S&P Global
Platts

BATTERY METALS INSIGHT

April 2020

CORONAVIRUS PANDEMIC RAISES NEW CHALLENGES TO THE BATTERY METALS INDUSTRY

Quarterly pricing wrap: COVID-19 provides short-lived momentum, deep dive to seaborne battery metals prices

Seaborne battery metals prices were directly affected by the coronavirus pandemic in the first quarter — initially with a short-lived increase but followed by a plunge that is expected to go deeper in the second quarter.

Although lithium, cobalt and nickel behaved similarly, each had its own timing and intensity in the ups and downs observed through Q1. The overall trend for the coming months, however, is bearish for the three of them: despite the maintenance of the Chinese subsidies policy for electric vehicles (EVs), announced at the end of Q1, demand is expected to be hit a lot harder than supply by the pandemic.

Moreover, lithium, cobalt and nickel prices had already been under pressure due to the existing oversupply in these three markets. The slowdown in adoption of EVs that is expected as a result of the COVID-19 crisis — deepened in the short term by the lower oil price environment, which makes EVs less attractive against internal combustion engine cars — will likely delay the consumption of these inventories, preventing a price rebound in the immediate term, sources said.

Lithium

After freefalling through 2019 due to oversupply, lithium prices started 2020 still under pressure. However, a tightness of lithium hydroxide coarse sands supported Chinese domestic lithium hydroxide prices in January, while carbonate moved down.

S&P Global Platts' Chinese domestic lithium assessment started January at Yuan 48,000/mt for lithium carbonate and Yuan 50,500/mt for lithium hydroxide, both on a DDP basis. Carbonate fell Yuan 1,000/mt on January 17 while hydroxide stayed unchanged until February 7.

At that point, the coronavirus outbreak had already affected logistics in China significantly, which started to boost lithium spot prices — especially those of hydroxide, which has a shorter shelf-life compared to carbonate.

The support provided by logistics, coupled with a price hike announcement by major producer Ganfeng, drove lithium hydroxide DDP China up on February 14 to Yuan 53,500/mt. This level was maintained until March 20. Lithium carbonate DDP China held steady through February, then moved up to Yuan 48,500/mt on the last day of the month.

Even when trucks started to be available again, some sources indicated that costs were up to twice as much as usual; however, the demand reduction was already obvious by that point, generating concerns about lithium pricing.

On March 20, these concerns translated into lower carbonate spot prices, which returned to the Yuan 47,000/mt level and finished Q1 even lower at Yuan 46,800/mt, before falling further to Yuan 46,000/mt on April 3. Hydroxide also stepped back to Yuan 53,000/mt on March 27 — but was still higher than at the beginning of Q1.

The seaborne spot market, which is significantly less liquid than the Chinese domestic one, remained mostly flat due to the lack of trade during this uncertain period. Lithium carbonate CIF North Asia held flat over Q1 at $7,250/mt, while lithium hydroxide CIF North Asia had a $500/mt uptick on February 14, staying at this level until the end of March.

Cobalt

Similarly to lithium, cobalt sulfate prices were also under pressure last year due to oversupply, although the outlook was more promising at the beginning of January.

Stronger market sentiment drove Platts' cobalt sulfate DDP China assessment up on January 9 to Yuan 49,000/mt from Yuan 45,500/mt. Cobalt sulfate CIF North Asia also increased to $8,000/mt from $7,600/mt.

Moreover, Chinese sellers cut loadings in mid-January as truck transportation would be halted for a few days ahead of the Lunar New Year holiday, from January 24-30. The domestic DDP China assessment rose to Yuan 51,000/mt, and the CIF North Asia price reached $8,300/mt.

After the holiday season, the coronavirus pandemic had already forced the Chinese government to implement social distancing measures, affecting logistics more drastically. This provided more support to cobalt sulfate prices.

Despite some Chinese participants returning to work by mid-February, demand remained muted with only sporadic offers heard. Some producers remained out of the market pending government notice. Logistic issues continued to hamper trade as the coronavirus outbreak led to stringent checks on cross-provincial transport personnel.

Cobalt sulfate prices reached their highest levels for the quarter in the second half of February, at Yuan 58,000/mt DDP China on February 20 (repeated on February 27) and $8,500/mt CIF North Asia also on February 20 (maintained until March 12).

In the first week of March, poor demand started to weigh on Chinese domestic cobalt sulfate prices, which moved down Yuan

(continued on page 2)

4,000/mt to Yuan 54,000/mt DDP China basis. The price kept heading down through the month, finishing March at Yuan 47,000/mt and starting April at Yuan 44,000/mt.

In the seaborne market, traders stood on the sidelines waiting for clearer cues in early March, which delayed the downtrend until March 19, when the CIF North Asia price retreated $500/mt to $8,000/mt.

Market participants continued to cite slow demand, with a lack of any clear sign of recovery in EVs production as the major pressuring factor. Panic due to the coronavirus pandemic and falling cobalt metal and major feedstock cobalt hydroxide prices were also reasons for the downtrend.

Not even the closure of South African ports — usually employed to ship DR Congo's cobalt exports — offset the bearish trend as there were still high inventories to be consumed, sources said.

Nickel

The promising outlook for nickel prices -- which were pointing up since the Indonesian government announced last August 30 a ban on nickel ore exports from January 2020 -- also turned negative in Q1 due to the pandemic.

In early January 2020, LME three-month nickel was over $14,000/mt, just above 2019's average of $13,970/mt. The trajectory was a steep decrease towards $12,500/mt, with a slight rebound in early February, when prices recovered the $13,000/mt mark.

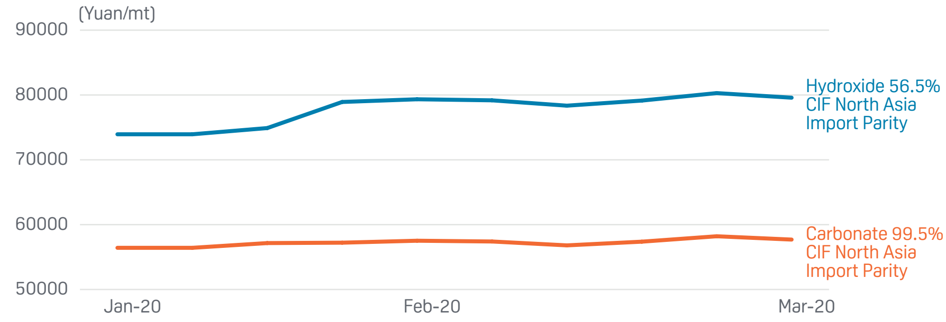
The short-lived recovery ended by mid-February, when LME three-month nickel fell progressively until it approached the $11,000/mt level.

"Other bearish factors, such as the crude oil price collapsing to an 18-year low and high London Metal Exchange nickel stocks, have contributed to the LME three-month nickel price dropping by 11.4% month over month March 19 to $11,225/t," S&P Global Market Intelligence said in its Nickel Commodity Briefing Service March 2020 report. That was the lowest price since June 2019.

Market Intelligence previously expected a nickel deficit of 69,000 mt in 2020, but the likely bigger impact from the pandemic on demand than supply has shifted this forecast to a surplus of 11,000 mt.

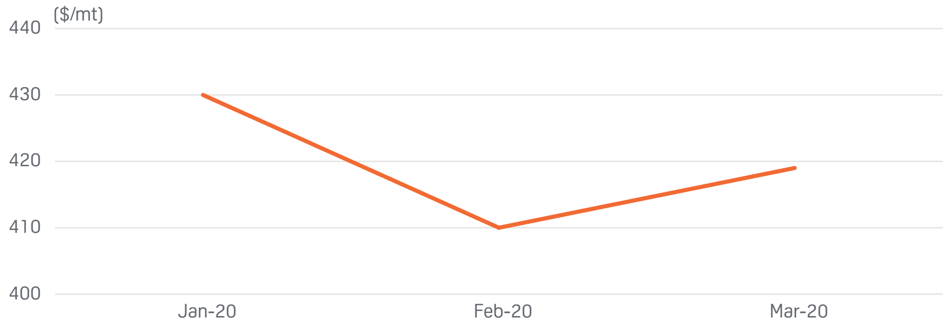
"We have dropped our forecast for 2020 global primary nickel consumption by 231,000 mt. We have also lowered our 2020 global primary nickel production forecast by a smaller amount, 151,000 mt, due to anticipated

LITHIUM CARBONATE AND HYDROXIDE SPREADS



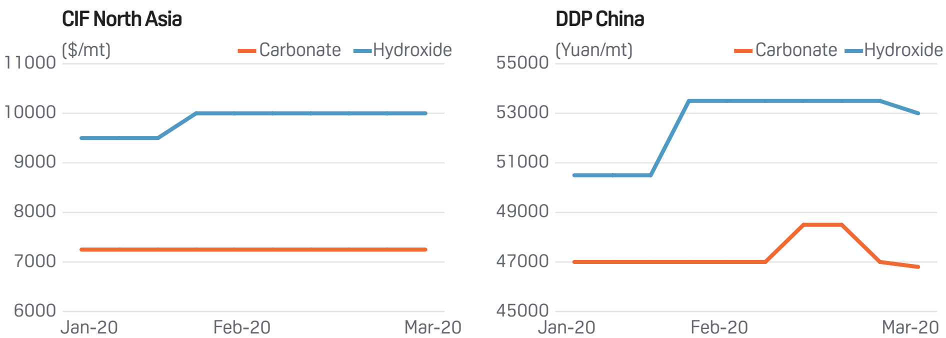
Source: S&P Global Platts

SPODUMENE CONCENTRATE 6% PRICING



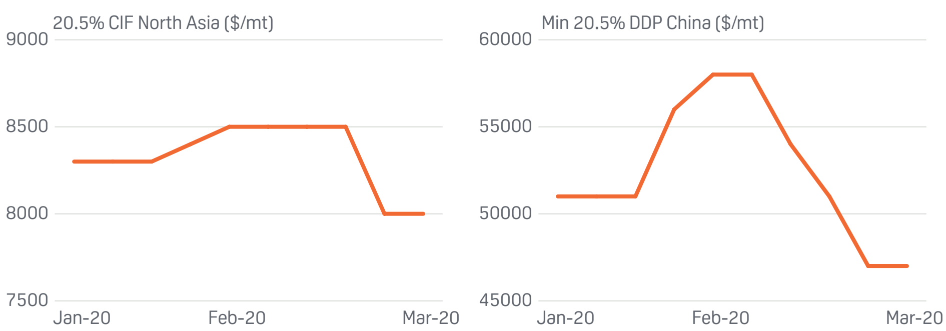
Source: S&P Global Platts

LITHIUM CARBONATE AND HYDROXIDE PRICING



Source: S&P Global Platts

COBALT SULFATE PRICING



Source: S&P Global Platts

logistical and transportation issues that will put downward pressure on supply," the Nickel CBS March 2020 report said.

As a result, Market Intelligence's 2020 average LME three-month nickel price forecast fell to $12,036/mt from $14,753/mt, representing a 13.8% decrease from the 2019 average price.

Plunging LME nickel prices also affected nickel sulfate, which is employed on NCA and NCM cathode chemistries. Moreover, Japanese and South Korean precursor manufacturers have halted production, according to some market participants, undermining demand.

Prices for battery-grade nickel sulfate with minimum 22% Ni content were heard at Yuan 22,500/mt in late March, on a similar downtrend to lithium and cobalt chemical compounds used in batteries.

— Henrique Ribeiro, henrique.ribeiro@spglobal.com

Coronavirus temporarily halts Chinese battery metals market activity

The coronavirus pandemic that originated in Wuhan city, Hubei province, created constraints to supply chains and transportation across China starting in late January as the government initiated lockdowns and businesses closures to prevent the spread of the virus. Several Chinese industry sources in the battery chain told S&P Global Platts that they had either halted or reduced production, or stopped procurement and relied on January stockpiles. This supply shock bumped up prices for battery raw materials in the near term.

Domestic lithium chemicals markets saw a slight rebound after the Chinese Lunar New Year holidays in February as major spodumene converters insisted that temporary supply tightness and surging logistics costs buoyed conversion costs, on top of a shrinking margin as some continue to consume feedstocks purchased on a long-term contract basis last year at relatively higher prices.

Truck transportation costs were heard to have doubled in the first few weeks of the nationwide lockdown. Local governments put stringent restrictions on trucks as all transportation was forced to give way to critical medical supplies and necessities, while non-essential services were suspended during the first wave of the pandemic.

Logistics gradually opened up outside of Hubei province as most other regions observed fewer new cases. Hubei itself had about 60% of total affections in China. Sources told Platts that costs were doubled and some preferred to sell forward cargoes a month ahead.

On February 14, battery-grade lithium hydroxide prices rebounded for the first time since Platts first started assessing them a year-and-a-half ago, rising 5.9% from the lows seen throughout January despite spot trading activities remaining tepid amid the holiday lull. Offers rose to as high as Yuan 58,000/mt for top tier coarse sand grades, but buying interest continued to hover around Yuan 50,000-53,000/mt.

Lithium carbonate prices followed the same trend, with a two-week delay, on sufficient inventories at cathode manufacturers and supply far exceeded demand. On February 28 Platts battery-grade lithium carbonate assessment recovered slightly from the downward correction to Yuan 48,500/mt. However, the uptick soon fell off the plateau as persistent oversupply and slow demand continued to weigh on prices, thus widening the spread between hydroxide and carbonate.

Lithium hydroxide is often used in nickel-rich batteries, mostly NCM811 (representing eight parts nickel, one part of cobalt and one part of manganese) and NCA (nickel cobalt aluminum oxide) type of batteries for high performance electric vehicles, whereas lithium carbonate is more widely used in lower energy density batteries such as NCM523 and NCM622 for passenger vehicles, LFP (lithium iron phosphate) for passenger and commercial vehicles, LCO (lithium cobalt oxide) and LMO (lithium manganese oxide) typically for consumer electronics.

NEV market remains weak

The Chinese battery metals market remained in the doldrums with a large supply overhangs and weak demand from NEVs. According to the latest report released by China Association of Automobile Manufacturers, Chinese output of new energy vehicles (NEV) in January-March fell 60.2% year on year to 105,000 units, while sales fell 56.4% to 114,000 units. Demand for battery chemicals accounts for slightly more than 50% of cobalt consumption.

Beijing has extended help to the NEV industry through numerous measures to boost demand for NEVs, with the latest in the form of an extension of EV subsidy programs in late March. However, most sources deemed the near-term impact to be minimal but were more hopeful for the longer term.

Cobalt export uncertainty remains

Prices for Platts' battery-grade cobalt sulfate min. 20.5% DDP China price hit a three-month high of Yuan 58,000/mt DDP on February 20 and subsequently fell to a four-month low of Yuan 44,000/mt on April 2 as weak demand roiled the market.

Feedstock supply disruption concerns are expected to become starker, after the South African government announced last week that the 21-day lockdown would be extended to the end of April in a bid to control the spread of coronavirus. The impact on cobalt exports was unclear. The first lockdown commenced on March 26, to last for 21 days. The Democratic Republic of Congo, where the bulk of the world's cobalt is mined, transports its cobalt via neighboring African ports including South Africa's Durban port and Tanzania's port of Dar es Salaam. Durban is the main export corridor for cobalt shipments.

However, refiners in China were unfazed, with sources saying inventories of cobalt feedstocks could last for a few months. The lockdown lent minimal support to cobalt sulfate prices, as weak demand from downstream precursors and cathodes remained the overarching concern.

Elsewhere, S&P Global Platts is set to launch a weekly cobalt hydroxide CIF China assessment on May 7. The launch of the assessment comes on the back of consistent and growing market demand for increased pricing information in the global cobalt hydroxide and cobalt cathode markets, as well as the battery metals markets as a whole.

— Xinyue Zhang, xinyue.zhang@spglobal.com
— Melvin Goh, melvin.goh@spglobal.com

COVID-19 impacts battery metals' operations and rises uncertainty in the industry

With the global coronavirus pandemic impacting many aspects of the battery metals supply chain worldwide, it seems inevitable industry activity will be harmed this year, although some players remain optimistic about a demand recovery after the first wave of the virus passes.

China, where most of the demand for battery metals is currently concentrated, was the first epicenter of the pandemic, especially during January and February, although large battery metal players in the country did not experience much disruption production-wise.

Sources at two large China-based lithium producers said production had not been impacted by the virus outbreak, while a source at a lithium converter in the southwest of the country said his company had already been shut for maintenance over the Lunar New Year period and the outbreak only postponed the return to production to early March.

In early April a source at a Chinese cathode materials producer said his company had been back at work for nearly two months already and was almost back at full capacity.

However, Chilean lithium producer SQM, which still hadn't reported any impact on production as of early April, said in March that the health crisis reduced its shipments into China by 2,000 mt, which represents 4.8% the company's total shipments last year.

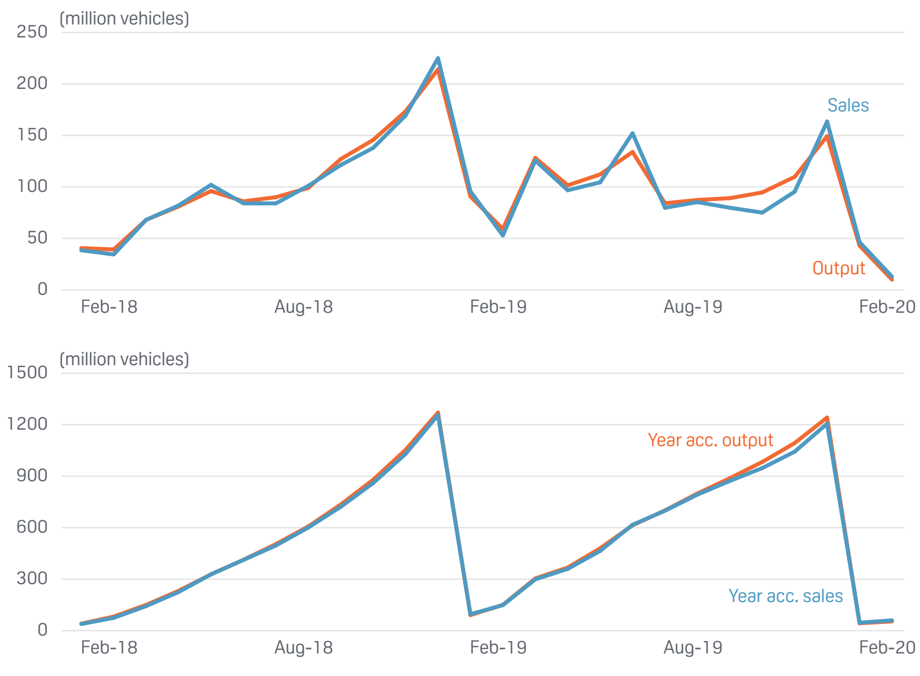
"For the rest of the year, the impact on our sales volumes and average prices will depend on the duration of the coronavirus in different markets, the efficiency of measures implemented to contain the spread of the virus in each country and fiscal incentives that may be implemented," SQM said.

According to the China Automobile Industry Association, February production and sales of new energy vehicles, including pure and hybrid electric vehicles, fell sharply in China to 9,951 and 12,908, respectively, down 82.9% and 75.2% year-on-year.

According to the China Automobile Power Battery Industry Innovation Alliance, the loading volume of power batteries, which is the major consumer of cathode materials and battery metals, dropped 73.4% year-on-year in February to 0.6 GWh, which was also 74.2% lower than the previous month.

In addition, China's domestic mobile phone shipments dropped 56% year on year in February to 6.4 million units.

CHINESE NEV PRODUCTION AND SALES PLUNGE IN FEBRUARY DUE TO THE CORONAVIRUS



Source: China Association of Automobile Manufacturers

Supply-side operations temporarily halt production

As the epicenter of the pandemic moved away from China and spread through the rest of the world, particularly Europe and the US, more concerns arose regarding demand, as well as supply.

Brazil-based miner Vale was forced in mid-March to ramp down its Voisey's Bay mining operation in Canada and place it on care and maintenance for an initial period of four weeks.

"The Long Harbour Processing Plant continues to operate and nickel and cobalt production should not be affected," Vale said at the time, relying on the availability of stockpiled concentrates. Copper concentrate production, however, was paralyzed, and Vale decided to put on hold the Voisey's Bay expansion project.

Voisey's Bay produced 35,400 mt of nickel in 2019, down 8.3% from 2018. Cobalt output at the site was 1,608 mt in 2019, down 15.5% from 2018.

In Argentina, a quarantine decree from the government forced both US-based Livent and Australia-listed Orocobre to temporarily suspend their lithium operations until March 31, although the government then extended the quarantine period to April 12 and declared some mining to be "essential," which allowed certain activities to be undertaken within strict health and safety standards.

Orocobre, which had put its Olaroz lithium facility on care and maintenance on March 20 due to the first decree, said initial activities at the facility would focus on pond maintenance to ensure the brine concentration process was managed through the shutdown.

It also restarted production at Borax Argentina with minimal personnel and complying with strict biosecurity procedures to ensure supply of essential products to customers.

Livent, which also halted operations, said April 6 that it had resumed them after receiving authorization from the government.

Though operations will resume, Livent withdrew its previous full-year 2020 financial guidance as the pandemic continued to affect the global business environment.

Livent produced 16,785 mt of lithium carbonate and 21,348 mt of lithium hydroxide in 2019, while Orocobre produced 13,209 mt of lithium carbonate during the same period.

Construction of lithium projects in Argentina were halted by Orocobre, Galaxy Resources and Lithium Americas, while Livent said it had halted capital expenditure projects globally.

Global disruptions on both supply and demand also affected Belgium-based cathode materials maker and battery recycler Umicore.

"Until automotive OEMs restart production again, Umicore is temporarily shutting down most of its catalyst production capacity outside Asia and is resorting to temporary unemployment where applicable," Umicore said in an emailed response to questions.

It added that it had "adjusted the inflow of raw materials accordingly."

The company said it had seen a serious slowdown in automotive catalyst and battery materials activities in Asia at the time of the Lunar New Year holidays and in the following weeks.

Although demand and production were starting to gradually pick up in Asia, the spread of the coronavirus into other regions was concerning, as several OEMs had halted production, Umicore said.

In addition to halted car manufacturing, consultancy LMC forecast recently that global light vehicle sales would fall to under 77 million units this year, down 15% from 2019.

Lower impact elsewhere so far

Other companies in the battery metals industry have been less affected so far.

A BASF spokesman told S&P Global Platts that the company was in continuous contact with its customers and partners to monitor the situation closely.

"Due to the highly dynamic situation it is hard to foresee the detailed impact on our business yet. We always stay close to our customers and support each other at this challenging situation," the spokesman said.

Switzerland-based Glencore's cobalt operations in the Democratic Republic of Congo were still operating at the time of writing, although its Raglan nickel mine in Canada was put under care and maintenance for three weeks on March 26.

Meanwhile, BHP had not seen any effects on its Nickel West operation in Australia, although it had reduced the number of people at all operational mine sites and other operational facilities to business critical employees and contractors only, and in Chile the miner restricted the entry of workers from contractor companies at its Escondida copper operations for 15 days from March 26.

Russian nickel and copper producer Nornickel said March 25 that all its operations were carrying on business as usual, with an emergency response team established at all production sites to ensure the business continuity of its production, procurement, sales and marketing operations and protection of employees' health and safety.

Eurasian Resources Group (ERG), which is a major copper and cobalt producer in the DRC and Zambia, also said March 19 it had implemented a set of measures to ensure the uninterrupted and safe running of its global operations.

It said its subsidiary, ERG Africa, had "instigated a number of immediate actions to protect employees across both corporate offices and operational sites, adding that "plans are currently being drawn up to establish a quarantine area should the need arise."

— Jacqueline Holman, jacqueline.holman@spglobal.com
— Henrique Ribeiro, henrique.ribeiro@spglobal.com
— Lucy Tang, lucy.tang@spglobal.com

China's logistics returning to normal after coronavirus-related restrictions

After severe constraints caused by the coronavirus outbreak, China's logistics performance index (LPI) reached 51.5% in March, up from 26.2% in February and 49.9% in January, according to the latest report released by China Federation of Logistics & Purchasing (CFLP). An LPI above 50% indicates expansion.

This was in line with feedback from domestic battery metals market participants, which have suffered from coronavirus-related logistics restrictions since late January.

Production and logistics have gradually started to normalize as the spread of virus was brought under control in China, but slow demand from downstream sectors has become a major concern, market sources said.

"We shut down for maintenance during the Lunar New Year period and were due to start production from early February, but the virus outbreak postponed our production to early March," said a southwest China-based lithium converter.

"The downstream demand is lackluster now," he said, adding that the outbreak had made him more bearish about the battery metals market this year.

Another converter source in the region said his company's logistics had returned to normal, while its production had been unaffected by the virus outbreak.

Chinese logistics came to standstill in late January due to the virus outbreak and gradually got back on track after the Chinese government's decision to scrap all tolls nationwide from February 17.

China rolled out a raft of measures to ensure smooth road transport and accelerate work resumption, which achieved notable results as the spread of the virus was gradually brought under control.

The daily running rate of heavy haul freight cars (with a daily mileage of 20 kilometers or more) reached 41.9% as of March 22, compared with 95.2% at the same point last year, according to a CFLP weekly report. The report estimated that freight traffic would be fully recovered by mid- or late April.

Meanwhile, the virus spread has had little impact on the shipments to Japan and South Korea so far, according to market sources.

"There is no impact on logistics now," said a source with a Chinese cathode materials producer, whose company sends 70% of its shipments to Japan and South Korea.

He was more concerned that some vehicle producers in the two countries had shut down production due to the virus outbreak.

China's battery metals market sentiment remained gloomy, although Beijing has announced it will extend the subsidies and tax exemption for purchasing new energy vehicles (NEV), which was due to be removed by the end of this year, for two more years in a bid to boost consumption of these vehicles. Some market participants didn't think this would help, at least in the near term, as it could take some time before any improvement in NEV demand, driven by the subsidy extension, becomes evident.

An eastern China-based analyst took a bearish outlook on battery metals market, expecting that consumption for NEVs could remain depressed even with the subsidy extension, due to uncertainty beyond China caused by the pandemic.

Cobalt shipments to be hit by SA lockdown

Market participants expected cobalt exports out of South Africa to be negatively impacted by the country's nationwide lockdown, with sea ports remaining open only for essential cargoes like medical and food supplies.

South Africa started a 21-day lockdown at midnight on March 26 in a bid to halt the spread of the coronavirus in the country, with only "essential cargo" allowed at South Africa's eight sea ports. The lockdown was subsequently extended at least to the end of April.

The country's transport minister, Fikile Mbalula, said that port operations would be reduced to a minimum, prioritizing medical and food supplies.

The country's state-owned logistics operator Transnet announced March 27 that it had decided to reduce break-bulk terminals at the Port of Cape Town, Richards Bay and Durban to single berth operations, while multi-purpose terminals at the ports of East London, Saldanha, Port Elizabeth and Maydon Wharf in Durban would be closed.

"All bulk terminals, which handle mineral mining commodities will be scheduled as per demand from mining customers, subject to approval by the Department of Public Enterprises and Department of Mineral Resources," it said.

The Minister of Mineral Resources and Energy Gwede Mantashe had previously said that in the case of export of mined commodities, "each case will be evaluated on its merits."

One cobalt miner source told S&P Global Platts that cobalt exports out of South Africa were "shut completely."

The mostly landlocked Democratic Republic of Congo, where the bulk of the world's cobalt is mined, transports its cobalt via neighboring African ports including South Africa's Durban port and some through Tanzania's port of Dar es Salaam.

One trader said he expected supply tightness due to the coronavirus to "create upward pressure for cobalt and intermediate product prices in the near term," although other market sources said Chinese inventories were still sufficient and the prevailing weak demand would likely soften the impact of the tightness in supply.

"There wouldn't be any issue for a few months. That being said, Dar es Salaam… is still operational. Demand is poor, so basically there is no effect," a battery maker source said in late March when South Africa's lockdown started.

"Cobalt producers are suffering losses recently with cash flow issues, [so they] might use this opportunity to increase prices."

A cathode maker source said at the same time that there was no cause for concern as, "cobalt metal can be recycled to add to the supply and there's enough port stocks. There is no need to panic," he said.

— Lucy Tang, lucy.tang@spglobal.com

— Jacqueline Holman, jacqueline.holman@spglobal.com

CHINESE LOADING VOLUMES PLUNGE

(GWh)	Feb-20	Feb-19	Y/Y change (%)	Jan-Feb 2019	Jan-Feb 2020	Y/Y change (%)
Loading volume of power batter	0.6	2.24	-73.4	7.2	2.9	-59.6
Loading volume of ternary battery	0.5	1.85	-71.8	5.3	2.1	-60.4
Loading volume of LFP	0.1	0.32	-76.2	1.74	0.8	-54.1

Source: China Automobile Power Battery Industry Innovation Alliance

DEMAND SIDE: THE VIEW FROM PLATTS ANALYTICS

European PEV long-term trajectory bullish despite COVID-19 impact

While European sales of plug-in electric vehicles (PEV) are likely to be hit by the coronavirus pandemic in the short term, S&P Global Platts Analytics' Scenario Planning Service sees the long-term trajectory as bullish due to a strong regulatory framework.

Western Europe has a highly developed auto market with a large, urban population and high average household incomes. The high retail cost of gasoline/diesel, a wide variety of tax breaks/purchase subsidies and strong regulation improves the economics of owning PEVs in Western Europe.

Governments across Western Europe have been proactive in planning and installing public charging infrastructure, creating the world's second-largest charging network behind China (though not fully integrated across national boundaries).

In 2018-19, EU governing bodies agreed upon a suite of policy measures to support decarbonization of the EU transportation sector. In particular, strict emission standards were established for light duty vehicles, mandating reductions to 95, 81 and 60 gCO_2/km in 2021, 2025 and 2030 respectively off a 2018 base of 120.5 gCO_2/km.

This reinforcing regulatory environment has proved incredibly effective at encouraging consumers (demand) and manufacturers (supply) to coalesce around a plug-in EV market.

As highlighted in Platts Analytics' April EV Essentials Monthly, Western Europe has seen at least double-digit year-on-year growth in PEV sales for the past 26 consecutive months – even as other major auto markets like China and the US suffered significant year-on-year declines throughout much of 2019.

The EU, including the UK, experienced especially high growth in the first two months of 2020, posting near 130% growth compared with the first two months of 2019.

France has been a particular all-star performer, with year-on-year growth of over 200% each month.

These sales have pushed monthly average light duty vehicle emissions from new vehicles down to below 96g CO_2/km in February from 113g CO_2/km in December.

Moving into March and beyond, we will see the effects of the coronavirus pandemic on European auto sales.

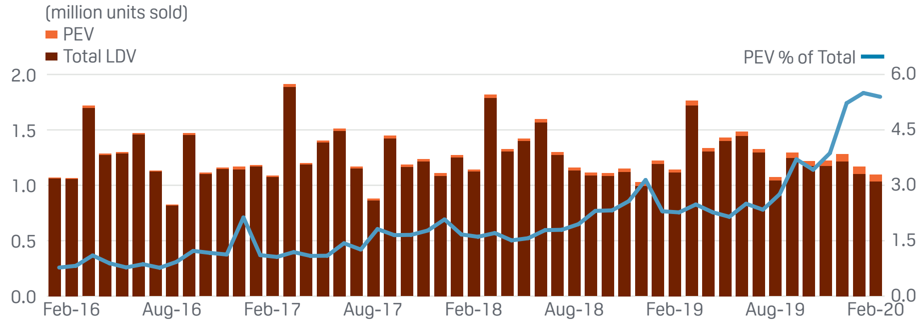
The struggles of the Chinese EV market intensified as coronavirus spread, with February seeing a dramatic 72% year-on-year decline in plug-in EV sales (though PEV market share increased to over 6% given an even more dramatic drop in total light vehicle sales).

European PEV sales are unlikely to be spared, particularly given their high upfront costs versus internal combustion engine vehicles.

Nonetheless, the Scenario Planning Service long-term trajectory of PEVs in Western Europe looks bullish, with a strong regulatory framework helping lay a foundation for an economically competitive PEV.

— *Zane McDonald, zane.mcdonald@spglobal.com*

PLUG-IN PASSENGER LIGHT DUTY ELECTRIC VEHICLE SALES AS A PERCENTAGE OF TOTAL LIGHT DUTY VEHICLE SALES – EU



Date as of April 9, 2020.
Sources: S&P Global Platts Analytics' EV Essentials, European Automobile Manufacturers Association

S&P Global Platts

GO DEEPER

Platts Analytics Scenario Planning service provides in-depth and comprehensive coverage of Alternative Transportation developments. Coverage includes the **EV Essentials monthly** publication, which tracks historical progression of EV sales growth and other key metrics, the **Platts Analytics Long Term EV Outlook** assessing the potential impact of major policy initiatives and investments on EV adoption momentum at the global and national level.

Reach out to **scenarioanalytics@spglobal.com** to get access to the reports, and further analysis.

SUPPLY SIDE: THE VIEW FROM S&P GLOBAL MARKET INTELLIGENCE

Battery metals output hit by coronavirus pandemic

The coronavirus pandemic and the rapidly evolving global effort to contain it have had a negative impact on global metals production, and battery metals have not been spared.

The pandemic and the resulting supply constraints have prompted Chinese nickel producers to reduce output. According to Shanghai Metals Market, China's February production of nickel sulfate and primary nickel production decreased by 24.4% and 7.2% month on month respectively, as logistical constraints caused by the epidemic led to shutdowns or production curtailments at Chinese nickel plants.

S&P Global Market Intelligence anticipates that Chinese primary nickel production will decrease in 2020, reflecting downward pressure from logistical and transportation issues caused by the pandemic and decreased availability of nickel laterite ore from Indonesia.

As of March 23, we forecast China's primary nickel output to drop by nearly 17% year-on-year to 601,000 mt in 2020.

We expect global primary nickel production to fall by 6.4% to 2.22 million mt in 2020, as the number of countries on lockdown increases.

On April 8, the Philippines' top nickel ore producers, Nickel Asia and Global Ferronickel Holdings Inc., decided to suspend their mining operations. The move came just two days after they announced a resumption of operations after an earlier local suspension order was lifted.

In the absence of nickel ore from Indonesia, the market was looking to the Philippines to be the main source of feedstock for China's nickel pig iron industry.

Prior to this latest development, we anticipated that the Philippines' ability to do so would be limited by various factors such as the country's moratorium on new mining projects and government-ordered suspensions at some existing nickel mines, both for environmental reasons.

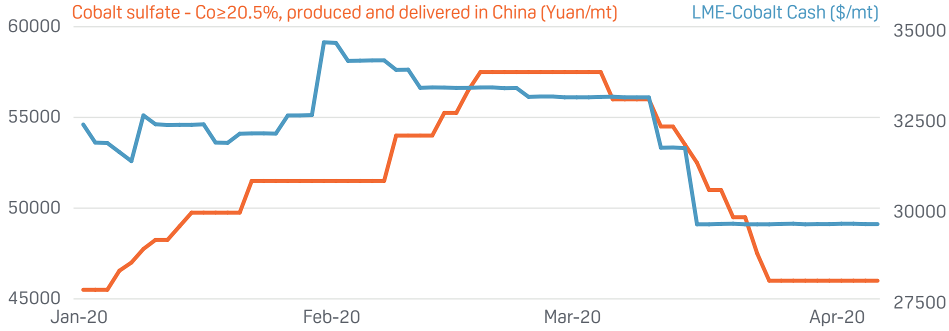
This will be put additional downward pressure on contained mined nickel output from the Philippines, which will have a negative impact on Chinese NPI output later in the year as Chinese nickel ore port stocks and stocks held by producers become depleted.

We forecast global primary nickel demand to decline by 8.1% year-on-year – more severe than the expected contraction in supply – to 2.21 million mt in 2020.

The global primary nickel market will consequently move from an estimated deficit of roughly 30,000 mt in 2019 to a small surplus of 11,000 mt in 2020, compared with our December expectations for the market to move to a wider deficit of 95,000 mt this year.

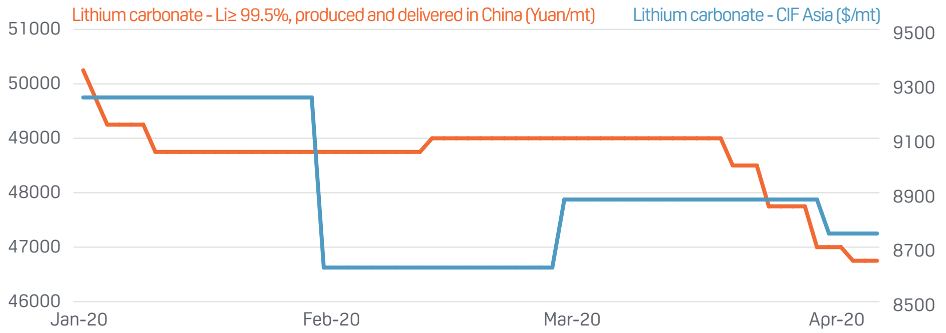
We expect the average London Metal Exchange 3-month nickel price to fall by 13.8% year-on-year to $12,036/mt in 2020, with additional risks skewed to the downside.

GLOBAL COBALT PRICES DECLINED IN MARCH BEFORE STABILIZING



Date as of April 7, 2020.
Sources: S&P Global Market Intelligence, London Metal Exchange, Thomson Reuters, Shanghai Metals Market

LITHIUM PRICES CONTINUE A FALLING TRAJECTORY



Date as of April 7, 2020.
Sources: S&P Global Market Intelligence, Benchmark Mineral Intelligence, Shanghai Metals Market

Lithium and cobalt output hit by increased disruptions as the virus spreads

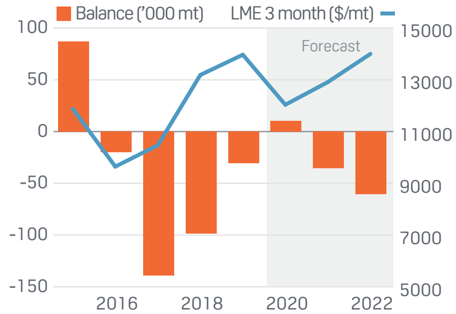
Argentina produced 31,700 mt of lithium carbonate equivalent in 2019, accounting for 6% of global lithium raw material supply.

The country's two operating lithium brines, Livent Corp.'s Hombre Muerto and Orocobre Ltd.'s Salar de Olaroz, have each lost 14 and 17 days of operation respectively due to mandatory quarantine measures. The two companies have received approvals to resume operations, but both have withdrawn their previous 2020 production guidances.

S&P Global Market Intelligence estimates Salar de Olaroz's second quarter 2020 lithium production to be around 2,500 mt of lithium carbonate equivalent (LCE), compared to 3,824 mt of LCE needed to achieve the company's previous production guidance of a 5% increase year-on-year for the financial year of 2020.

Our revised production estimate for Hombre Muerto is 17,000 mt of LCE, which falls short of the 21,500 mt of LCE needed to achieve the companies' previous sales

GLOBAL PRIMARY NICKEL MARKET NOW EXPECTED TO BE BROADLY BALANCED IN 2020



Data as of March 18, 2020
Source: S&P Global Market Intelligence, LME

guidance of a 30% year-on-year in 2020. The risks to our production estimates are weighted on the downside.

Additionally, projects with an estimated 115,000 mt of LCE capacity previously expected to begin operations in Argentina between 2020 and 2022 now face site-work delays or capital withdrawals as a result of the pandemic.

Lockdown in Western Australia has not stopped movement of minerals; lithium companies are ensuring compliance with containment rules while maintaining production levels with minimal personnel movements.

Chile's containment measures have not affected lithium production in the Atacama region; however, Q1 disruption of demand and logistics will inevitably further increase producer inventory.

In cobalt, the Democratic Republic of Congo implemented a 48-hour lockdown in the province of Haut-Katanga on March 23. Closures of ports in South African have also disrupted the established export channel from the Central Africa copper-cobalt belt.

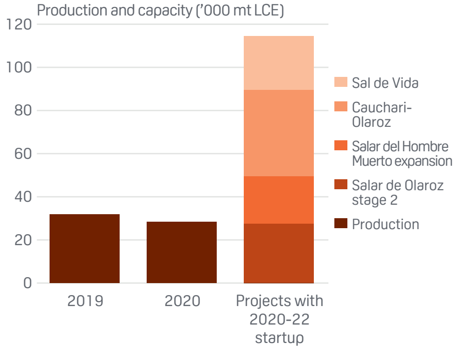
Lithium and cobalt supply disruptions are likely to be exacerbated if key supplying countries adopt more restrictive containment measures. Project development is likely to be further delayed as owners face demand softness, high inventory levels and the need to preserve cash flow.

Recent events highlight the risk that battery metal output could be hit by increased disruptions as the virus spreads. This, combined with expectations that the Chinese economy will start to recover in the second half of 2020, could provide some support to prices later in the year.

— Jason Sappor, jason.sappor@spglobal.com

— Alice Yu, alice.yu@spglobal.com

DELAYS TO 115,000 mt LCE OF LITHIUM PROJECTS IN ARGENTINA



As of April 9, 2020. LCE = lithium carbonate equivalent
Sources: S&P Global Market Intelligence