

China Rare Earth Quarterly

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Highlights

News: China Northern Rare Earth (Group) High-Tech obtained over half of China's first batch of quotas for rare earth mining, smelting and separation for 2019. Japan committed to fully exploring deep sea rare earth; and China became the world's top importer of rare earths in 2018.

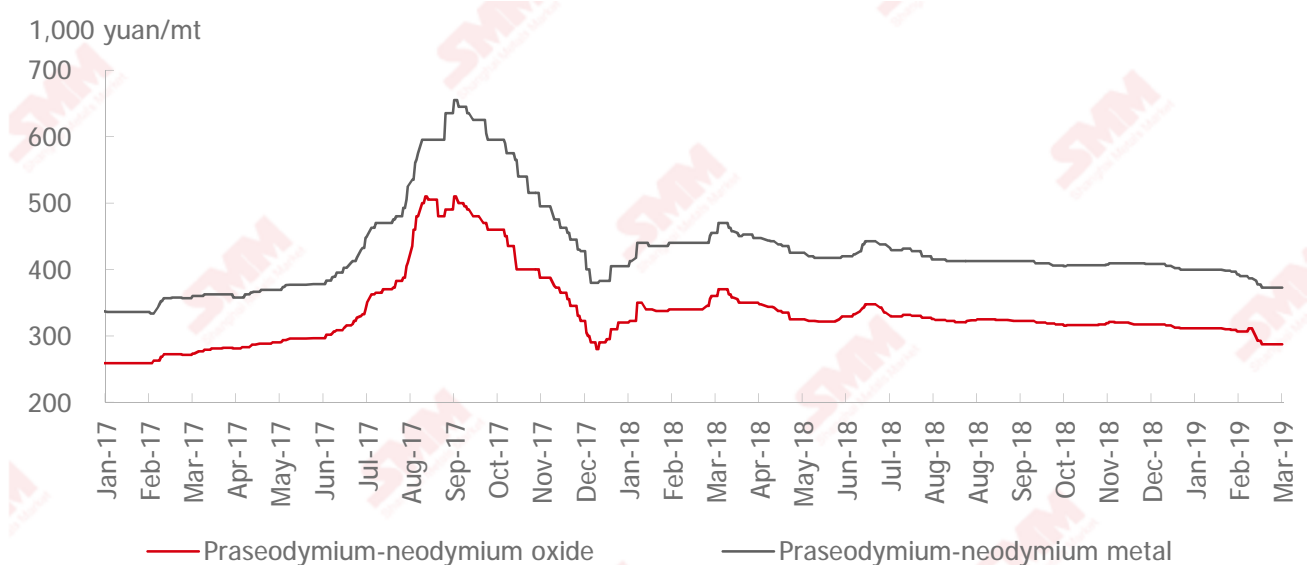
Outlook: Prices of light rare earth are likely to see limited downside room in the second quarter as imports may fall and as suppliers hold back goods at low prices. Higher sales of new energy vehicles will boost demand for light rare earth, and this will also support prices.

China resumed its ban on imports of rare earth ore from Myanmar from May, and this is expected to keep prices of medium heavy rare earth at highs.

Lynas returned to normal production and produced 5,444 mt of rare earth oxides in the first quarter, up 32.5% from a year ago. Lynas announced that it will save all of its praseodymium-neodymium (Pr-Nd) for its strategic partners over the next two to three months.

Pr-Nd suppliers refrained from further price cuts at the start of May after prices fell continuously. Medium-heavy rare earth failed to meet domestic demand as environmental checks significantly lowered output in the south.

Macro: China's GDP grew 6.4% year on year to 21.34 trillion yuan in the first quarter of the year, but remained flat from the previous quarter. Its manufacturing PMI climbed 1.3 from February to 50.5 in March.



Source : SMM

Hot topics in Q1 2019

News in international markets

Rare earth elements discovered in Kaolin mines in Georgia

The Buffalo Creek Kaolin that Thiele Kaolin mined in two quarries near Sandersville, Georgia State contained about 100 times more enriched-heavy rare earth elements than concentrations in the upper continental crust, according to a study led by Georgia State University and Thiele Kaolin. The high-density minerals in the Georgia mines are potential sources of rare earth elements, including heavy rare earth elements.

Japan to fully explore deep-sea rare earth

With support from the Japanese government, a team from the Japan Industry Technology Comprehensive Research Institute and the Ocean Research and Development Institute will evaluate rare earth mud in the surrounding sea of the Minamitori Island. This is in line with its plan for trial exploration near the island, by 2022.

A professor from the University of Tokyo found rare earth mud that contained high levels of neodymium in 2013 and said that minerals can be extracted from rare earth mud by using special pipes to bring the mud onto the seabed before soaking it in acid.

The professor estimated in 2013 that it would require about 16 years to recoup JPY 75 billion of investment in exploration equipment.

China, South Korea, India and Russia are also exploring undersea resources. The International Seabed Authority (ISA) under the United Nations (UN) plans to establish rules for the development of undersea resources with consideration to environmental impact before 2020.

Russia to lower rare earth metals mining tax

The State Duma committee on budget and taxes provided a draft law to promote the mining of rare earth metals. The draft law suggested decreasing tax on the mining of natural resources when extracting rare earth metals. The bill could come into effect from January 1, 2020. This may make Yakutia become one of the leaders in rare earth metal mining in Russia.

Arafura forecasts average annual output of 4,357 mt of NdPr oxide for Nolans project

Arafura Resources Limited announced on February 7 the results of a feasibility study for its Nolans neodymium-praseodymium (NdPr) project 135 km north of Alice Springs in the Northern Territory of Australia. The project was categorised as financially and technically-ready to support extended operation.

Arafura's managing director Gavin Lockyer said that Nolans might be the next potential scale producer of NdPr oxide outside China. The feasibility study confirmed Nolans as an ultra low-cost producer. The project was forecasted to produce 4,357 mt of NdPr oxide per year, 21% higher than previously expected. Having secured environmental approvals, delivery of the definitive feasibility study will help the company complete binding offtake and project finance ahead of targeted construction in 2020 and commissioning in 2022.

The project will require pre-production capital of A\$1 billion (\$726 million).

Arafura will construct a mine, process plant and related infrastructure for the project.

Lynas: 'Unfair' to compare rare earth residues with Sungai Kim Kim pollution

Ismail Bahari, Lynas' radiation safety general manager, appealed to protesters to re-evaluate the findings of the 2012 parliamentary select committee appointed by the National Front, and the findings of a recent executive review committee appointed by the Pakatan Harapan government. The findings corroborated each other.

Dr Ismail said that it was "unfair" to compare residues at Lynas with the pollution in Sungai Kim Kim as Lynas was monitored by regulators and the International Atomic Energy Agency even before it started operations, and that there had not been a single incident that "caused alarm".

Hon Kai Ping, legal adviser for Save Malaysia, Stop Lynas, said that there were over 1 million mt of residues classified as scheduled waste being stored at the Lynas Advanced Materials Plant in Gebeng.

Under the 2005 Scheduled Waste regulation of the Environmental Quality Act, no more than 20 mt of waste can be stored on site for more than 180 days. However, Lynas piled up this type of waste more than 60,000 times over the permitted levels, Hon pointed out.

Dr Ismail explained that data and analysis carried out by the Standard and Industrial Research Institute of Malaysia (SIRIM) suggested that neutralisation underflow (NUF) residue was not toxic.

Rare earth ore

Northern Rare Earth obtains over half of China's first batch of rare earth production quotas in 2019

China's Ministry of Industry and Information Technology (MIIT) released the first batch of quotas for rare earth mining, smelting and separation for 2019, which fell 50% from 2018. The limits for rare earth mining stood at 60,000 mt, and limits for smelting and separation at 57,500 mt.

China Northern Rare Earth (Group) High-Tech obtained 34,625 mt of quotas for rare earth (rock type) mining, and 29,741 mt of quotas for smelting and separation, which accounted for 57.7% and 51.7%, respectively, of total quotas.

Of six groups of rare earths in China, processing ore for others is banned. Rare earth groups must report quota implementations and upload data (including data for imported ore) onto the rare earth product tracking system, and must not arbitrarily alter production and inventory data. Fraudulent reporting or underreporting will incur penalties of quota cuts.

Companies that engage in comprehensive utilisation must not process light rare earth ore, including imported ore. Companies that utilise imported rare earth resources must provide complete import procedures. Processors must report purchasing volumes and use volumes in the rare earth product tracking system.

Industrial and natural resource authorities at provincial and district levels must check implementations in a timely manner and tighten crackdowns on illegal sources of rare earth ore.

China discovers rare earth-rich deposits in Pacific Ocean

A Chinese scientific expedition team discovered 1.5 million km² of rare earth-rich deposits in the south-east Pacific ocean during its first maritime research mission.

Earlier, China identified four rare earth-rich metallogenic belts in the Pacific Ocean and the Indian Ocean, and 12 potential survey sites for rare deep-sea element resources.

Jiangxi discovers large prospective rare earth deposit

A geological survey by a south Jiangxi team found a large prospective rare earth deposit, a medium-sized prospective rare earth deposit, nine mineral spots and five mineralisation spots.

Heilongjiang makes first rare-earth discovery

Heilongjiang province discovered 16 large deposits, eight medium-sized deposits and three small deposits in its three-year exploration campaign that started in 2015. Rare earth was found at 782 highland in Mohe, the first discovery in the northern province.

Rare earth demand

CSRE, CRRC to build rare earth high-end applications project in Ganzhou

China Southern Rare Earth Group (CSRE) and CRRC Corporation Limited (CRRC) will build a 10 billion yuan rare earth high-end applications project in Ganzhou, Jiangxi province. CSRE is one of China's six rare earth groups, while CRRC is China's leading supplier of rail transit equipment.

Baotou to build 42 key rare earth projects in 2019

Inner Mongolia's Baotou planned to build 257 key industrial projects in 2019, with a total investment of 161.2 billion yuan. This includes 42 rare earth projects. The project will produce 27,000 mt of NdFeB magnetic materials per year after it reaches full capacity.

Vestas receives 101 MW order in China for V120-2.2 MW turbines

Vestas secured a 101 MW order in China for 46 V120-2.2 MW turbines that will feature the country's tallest towers with a hub height of 152 metres. The project's tower solution improves access to higher and more consistent wind speeds.

In 2018, Vestas installed several wind parks with 2 MW platform turbines and hub height of 137 metres. That was the tallest hub in China at that time.

Delivery and commissioning are expected to begin in the second quarter of 2019.

China to produce 600 km/h maglev train by 2020

China's High-Speed Maglev Train Test Centre will roll out a high-speed maglev train with a speed of 600 km/h by 2020. The project, located in Chengyang district, Shandong province, has a total investment of 48.74 million yuan.

Xinwei Leeshing purchases 500 mt of rare earth mixed oxides from RUS annually

Yixing Xinwei Leeshing Rare Earth, non-wholly owned subsidiary of Chinalco Rare Earth & Metals, will purchase 500 mt of rare earth mixed oxides from REE UNO SPA (RUS) per year, according to a non-binding agreement signed.

China becomes world's top importer of rare earths in 2018

China emerged as the world's biggest importer of rare earths last year when import volumes were about 10 times higher than before 2015, Liu Wenping, an analyst at China Merchants Securities said in a note.

China imported 41,400 mt of rare earth oxides and oxide equivalents in 2018, up 167% from 2017, as a crackdown on illegal production reduced domestic output, according to a report by consultancy Adamas Intelligence.

Shipments were primarily in the form of minerals and chemical concentrates from Myanmar and the US, said Ryan Castilloux, managing director at Adamas Intelligence. In the case of at least seven key rare earths, including praseodymium and yttrium, China was a net importer in 2018 for the first time in more than 30 years, Castilloux added.

China has for years been the world's biggest rare earths exporter, with exports up 4% year on year to over 53,000 mt in 2018.

Market review and outlook

Prices of light rare earth are likely to see limited downside room in the second quarter as imports may fall and as suppliers hold back goods at low prices. Higher sales of new energy vehicles will boost demand for light rare earth, and this will also support prices.

China resumed ban on imports of rare earth ore from Myanmar from May, and this is expected to keep prices of medium-heavy rare earth at highs.

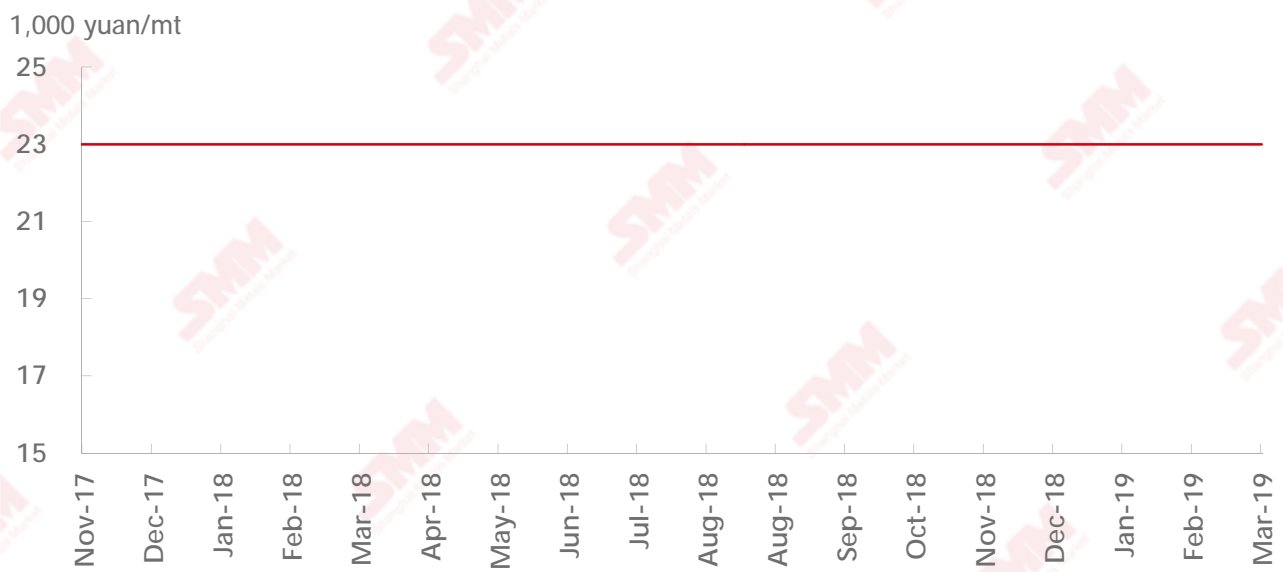
Lynas returned to normal production and produced 5,444 mt of rare earth oxides in the first quarter, up 32.5% from a year ago. Lynas announced that it will save all of its Pr-Nd for its strategic partners over the next two to three months, and this may grow its inventories during April-June.

Pr-Nd suppliers refrained from further price cuts at the start of May after prices fell continuously. This kept prices of Pr-Nd oxide above 260,000 yuan/mt.

Medium-heavy rare earth failed to meet domestic demand as environmental checks significantly lowered output in the south.

Twelve departments under the State Council imposed severe punishment on companies that sold rare earth ore illegally in January and issued the Notice about Further Enhancing Crackdowns in Rare Earth Industry. The MIIT and Department of Natural Resources (DNR) issued in March the first batch of quotas for rare earth mining, smelting and separation for 2019. The State Taxation Administration issued the Announcement about Incorporating Rare Earth Companies into Chinese Character Anti-Counterfeiting Management and Issuing Value-Added Tax in March.

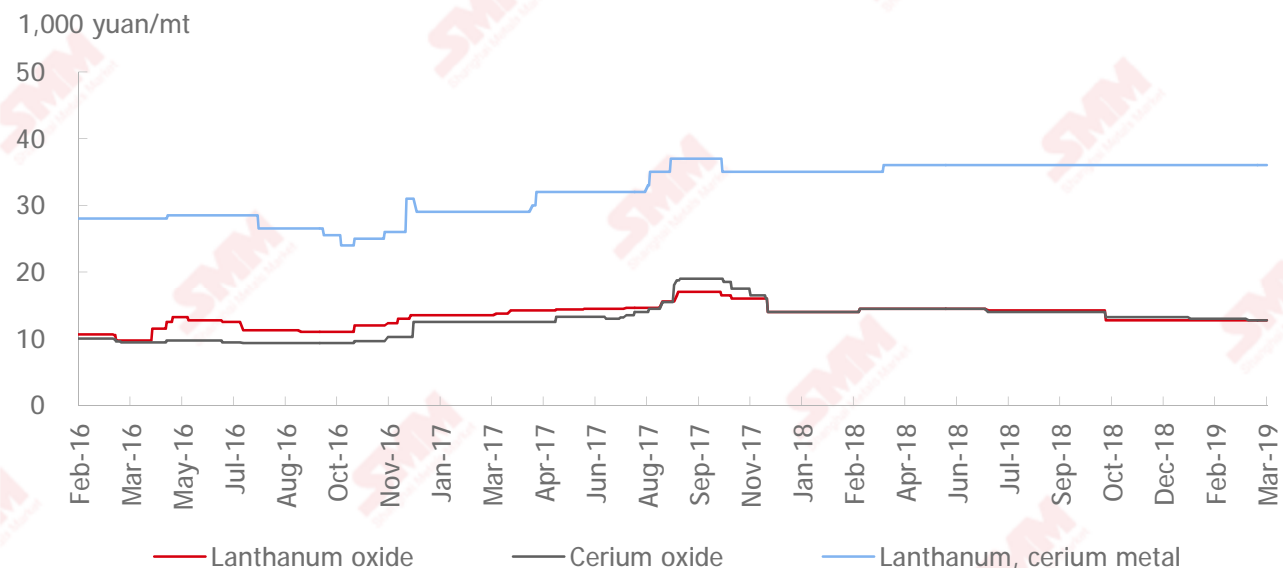
Price trend of rare earth carbonate



Source : SMM

Prices of rare earth carbonate ores stabilised in the first quarter of 2019. Current significant declines in light rare earth oxides prices lowered prices of rare earth carbonate to 18,000 yuan/mt.

Price trends of lanthanum oxide, cerium oxide and cerium misch metal

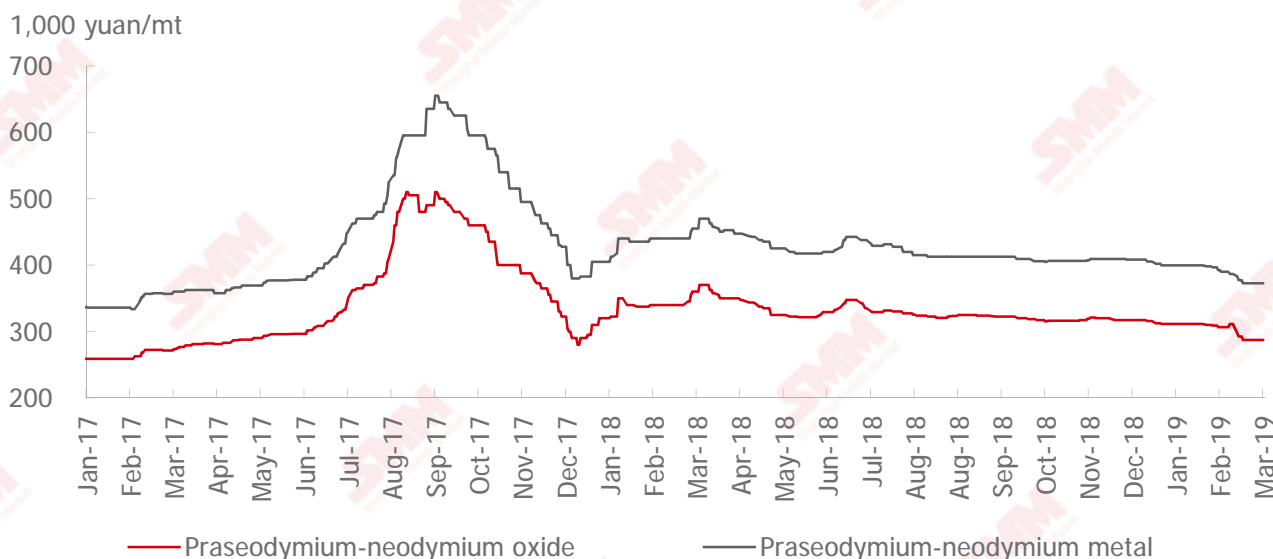


Source : SMM

Prices of lanthanum-cerium products and lanthanum oxide steadied in the first quarter while prices of cerium oxide dipped. An oversupply of light rare earth and lower prices across some producers lowered prices of polishing powder and that dragged on prices of cerium oxide.

Substitutes such as lithium-ion batteries weakened prices of hydrogen storage alloy in the first quarter. Prices of cerium misch metal saw no significant volatility.

Price trends of didymium oxide and praseodymium-neodymium alloy

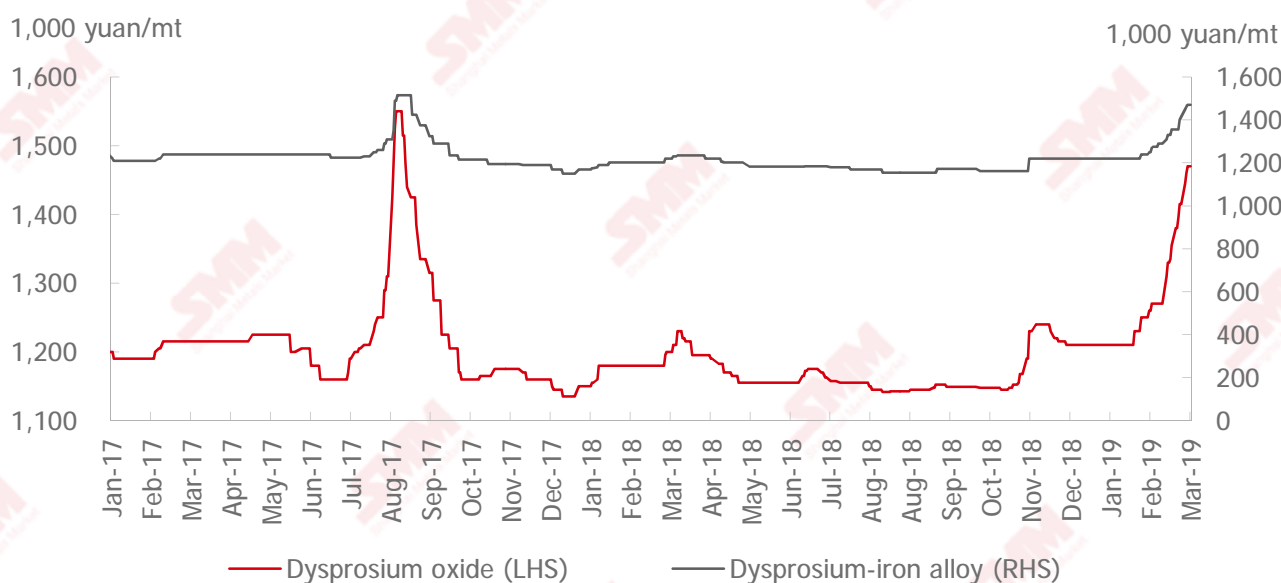


Source : SMM

Domestic oversupply and imports from Australian rare-earths mining company Lynas lowered prices of praseodymium-neodymium oxide and praseodymium-neodymium alloy in the first quarter. Lynas produced 5,444 mt of rare earth oxides in the first quarter, up 32.5% from 4,110 mt in the same period last year.

Domestic producers of permanent magnet purchased as required in the face of continual price declines. Mainstream prices of praseodymium-neodymium oxide currently stand at 263,000 yuan/mt, and those of praseodymium-neodymium alloy stand at 330,000 yuan/mt.

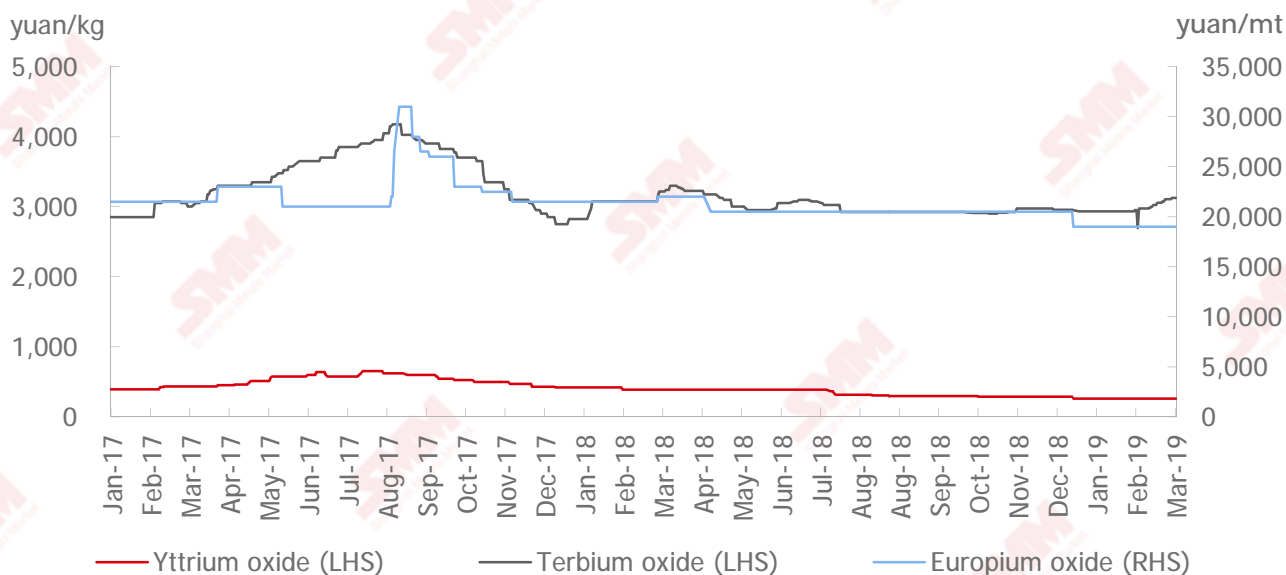
Price trends of dysprosium oxide and dysprosium-iron alloy



Source : SMM

Restrictions on exports of ion-type ore by Myanmar and low domestic output of medium- and heavy rare earth drove prices of dysprosium products in the first quarter. Prices of dysprosium oxide rose from 1.21 million yuan/mt at the end of 2018 to the current 1.49 million yuan/mt. This also buoyed prices of dysprosium iron alloy from 1.22 million yuan/mt to the current 1.49 million yuan/mt.

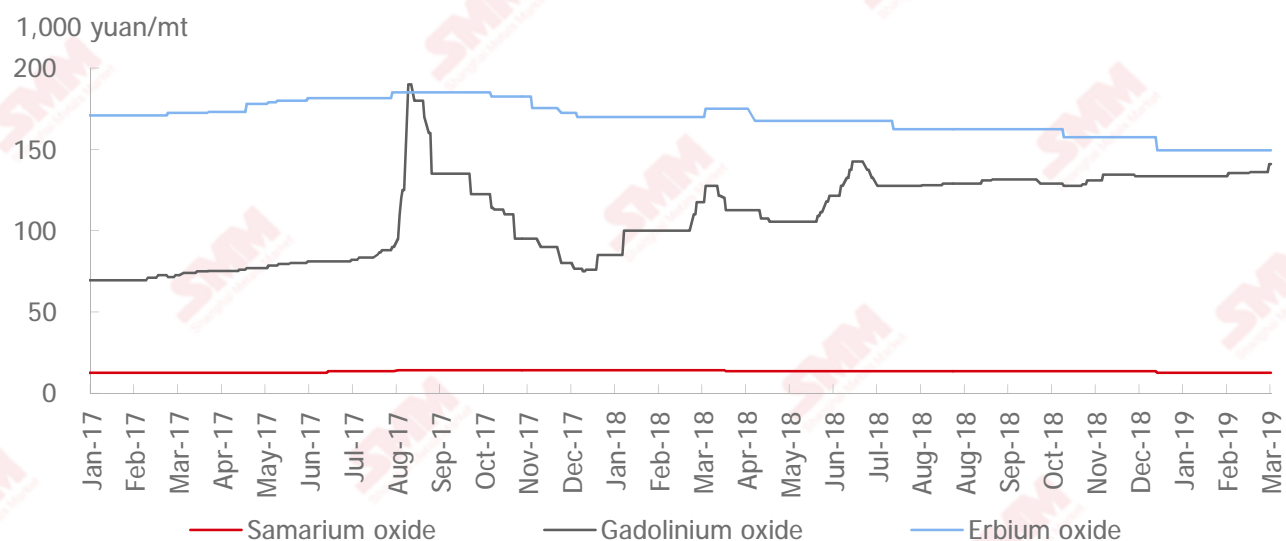
Price trend of europium oxide, terbium oxide, yttrium oxide



Source: SMM

Prices of europium oxide and yttrium oxide stabilised in the first quarter. Imminent restrictions on exports of ion-type ore by Myanmar bolstered prices of terbium oxide. Prices of terbium oxide currently stand at 315,500 yuan/mt. Supplies of europium oxide and yttrium oxide slightly exceeded demand. Prices steadied and demand from producers of fluorescent powder weakened.

Price trends of other rare earth products

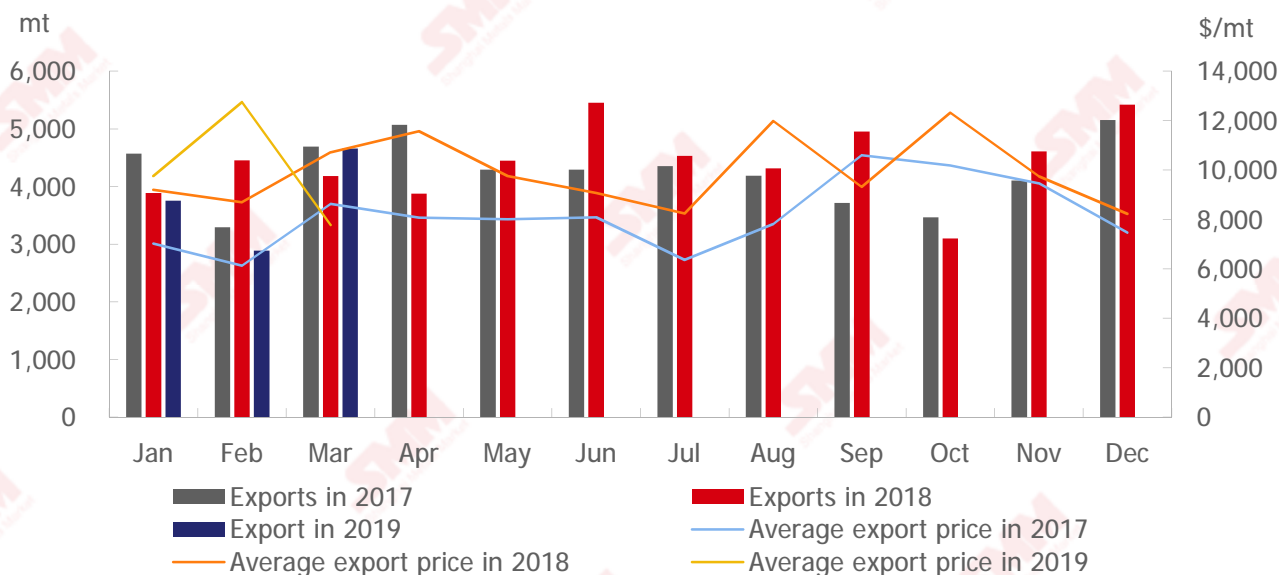


Source : SMM

Prices of gadolinium oxide climbed in the first quarter, while prices of samarium oxide and erbium oxide held flat. Robust demand for medium- and heavy rare earth, especially from new-energy vehicles (NEV) bolstered prices of gadolinium oxide.

Analysis of rare earth exports

Exports 2016-2018



Source: SMM, China Customs

Customs data showed that China exported 3,752.9 mt of rare earth in January, 2,886.1 mt in February and 4,659 mt in March. Exports in the first quarter totalled 11,298 mt, down 9.3% year on year. Export value stood at \$36.6 million in January, \$36.8 million in February and \$36.2 million in March. Total export value in the first quarter stood at \$1.1 billion, down 8.1% year on year. Export prices averaged \$9,752.5/mt in January, \$12,750.8/mt in February and \$7,770.7/mt in March. Export prices in the first quarter averaged \$10,091.3/mt, up 5.8% year on year.

In January, China's imports of mixed rare earth carbonate decreased by 2,049.8 mt from a year earlier to 1,480.2 mt. Mixed rare earth carbonate from Myanmar fell 67.21% on the year and 10.69% on the month to 2,937.9 mt. In February, imports stood at 790.6 mt. Mixed rare earth from Myanmar dropped 62.15% year on year and 20.4% month on month to 767 mt. In March, imports stood at 2,565 mt. Imports from Myanmar declined 3.14% on the year but expanded 200.51% on the month to 2,305 mt. Total imports of mixed rare earth carbonate in the first quarter of 2019 stood at 4,835.8 mt. First-quarter imports from Myanmar fell 45.06% year on year and 9.93% month on month to 4,035.4 mt.

In the first quarter, exports of rare earth dropped 9.3% from a year ago to 11,298 mt. Exports of rare earth in February fell 35.16% year on year due to the CNY holiday. The average export prices of rare earth rose 5.8% on the year as value-added of export products increased in the first quarter. In January and February, imports of rare earth shrank significantly as the CNY holiday kept low operating rates across plants. In March, rare earth imports returned to usual levels as domestic producers resumed production and as Tengchong Customs would stop importing mixed rare earth carbonate from Myanmar.

End-user markets

Automobile and new energy auto sector

According to the China Association of Automobile Manufacturers (CAAM), automobile output decreased 9.81% on the year to 6.34 million units, and sales dropped 11.32% year on year to 6.37 million units in the first quarter. Output and sales of passenger vehicles fell 12.42% and 13.72% on the year to 5.23 million units and 5.26 million units, respectively. Output and sales of commercial vehicles rose 4.95% and 2.22% year on year to 1.1084 million units and 1.1095 million units, respectively.

Poor consumption and an automobile acquisition tax implemented during 2017-2018 lowered automobile sales. Consumers put more into real estate and were left with poorer purchasing power for automobiles.

In the first quarter, output of NEVs rose 102.7% from a year ago to 304,000 units. This included 226,000 pure electric vehicles, up 109.3%, and 78,000 PHEVs, up 85.2%. Sales of NEVs grew 109.7% to 298,900 units. This included 227,000 pure electric vehicles, up 121.4%, and 72,000 PHEVs, up 79.1%.

Air-conditioner industry

In the first quarter, the number of domestic procurement projects of air-conditioners declined 11.7% from a year earlier to 500, with total purchases of 2.03 billion yuan. Civil air-conditioner purchases stood at 850 million yuan, accounting for 46%, and purchasing across government institutions and the education industry stood at highs as well.

Projects for people's livelihood include the use of clean energy in winter heating in north China. The Ministry of Ecology and Environment reported the air quality situation in China from January to February. The average number of clear days in February in Beijing, Tianjin, Hebei and the surrounding areas accounted for just 36.4%.

In the first quarter, purchases of heating devices that use clean energy stood at about 800 million yuan. Most projects came from Tianjin and Shanxi and were household heating projects in rural areas. Most areas face issues such as cash flows in their promotion of heating equipment that use clean energy.

Some government agencies preferred bulk purchases for cost savings. In addition to government agencies, the education industry remained a major purchaser of air-conditioners. Nanjing University and Shandong University completed the purchasing and installation of air-conditioners. Some universities began to build branch campuses or renovated old campuses. The first quarter saw numerous hospital and public construction projects which attracted many central air-conditioner producers

In the first quarter, Tianjin, Henan and Fujian emerged as the top three in air-conditioner purchases. Tianjin held 10 procurement projects of air-conditioner, with total purchases of 516 million yuan; Henan had 50 projects, with total purchases of 223 million yuan; Fujian held 14 projects, with total purchases of 218 million yuan. Shandong, Guangdong and Shaanxi also purchased more than 100 million yuan of air-conditioners.

Air-conditioner purchases in the north reached 1.33 billion yuan which was 300 million yuan higher than in the south, accounting for 65.5% of national air-conditioner purchases.

Purchases of heating equipment that use clean energy outperformed other appliances in Tianjin. Most purchasers in Henan and Shaanxi provinces were county-level development and reform commissions and they purchased various types of heating equipment, including hot air blower, electric heating table, electric heater, inverter air conditioner and carbon crystal wall heating. Producers of large air-conditioners focused on household heating markets in Henan, Hebei, Shaanxi and Shanxi and commercial central heating markets in Xinjiang.

Purchasing demand for appliances remained strong. Procurement of heat generators stood at 960 million yuan, accounting for almost 50% of total purchases. As public construction projects commenced, purchases of central air-conditioners climbed to 742 million yuan. Civil air-conditioners ranked third with strong support from bulk purchasing. Air conditionings used in computer rooms and air purification system ranked fourth.

Xiamen's bulk air-conditioner purchasing project added four new products that met the first-class energy efficiency standard.

Lighting

China's LED exports totalled \$98.8 million in January, up 37.68% on the year and 28.51% on the month. In February, it totalled \$92.89 million, up 5.24% year on year but down 47% month on month. LED exports totalled \$1.01 billion in March, up 3.85% on the year. LED exports in the first quarter of 2019 grew 1.02% from a year ago to \$3.26 billion.

LED bulbs, ceiling lamps and tube lamps were the top three exported LED products in January. Exports of LED bulbs rose 6.59% from December 2018 to \$346 million, accounting for 23.29% of total LED exports. Exports of tube lamps stood at \$175 million, and ceiling lamps grew 15.29% from a month ago to \$104 million in January 2019.

Germany, Britain and France accounted for 16.71%, 14.8% and 12.25% of China's LED exports to Europe in January. Exports to Germany climbed 2.64% from December 2018 to \$71.43 million and gained 0.89 percentage point in terms of export proportion. Exports to Britain amounted to \$65.64 million. Exports to France rose 12.64% from a year ago and gained 3 percentage points. Exports to Spain rose 35.07% on the month and grew 2 percentage points.

Exports of LED tube lamp climbed 5.24% on the year but dropped 47% on the month to around \$92.89 million in February. It accounted for 12.08% of China's total LED exports in February, up 0.3 percentage point from January. Exports to the US, South-east Asia, and the European Union (EU) stood at \$32.66 million, \$11.64 million and \$11.22 million, respectively, accounting for 35.16%, 12.53% and 12.08% of China's tube lamp exports. Exports to the US and South-east Asia declined significantly from January, down 48.91% and 53.11% respectively. In terms of export proportion, South-east Asia gained 2 percentage points while the EU lost 2 percentage points.

Guangdong province and Zhejiang province were two main exporters of tube lamps. In February, Guangdong, Zhejiang and Fujian topped the list of China's tube lamp exporters. Guangdong exported \$32.38 million in February, down 31.65% on the year, and fell 18.81 percentage points on export proportion. Zhejiang exported \$25.66 million, up 31.86% year on year, and gained 5.5 percentage points on export proportion. Fujian exported \$8.91 million, up 3.33% from a year earlier, and its export proportion changed little.

China's exports of LED products in March rose 3.85% on the year and 31.01% on the month to \$1.01 billion. Exports in the first quarter increased 1.02% from a year earlier to \$3.26 billion.

In March, the US and the EU remained the main export markets of China. Exports of LED products to the US stood at \$277 million. It accounted for 27.47% of total LED exports, up 41.34 percentage points on the month. Exports to the EU accounted for 19.73%, up 12.91 percentage points month on month. Exports to BRICS nations declined 32.09% on the year and 4.39% on the month. Exports to other countries and areas increased slightly compared with the same period last year.

Exports of LED products from Guangdong fell 24.84% on the year but increased 14.75% on the month to \$339 million in March, accounting for 33.68% of total exports. Exports from Zhejiang dropped 15.54% from a year ago but grew 40.17% from a month ago to \$201 million, accounting for 19.99% of total exports. Exports from Fujian declined 3.89% year on year but climbed 11.74% month on month to \$119 million, accounting for 11.8%. Exports from Shanghai increased significantly in March, up 151.57% on the year and 59.85% on the month.

Electronics

Electronics in China continued to develop rapidly, and the demand for electronic components and materials remained strong. Products such as mobile phones and PCs continued to decline in popularity due to the lack of innovation.

Electronic materials include silicon wafers and copper clad laminates. Electronic components include inductors, capacitors, semiconductor discrete devices and printed circuit boards. The electronic industry can be divided into consumer electronics (mobile phones, PCs, TVs and so on), semiconductor, automotive electronics, security electronics, LED, and the Internet of Things.

US-Sino trade friction lingered, and China's electronics exports maintained growth but remained below the average level of 2018. Value-added by electronic information manufacturers climbed 6% on the year, and its monthly growth fell 6.1 percentage points from a year earlier. Export value of large electronic information manufacturers rose 2.7%, but growth dropped 8.6 percentage points, both on a yearly basis.

In January and February, revenues across large producers of electronic information grew 3.3%, total profits fell 21.7%, and costs rose 3.2%, all on a yearly basis. Profit rate stood at 1.54%. Revenue and profit across producers of electronic information slid significantly from the same period of 2018.

In the first two months, value-added in manufacturing industry of electronic components and electronic specialised materials climbed 6.5% on the year, but export value dropped 7.3% year on year. Overcapacity and slower innovation lowered output of electronic components by 6.2% from a year earlier.

Value-added in communication equipment manufacturing industry rose 5.2% on the year, and export value increased 0.8% from 2018. Output of mobile phone dropped 12.3% year on year, and output of smartphone fell 12.4%, as the application of 5G technology prompted mobile phone producers to update their products.

In the first quarter of 2019, domestic sales of mobile phone fell 11.9% on the year to 76.93 million sets. Sales of domestic brands dropped 6.6% year on year to 70.86 million sets, accounting for 92.1% of total mobile phone sales. Shipments of smartphones fell 10.7% year on year to 73.07 million sets in the first quarter of the year and accounted for 95% of all mobile phones.

Shipments of all mobile phones dropped 6% on the year to 28.37 million sets in March. The decline slowed from 12.8% in January and 19.9% in February.

Added-value in computer manufacturing sector rose 2.4% year on year in the first two months of the year, while export value climbed 6.6%. Output of laptops fell 2.2%, and that of tablets jumped 21.6%.

Battery industry

China's output of motive batteries climbed 70.2% from February to 8.2 GWh in March. Output of ternary batteries grew 82% month on month to 5.5 GWh and accounted for 66.8%. Output of LFP batteries rose 49.4% month on month to 2.5 GWh and accounted for 30.4%.

For the first quarter, output of motive batteries totalled 19.8 Gwh. This included 12.1 Gwh, or 61.2% of ternary batteries, and 7.1 Gwh, or 35.8% of LFP batteries.

The top three producers produced 13.4 Gwh, or 67.5% of motive batteries in the first quarter. Output by the top five producers stood at 15.1 Gwh and accounted for 76.1%. Output by the top 10 producers stood at 17.7 Gwh and accounted for 89.6%.

Sales of motive batteries stood at 6.8 Gwh in March. This included 4.5 Gwh, or 66.5% of ternary batteries, and 1.9 Gwh, or 28.3% of LFP batteries.

For the first quarter, sales of motive batteries amounted to 17.6 Gwh. Sales of ternary batteries stood at 11 Gwh and accounted for 62.7%, while those of LFP batteries stood at 6 Gwh and accounted for 34.3%.

Installed capacity of motive batteries rose 127% month on month and 145% year on year, and stood at 5.1 Gwh in March. For the first quarter, installed capacity climbed 179% from a year ago to 12.3 Gwh.

Installed capacity of motive batteries in pure electric passenger vehicles accounted for 75.6% in March, followed by 12.9% in pure electric buses.

There were 40 producers of motive batteries that installed batteries in vehicles in March, up five from February. Installed capacity across the top 10 producers stood at 4.65 Gwh and accounted for 91.4% in March, and stood at 10.97 Gwh and accounted for 89.3% in the first quarter.

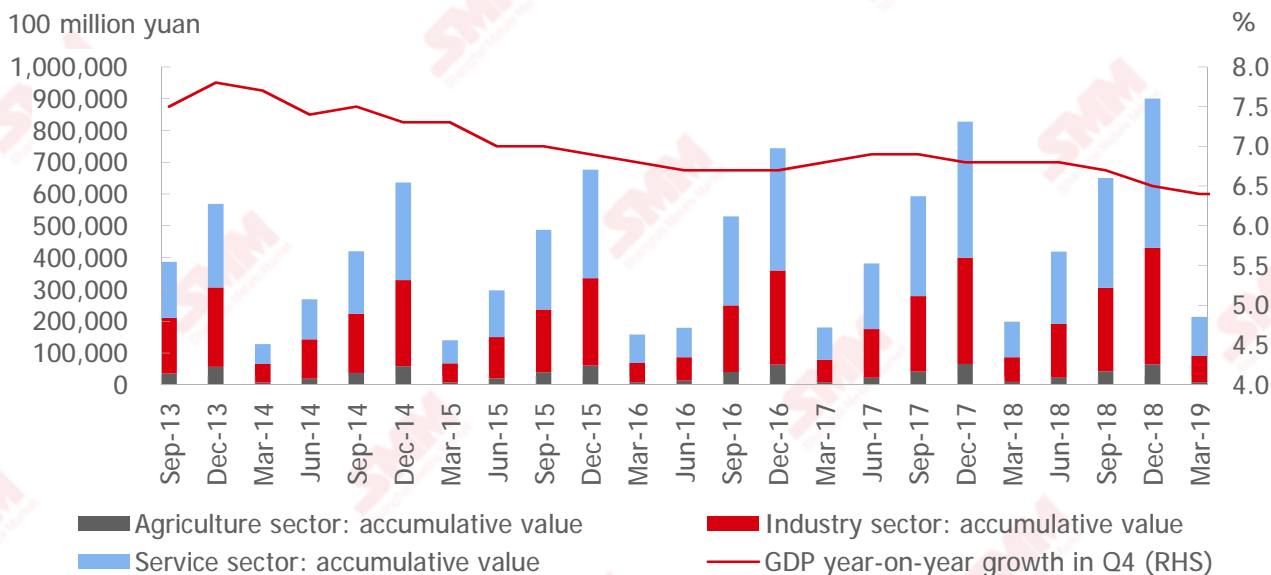
Installed capacity of motive batteries climbed 177% from a year ago to 12.33 GWh in the first quarter. This included 9.53 Gwh in new energy passenger vehicles, up 212% on the year and accounting for 77.3%.

Output of new energy vehicles (NEVs), especially of passenger vehicles, is expected to continue to grow in the second quarter before subsidies are phased out this year. This will further boost installed capacity of motive batteries.

Macroeconomy and relevant markets

China GDP up 6.4% YoY in Q1

China GDP



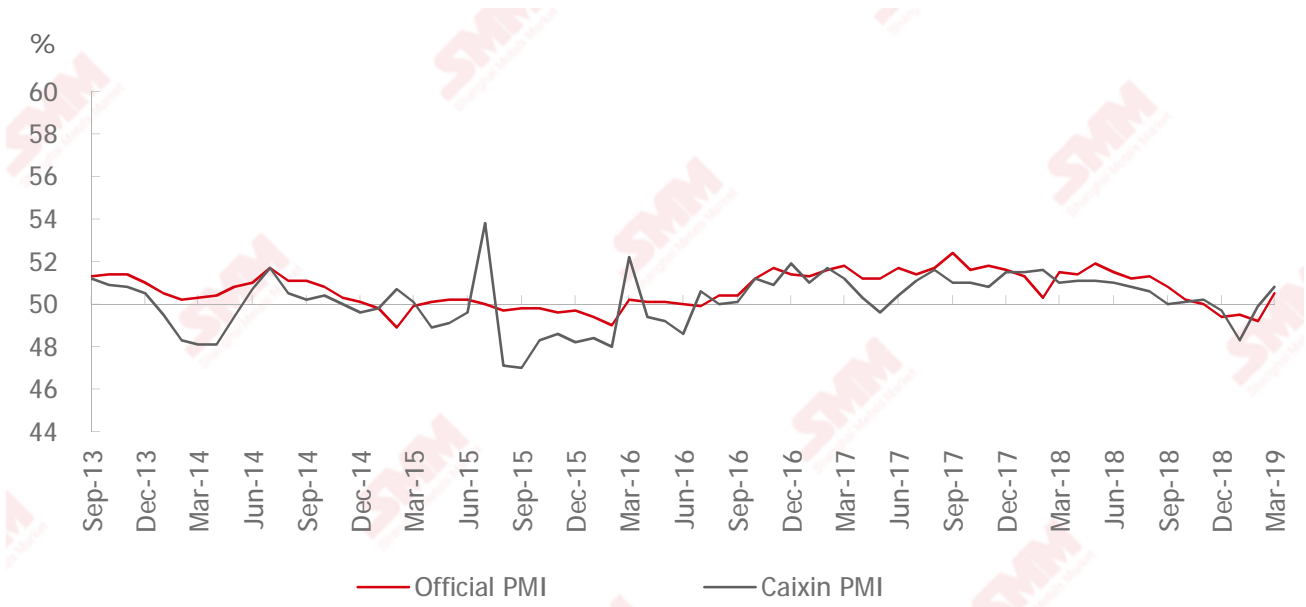
Source: NBS

China's gross domestic product (GDP) for the first quarter stood at 21.34 trillion yuan, up 6.4% year on year and flat from the fourth quarter last year. This dropped 0.4 percentage point from the same period last year and 0.2 percentage point from 2018. Value-added at the primary industry stood at 876.9 billion yuan, up 2.7% year on year. Value-added at the secondary industry rose 6.1% to 8.2 trillion yuan and that in the tertiary industry gained 7% to 12.2 trillion yuan.

Agricultural production steadied with planting structure improved. Industrial production accelerated and the hi-tech sector accounted for a greater proportion. The service sector grew rapidly. Market sales increased faster and online retail sales accounted for more. Investment recovered, especially in the hi-tech industry. Import and export value grew faster while trade structures continued to improve. Household consumption prices rose slightly and industrial producer prices advanced. Unemployment dropped across cities and towns and migrant labour continued to grow. Rural household income grew faster than cities and towns. Market expectations improved significantly.

China official PMI returns above 50 in Mar

China's manufacturing PMI



Sources: China Federation of Logistics and Purchasing (CFLP); caixin.com

China's purchasing managers' index (PMI) in March increased 1.3 percentage points from February and stood at 50.5%.

The PMI across large enterprises dropped 0.4 percentage point on the month to 51.1%. The index for small and medium-sized enterprises stood at 49.3% and 49.9% respectively, up 4 and 3 percentage points.

The index for production, new orders and supplier deliveries exceeded 50, while the index for inventories of raw materials and employees stood below 50.

The index for production increased 3.2 percentage points to 52.7% as restarts after CNY accelerated production across manufacturers.

The index for new orders gained 1 percentage point to 51.6% and exceeded 50 for two consecutive months. That reflected continual growth in demand for manufacturing.

The index for inventories of raw materials gained 2.1 percentage points to 48.4% as inventories of major raw materials declined slower.

The index for employees climbed 0.1 percentage point to 47.6% as declines in labour hired by manufacturers shrank.

The index for supplier delivery time increased 0.4 percentage point to 50.2% and shorter delivery time accounted for the growth.

Appendix

Appendix 1: SMM main rare earth prices

Product	Grade	Unit	2019/5/6	Average price		
				Jan	Feb	Mar
Rare earth carbonate	REO 42.0-45.0%	yuan/mt	21,000	23,000	23,000	23,000
Lanthanum oxide	La ₂ O ₃ /TREO 99.5-99.9%	yuan/mt	12,450	12,750	12,750	12,750
Cerium oxide	CeO ₂ /TREO 99.5-99.9%	yuan/mt	12,450	13,091	13,000	12,821
Praseodymium oxide	Pr ₆ O ₁₁ /TREO 99.0-99.9%	yuan/mt	355,000	397,500	397,500	389,286
Neodymium oxide	Nd ₂ O ₃ /TREO 99.0-99.9%	yuan/mt	267,500	312,500	310,367	297,833
Samarium oxide	Sm ₂ O ₃ /TREO 99.5-99.9%	yuan/mt	12,500	12,773	12,500	12,500
Europium oxide	Eu ₂ O ₃ /TREO 99.95-99.99%	yuan/kg	260	268	260	260
Gadolinium oxide	Gd ₂ O ₃ /TREO 99.5-99.9%	yuan/mt	145,000	133,500	133,633	136,238
Terbium oxide	Tb ₄ O ₇ /TREO 99.95-99.99%	yuan/kg	3,155	2,941	2,939	3,048
Dysprosium oxide	Dy ₂ O ₃ /TREO 99.5-99.9%	yuan/kg	1,485	1,210	1,235	1,361
Erbium oxide	Er ₂ O ₃ /TREO 99.5-99.9%	yuan/mt	149,500	151,682	149,500	149,500
Yttrium oxide	Y ₂ O ₃ /TREO 99.995-99.999%	yuan/mt	19,000	19,409	19,000	19,000
Didymium oxide	(Nd ₂ O ₃ +Pr ₆ O ₁₁)/TREO ≥ 75.0%	yuan/mt	263,500	313,409	309,767	293,405
Lanthanum metal	La/TREM ≥ 99.0%	yuan/mt	35,500	37,500	37,500	37,500
Cerium metal	Ce/TREM ≥ 99.0%	yuan/mt	34,500	36,500	36,500	36,500
Praseodymium metal	Pr/TREM 96.0-99.0%	yuan/mt	690,000	660,000	660,000	670,000
Neodymium metal	Nd/TREM 99.0-99.9%	yuan/mt	337,500	399,000	396,400	380,333
Terbium metal	Tb/TREM ≥ 99.9%	yuan/kg	4,055	3,882	3,880	3,966
Dysprosium metal	Dy/TREM ≥ 99%	yuan/kg	1,795	1,655	1,655	1,713
Yttrium	Y/TREM 99.9-99.95%	yuan/kg	225	225	225	225

metal							
Cerium misch metal	Ce/TREM \geq 65.0% TREM \geq 98.5%	yuan/mt	34,000	36,000	36,000	36,000	36,000
Praseodymi- um- neodymium alloy	Pr/TREM 20-25% Nd/TREM 75-80% TREM \geq 98.5%	yuan/mt	340,000	402,591	397,133	378,191	
Battery class misch metal	TREM \geq 99.0% Nd/TREM \geq 15%	yuan/mt	145,000	145,000	145,000	145,000	145,000
Dysprosium -iron alloy	Dy80%	yuan/mt	1,485,000	1,220,000	1,232,667	1,360,238	

Note: SMM rare earth prices refer to mainstream average traded prices in major domestic markets which are settled on the basis of various price levels in markets, producers and traders.

Appendix 2: Major Chinese laws and regulations on rare earth industry in recent years

Issue date	Contents
Mar 2019	The Notice Regarding the Issue of Controlling Plan for the 1st Batch of Rare Earth Mining, Smelting and Separation Quota issued by the Ministry of Industry and Information Technology (MIIT) and Ministry of Natural Resources The Notice Regarding Value-added Tax Invoices Issued by Rare Earth Producers Included in Chinese Characters Anti-Fake Project Management issued by the State Taxation Administration (STA)
Jan 2019	The Serious Treatment of Companies Selling Illegal Rare Earth issued by 12 departments Notice Regarding Continual Enhancement of Rare Earth Industry Order Rectifications issued by 12 members of the rare metal inter-department coordination mechanism including the MIIT, National Development and Reform Commission and Ministry of Natural Resources
Nov 2018	From November 1, 2018, Jiangsu implemented the local standard Radioactive Exemption Requirements for Rare Earth Smelting Slag. The Environmental Protection Bureau of Mianning county, Sichuan province launched inspections on rare earth mining companies and beneficiation plants.
Oct 2018	The State Administration of Taxation issued a notice to adjust the export rebate rate for rare-earth permanent magnet to 16%.
Oct 2018	Eight ministries and authorities, including the Ministry of Industry and Information Technology (MIIT) and the National Development and Reform Commission, conducted investigations across the rare earth sector in major production regions across eight cities and provinces. Members of the Rare Earth Inter-department Coordination Mechanism carried out special investigations to monitor the sector from October 30 to November 30. Provinces affected were Inner Mongolia, Jiangsu, Fujian, Jiangxi, Hunan, Guangdong, Guangxi, and Sichuan.
Sep 2018	On September 18, with approval of the State Council, the Customs Tariff Commission decided to impose tariffs of 5%-25% on various products from the US. Among these, many were rare-earth products.

Sep 2018	The Jiangxi provincial government issued a letter for special action against illegal activities in the rare earth sector. Self-checks were conducted in September and October, and authorities will investigate in November and December. Those found to be in violation of regulations will be reported and dealt with in January 2019.
Aug 2018	The Ministry of Industry and Information Technology (MIIT) and the Ministry of Natural Resources issued a notice of the second quota in 2018 for rare earth exploration, smelting and separation. An annual quota of 120,000 mt was allocated for exploration and 115,000 mt for smelting and separation. In the second batch, 46,500 mt was allocated for mine exploitation and 45,000 mt for smelting and separation.
Jun 2018	The ban on foreign investment in rare earth smelting and separation was lifted in the Negative List for the Access of Foreign Investment (2018), which was a modification of the Catalogue of Industries for Guiding Foreign Investment (Revision 2017). The number of items in the 2018 list was cut from 63 to 48.
Apr 2018	The Ministry of Industry and Information Technology (MIIT) issued the first batch of rare earth mining quotas, with a volume of 73,500 mt that was 70% of last year's total quota. This included 12,530 mt of ionised rare earth, mostly medium-weight and heavy weight, and 60,970 mt of rock or lightweight rare earth.
Jan 2018	The Ministry of Commerce and General Administration of Customs released the <i>2018 Catalogue for Goods Subject to the Administration of Export License</i> that took effect on January 1, 2018. Rare earths will still be subject to the export licensing scheme in 2018.
Nov 2017	The Sichuan government released the <i>Notice of Development Guideline for Vanadium, Titanium, Iron and Steel, and Rare Earth Sectors</i> in the 13 th five-Year plan.
Nov 2017	Rare earth type selective catalytic reduction (SCR) denitration catalysts (GB/T 34700-2017) will take effect on May 1, 2018.
Nov 2017	The Ministry of Industry & Information Technology (MIIT) released the <i>Industry Key Common Technology Development Guidance 2017</i> . The document prioritises 174 such technologies, including 53 in the raw material industry, 33 in equipment manufacturing, 36 from electronic information and communications, 27 in consumer goods and 25 from environmental protection and recycling.
Oct 2017	Henan province released the <i>Standards for Outdated Capacity Elimination</i> which covers energy consumption, environmental protection, quality, safety and technology, based on the national compulsory energy consumption ceiling limit.
Aug 2017	The MIIT released guidelines to standardise the approval process for rare earth investment. The information covers ideology, the definition of approvals, preconditions for approval, standardisation of project verification and enhancement of project supervision.
Jul 2017	China's Ministry of Industry & Information Technology (MIIT) issued the second batch of rare earth production quota for 2017, including 52,500 mt of mineral products and 49,925 mt of smelting and separating products.
Jul 2017	Jiangxi's Ganzhou held a meeting about checks over No. 2 and No. 3 measures, which are listed in Jiangxi's <i>Correction Program for Complying with Central Environmental Protection</i> aimed at tackling with ecological damage in rare earth mining.
May 2017	A bid invitation by the State Reserve Bureau (SRB) ended with purchasing volumes exceeding 3,000 mt. Participants in the bid include China Minmetals, Baosteel, Chalco, Ganzhou Mining, Rising Nonferrous Metals, Xiamen Tungsten, and China Nonferrous Metal

Mining. The bids include 250 mt of neodymium oxide at about 285,000 yuan/mt, 200 mt of europium oxide at 570,000 yuan/mt, 520 mt of dysprosium oxide at 1.24 million yuan/mt, about 35 mt of lutetium oxide at 5.21 million yuan/mt, about 330 mt of yttrium oxide at 26,000 yuan/mt, about 300 mt of erbium oxide at 190,000 yuan/mt.

Apr 2017	The MIIT released the rare earth production quota for 2017, with 52,500 mt of ores, 50,075 mt of smelting separation products. The first indicator for light rare earth is 43,550 mt for 2017, and 8,950 mt for medium and heavy rare earth, totalling 52,500 mt.
Dec 2016	Ganzhou's five departments, including Ganzhou Municipal Industry & Information Committee, launched inspections on rare earth classification recycling.
Dec 2016	The Ministry of Commerce published the <i>2017 Catalogue of Goods Subject to Export License Administration</i> on December 30, 2016, which was implemented on January 1, 2017. According to catalogue, rare earth is subjected to export licence administration. Exports of cerium and its alloy (<500 μ mare) are free from export licences but exporters should apply for 'Dual-Use Items and Technologies' export licenses.
Dec 2016	Eight ministries, including the MIIT, jointly announced inspections on illegal activities from December 2016 to April 2017. The inspection team will target illegal mining and illegal processing of ore products.
Dec 2016	The State Council delegated approval rights of rare earth mine exploitation and smelting and seperating projects in December 2016.
Dec 2016	Five departments, including the Commission of Industry & Information Technology of Ganzhou, launched inspections on rare earth recycling through classification in December 2016.
Oct 2016	The MIIT issued the <i>Rare Earth Industry Development Plan (2016-2020)</i> on October 18. The plan summarises achievements and challenges in the Chinese rare earth sector during 12th five-year period and identifies the key tasks for the next five years, with supply side reform and high-end applications promotion. The government will eliminate outdated rare earth capacity and reduce rare earth annual separation capacity to 200,000 mt/yr by 2020.
Jul 2016	In July, the Ministry of Land & Resources released the circular on rare earth mining quota in 2016, which sets 105,000 mt of rare earth oxides (REO) mining quotas in 2016, including 17,900 mt of the ion-absorption-type medium and heavy rare earths, and 87,100 mt of the rock-type light rare earths.
May 2016	On May 10, the Ministry of Finance and State Administration of Taxation jointly released the <i>Notice on the Implementation of the Reform of Resource Tax</i> , which takes effect July 1, 2016. The notice keeps the resource tax unchanged for crude oil, natural gas, coal, rare earth, tungsten and molybdenum, whose taxes are levied based on prices.
Apr 2016	The Ministry of Land and Resources issued on April 14 the <i>Outlines of the 13th Five-Year Plan for Land and Resources</i> . It discussed more effective exploration and protection of land and resources, improvement of mineral reserve mechanism and increase in stockpiling of strategic mineral resources, including tungsten, rare earth and crystalline graphite.
Apr 2016	To implement the resolutions of the United Nations Security Council, China's foreign trade law banned imports of gold ore, titanium ore, vanadium ore and rare earth minerals from North Korea.
Apr 2016	The MIIT recently announced the production limit on the first batch of rare earth in 2016. Ore production shall be controlled at 525,000 mt and smelting and separation products

shall be controlled at 45,000 mt. Of which, six large rare earth producers can produce 52,440 mt of ore products and 44,805 mt of smelting and separation products.

Dec 2015

The Standardization Administration of the People's Republic of China (SAC) reports the General Administration of Quality Supervision, Inspection and Quarantine and the SAC approved and promulgated 23 national standards for the rare earth sector as of early December 2015. There were 14 standards revised, which will come into effect April 1, 2016. The other 9 standards were new and will take effect August 1, 2016.

Aug 2015

The Standardization Administration (SAC) issued *The Second Batch of National Standards Revision Plan 2015* on July 31. The plan covers SCR catalyst, determination of aluminum oxide content (GB/T 18882.2-200) - the 2th part of chemical analysis methods for mixed rare earth oxide of ion-absorbed rare earth ore, and determination of lead oxide content (GB/T 16484.13-2009) - the 13th part of methods for chemical analysis of rare earth chloride and carbonate.

Jul 2015

The Central Board of Excise and Customs (CBEC) announced on July 28 that it will accept the result of anti-dumping investigation into imports of compact fluorescent lamps (CFL) from China and will levy anti-dumping duties on CFL imports from China for a period of 5 years, effectively July 28, 2015. The tax rate shall be 30 US cents for each CFL and the Customs assigned number is 8539.

May 2015

The Chinese government will levy resource tax on rare earth, tungsten, and molybdenum based on prices starting on May 1, to replace the old volume-based, with an 11.5% rate for Inner Mongolia light rare earths, 9.5% for Sichuan and 7.5% for Shandong. The tax rate for medium and heavy rare earth was set at 27%.

Apr 2015

The MIIT announced the first batch of rare earth production quota for this year, which includes 52,500 mt of rare earth mining products and 50,050 mt of rare earth smelting and separating products. Production quota allocated to six rare earth groups totals 96,402 mt, including 49,712 mt of mining products and 46,690 mt of smelting and separating products. China Northern Rare Earth (Group) High-Tech has obtained production quota for 29,750 mt of mining products and 25,960 mt of smelting and separating products, accounting for nearly 60% of quota allocated to six groups.

May 2017

A bid invitation by the State Reserve Bureau (SRB) ended with purchasing volumes exceeding 3,000 mt. Participants in the bid include China Minmetals, Baosteel, Chalco, Ganzhou Mining, Rising Nonferrous Metals, Xiamen Tungsten, and China Nonferrous Metal Mining. The bids include 250 mt of neodymium oxide at 285,000 yuan/mt, 200 mt of europium oxide at 570,000 yuan/mt, 520 mt of dysprosium oxide at 1.24 million yuan/mt, about 35 mt of lutetium oxide at 5.21 million yuan/mt, about 330 mt of yttrium oxide at 26,000 yuan/mt, about 300 mt of erbium oxide at 190,000 yuan/mt.

Sources: SMM, Ministry of Land and Resources, Ministry of Commerce, Ministry of Industry and Information Technology, Ministry of Environmental Protection, the State Council, State Administration of Taxation, China Customs, Ministry of Finance

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Contact us

Analyst	Contact number	Email
Grace Wu	+86-21-51666892	wuxiaofeng@smm.cn
Sabrina Li	+86-21-51666830	Sabrinali@smm.cn

SMM Information & Technology Co.,Ltd.

Address : 9th FL in South Section, Building 9, Lujiazui Software Park, No. 20, Lane 91,

E'Shan Road, Pudong New Area, Shanghai, 200127, China.

Hotline: +86-21-3133-0333 Fax: +86-21-5127-5007 Website: www.metal.com

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