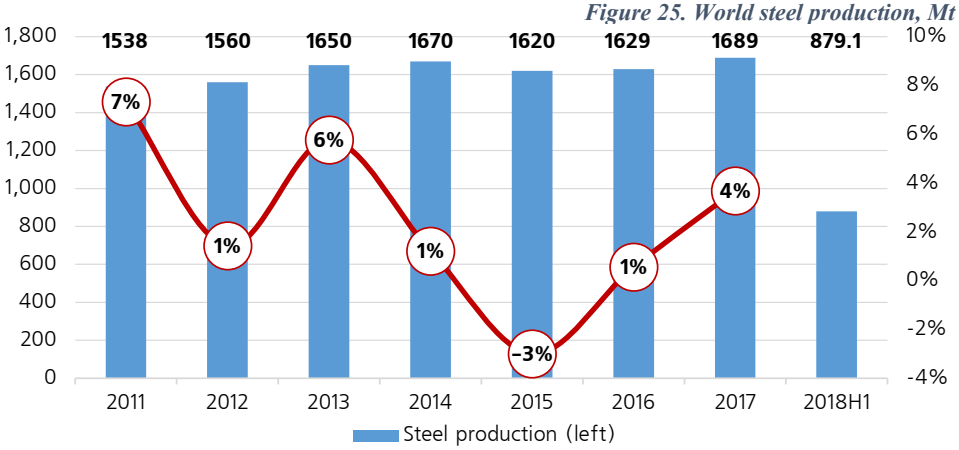
In this update, market changes and trends are shown by key countries. In the demand section, China was emphasized as its the main producer and consumer of steel in the world and produced 47 percent of global steel in 2017 and India's steel production and consumption increased drastically and is expected to become the second largest steel maker in 2018. In the supply section, Australia and Brazil are highlighted as they are the top two exporters of iron ore. In the Mongolian market section, progress of domestic metallurgical plants and concentrate plants projects were emphasized.

WORLD MARKET

DEMAND SIDE

Iron ore is a main input in the steel making process, so demand for iron ore is heavily reliant on steel production. Therefore, steel production is considered to determine demand for iron ore. World steel production has steadily increased in the last 2 years since 2015 when it declined by 3 percent. World steel production was 1,689 Mt in 2017, an increase of 3.6 percent year-on-year. In the first half of 2018, world steel production was 879.1 Mt, an increase of 39 Mt or 4.7 percent year-on-year.

Figure 25. World steel production, Mt



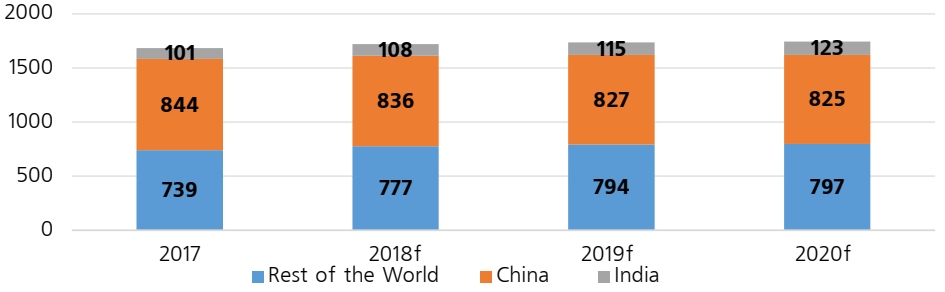
Source: World Steel Association

Crude steel production in China reached 832 Mt in 2017, 2.98 percent increase year-on-year. In the first half of 2018, China's steel production increased by 5.27 percent year-on-year to reach 448 Mt. Closure of illegal and small steel mills with inefficient operations and poor safety by the Chinese government led to increased steel production as profit margins were widen. Similar to China, steel production in India was 101 Mt in 2017 and rose by 6.3 percent year-on-year. In the first half of 2018, India's steel production reached 52 Mt, increase of 6.27 percent year-on-year. This growth was driven by expansion of domestic steel demand due to rapid urban population growth, government investment in infrasturucture and expansion of the manufacfuring sector.

Demand outlook

World steel production is projected to increase gradually from 2018 to 2020. Average annual growth of steel production is forecasted to be 1.2 percent from 2018 to 2020. Crude steel production is expected to reach 1,745 Mt in 2020 and rose by 3.4 percent compared to 2018.

Figure 26. World crude steel production forecast, 2018-2020, Mt



Source: Department of Industry, Innovation and Science (2018, June)

China's steel production is forecasted to gradually decline from 2018 to 2020 while steel production in India is expected to increase over the same period. In China, easing fiscal support to the infrastructure and construction sectors in an effort to cool the real estate market are constraining domestic steel demand. The government is trying to curb steel and iron ore production to decrease air pollution. In July, the government released new three year (2018-2020) plan to combat air pollution. Under the plan, the Chinese government is expanding the constrains on the production of steel and iron ore to 82 cities in selected regions to decrease PM 2.5 levels by 18 percent by 2020 from 2015 baseline. China's steel production is expected to decrease over the from 2018 to 2020 due to decreasing domestic demand and strict environmental regulation against air pollution.

Average annual growth rate of steel production of India is forecasted to be 5.9 percent per year during 2018 to 2020 period (outlook period). This growth is driven by the ongoing expansion of steel making capacity and increasing steel demand. India's steel consumption is expected to increase over the outlook period due to growing urbanization, government investment in infrastructure and expansion of the manufacturing sector. In particular, growth of vehicle production due to investments by Suzuki Motors, Kia Motors and Groupe PSA into passenger vehicle production in India is expected to support the steel consumption. This growth in steel consumption may continue out of the outlook period. BHP Billiton has forecasted that Indian steel demand will double by 2025 due to construction and infrastructure growth.

An additional source of the increased steel demand is the Belt and Road Initiative (BRI), which was launched in 2013 by China. The initiative is to mainly develop infrastructure projects. "Belt" refers to the re-creation of the old silk route that connected China with Europe via Central Asia while "Road" is the maritime connection between China and Europe via the seas through Southeast, South Asia, Middle East and East Africa. The metals and mining investment and trade agreements are not clear under the BRI because of the open-ended nature of the initiative. Some BRI investment projects are reported under BRI, while others are not. (STRADE, 2018)

Steel demand is boosted by projects in the infrastructure, construction, energy and mining industries. BRI's estimated expenditure is around 1.3 trillion USD which will potentially generate up to 150 Mt of steel demand. (BHP, 2018).

SUPPLY SIDE

Global iron ore production rose by 101 Mt or 3.3 percent year-on-year in 2017 and reached 3.17 billion tonnes (Table 15). This growth was primarily driven by increase of iron ore production in Brazil and Australia. Australia's iron ore production reached 866.3 Mt in 2017, increase of 5 percent while Brazil's production rose by 7.4 percent and reached 420 Mt. China's iron ore production, which accounts for 40 percent of global production, increased by 12.8 Mt to 1,293 Mt in 2017 due to increasing steel production.

Table 15. Iron ore production[12], Mt

	2015	2016	2017	2018[f]	2019[f]	2020[f]	2021[f]
Global	3191.4	3073.6	3175.3	3255.1	3270.5	3266.2	3261.7
Australia	817.0	825.0	866.3	892.2	895.8	884.2	857.6
China	1381.3	1280.9	1293.7	1293.7	1280.8	1261.6	1242.6
India	156.0	185.0	190.0	186.2	195.5	203.3	211.5
Brazil	397.0	391.0	420.3	437.1	454.6	468.3	480.0

Source: BMI Research

Steel production of top iron ore's producers (Table 16) was 1.23 Mt in 2017, increase of 1.2 percent year-on-year. The main contribution for the increase was from Vale, one of the world's largest mining company, as their iron ore production increased by 5 percent year-on-year due to beginning of the S11D mine.

Table 16. Iron ore production by major companies, Mt

	Company	Country	2015	2016	2017
1	Vale	Brazil	346.1	348.8	366.5
2	Rio Tinto	Australia	263	281.3	282.4
3	BHP Billiton	Australia	227	231.3	238
4	Fortesque	Australia	169.4	170.4	170
5	Arcelor Mittal	India	62.8	55.2	57.4
6	Anglo-American	UK and South Africa	54.1	57.6	45
7	Glencore	UK and Switzerland	41.2	47.1	47.7
8	Cliffs Natural Resources	USA	31	30	28.5

Source: (Anglo-American, 2018), (Arcelor Mittal, 2018), (BHP,2018), (Cliffs Natural Resources,2018), (Fortescue, 2018), (Gelencore, 2018), (Rio Tinto, 2018), (Vale, 2018

[12] Crude ore production instead of usable production due to availability of data.

Supply outlook

Supply of iron ore is expected to grow modestly in short term. According to BMI Research, global iron ore production will reach 3255 Mt in 2018, increasing by 80 Mt or 2.5 percent year-on-year (Table 15). Brazil and Australia's iron ore production will remain strong over the period from 2018 to 2021 while China's production is forecast to decline. Iron ore production in Australia is expected to start decrease from 2021 due to major miners' strategy to increase profit through cutting production cost.

Australia's iron ore production is forecasted to increase and reach 884.6 Mt in 2020. Higher productions are driven by productivity improvements and replacement mines at Rio Tinto and BHP's operations. Rio Tinto has been working on an autonomous rail project, AutoHaul, since 2012. The first 280 km delivery of iron ore by the driverless train was completed in July 2018. The company was able to decrease transportation time and improve safety through the autonomous train system. The AutoHaul project is expected to be fully completed by the end of 2018. China's iron ore production is forecasted to decrease during the from 2018 to 2020 and reach 1,242.6 Mt in 2021. China's steel production is decreasing due to constraints on steel demand and tightening environmental standards. Strict environmental regulations will boost demand for high grade iron ore.

Table 17. List of key projects for iron ore mine

Mines	Country	Owner	Annual capacity	Detail
S11D	Brazil	Vale	22Mt in 2017, 50-55Mt in 2018, 70-80Mt from2019	Project brings innovation that cut operation cost such us truckless system which replaces traditional off-highway trucks for conveyor belts and dry processing which saves water and eliminate the need of tailings dams
Mines-Rio	Brazil	Anglo American	26.5 Mt from 2020	Anglo American expects to obtain long-awaited licenses that pave the way for the company to expand its Minas-Rio iron ore mine in second half of 2018
Samarco	Brazil	Vale and BHP	19 Mt a year	Samarco mine closed since 2015 when existing dam burst, releasing a torrent of toxic mud that killed 19 people. Vale had said it expects mine to reopen in end of 2018 or earlier of next year, but they had pushed back their forecasts several times
South flank	Australia	BHP	80 Mt from 2021	Flank will replace existing production of Yandi as it ramps down by 2022
Eliwana	Australia	Fortescue	30 Mt a year	

Source: Department of Industry, Innovation and Science, Vale day2017, Reuters

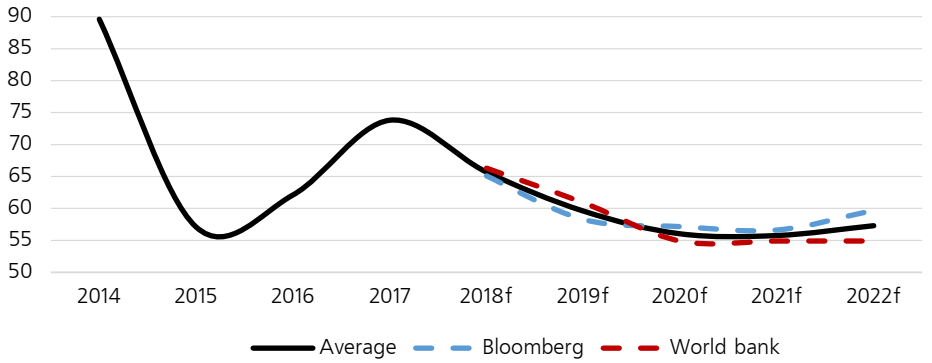
Brazil's iron ore production is estimated to be 480 Mt in 2021. Brazil's iron ore production growth remains strong in the coming years, due to low operating costs and a solid project pipeline (BMI, 2018). Also, projects in Brazil such as S11D and Mines-Rio by some of the world's largest iron ore producing companies are expected to support iron ore productions.

Increasing demand for high grade[13] iron ore is expected to support exports from Brazil and Australia which accounts for most of their iron ore exports. Highlighted below are some of expected capacities and mines which will commence operations in the near future.

PRICE

Iron ore price is forecasted to decline gradually in 2018 to 2022 period (Figure 27). Main reason for this decline is China's slowing steel production due to moderate steel demand and environmental policies implemented by the government. Decreased steel demand will lead to an oversupply of steel on the global market, pushing price downwards. In supply side, top iron ore producers with large margins will generate additional output and mining projects, leading to further weakening of iron ore prices.

Figure 27. Iron ore (62%) price projection



Source: Bloomberg Intelligence and World Bank

The price spreads of different grades of iron ores has been increasing in first half of this year. The Chinese government is trying to reduce pollution by shut down on outdated plants, while bringing on more efficient operations with lower emissions to ensure supply. Use of high-grade iron ore that has less impurities enables mills to produce more steel while decreasing pollutants. Currently, the quality of the iron ore used by China is low, around 30 percent, compared to the benchmark of 62 percent. As a result, demand of premium grade iron ore is increasing, thus influencing price.

MONGOLIAN MARKET

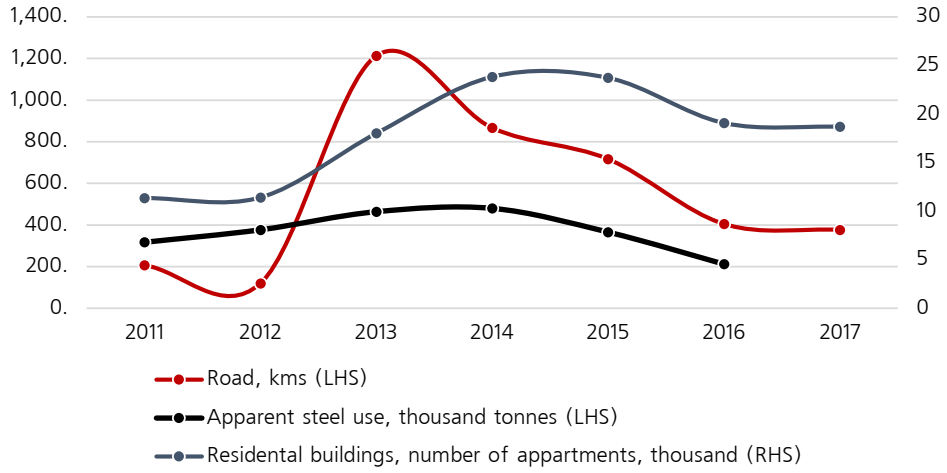
DEMAND SIDE

As stated in our first market study report (in March 2017), half of the steel produced globally was used in the construction and infrastructure sectors. Mongolian apparent steel use has increased during the recent economic boom years (2012, 2013) as infrastructure and construction sectors are boosted and the number of finished residentials and length of road built reached its peak (Figure 28). After the economic boom years, number of finished construction and road sharply declined. Economic conditions tend to have a delayed effect on the infrastructure sector. Thus, infrastructure projects like construction and road fell in 2016, a full year after the economic decline in 2015. As the economy has been recovering over the past two years, the infrastructure and construction sectors have stabilized.World Bank forecasts Mongolian economic growth will reach 5.3 percent and

[13] High grade means above the benchmark 62 percent ore.

6.4 percent in 2018 and 2019, respectively. Domestic steel demand will be supported by the effects of economic growth in coming years as construction picks up. Domestic steel demand is going to be increasing in near term. But increasing demand will have small effect on iron ore production due to capacity of metallurgical plants. But, there is an opportunity for domestic demand for iron ore to increase in the near term as several steel mills projects are supported by the government to develop domestic metallurgical production. "Khuh Gan" company, began production of direct reduced iron in 2009, stopped its production in 2015 due to market condition. In 2018, the company is planning to restart the production and its capacity was 30 thousand tonnes a year.

Figure 28. Finished construction, road and steel use



Source: National Statistical Office and World Steel Association

Darkhan metallurgical plant produces steel products using steel scrap. Darkhan metallurgical plant have been working on producing steel from iron ore. Currently they have opened two iron ore mine and its concentrate plant. The company have been working to build intermediate product's plant. Erdenes Mongol LLC and Beren Group, one of the steel and iron ore producers in Mongolia, established joint company called Erdenes Steel LLC to implement the "Coke and Steel plants complex" project in GoviSumber province (South-central Mongolia). Gankhuu Purevjav, CEO of Erdenes Mongol LLC, stated that it will start producing steel in 2019. The annual capacity of the "Coke and steel plants complex" will be 0.3 Mt. This presents an opportunity to boost the domestic demand for iron ore with new domestic steel plants.

China is target market of Mongolian iron ore mines. China's iron ore import was 1.07 billion tonnes in 2017, increase of 5 percent year-on-year. Of the iron ore imports, 62 percent was from Australia and 21 percent from Brazil. Iron ore from Mongolia accounted for 0.6 percent of Chinese iron ore imports, an increase of 5 percent year-on-year. Mongolia's iron ore exports was 6.3 Mt in 2017, an increase of 2.8 percent year-on-year. During first seven months of 2018, iron ore exports rose by 777 thousand tonnes or 24.4 percent year-on-year to reached 3.96 Mt.

China's iron ore imports are forecasted to gradually decline from 2018 to 2022 and reach 1.068 billion tonnes in 2020 due to limited steel production. The impact of decreasing steel production on iron ore imports is expected to be partially offset by a projected decline in China's iron ore production that is caused by strict environmental restriction.

Table 18. Iron ore imports forecast

	2017s	2018f	2019f	2020f
European Union 28	144	157	160	161
Japan	127	131	134	135
China	1,075	1,093	1,075	1,068
South Korea	72	76	75	75
India	5	8	16	22

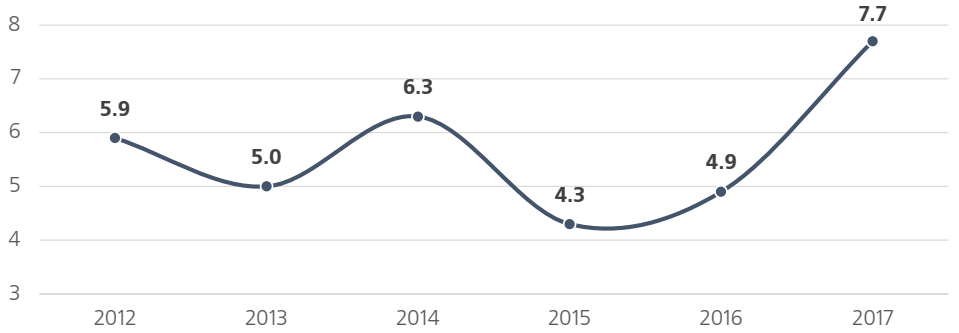
Source: Department of Industry, Innovation and Science (2018, June)

Demand for high grade iron ore is expected to increase due to environmental restriction in China whose iron ore reserves are low grade around 30 percent. Therefore, some Mongolian iron mines with high grade iron ore may be supported by increasing high grade iron ore demand from China.

SUPPLY SIDE

Iron ore is one of the main export products, accounting for 5 percent of Mongolia's total export in 2018. Mongolian iron ore production reached a historical high of 7.7 Mt and increased by 55.8 percent year-on-year. This is due to the growth of iron ore price on global market. Iron ore price reached 71.8 USD per tonne in 2017, increase of 22.3 percent year-on-year. Elevated levels of Chinese steel production led to increase demand for iron ore in 2017.

Figure 29. Mongolian iron ore production, Mt



Source: National Statistical Office

One of the main restrictions on Mongolian iron ore supply is transportation issues. New opportunities may emerge in the Mongolian iron ore sector as transportation system improve and decrease freight. The Mongolian parliament first approved the government's policy on railroad transportation in 2010 and identified several railroad construction projects that is ordered by first and second stage to build. In June, the parliament approved to include the construction of 281 km new railroads linking the Zuunbayan station to the Khangi border checkpoint in the list of projects. Total value of the railroad is around 1 billion USD. The Sainshand-Khangi-Mandal-Bugat route will be 590 km which is 318 km shorter than Sainshand- Zamiinuud-Erlian-Bugat route. With this new route, transporting cost will decrease by 4 USD per tonne. Currently, most iron ore mines export their product

to Bugat which is one of the major steel producing region of China through the Sainshand-Zamiinuud-Erlian-Bugat route.

Construction of the railroad is only added to list of railroad to build in second stage. The Tavantolgoi-Gashuunsuhait railroad project is also included in the second stage has been planned since 2011 but has been postponed several times due to political and financial issues.

Altain Khuder, one of the largest iron ore producer, opened a concentrate plant in 2017 with an annual capacity of 3 Mt. This plant uses dry magnetic method in its separating process, which utilizes less electricity than previous concentrate plants that were small, had high operating costs and were outdated. In near the term, several concentrate plants are projected to build. These are shown in the table below.

Table 19. List of projects for concentrate plants in Mongolia

Company name	Since	Capacity Mt	Location (province, soum)	Net investment Million USD
Mongolchezchmetal	2018	0.5	Dornod, Khalkh	Total value of project is 41 Mt and require additional investment
Shin Shin	2017	0.9	Dornod, Dashbalbar	Total value of project is 40.5 Mt and require additional investment
MI Tsahiurt Ovoo	2017	2	Sukhbaatar, Uulbayn	Total value of project is 9.5

Source: Mongolian mining journal (December, 2017)

"Tangshan development" company will be working on an iron ore open-pit mining project in Dundgovi province (Southern central Mongolia). The project is expected to start in 2018 and produce 2.5 Mt iron ore per year. Total investment of the project is 70 million USD.

CONCLUSION

The iron ore price is forecasted to be 64 USD per tonne in 2018, and decline to 60 USD per tonne in 2019. Iron price is heavily reliant on china's market, especially rate of the steel production and demand. Thus, changes in China's government policy shows large impact on iron ore price. China's decreasing steel production coupled with increasing supply in Brazil and Australia is expected to reduce iron ore price in the short term. Environmental policies to fight air pollution and constrained demand are the main reasons of decreasing steel production in China. New mining projects and large margins will lead to additional output in the iron ore market. Steel mills in China are expected to shift towards using high grade iron ore as it causes less pollution. With an expected ongoing government push to improve air quality through increasingly stringent air pollution policies, price spread among different grades of iron ore are expected to widen in the near term

Mongolian iron ore production increased sharply in 2017 due to high prices. Production of iron ore is supported by demand from domestic and international markets. Two metallurgical plants are expected to begin operation within the next couple of years, generating more domestic demand for iron ore. However, there are uncertainties in iron ore export due to infrastructure issues and environmental policies implemented by China. Increase of high grade iron ore exports are expected as Chinese steel mills demand for high quality iron ore input increases. In the long term, there are opportunities to reduce transportation cost and increase exports via the new Sainshand-Khangi-Mandal-Bugat route that was just included on the list of planned railroad

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