

S&P Global Platts

# Insight

May 2019



S&P GLOBAL PLATTS  
GLOBAL METALS AWARDS

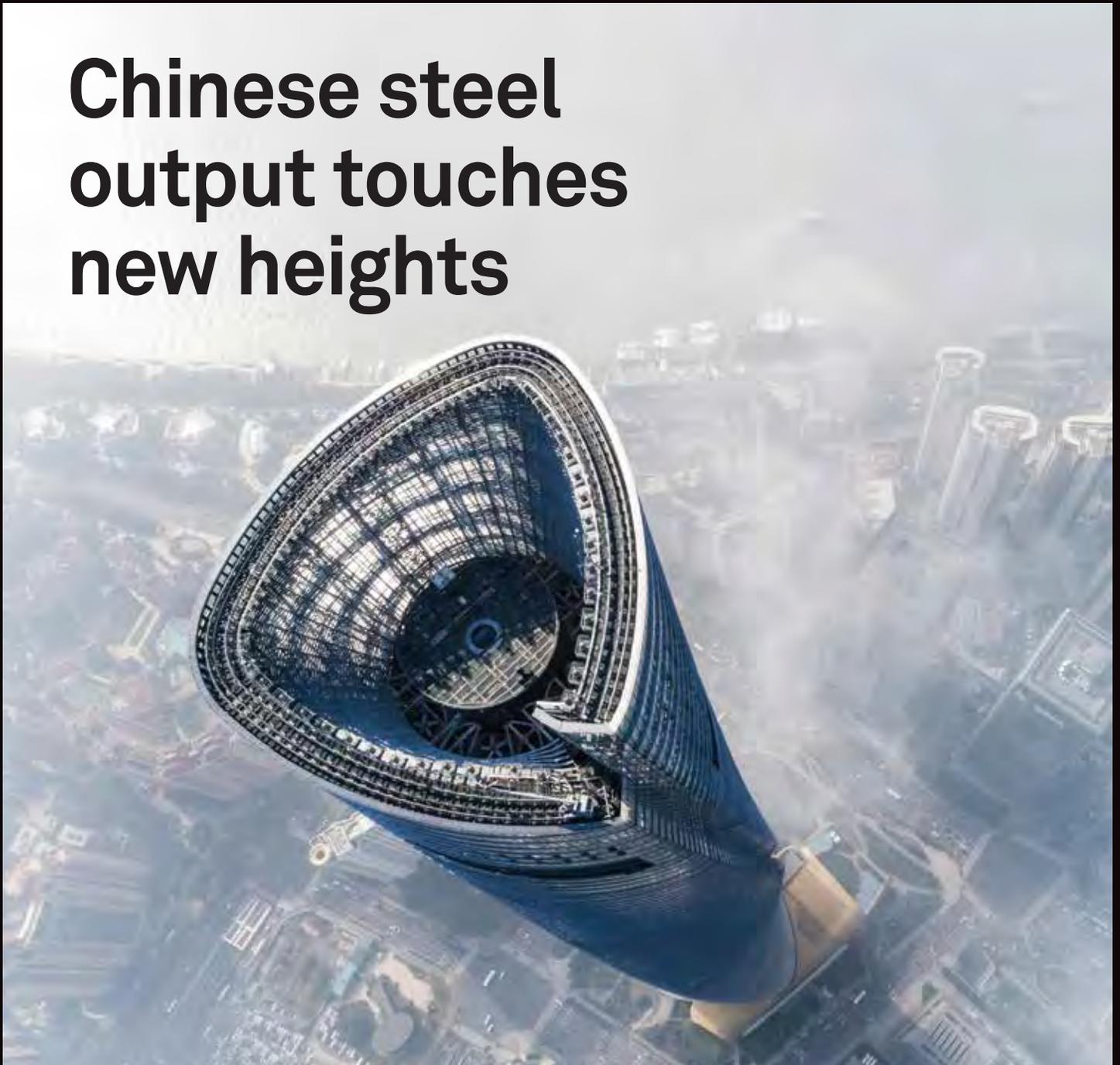
Reinvention in the US  
steel sector

Batteries and metals  
demand

Mexico's troubled  
gas market

US sanctions on  
Venezuela

## Chinese steel output touches new heights

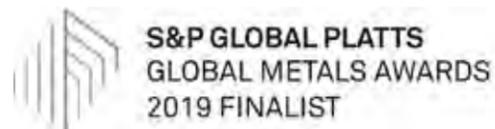


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## Insight

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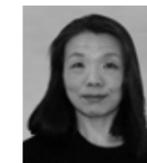
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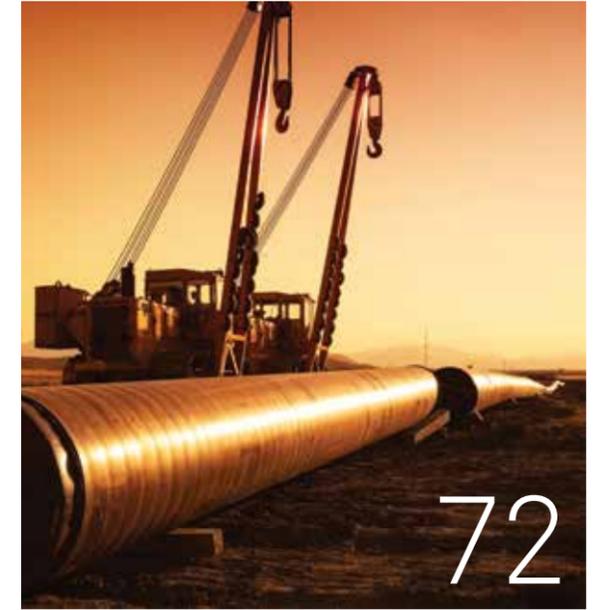


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# Editor's Note



Emma Slawinski

Editor

As this issue of Insight went to press, ahead of the S&P Global Platts Global Metals Awards, European cities were a stage for a number of popular demonstrations, providing a vivid reminder of some of the biggest pressures on the commodities sector.

Environmental protesters aligned with the Extinction Rebellion movement aimed to cause disruption across the globe, while in France the "gilets jaunes" or "yellow vests" movement, rallying against high living costs, continued to make its presence felt.

The drive to reduce emissions and broader ecological impacts is directly affecting commodities. Pressure to "clean up" comes from all sides, from consumers, to governments, investors and international organizations. But alongside the intensified calls for environmental responsibility, it is clear that swathes of the global population feel they have missed out on the economic prosperity from which others have benefited. This is an electoral flashpoint that has some fallout for the commodities world. Fuel prices and the cost of heating homes, along with the availability of jobs in heavy industry such as metals and coal, are sensitive areas that are being seized on by politicians in numerous countries.

US tariffs on imported steel and aluminum, introduced by President Donald Trump in March 2018 in an attempt to protect domestic industries, sparked further rounds of tit-for-tat duty hikes between the country and China. The measures have proved popular with the US steel trade, and, while not the only factor, the tariffs have undoubtedly contributed to the renewed enthusiasm and mushrooming investments in the sector (see page 25).

Meanwhile, despite challenges for China's steelmakers both in terms of the trade war and slowing growth at home, the country's steel output continues to soar. In our cover story on page 8, Paul Bartholomew and Jing Zhang analyze China's production capacity and find that despite a radical program of closures in recent years, facilities continue to be added, particularly electric-arc furnaces that are held to be better for the environment. The question for this year is, with domestic demand expected to slow, will exports rise, and what will be the impact on global steel prices?

Global and national politics are high on the agenda throughout this edition, as International Energy Agency executive director Fatih Birol discusses the role of OPEC in an evolving oil market, in this month's Insight Conversation interview (page 14). From page 72, J. Robinson investigates the sudden halting of Mexico's gas market liberalisation under new president Andres Manuel Lopez Obrador, while our Washington correspondent Brian Scheid discusses the effects of US sanctions on Venezuela on page 78.

Finally, while unpredictable swings in global politics can create an unstable environment for business, they can also push companies to innovate and continuously refine their model. Turn to our section on this year's S&P Global Platts Global Metals Awards winners on page 80, to learn how participants in the sector have been creating opportunity from adversity.

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# Best of the Rest

Our website [spglobal.com/platts](https://spglobal.com/platts) contains an extensive selection of free news, videos, podcasts and special reports about energy and commodities. Here's a small selection of recent highlights



## Video: Asia-Europe LNG price dynamics

LNG spot market prices in Asia recently fell below gas prices in Europe for the first time since 2015. S&P Global Platts Analytics explains why prices in Asia will have to regain their premium, and outlines key summer supply and demand forces that will drive the market.



## Blog: Challenges for energy trading

Falling margins and new competition from national oil companies are creating a tougher environment for the giants of independent commodity trading. They are adjusting by investing in areas such as LNG, renewables and power grids.



## Infographic: Clean energy targets

US states are striving to accelerate their energy transition, with four brand new mandates to hit 100% clean energy within the next 30 years. S&P Global Platts looks at the most ambitious targets and the challenges ahead to execute them.



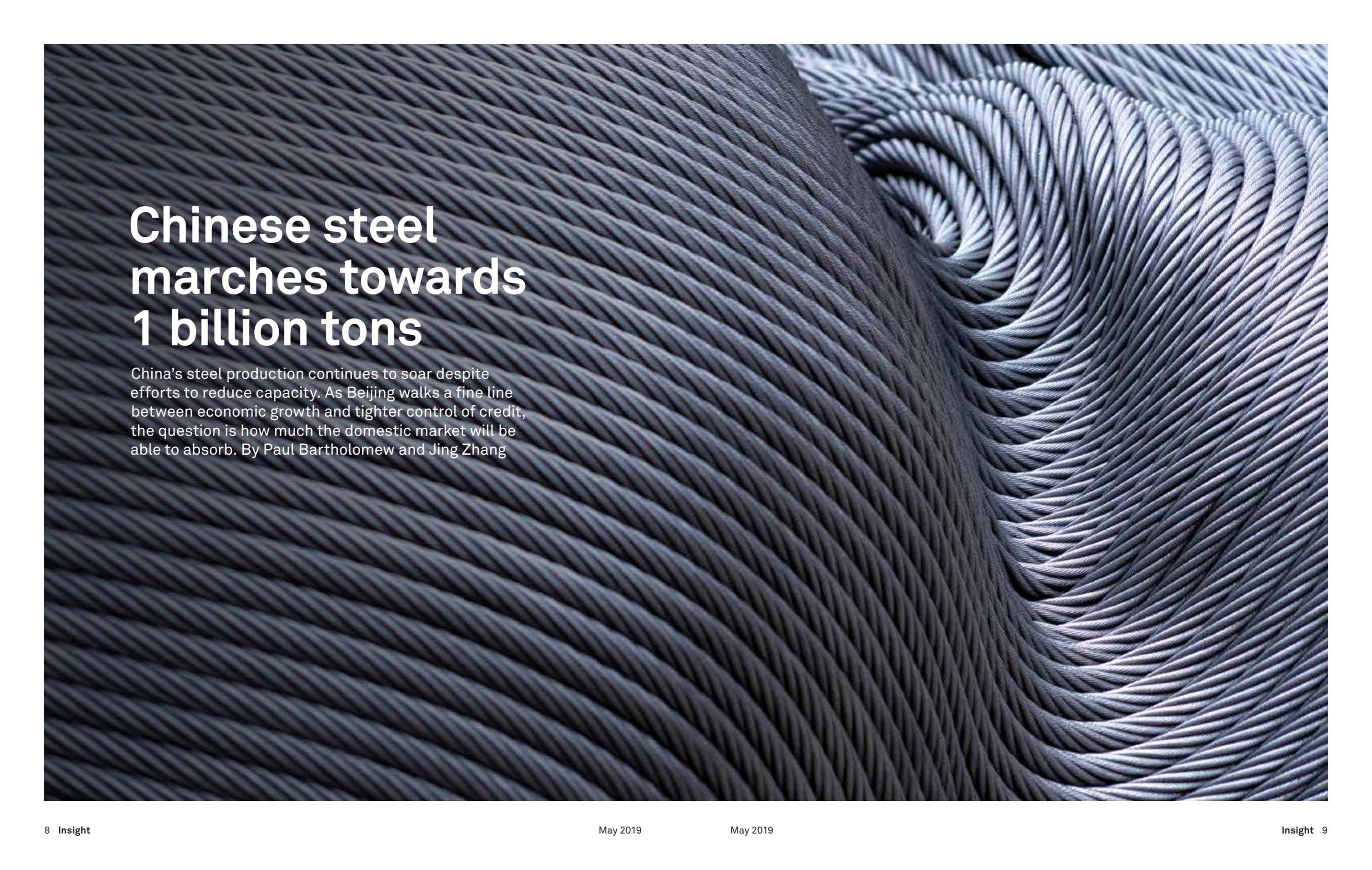
## Podcast: End of Iran sanctions waivers

In this podcast, S&P Global Platts Asia editors analyse the impact of the US sanctions waiver expiry on regional buyers – with China, India and South Korea depending heavily on Iranian crude and condensate imports to date.



## Special Report: Blockchain and container shipping

Rising oil prices and expectations of volatility as IMO 2020 regulations kick in are pushing the container industry to look at alternative contracting arrangements, and ways to improve transparency. Index-linked freight agreements and smart contracts facilitated by blockchain could be the way to achieve those goals.



# Chinese steel marches towards 1 billion tons

China's steel production continues to soar despite efforts to reduce capacity. As Beijing walks a fine line between economic growth and tighter control of credit, the question is how much the domestic market will be able to absorb. By Paul Bartholomew and Jing Zhang

Until a few years ago, market updates from major iron ore producers Rio Tinto and BHP routinely stated that they expected Chinese crude steel production to reach 1 billion metric tons sometime between 2025 and 2030.

This sounded like an incredible amount of steel, particularly as China's economic growth trajectory was heading south. Further, such a prediction seemed unrealistic given China's steel output had retreated by 2.3% in 2015 to just under 804 million mt.

For many Chinese government officials and steel analysts, the argument went something like this: steel consumption had peaked in 2014, Beijing was slashing steel capacity under its supply-side reform agenda, and the country was shifting toward a higher-value, consumption-driven economy based on cleaner technologies.

In short, the era of massive industrial capacity build, so-called "ghost cities", toxic assets, ballooning debt and excess that China was known for, was coming to an

end. China had embarked on a new era of sustainable growth, with its "blue skies" anti-pollution policy at the fore. In this setting, surely there was no way steel output would ever reach 1 billion mt?

So it came as a huge surprise that steel output increased by 15% over the past two years. China produced a record 928 million mt of steel in 2018, up 6.6% on the year before, according to the World Steel Association. Most forecasts at the start of the year envisaged output growth of 1-2%. Perhaps the 1 billion mt mark was not so far-fetched, as it would require less than 1% CAGR over the next 10 years to reach this level. Indeed, China started 2019 at a gallop: February's steel output of 71 million mt was up 9.2% on the year before.

S&P Global Platts expects steel production to rise this year by 2-3% to 947-956 million mt as mills keep run rates high to take advantage of decent margins.

The key concern for the rest of the world is that if China's economy slows and domestic demand is not



## S&P Global Platts expects steel production to rise this year to 947-956 million mt as mills keep run rates high to take advantage of decent margins

strong enough to absorb all of the steel it produces, its exports could destabilize global steel prices as they did over 2014-2016. During this period, China exported more than 100 million mt of steel each year. By the end of 2015, steel and raw materials prices reached a nadir.

In the Midwest region of the United States, domestic hot-rolled coil prices averaged \$373/short ton in December 2015, lower even than during the global financial crisis and 40% down on the same month a year earlier. Not surprisingly, many international steel companies were forced to slash production and staff, unable to continue operating at sub-economic prices. Some steel companies never recovered and were subsequently forced to find a buyer. A plethora of antidumping duties have been introduced to protect local steel industries and last year the US applied a 25% import tariff on steel from many countries. But trade protection measures often just shift the supply pressure problem from one place to another: as one door closes, exporters try to open another.

The topic of China's steel overcapacity has often been brought up at international government meetings, such as the G20. China has long been the US steel industry's bête noire – despite Chinese steel accounting for less than 2% of US steel imports – and the Section 232 import tariffs on steel and aluminum proliferated into a wider trade conflict. At the time of writing, tensions between China and the US had eased and a further tranche of tariffs had been delayed by the Trump administration.

### Capacity creep

China would argue it has been trying hard to reduce its capacity. It closed down around 140 million mt/year of unlicensed induction furnace (small scrap-fed rebar making facilities) capacity in 2017, and completed the removal of 150 million mt/year of legitimate steelmaking capacity over 2016-2018. In principle, companies are only to build new facilities if they remove a similar volume of capacity.

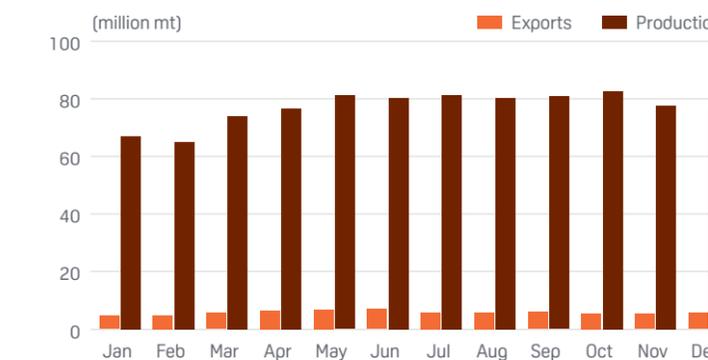
One of the reasons for the high steel production growth in 2018 could be that induction furnace production in 2017 was never included in the official data.

Notwithstanding the closures, the fact is that China already has steel capacity of 1.15 billion mt/year, S&P Global Platts estimates. And the country is building more. China will commission about 34 million mt/year of crude steel capacity via the basic oxygen furnace/blast furnaces route this year, and another 15 million-17 million mt/year of electric-arc furnace capacity, Platts estimates.

China wants to produce more steel from EAFs as this is considered to be better for the environment. As a result, there appears to be more flexibility and concession around new EAF capacity. Though the commissioning of new facilities is predicated on closures of existing iron-and steel-making capacity of equivalent or even slightly higher volumes, the numbers indicate there will be a net capacity increase this year.

Last year China commissioned nine new hot strip mills, with combined production capacity of around 25.35 million mt/year. This year will see another 12 new hot strip mills with capacity of 25.1 million mt/year come

CHINA'S STEEL EXPORTS AND PRODUCTION IN 2018



Source: National Bureau of Statistics



online, taking the total over two years to more than 50 million mt/year, according to Platts analysis.

In 2018, Chinese steel demand was extremely strong. Margins and prices hit six-year highs at times, and finished steel exports fell to a relatively modest 70 million mt. But in the final quarter, the market rapidly deteriorated as China's efforts to control debt and spending resulted in a tightening of liquidity. China's GDP slowed to 6.4% in fourth quarter, as Beijing took steps to stimulate the economy. Further, expectations that China would tighten up steel production in winter to curb emissions were priced into the market. But prices eased when these output constraints were loosened in response to the weaker economy.

### Outlook unspectacular

Domestic steel rebar margins averaged \$133.3/mt in the first half of 2018 and \$130.8/mt in the second half, indicating the resilience of the property construction sector. Domestic HRC margins averaged \$132/mt in H1 but fell to \$99.7/mt in H2, according to Platts analysis.

HRC is the main steel product used in manufacturing, which has been struggling due to weakness in consumer segments, such as automotive, white goods and appliances. Many consumers are highly leveraged to property and have found it harder to borrow money. Last year auto production fell for the first time since the early 1990s. Beijing plans to introduce some measures this year to stimulate demand in those segments, but overall the flat steel market may not grow much on last year.

The outlook for long steel products, such as rebar, is more positive as there is still a solid pipeline of construction work ahead. Property market investment increased by 11.6% year on year to Yuan 1.2 trillion (\$0.18 trillion) over January-February, according to the National Bureau of Statistics. Funding for residential property projects accounted for 72% of the total, up 18.0% year on year to Yuan 0.87 trillion. But house prices softened at the start of this year and S&P Global Ratings expects the property sector to contract by 8-12% in 2019.

Beijing has also stepped up investment in infrastructure through issuing local government

bonds after growth in the sector slowed last year. China's fixed asset investment in infrastructure increased by just 3.8% on year in 2018 – a big slowdown from 19% growth in 2017 – due to the nationwide deleveraging campaign.

China issued Yuan 1.22 trillion (\$0.18 trillion) of local government bonds between January and March. Investment in infrastructure construction rose by 4.3% year on year in the first two months of 2019, while investment in rail transport increased by 22.5% year on year.

But incremental demand growth from infrastructure is likely to be mild, while the overall steel demand outlook for the rest of the year is solid at best. In November, the World Steel Association forecast flat demand growth in China this year but acknowledged there would probably be an “upside to our forecast.” More positively, ANZ Bank said in late March that it had revised its forecast for Chinese steel demand growth this year to 4.5% from 3%.

Beijing needs to maintain solid economic growth and job creation without overcooking things and contributing to the debt mountain. The People's Bank

## Beijing needs to maintain solid economic growth and job creation without overcooking things and contributing to the debt mountain

of China has already said there will be no stimulus “flood” this year. There will be a tweak here and there, some fiscal levers pulled when necessary. But all the signs indicate a “steady as it goes” kind of year.

Given the increase in capacity outlined above, the likely level of crude steel production this year, and the muted demand and price outlook, exports look set to rise on last year. Some Chinese steel mills said they expected an increase of 5-10% on last year's 70 million mt. While it is unlikely there will be a return to the dark days of several years ago, additional volume into the market will pressure regional steel prices and could bite into steel margins this year. ■

# Insight Conversation: Fatih Birol

Fatih Birol, executive director of the International Energy Agency, speaks to Paul Hickin about the new oil market dynamics unleashed by US shale production, challenges facing Venezuela, and heightened geopolitical risk.

In 2012, Fatih Birol predicted that the US would become the largest oil producer by the end of the decade. In an exclusive interview with S&P Global Platts at the IEA headquarters in Paris, Birol did not hold back in outlining the impact US supply is now having on OPEC. The ardent supporter of Turkish soccer team Galatasaray, who has never driven a car, is also worried that Middle East producers may score an own goal if they do not diversify their economies quickly.

## What's your take on the oil markets right now?

I'm the chair of the energy board of the World Economic Forum, Davos and I have been going there 13 years in a row, participating in the meetings. This year, 2019, was the year when ministers and CEOs talked about geopolitics more than any other issue. Geopolitics is always part of the discussion, but this year it was talked about much more than demand and supply. And since the Davos forum in January, the geopolitical situation has worsened.

In addition to Iran and Venezuela, which are experiencing significant declines for different reasons in production and exports, we now have Libya going through a very difficult time, and of course, we don't know how things will evolve there; and then there is Algeria. When we look at those developments, plus the trade tensions between China, the US and other countries, geopolitics has become a key factor for oil markets for the next quarters to come. I am an energy man, therefore I don't like it, I would like to see oil markets determined by market forces rather than such developments.

## So are the interventions by OPEC, and Russia and its other allies, helping to stabilize the oil market, or are their cuts counter to its smooth functioning?

OPEC, plus Russia, are very important countries. I can tell you two things. One relates to the short term and one is more strategic. In the short term, after the emergence of the shale oil revolution which the IEA foresaw some ten years ago, the ability to determine market developments through meetings and resolutions is diminishing.

For example, last December those countries met in Vienna and took a decision [to cut output by 1.2 million b/d] with the expectation of bringing the prices up, and we see a few weeks later prices went significantly down because of the amount of potential [crude supply] coming out of the US. So we will see more competition between the resolutions in Vienna and the production in the Permian. Those days when oil markets, developments and prices were determined by resolutions, discussions and so on, are over. There are very strong market forces now, mainly driven by the US shale revolution. We see growth this year and we may well see acceleration in this respect.

I also have an important reminder to oil producing countries whose economies are heavily reliant on oil revenues. They are facing, in the medium term, two big challenges. One, because of shale oil, the amount of oil they are going to export will be lower. Our numbers show that the US may well be the number one oil exporter of the world, overtaking Russia and Saudi Arabia. So they will export less oil in terms of volumes, and they will not have the prices they would like to have. So the revenues will be less and their economies will be affected. Second, there are new technologies

coming into the picture. There are electric buses, very important, and there are electric cars and other clean energy technologies which will, not immediately, but in the longer term, eat at the share of oil in the global energy mix. Demand will still be there, but demand growth in the future will be slower than in the past.

To put these two things together, the shale oil affecting both the volume of export and the price, plus the developments in clean technologies, tell me that for those countries who meet in Vienna, it has never been more important for them to diversify their economies. We have seen in Algeria, for example, one of the main reasons is the low oil price and the impact on the economy, and the same with Venezuela and elsewhere.



My humble suggestion as a former OPEC employee is that it is now the highest time in history that they diversify their economic base.

### How do you view crude quality and how it is likely to impact demand in the coming year?

It is working in the right direction. Global oil demand, the slate, is getting lighter, lighter products coming into the picture. My colleagues tell me the gravity today matches with the shale [oil] that is between 40 and 50 [API], and this also makes for a change – the complexities of the refineries will be less and less in the future. A reversal of the trends we have been seeing in the past. So from our point of view, we don't see a major problem and shale quality is very much in line with the development with the oil demand.

### How quickly can Venezuela and Iran recover in a best case scenario, and are they the biggest supply risks?

I worked in the OPEC secretariat for several years and at that time PDVSA had a new strategy called “la apertura” which meant the opening up of the Venezuelan oil sector. Here the idea was building production to 5.5 million b/d, this was the target – this was in the 1990s. There was an increase in production but it never [reached that target] because of the political changes. No, the situation today is really very desperate, from the point of view of technology, decline rate, and the availability of skilled labour. But if there was a change in the current context, the rebound may not be as slow as many colleagues, who I call pessimistic, expect. But there are two conditions to seeing a rebound similar to the “apertura” days. One, there is an army of skilled petroleum experts outside of Venezuela, they need to bring them back. And second, they need to find a way to get investment in the country.

From a geological point of view, I don't see this as the main challenge, the main challenge is bringing the skilled workers home. There is an appetite around the world, if there was a stable investment situation in Venezuela I would expect a huge appetite from many companies. It is one of the richest countries in terms of resources.

And Iran has some serious challenges with most of the members of the international community and I hope these problems are resolved. Here the issue is more than geology, it is political.

### Do you see the plan for OPEC and Russia to formalize its relationship as an effective long-term plan in light of your comments about the US and shale? Do you see it taking hold?

When I read the statements from the OPEC countries and the Russian minister, I see the intention to transform the current partnership into a more strategic partnership. Of course, I don't know if this will work out from a political point of view but in my view, even a strategic partnership will try to put the markets in line with the resolution results in Vienna, [but] markets will not listen to those resolutions. The voice of Mozart will not be heard in Pennsylvania. The economic effect is stubborn, there is a lot of oil coming onto the market with the expansion of the pipelines, and should those developments take place in the US this will increase the ability and speed of US shale to react to international price developments, big time. Therefore you will see oil markets will gradually move into the market direction rather than the resolution direction. But I want to underline that the world will need the oil of Middle Eastern countries, of Russia, and others, because there is still robust demand which will be with us for several years to come.

### What does a balanced oil market look like? Is there an optimum price?

An optimum price for everyone to agree is very difficult. But to be honest with you, if the prices go high, \$70/b plus, and the global economy is weaker this year compared to last year, and China is experiencing, as they say, some of the slowest growth in 30 years – and don't forget China was responsible for almost half of global growth of oil demand in the past 10 years – we will see the effect of that. Higher prices will have a negative impact on the economy and very low prices will have a negative impact on investment, so our view is we should have a price that is not too high or too low either. ■



**Metalloinvest**  
Metalloinvest Trading AG

## RESOURCES CREATE OPPORTUNITIES

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Metalloinvest comprises of leading iron ore production facilities in Russia – Lebedinsky GOK and Mikhailovsky GOK; steel mills – Oskol Elektrometallurgical Plant and Ural Steel; a ferrous scrap enterprise – Ural Scrap Company.

Metalloinvest's sales and marketing operations are centralised. The managing company coordinates the Company's operations in the market, their production policy and external shipments, thereby achieving synergies and increasing the efficiency of production. The Company strives to maintain a favourable social environment in the regions where it is present and at each of its plants. Metalloinvest provides stable employment for more than 62 thousand employees and assists in solving actual problems in the regions where it operates.

## COMPANY STRENGTHS

**Unique energy-efficient technologies**

**Low production costs for pellets and HBI/DRI**

**Solid financial performance**

**Capable management team to ensure growth**



# Turkish steel navigates trade barriers

Recession at home and rocketing tariffs abroad have created an inhospitable environment for Turkey's steel producers. Meanwhile, inroads in the EU market are providing limited relief for the industry, writes Pascal Dick

After a healthy first half of 2018, the Turkish steel market now faces a drop in demand from both domestic and international customers.

International policy changes and a recession in the Turkish economy have contributed to a wider trade flow diversion across flat steel products like hot rolled coil (HRC), and long steel products like rebar and billet, with some effects also due to be felt more strongly in the wider ferrous scrap pricing complex.

An increase in US tariffs on Turkish steel imports from 25% to 50% in mid-August 2018 was the first factor in a longer process that triggered an intensification of trade flows. Faced with the doubling of tariffs on long and flat products that month, Turkey lost one of its main export markets for finished steel products overnight.

Simultaneously, the Turkish domestic market faced strong headwinds, as at the end of 2018 the country slipped into recession for the first time in a decade. As the Turkish Lira lost around 30% of its value by the end of last year versus 2017, steel makers and affiliated sectors have been hit by tightened credit conditions, and the construction sector has experienced several bankruptcies.

Data from Turkish statistics institute TUIK showed a 41% year-on-year drop in construction permits between January-September, while 1.5 million-2 million homes in Turkey remain unsold, illustrating the collapse in demand for long steel products. Sales of domestic passenger and light commercial vehicles shrank by 44.2% from January to March 2019 on the year – a worrying sign for flat steel product demand, which relies heavily on buying from the automotive sector.

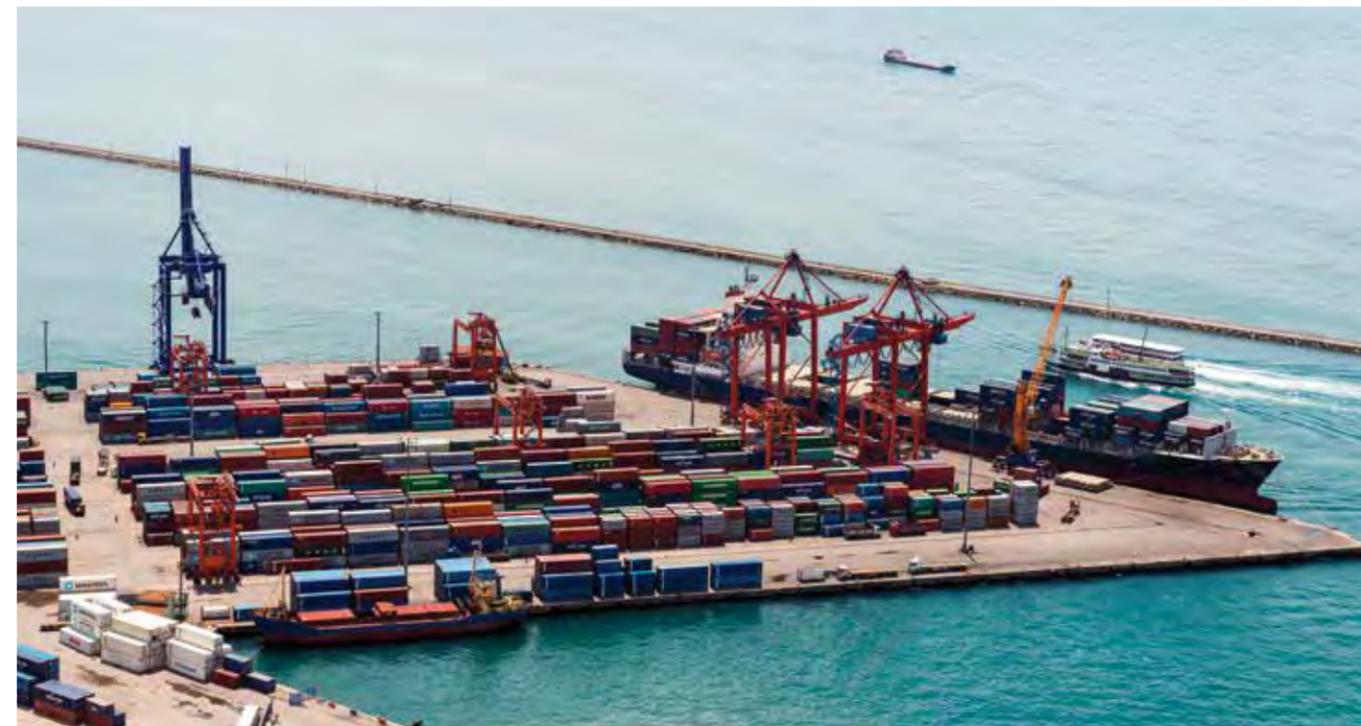
Given the country is the eighth biggest exporter of steel in the world, trade in ferrous products is a pillar of the Turkish economy. Conversely, Turkey also plays an essential role in trade flows and pricing for several steel products in Europe, Asia, North America and some parts of Africa.

At 37.3 million mt, Turkey's overall crude steel production is dwarfed by global production of 1.8bn mt – with China contributing 928.3 million. But its strategic location between Europe and Asia, and commercial presence in the Middle East and North Africa, have given it a special position in world steel trade.

### Flat products to EU

The US, one of Turkey's traditional markets for HRC, was restricted in the first half of 2018 and completely shut off from mid-August, in combination with slipping domestic demand. But Turkey was nevertheless able to redirect and even increase its HRC exports to EU countries by around 20% driving the hike in overall EU imports and displacing product from Ukraine, South Korea and India.

For cold rolled coils (CRC), Turkey's growing reliance on EU customers was even more dramatic, with exports increasing by 113% in 2018 versus the previous year, as the neighbouring bloc replaced the US as Turkey's main export destination. The EU also absorbed Turkey's coated coil exports – again, usually consumed by the US – with Spain attracting most of the volumes. That more than doubled overall imports of material like hot-dipped galvanized products into Spain.



As Turkey morphed from a net importer of HRC in 2018 to a net exporter, the EU also took measures to control this trade flow diversion. Overall imports of the flat product into the EU increased by 20% on the year in 2018, and pressured domestic prices to the disadvantage of EU producers.

Still, the generous global quota for HRC established in February this year will mean the EU remains the main consumer for Turkish rolled flat steel products, with little further diversion expected into the bloc's already slowing market.

### Long products in search of outlets

Long products faced a similar, yet even more dramatic shift in trade flows following the US import tariff hike, but tighter national quotas from the EU point to further redirections of material, as producers search for new outlets.

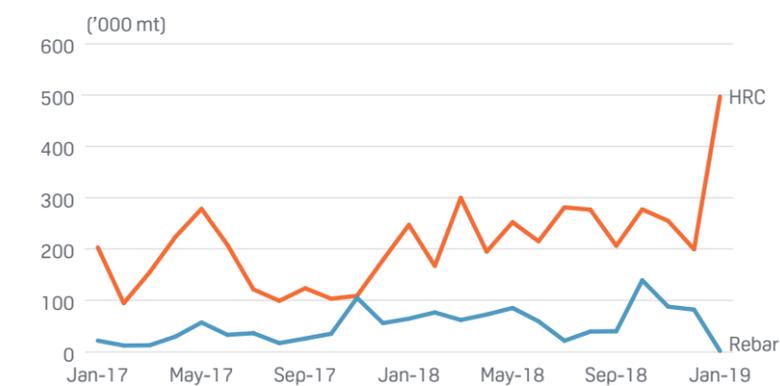
As access to the US was cut off, Turkish rebar producers focused their attention on the EU initially. Turkey increased its exports to the European Union by 89% on the year, which in combination with a hike in exports from the Black Sea region saw overall European imports of rebar surge by 51.2%.

Southeast Asia was another region that saw strong inflows from Turkey, as China's exports in 2018 were

restrained due to strong domestic demand and capacity reduction efforts as part of the country's wider environmental commitments. While exports to Singapore remained largely unchanged, those to Hong Kong and Malaysia were up 30% and 75% year on year respectively.

With considerably stricter safeguards from the EU on long products like wire rod and rebar, the original relief for non-EU longs producers in the first half of 2018 faded. Turkey, as well as some CIS producers, faced national quotas well below the previous year's numbers.

### TURKISH EXPORTS TO EU



Source: Eurofer



Rebar imports from Turkey, for example, stood at 831,070 mt to the EU in 2018. The new rebar quota for Turkey in 2019 is around 287,179 mt on an annualized basis, Platts calculations show. While strong exporters like Turkey could take advantage of the remaining global quota once their national one is completed, it can be expected that exports to the EU from Turkey will be halved this year. The same is true for Black Sea exporters.

As such, large volumes of long products, largely originating from Turkey and the Black Sea, will have to find a new home, with some expecting the material to flow to Central and South America, as well as African outlets. Flows to Southeast Asian markets, which proved attractive in the second half of last year, could remain spotty as a more export-oriented China, as well as India, Qatar and Saudi Arabia, are serious competitors in these markets. It remains uncertain, and increasingly unlikely, that these markets can compensate for Turkey's reduced flows to EU countries or the US.

### Scrap volumes fall

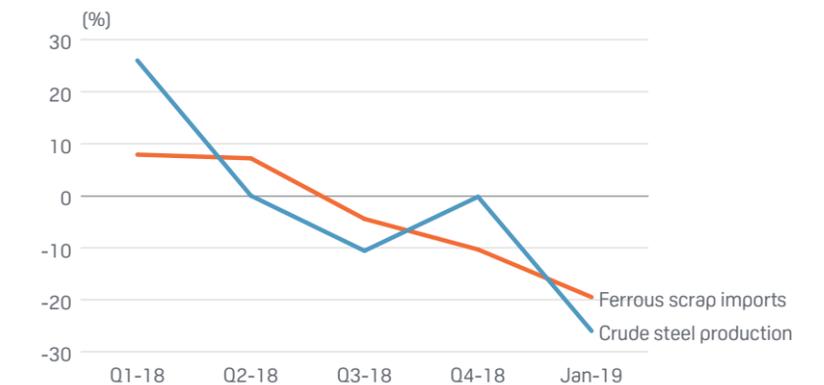
Turkey's woes do not end with finished products. Weak domestic demand and curtailed exports of long products, which make up 50% of overall Turkish steel exports, also affect flows of ferrous scrap to Turkey—the world's biggest import market for the raw material.

Turkey's crude steel production in the first two months of 2019 dropped by 16.1% year on year to 5.2 million mt. Output from electric arc furnaces (EAFs), which use scrap steel as feedstock, was down by 22% year on year for January-February 2019. This corresponded to a 38.3% drop in scrap import in the same period, versus 2018.

While March and April have seen a slightly better crude steel output, according to some longs producers, there is limited recovery in sight in the domestic market and continued export struggles abroad. Some Turkish steelmakers anticipate a 15-20% reduction in overall steel output by the end of the year. With lower production, scrap imports are anticipated to be considerably lower unless safeguards are lifted.

At 20 million mt scrap imports in 2018, a mere 20% reduction in crude production, and hence imports,

### TURKISH VOLUME CHANGES Y-o-Y



Source: Turkish Steel Producers' Association (TCUD), Turkish Statistical Institute (TUIK)

would imply 4 million mt of scrap that were originally destined for Turkey would flow into other markets instead. The surplus could be considerably higher if current output levels are maintained throughout the year.

Amid lower economic growth and a construction slowdown in Europe, there is little leeway for the surplus scrap from exporters in that region to be consumed domestically. Instead, markets in the Far East like India, Pakistan and Bangladesh are showing stronger interest for the scrap material. Technavio, a research company, forecasts 8% global growth in EAF production in 2019, and expects the majority of this will originate in the APAC region.

Although scrap flows to these Far East countries from European and North-American exporters are likely to intensify, their relatively small market size will probably prevent them from fully absorbing surplus scrap that would have previously gone to Turkey. As a result, Turkey is in a position to strongly influence this year's long and flat steel as well as international scrap flows, especially since it can rely less on its own domestic market, with market players across the globe eyeing developments in the country.

While any reduction in import tariffs from the US could mean a return to more traditional trade flows seen at the beginning of 2018, it is difficult to predict how trade policy will evolve. Conversely, if the current tariff remains in place, it could induce further changes to steel flows in 2019, with Turkey driving the trend. ■

# DISCOVER A HEAVYWEIGHT CHAMPION OF THE MINING INDUSTRY

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# American steel: Thriving on reinvention

Electric arc furnaces are emerging as the technology of choice in US steelmaking. Mini-mills are now making inroads into markets for higher-quality products, and reaping big profits along the way. By Nicholas Tolomeo, Michael Fitzgerald and Joe Eckelman

When it comes to raw materials, steel mills in the US are developing expensive tastes.

Of all the major steel-producing nations, no country is so geared toward electric-arc furnace (EAF), flat-rolled steel production as the US. Profits from EAFs, or mini-mills, are at their peak, and producers Nucor and Steel Dynamics last year had record profits of \$2.4 billion and \$1.3 billion, respectively.

As the US steel market moves further towards a market dominated by EAF, flat-rolled production, the shopping list that mini-mill raw material buyers take into the market is evolving, getting more specific and pricier. EAF mills that were once relegated to the lower ranks on the quality scale, charging their furnaces almost exclusively with steel scrap, now seek better-quality raw materials – leading to better-quality steel output.

Scrap still dominates these mills' raw material needs but EAF producers have an increasing need to “sweeten” the raw materials mix with virtually pure iron and prime scrap to continue climbing the quality ladder. The Holy Grail is exterior automotive sheet and its mirror-like finish.

If there was ever a place to build a steel industry reliant on scrap metal as a main raw material, it is the US, the world's largest economy. High GDP has historically meant high scrap generation. Americans typically do not hold onto white goods and vehicles as long as consumers in most countries, generating a steady flow of steel scrap – the most recycled material on the planet – that feeds the US steel market.

However, when it comes to the global steelmaking picture, the US is an exception, not the rule. Globally, about three-fourths of all steel is produced via the blast furnace or basic oxygen furnace (BF/BOF), according to World Steel Association. China is the main factor in this, as the country produces about half the world's steel and does so primarily via the BF/BOF route, which relies mainly on using iron ore and coking coal in a blast furnace. BF/BOF steelmaking is responsible for over 90% of Chinese steel production, accounting for about half of world steel output, and China remains heavily reliant on importing those mined raw materials, primarily from Australia.

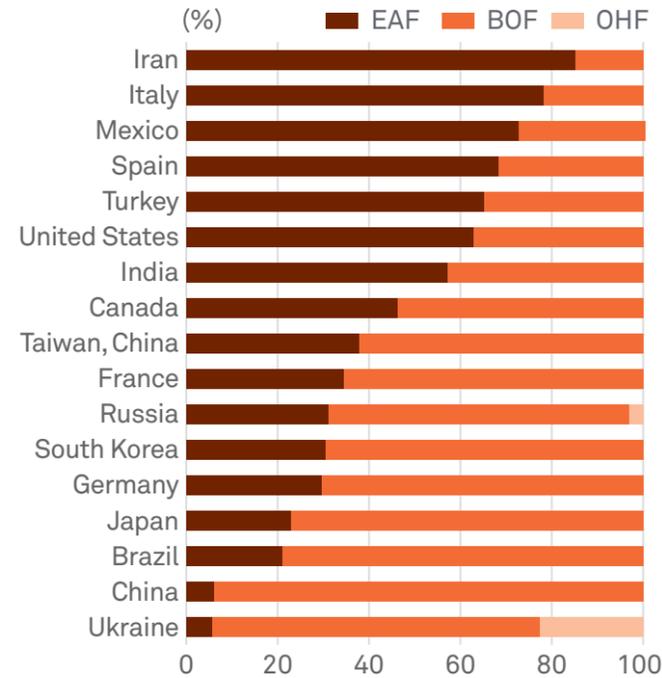
The fully integrated BF/BOF steelmaking route dominates the market for auto-quality sheet, even

in the US. The blast furnace is an economical iron producer, feeding a time-tested system that includes thick slabs of semi-finished steel, which are worked down to paper-thin sheet. The mini-mills pioneered a thin-slab system, which is more economical and nimble but still climbing the quality scale.

Companies have a choice when investing in steelmaking technology, and decisions vary from country to country. In resource-rich countries like Brazil and Russia, using iron ore is a no-brainer. In the US, iron ore is mostly concentrated in the interior states of Michigan and Minnesota. As a high US GDP fueled the growth of the domestic scrap reservoir and EAF technology improved, EAFs were able to produce higher-end steels at lower costs that could compete with BOF-produced steel, and steelmaking investment decisions in the US soon became a no-brainer too.

US EAF pioneer Nucor opened its first mini-mill in Darlington, South Carolina in 1969. Mini-mills slowly spread throughout the US over the next two decades but their product lines were limited to long products such as rebar. That changed in 1989 when Nucor's

### STEEL EAF SHARE BY COUNTRY 2017



Source: World Steel Association

\*Largest 17 steel producers



mini-mill in Crawfordsville, Indiana began to produce flat-rolled steel. Others soon followed as better EAF technology allowed mini-mills, once mainly construction steel producers, to encroach on product lines long dominated by BOFs, such as power generation, oil and gas, and the automotive sector.

The newest operating blast furnace in the US opened in 1964 in Burns Harbor, Indiana. The newest operating EAF in the US began melting scrap in 2017 in Durant, Oklahoma. It will not be the youngest for long, as a wave of new EAF projects have been announced in the US.

A steel-friendly administration under President Donald Trump has implemented tariffs and quotas on imported steel over the last year. The trade barriers, in addition to a strong US economy, have fueled exploration and investment into new steelmaking capacity, all of which is planned as EAF capacity.

The US steel market, already home to the largest fleet of mini-mills in the world, and preparing to add more, will command an appetite for steelmaking raw materials unlike any other country.

Now, steel mills, their raw materials suppliers and technology firms are rushing to make sure the shelves are stocked with the raw materials needed to satisfy this evolving steel market.

In 2018, US crude steel production reached 92.4 million short tons (83.8 million metric tons), according to the American Iron and Steel Institute – 67% of which came from EAFs.

Rewind to 13 years ago and the split was more balanced as EAFs maintained only a slight majority market share

in 2005 of 55% to 45%, during a time when the US was producing over 100 million st/year of crude steel.

The financial crisis-induced US market shake-out disproportionately hurt the less nimble blast furnace mills, which basically make steel from scratch, and have high capital costs and typically less-favorable legacy labor arrangements.

In 2008, blast furnaces fueled 42.2 million st of crude steel output, or 43% of total US production. It would be the last time the BF/BOF process would account for more than 42% of the market or produce more than 40 million st of crude steel in a year. In the post-crisis steel world, EAFs have maintained US market share, ranging from 58% to as high as 67% in 2017 and 2018.

Among the 10 largest steel-producing nations, only EAFs in Turkey maintain a market share over 60%. Unlike the US, however, the Turkish market is dominated by long products production. Longs mills typically use a less expensive melt mix that includes heavy melting scrap, turnings and little if any pig iron or prime scrap.

In 2018, Turkey produced 37.3 million mt of crude steel, of which 69%, or 25.8 million mt, was produced via EAF. Of the total output, 66%, or 24.7 million mt, was long products, according to the Turkish Steel Producers' Association (TCUD).

In 2018, total steel shipments in the US were 93.9 million st. Of those shipments, 65.6 million st – or 70% – were flat-rolled products. From 2014-2018, flat-rolled shipments in the US accounted for 70-72% of all steel shipments, compared with 28-30% shipments of long products.

The main raw material in most EAFs producing light flat-rolled steel is prime scrap. Raw material procurement teams at modern EAF sheet mills indicate 30%-40% of their melt is prime scrap, mostly No. 1 bundles and No. 1 busheling, compared with 25%-35% of shredded scrap.

As mills move up the finished steel value chain, they need to move up the raw material value chain as well. In addition to prime scrap, metallic raw materials such as pig iron, hot-briquetted iron (HBI) and direct-reduced iron (DRI) have become more in demand than ever in the US. Pig iron, HBI and DRI are all ore-based metallics, material derived from iron ore that can be used in mini-mill EAFs.

Pig iron is generated via a blast furnace and transferred directly within the mill in liquid form as hot pig iron for BOF steel production. However it is also supplied by merchant pig iron producers who use blast furnaces and then cast the molten iron into ingots to produce cold pig iron, which is typically shipped via ocean-going bulk vessels to overseas EAF mills.

DRI is derived from the direct reduction of iron ore, typically by using natural gas or coal, so that it can be used in an EAF. DRI can be compacted into HBI to allow for easier shipping and handling. Pig iron, DRI and HBI can help EAF mills lessen their need for high-quality scrap by diluting impurities in lower-quality scrap.

### Adapting supply chain

The growing demand for high-quality iron units in the US is creating opportunities for technology firms prepared to invest in the country.

This decade, the US has seen the startup of a 2.5 million mt/year DRI facility in Louisiana by Nucor and a 2 million mt/year HBI facility in Texas by Voestalpine. DRI and HBI production in the US had been long gone before a natural gas revival allowed companies to produce these ore-based metallics in a cost-effective way.

Cleveland Cliffs announced it was building a 1.6 million mt/year HBI facility in Toledo, Ohio, and well before the expected 2020 startup date, the company announced recently it was expanding the plant to 1.9 million mt/year.

“There is clearly room in the [US] market for at least one more [HBI plant],” John Kopfle, Midrex corporate development director, told S&P Global Platts earlier this year. “Gas prices will continue to remain low [around \$3/MMBtu] in the US for the foreseeable future.”

Midrex, a global ironmaking technology firm, estimates a pending shortfall of ore-based metallics (HBI, DRI, pig iron) in North America to the tune of 8.2 million mt/year over the next few years.

### Procurement strategies

The hunt for high-quality ferrous scrap has created a situation where export cargoes of US scrap headed to Europe off the Atlantic Ocean shores might be passing incoming scrap from Europe en route to the US.

The US exported 17.3 million mt of ferrous scrap in 2018 but it also imported over 5 million mt, an all-time high. The US is the world’s largest ferrous scrap exporter, but now it is also a top five importer.

By volume, the largest grade of scrap the US exports is the obsolete grade – heavy melting scrap – while over a quarter of the scrap the US is importing is prime scrap, No. 1 and No. 2 bundles, according to US Department of Commerce data.

“It’s a result of what’s happening in the industry,” Nucor CEO John Ferriola told Platts. “There are several things happening. One, more companies are shifting to the electric-arc furnace model. Second, more companies are producing because customers are demanding higher strength, higher quality steels, so you need purer scrap to go into it. That’s why you see Nucor investing so heavily into DRI plants because we believe in 10 years there is going to be pressure on prime scrap.”

Pig iron typically accounts for 20%-25% of the melt mix for the newer sheet-producing EAFs in the US. Overseas, Ukraine and Russia have come to dominate the US imported pig iron market. The two CIS merchant pig iron producers account for over three fourths of all US pig iron imports and both countries set records for pig iron export volume to the US in 2018.

### Investment and expansion

The movement toward mini-mill steel production is showing no signs of slowing. Fueled by Section 232 import tariffs, mini-mill producers had record profits last year and, as the bottom line swelled, capacity expansions were soon on these companies' wish lists.

In September 2018, Nucor announced it would be making a \$650 million investment at its Kentucky sheet mill to add 1.4 million st/year of capacity. Four months later, Nucor followed the sheet expansion announcement with a \$1.35 billion plan to build a 1.2 million st/year steel plate mill in Kentucky.

In November, SDI announced it would be investing \$1.7-\$1.8 billion on a new 3 million st/year flat-rolled steel mill in the southwestern US.

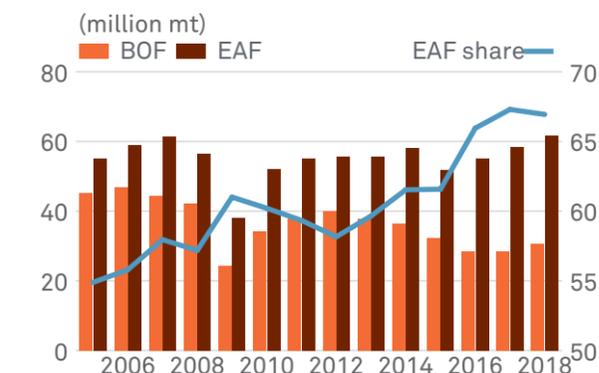
The new capacity expansions were not limited to just the largest players. BlueScope Steel is upbeat about a possible \$600-\$700 million expansion at its Ohio-based flat-roll mini mill. The expansion would add a third electric-arc furnace and a second caster to the mill and grow capacity by an additional 881,000-992,000 st/year.

JSW Steel announced up to \$1 billion of investments, which included adding an EAF at its 1.3 million st/year Baytown, Texas, plate and pipe mill, as well as investments into the restarted 1.6 million st/year EAF at its recently acquired Ohio flat-roll mill. JSW noted the potential for a phase-two expansion in Ohio, which would add another furnace to the mill and double capacity.

In July 2018, Arkansas-based Big River Steel announced its phase-two expansion, which will cost \$1.2 billion and double its annual capacity to 3.3 million st/year.

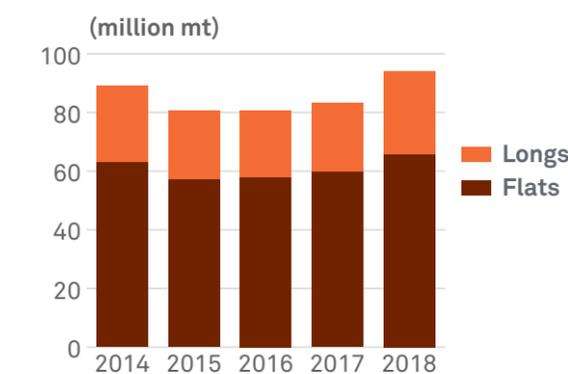
At least psychologically, the most telling announcement perhaps came from US Steel, the blast furnace giant founded in 1901. The company announced it will move forward with plans to build its first EAF, a 1.6 million st/year mill, in Fairfield, Alabama. Construction was suspended at the facility in December 2015 due to unfavorable market conditions at the time. This new facility is expected to be producing steel tube rounds in the second half of 2020. When the EAF is completed, US Steel expects to save \$90/st for each seamless tubular round it produces versus its current cost of purchasing

### US ELECTRIC ARC FURNACE STEELMAKING SHARE



Source: AISI

### US FLAT STEEL TO LONG STEEL PRODUCTION RATIO



Source: AISI

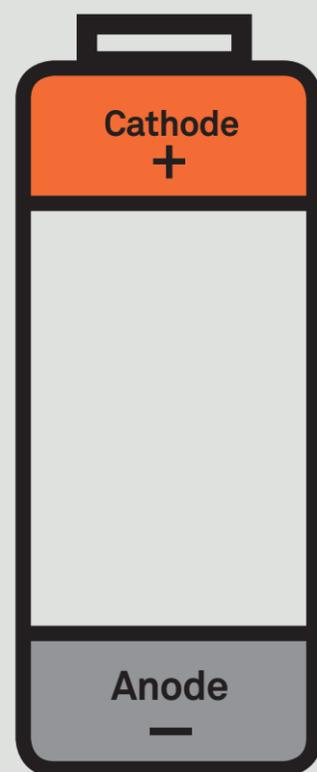
rounds from outside sources, Phil Gibbs, analyst at KeyBanc Capital Markets, said in a recent research note.

Through a combination of new and restarting capacity, either commissioned, announced, or being explored since the start of 2018, an S&P Global Platts analysis shows an estimated 17.5 million st/year potential increase in US steelmaking capacity. That would equate to a 19% increase from 2018 steel production.

Steel industry momentum in the US is squarely on the side of EAF, flat-rolled producers and their appetite for high-quality raw materials is unlikely to be sated anytime soon. Now, it is up to the steel mills and their raw material suppliers to feed that appetite in an economically viable way. ■

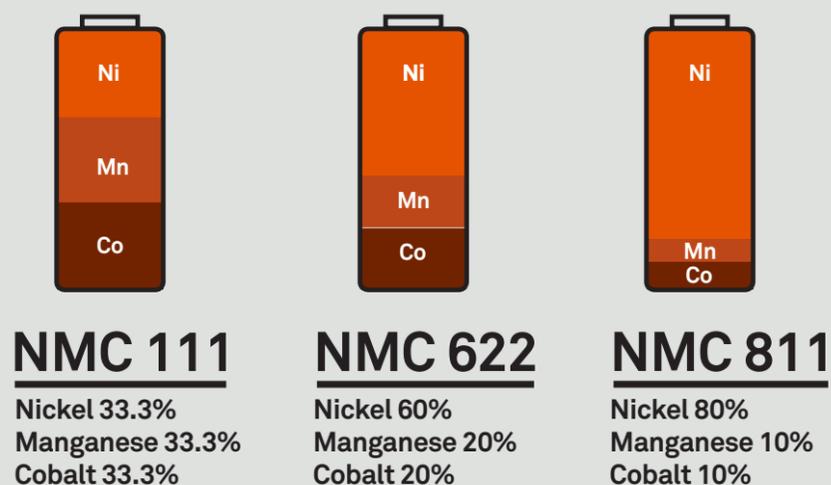
# Vital elements: Batteries and raw materials

Electric vehicle range and cobalt supply concerns have been driving changes in battery cathode chemistries. In turn, the evolution of battery chemistries is influencing cobalt, nickel and lithium markets as raw material requirements from cathode producers shift. Emmanuel Latham and Felix Maire explain the current and future phases of battery technology, and the major issues conditioning markets for the most important metal components.



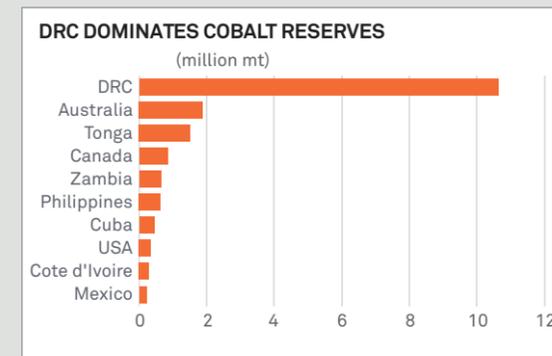
## Cathode composition

The cathode and anode are essential components of any battery. Lithium ion batteries typically have a graphite anode, and a cathode containing lithium, alongside other metals. A battery's properties can be altered by changing the composition of those additional metals. For example, NMC battery cathodes use lithium, nickel, manganese and cobalt. The popular NMC batteries are shifting towards higher nickel content, improving battery capacity and vehicle range, albeit at the expense of stability. EV manufacturers have been increasing ranges by dialing up nickel content, from 33.3% in NMC 111 cathodes to 80% in NMC 811 cathodes, dramatically improving battery capacity.

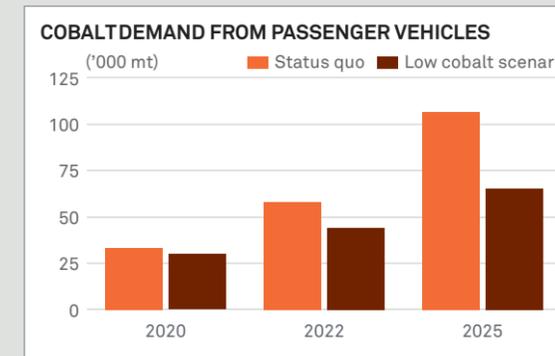


## Cobalt

Major producers are looking to reduce cobalt in cathodes, but cobalt demand from EVs still looks set to rise.



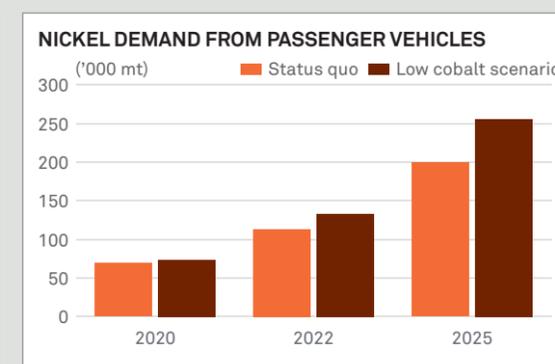
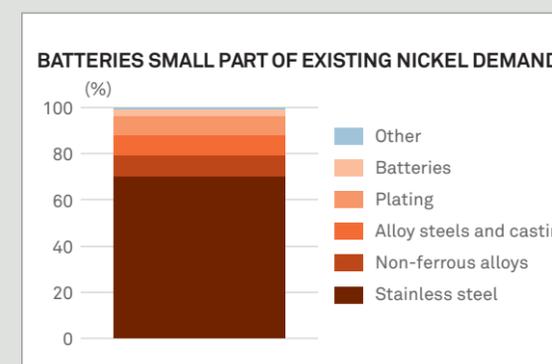
Aggregate reserves and resources



Based on Platts Analytics Long-Term EV Outlook

## Nickel

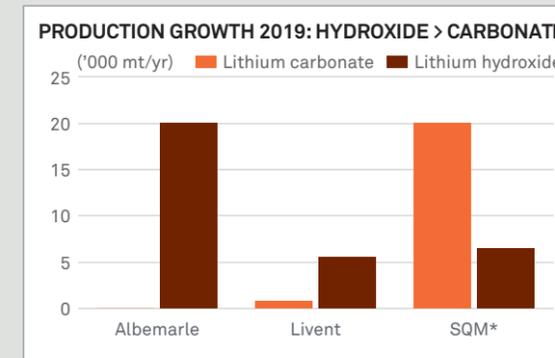
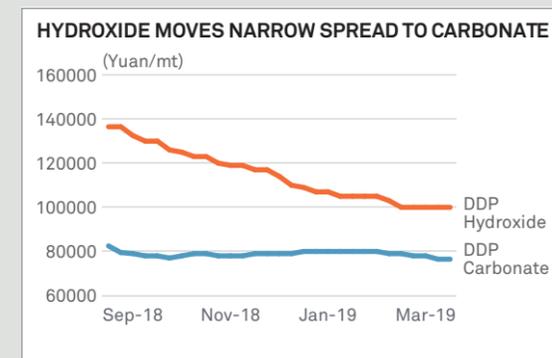
The push to reduce cobalt in cathodes is increasing demand for nickel, and many in the industry expect a supply crunch up ahead.



Based on Platts Analytics Long-Term EV Outlook

## Lithium

Lithium hydroxide has seen growing interest over the last year, proving to be the lithium product of choice for producers of higher nickel-content cathodes.



\*SQM stated it doesn't plan to offer the increased supply as its goal is to rebuild inventory.

As the automotive sector hits difficult times, electric vehicles are proving to be one area in which horizons seem bright. Global light duty plug-in electric vehicles were up 43% year on year in February as depicted in the latest Platts Analytics EV Essentials data, and several carmakers are increasing their commitment to the electrification of passenger vehicles.

As these commitments grow, the raw materials that underpin the EV industry are subject to greater scrutiny. Lithium, cobalt and nickel are all key components of the current cathode technology, NMC. Both lithium and cobalt have seen the landscape of their markets rewritten by the newfound demand, while nickel, the only one of the new "battery metals" whose major demand base is not batteries, looks set to experience some supply shortages going forward.

Consumer demand and favorable Chinese subsidies have seen the battery industry pushing towards increased ranges in recent years, while cobalt's price movements over 2018 and unreliable supply origins have seen moves to reduce cobalt content in cathodes. Fortunately thanks to advances in NMC technology, increasing range and reducing reliance on cobalt go hand in hand for battery makers.

The dependence of the global cobalt supply on the Democratic Republic of Congo, has encouraged battery makers to look into alternative technologies that limit their exposure to the metal. The unpredictability of doing business in the DRC has caused difficulties for the battery industry. For instance in December 2018 the country classed cobalt as a "strategic" substance, nearly tripled royalty payments, ramping up costs for producers based there.

The DRC's artisanal mining industry is also a factor behind battery makers and EV manufacturers' attempts to reduce cobalt consumption. According to Amnesty International some artisanal operations in the DRC have children working in hand-dug mines and facing serious health risks as a result. Given this situation, it comes as little surprise that international companies would like to limit cobalt use, although it is worth noting that according to one major producer, the lower prices of cobalt hydroxide in 2019 have heavily disincentivized, and thus reduced, artisanal activity so far.

Higher nickel, lower cobalt batteries such as the NMC 811 are widely considered the future, using three times less cobalt than the existing NMC 111. Despite expectations that the cobalt quantity per battery will fall, overall cobalt demand (from passenger vehicles) is expected to grow, according to S&P Global Platts Analytics.

While it only forms a small portion of present nickel demand, growth from the battery sector is expected to outstrip that of other demand bases. As NMC cathode technology moves towards higher nickel content, demand per battery is set to grow. Compounded with anticipated increases in stainless steel and alloy industries and the lack of fresh nickel supply coming online, this has led to widespread expectations of a supply crunch.

HPAL production from Indonesia could well prove the answer. Tingshan Group announced in 2018 plans to build a high pressure acid leaching plant (for nickel extraction from laterite ore) in Indonesia by 2020. Other HPAL projects in the country could also be on the horizon.

### China rolls back EV subsidies

Chinese EV subsidies are being phased out very quickly. At end of March 2019 Chinese central government subsidies were reduced by about 60% and local government subsidies were fully eliminated. The remaining subsidies are slated to be removed completely by year-end 2020. As purchase subsidies become less relevant, tightening license plate restrictions on internal combustion engine vehicles and the New Energy Vehicle policy become primary drivers for EV adoption in China.



Also feeling the impact of the push towards higher nickel NMC cathodes is the lithium industry. Earlier cathode technologies used lithium carbonate, but for NMCs with over 60% nickel content, lithium hydroxide is proving essential. Synthesizing higher-nickel content cathodes with lithium carbonate requires high temperatures, which damage the crystal structure of the cathode. With hydroxide, the synthesis can occur rapidly at lower temperatures, maintaining battery performance.

Despite the increased demand and attention, hydroxide prices have trended down over the year, narrowing the spread to carbonate, and some market expectation was seen that the spread could narrow to merely the cost of conversion between the two products, but this is yet to be seen. Major producers are targeting hydroxide expansions through 2019, with Albemarle leading the charge, by commissioning an additional 20,000 mt of capacity to their Xinyu hydroxide plant in China. Carbonate remains the most heavily traded product, but with increased production and inquiries, hydroxide is gaining ground.

However, changes to Chinese subsidies for electric vehicles, announced March 26 could change market direction. The new measures have slashed the subsidy for vehicles with ranges over 400 km by half, and increasing the range required for any subsidy to be paid at all, prompting worries that cathode technology progression could stall. Despite being widely anticipated by the market, some lithium hydroxide producers fear that the subsidy cuts could hinder

demand, with murmurings that some projects have been postponed on the announcement.

The announcements have also created some anticipation that cheaper but more rudimentary cathodes, such as Lithium Manganese Oxide and Lithium Iron Phosphate might see increased production, which would improve demand for industrial grade lithium carbonate. Nevertheless, in the longer term, as the market becomes more consumer-driven, increases in EV ranges look inevitable, and with them hydroxide demand growth: as one precursor producer put it, when making cathodes, "Hydroxide is always better". ■

### Go deeper

S&P Global 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 quarterly **Electric Vehicle Sales and Policy Scorecard** assessing the potential impact of major policy initiatives and investments on EV adoption momentum at the national and company level, and the **Platts Analytics Long Term EV Outlook**.

Reach out to [scenarios.pira@spglobal.com](mailto:scenarios.pira@spglobal.com) to get access to the reports, and further analysis.

A large container ship is shown at sea during the "blue hour" of dusk. The ship's deck is stacked high with colorful intermodal containers in shades of red, blue, and yellow. The ship's hull is dark green above the waterline and red below. In the background, a large industrial refinery or port facility is visible, with its lights glowing against the twilight sky. The water is calm, reflecting the colors of the sky and the ship. The overall mood is industrial and serene.

# IMO 2020: Living with the limit

The IMO's 0.5% marine fuel sulfur cap heralds a tightening of environmental rules for the shipping industry that is unlikely to end in 2020. S&P Global Platts looks at the consequences for the sector, spillovers for the wider energy industry, and the likely winners and losers

# What is the future of fuel oil?

Marine emissions rules are causing uncertainty over fuel oil's future. Jack Jordan explains why the International Maritime Organization's decisions matter in 2020 and beyond

The present uncertainty over fuel oil's prospects has been driven by the International Maritime Organization, a UN body to which much of the oil industry is now begrudgingly paying attention for the first time.

The IMO's lower sulfur limit for marine fuels in 2020 should not have come as a surprise to the oil and shipping industries. This change has been on the cards since at least October 2008, when the IMO set in place its revised Marpol Annex VI agreement on marine pollution.

Nonetheless, the final decision in October 2016 to proceed with the 2020 deadline has occasioned a degree of angst among shipowners, operators and in the wider commodity markets in the two years since then.

The effect on commodity markets will be profound: a large majority of the world's commercial fleet will shift from burning fuel oil to middle distillate-based bunkers, and refiners are expected to increase crude runs to maximize distillate output for the shipping industry's needs. S&P Global Platts Analytics forecasts a bunker demand shift of more than 3 million b/d and Brent crude price rise of as much as \$7/b in 2020.

The main problem the shipping industry has to address is how it will cope with an unfamiliar set of new fuels in 2020. Little is yet known about the new 0.5% sulfur blends the refining industry is developing, but a wide range of products is expected to be on offer.

Refiners will blend new marine products primarily using the 0.5% sulfur limit as their target – rather than the 380 CST viscosity specification they currently aim for when blending high sulfur fuel oil – and they will have a broad array of options for how to meet it.

Products could range from a largely unaltered low sulfur straight run fuel oil to a primarily distillate-based product, or use other refinery streams including VGO and hydrocracker bottoms. The trouble will come when the products are mixed and some blends prove incompatible with one another: when a more aromatic 0.5% product comes into contact with a more paraffinic blend, the products are likely to separate and form sludge, blocking filters.

The risk of a spate of engine failures across the world in 2020 is currently keeping marine engineers awake at night. A contamination crisis in the bunker fuel industry in 2018 after harmful off-specification product seen first in the US Gulf was exported across the global supply chain has also concentrated minds on how similar problems may arise with the new fuels.



And 2020 will not be the end of the shipping industry's struggle with emissions regulation. A proposal to extend the European Emissions Control Area to include the Mediterranean is currently under discussion at the IMO – a measure that would impose an even more stringent 0.1% marine fuels sulfur limit across European waters, further tightening middle distillate supplies.

IMO member states are also examining the possibility of banning the use of fuel oil – and possibly some of the new 0.5% sulfur blends – in the Arctic, where marine traffic is expected to increase significantly in the years ahead.

But the biggest challenge for the shipping industry after 2020 will be in meeting the IMO's initial strategy for reducing greenhouse gas emissions, adopted in April 2018 and due to be revised by 2023.

The strategy aims for GHG emissions to peak as soon as possible and for the shipping industry's total emissions to drop by at least 50% from 2008's levels by 2050. Given the rate of growth expected in shipping over the coming decades, this strategy will need zero-GHG-emission vessels to come into service at commercial scale sometime in the 2030s.

The shipping industry's options for reducing GHG emissions are limited at present, and much research and development work will need to be done over the next decade before zero-GHG designs are viable at the right scale.

One option in the short term could be mandatory slow steaming and energy efficiency measures across the global fleet. Reducing speed to maximize fuel efficiency and mandating other energy-efficiency measures like using LEDs instead of light bulbs could deliver significant savings within a short time-frame.

But over the longer term the shipping industry will need to take on new energy sources. Switching to methanol or LNG derived from biomass may be suitable for some segments of the industry. Some owners may opt for hybrid ship designs that incorporate conventional fuel sources as well as wind-powered rotor technology, batteries or solar power – although none of these technologies alone are likely to be viable as the only energy source for a large commercial vessel for some time yet.

Most of the industry for now is pinning its hopes to developments in hydrogen fuel cells. Several companies are already developing the technology – which produces no emissions – for use in ships.

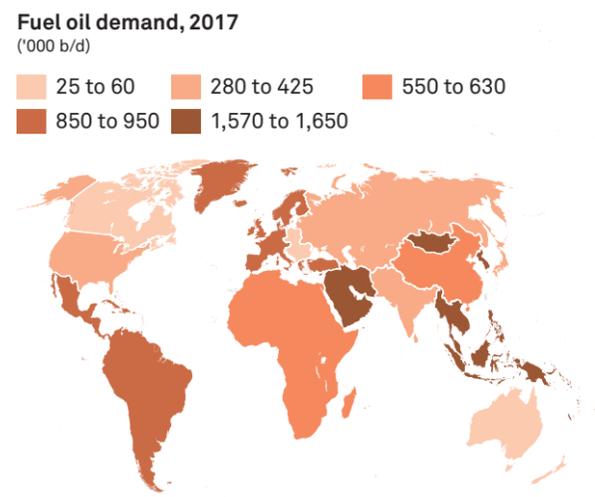
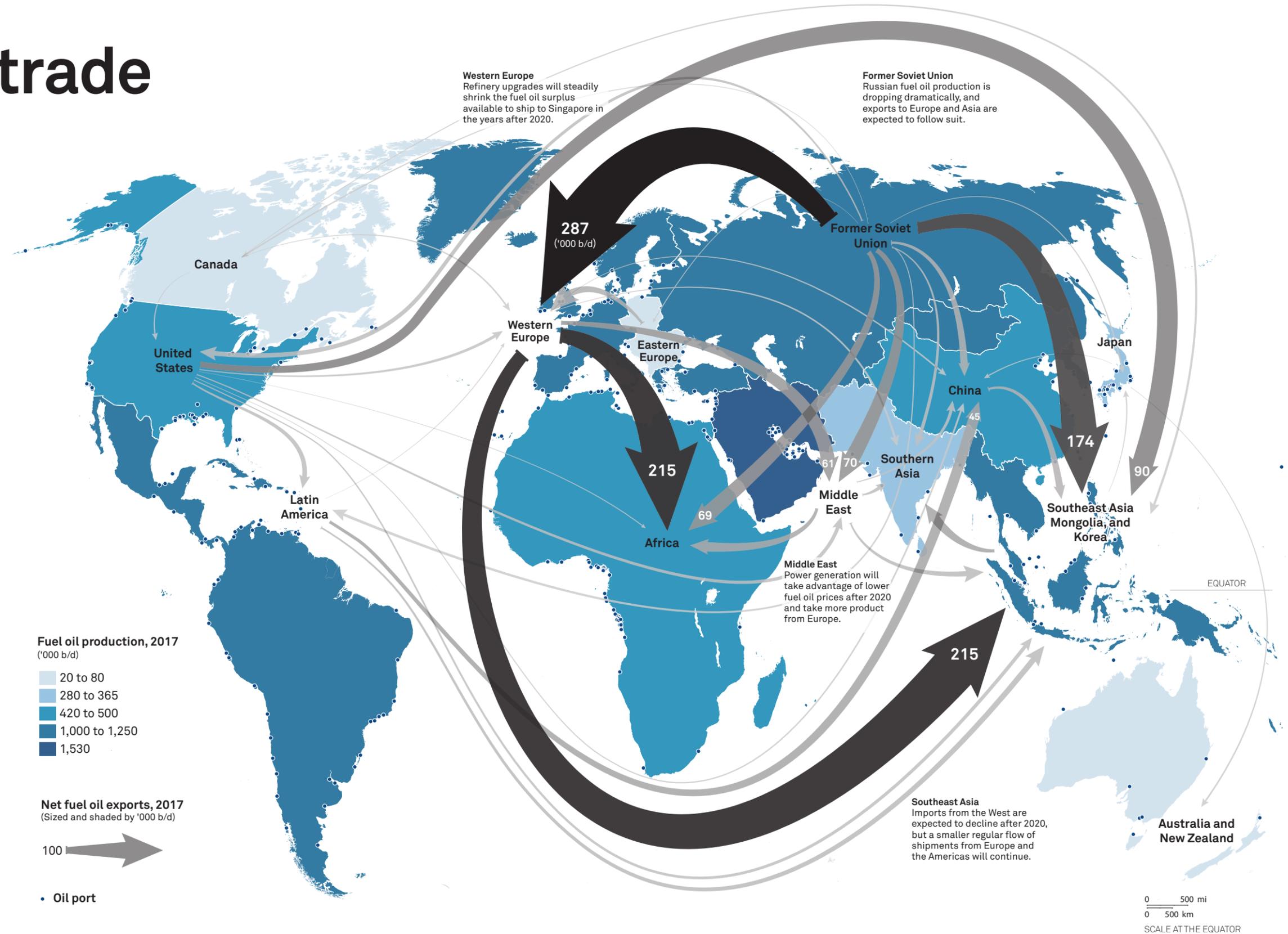
The challenge will be in whether the technology can be developed – and delivered at the scale required by the shipping industry – within the relatively short timetable set by the IMO.

If progress in research and development appears prohibitively slow, or if the implementation of the sulfur cap in 2020 is widely seen as flawed among the world's politicians, IMO member states may be inclined to set less ambitious targets when they revise the initial strategy on GHGs in 2023. ■

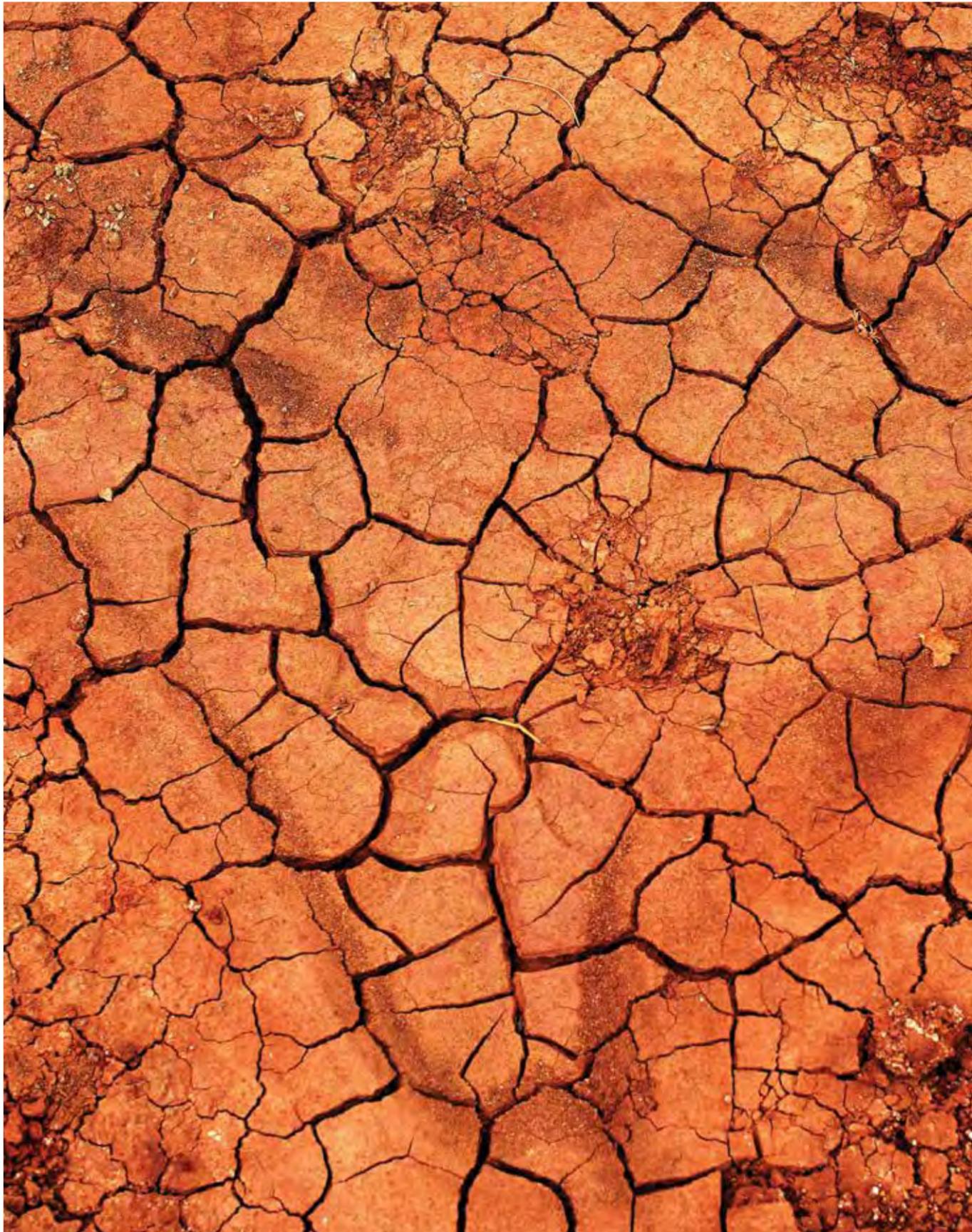
# Currents of trade

Visualizing the flow of fuel oil around the world demonstrates how complicated this market is; the average barrel of this product is consumed far from the refinery that produced it. This map shows 2017 interregional net trade flow balances produced by S&P Global Platts Analytics to give a clearer view of how the bottom of the barrel is traded globally. In the notes we set out how those flows might change.

The main impulse behind the global fuel oil trade is to take the surplus produced by older, simpler refineries in Europe and the former Soviet Union and deliver it to growing markets in the Middle East and Asia-Pacific. This general dynamic should continue in the years after 2020 even after the majority of marine fuel oil demand disappears, but individual arbitrage routes may shift.



Source: S&P Global Platts Analytics



# The price of a gallon

There is no shortage of data on the expected costs of IMO 2020, as refineries scramble to meet new market demands. Much less attention has been paid to the likely impact on limited water resources, writes Seth Clare

Few topics in energy have been more discussed than the International Maritime Organization (IMO) regulations set to take effect in 2020. Mountains of research have been produced on the economic changes these regulations will bring, but less thought has been given to IMO 2020's environmental consequences, which are often assumed to be benign.

The adverse health effects of sulfur dioxide emissions are well documented and reducing them will be a boon to public health, but these regulations will also come at a rather steep cost, measured not just in dollars, but gallons of water.

The US refining complex will need more water than ever before after IMO 2020 comes into effect. This conclusion is based primarily on forecasting from S&P Global Platts Analytics and the US Energy Information Administration along with the findings of recent academic research. The sheer scale of this issue is difficult to appreciate, but simply considering the US refining complex processed some 17.2 million b/d in 2018, using approximately 1.5 barrels of water for each barrel of oil, any marginal increase in the sector's water usage demand is worth discussing.

Without a doubt, modern societies could not exist without sufficient energy or water and, vexingly, their production is highly interdependent. In other words, producing one tends to require a vast amount of the other. Scholars have named this problem the "energy-water nexus" and solving it will be one of the greatest challenges of the 21st century, given this interdependency should become more dramatic over time. The International Energy Agency (IEA) says the global energy complex accounts for about 10% of global water withdrawals, or the amount of water removed from the source, and about 3% worldwide water consumption, defined as the volume of water withdrawn but not returned to the source. By 2040, water consumption by the energy sector is expected to rise by almost 60% to over 75bcm, compared with 2014 levels.

Most of the energy sector's water demand comes from electricity, but creating liquid transport fuels is another thirsty business, because each refinery processing units needs ample water for cooling. Diving a bit deeper, *Estimation of US refinery water consumption and allocation to refinery products*, a paper authored by a group of scholars with the Argonne National Laboratory and Jacobs Consultancy last year, offers a look not only at the amount of water needed to make various refined products, but also at how those figures are sensitive to refinery complexity.

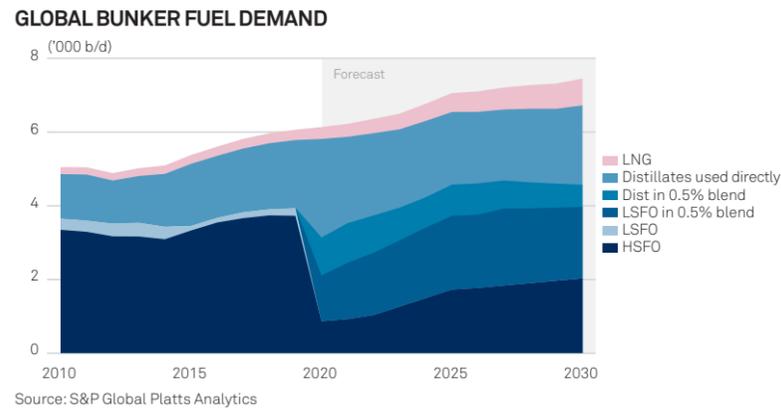
The authors modelled three different refinery configurations: cracking, light coking, and heavy coking. They assumed the simplest configuration uses light, sweet crude while the most complex refinery uses heavier, sour barrels. The research is nuanced, but it broadly shows a refinery's water needs will rise higher if:

- The crude processing rate increases
- The facility becomes more complex, adding new processing units
- The crude slate becomes sourer
- The crude slate becomes heavier

Most crucially for IMO 2020, the research shows that destroying high sulfur fuel oil through a heavy coking system to make more diesel is highly water intensive. Diesel at a simple cracking refinery uses about 0.2 gallons of water per gallons of water, while a heavy coking refinery uses double that. These findings have critical implications for water demand, given expectations for the post-IMO 2020 oil sector.

The regulations coming into force next January will move the maximum sulfur cap for marine fuels on the high seas down to 0.5% from the current 3.5%. Platts Analytics predicts this adjustment will cause more than \$1 trillion to change hands from 2020 to 2025 as refiners and oil producers cash in on the production of cleaner, more expensive marine fuels.

Almost overnight, makers of bunker fuel will have to find a way to replace 3 million b/d of high sulfur fuel oil, which will no longer be compliant with marine fuel regulations. Platts believes the missing fuel oil in the global bunker pool will be supplanted by 1.3 million

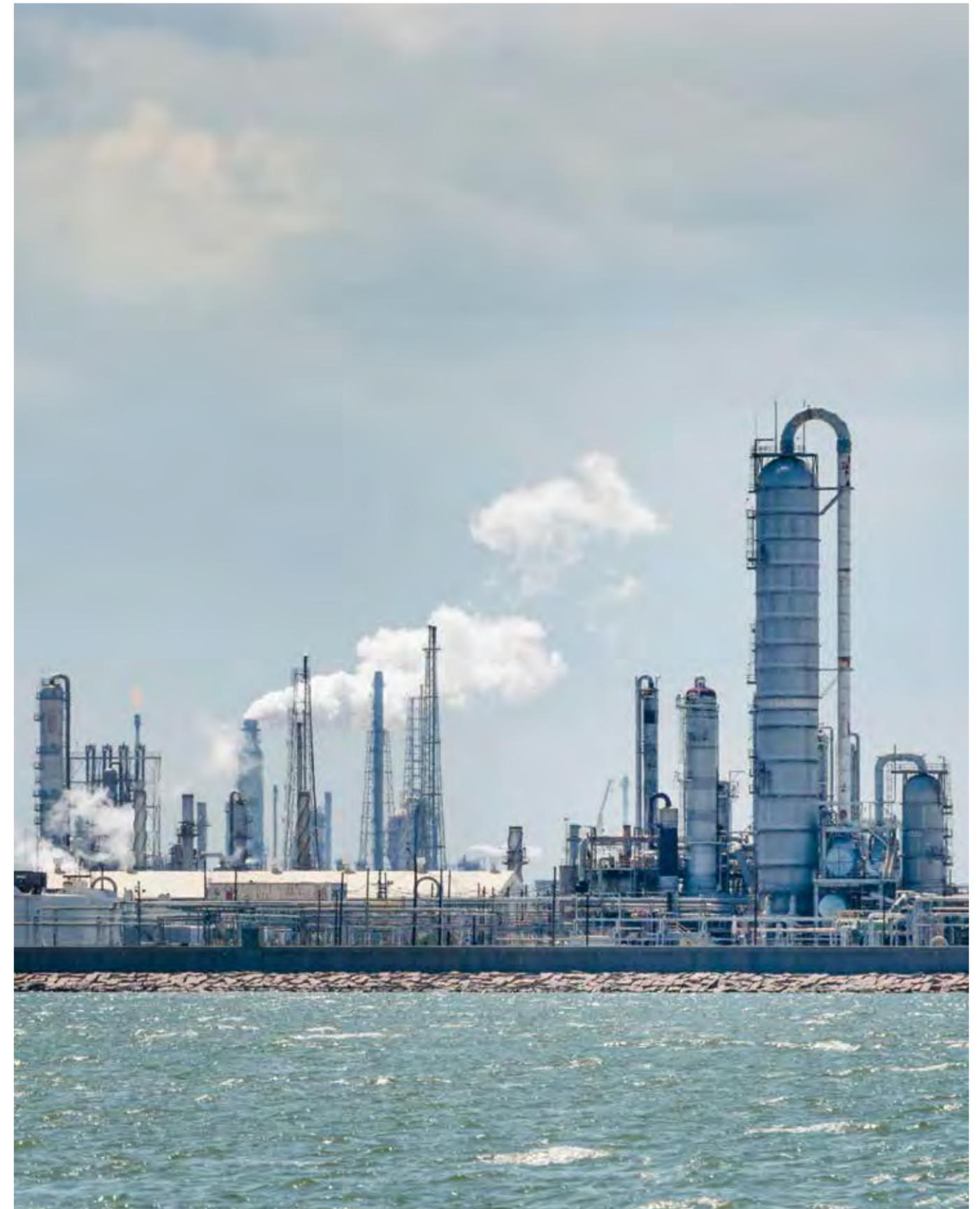


b/d of new low sulfur fuel oil paired with as much as 2 million b/d of increased distillates for bunkering.

Refiners will achieve this by adding new, more complex refinery units, combined with stronger refinery runs. Platts Analytics expects the global refining complex's conversion capacity will grow by 1.7 million b/d from 2017 to 2020, which should help destroy as much 1.6 million b/d of high sulfur fuel oil. According to IMO data, global coking capacity and hydrocracking capacity will grow by 35% and 37% respectively between 2012 and 2020.

In the US, the EIA forecasts the refining complex will process 17.9 million b/d in 2020, an all-time high. Margins on diesel production could double after the sulfur cap goes into effect, and the EIA predicts US distillate refinery yields will increase from 29.5% of US production in 2018 up to 31.5% of US production in 2020. Residual fuel yields should meanwhile decrease from an average of 2.4% in 2018 to an average of 2.2% in 2020.

According to IMO data, global coking capacity and hydrocracking capacity will grow by 35% and 37% respectively between 2012 and 2020



Speaking on the Platts Capitol Crude podcast series in February, Susan Grissom, chief industry analyst for the trade association, American Fuel & Petrochemical Manufacturers, said US refineries with sufficient complexity to run heavier, more sour crude slates will be best positioned to reap the gains of IMO 2020. This will be because simpler refineries, especially outside the US, will need to pay steeper premiums for lighter, sweeter barrels if they wish to increase middle distillate creation.

This view seems to gel with Platts Analytics' forecasting, which foresees low sulfur versus high sulfur crude oil spreads widening "sharply" with the 30 API Mars crude discount to Light Louisiana Sweet Crude at 38 API in 2020 nearly doubling from 2018. With sweet-sour spreads widening, "deep conversion refineries will see much stronger margins as they produce essentially all light products and no fuel oil, and they can do that using 'cheap' heavy high sulfur feeds," Platts Analytics said in an April 2018 report, *Making Waves*. Despite higher prices for light, sweet crudes, simpler US refineries will also run at higher rates: "even cracking refineries should see healthy margins."

Higher refinery runs, heavier crude slates, the addition of new conversion units, and increased high sulfur fuel oil destruction to boost distillate output all point to the same inescapable conclusion: more water than ever before will be needed to run the US refining complex in 2020. What's more, the global refining complex will continue to grow more sophisticated after 2020.

Simpler refineries, especially those outside the US, will need to pay steeper premiums for lighter, sweeter, barrels if they wish to increase middle distillate creation



To get a sense of what this could mean for individuals and businesses, just look to Galveston County, Texas. That is where the Marathon Petroleum Galveston Bay Refinery and Valero Texas City Refinery are located, with a combined capacity of nearly 800,000 b/d.

By virtue of its location, this mini-refining hub gets 100% of its water from the Brazos River under the auspices of the Gulf Coast Water Authority, an independent government agency. These refineries compete with over 18,000 acres of irrigated rice crops in the region, the 50 million gal/d Thomas S. Mackey Water Treatment Plant, and other industrial users such as a Dow Chemical Plant, for allocations of river water.

In this microcosm transport fuels, consumer goods, food, and drinking water are all in competition for the same increasingly scarce river water. If these refineries increase their utilization rates without decreasing their water footprint after IMO 2020, it will heighten competition for water in an area that has already dealt with shortages. According to environmental consultancy SWCA, "the Brazos' 2011–2015 drought period was the worst in recorded history" for certain parts of the river, and the risk of drought can only worsen, given the Brazos River Basin population could swell to 5.4 million people by 2060.

On the bright side, because refining companies know water is a critical input for their business models, they have a constructive role play in its conservation. In a report for investors last year, Marathon Petroleum said: "Since taking ownership of our Galveston Bay refinery in 2013, we have been implementing a water optimization program that has already reduced water consumption by over 750 gallons per minute."

"We are currently studying a reverse osmosis process that would enable the reuse of treated wastewater effluent in the refining process," the report continued. "This effluent reuse could potentially reduce water usage by another 4,000 gallons per minute and make operations more sustainable in the event of drought."

Marathon Galveston Bay claims to be the second largest refinery in the US with a Nelson Complexity index ranking above 15: it is precisely the kind of facility Platts expects will ramp up distillate output after IMO 2020, using more water than ever before. But as the Gulf Coast Water Authority warns, "even senior water rights will not meet customer demands in low river

If [Galveston] refineries increase their utilization rates without decreasing their water footprint after IMO 2020, it will heighten competition for water in an area that has already dealt with shortages

flows." In other words, a prioritized legal right to use water from the Brazos will not do these refineries much good during a severe drought.

This will only get worse after IMO 2020 comes into effect but it is by no means unique to Galveston County: the US Department of Energy estimates refineries across the country will have to spend more than \$10 billion over the next 50 years to ensure they have access to adequate water supplies. The situation along the US West Coast may be especially challenging as refineries there get about half of their water from municipal or city water sources and the region is especially vulnerable to drought. California – home to 16 different refineries – recently signed new legislation to permanently place restrictions on urban and agricultural water usage to help cope with future droughts. While those restrictions may affect each refinery differently, they raise an obvious question: to what extent will California facilities be able to increase refinery runs after IMO 2020 if they have less water at their disposal?

It is almost certain the US refining complex will consume more water after IMO 2020. While Trucost, part of S&P Global, says that the switch to cleaner marine fuels should save billions in healthcare costs, there may be unintended and unforeseen costs in the amount of water – and money – it will cost to produce them. The lesson is that solutions to problems at a global scale will always require difficult choices and tradeoffs – in the case of IMO 2020 the exchange of potentially vast amounts of water for cleaner air. Only time will tell if this price was right. ■

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## IMO 2020: Winners and losers

The effects of the IMO's 0.5% cap on marine fuel sulfur are set to ripple across the global economy. Is this good or bad for the industries, countries and other groups affected? By Eklavya Gupte and Tom Washington

The change in sulfur regulation for marine fuels in 2020 sounds like an obscure point that should have limited interest for those outside the bunker industry. But a major structural shift hitting both oil and shipping simultaneously has the potential to touch upon almost every market on the planet.

In this section we have gathered details on some of the industries, countries and other groups that stand to gain or lose the most in 2020.

### Petrochemical buyers

Buyers of petrochemicals should be worse off as the ripple effect of IMO 2020 comes into contact with their market.

Increased refinery runs may grow the supply of naphtha – a key petrochemical feedstock – by as much as 150,000 b/d globally in 2020, according to

S&P Global Platts Analytics. But refiners maximizing middle distillate production will deliver tighter gasoline supply, which should deliver a net draw on naphtha into gasoline blending and away from petrochemicals, increasing prices for petrochemical buyers.

In turn that could be expected to shift steam cracker feed preferences away from naphtha and towards LPG or ethane.

### Power generation

The power generation industry in parts of the developing world with less strict emissions regulation will benefit from the option of switching to oil-fired capacity.

Fuel oil prices are unlikely to drop to the same level as coal, but they are likely to be low enough to beat gas-fired generation, particularly for plants located near refineries with a fuel oil surplus.

The power industry will also face higher freight costs across all of its raw materials.

 **Saudi Arabia**

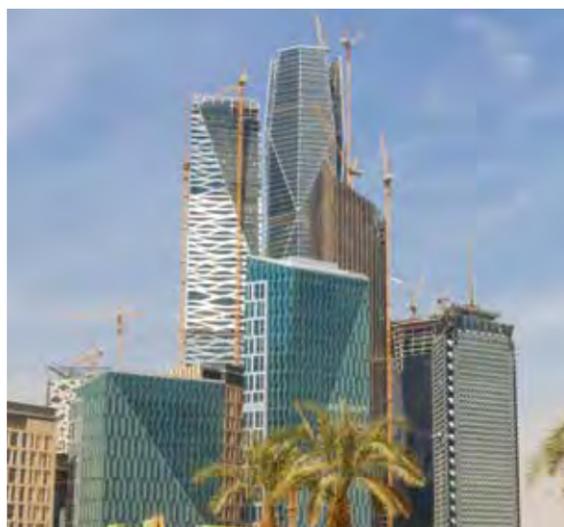
Saudi Arabia will see a mixed impact from the specification changes in 2020.

In the short run, the oil-rich kingdom looks well placed to benefit. Its light, sweet crude exports will be in demand to produce low-sulfur fuels, its complex refineries will see strong demand for middle distillate exports to plug Europe's deficit and its desalination plants will see lower prices for the fuel oil they burn.

But it's notable that the Saudi delegation at the IMO has been in regular opposition to the 2020 implementation date. In February the Saudi representatives told S&P Global Platts they were supporting an initial "transition period" for the 0.5% sulfur cap, giving the shipping and refining industries more time to prepare.

The longer-term impact of the lower sulfur limit may help to explain Saudi opposition. While the short-term advantages are clear, the longer-term consequences of refining capacity gradually shifting to the east after 2020 may be less beneficial to refiners in the Gulf. The regulation may also provide a boost to shale oil producers in the US.

And it can be argued that emissions regulation of any kind tends to accelerate the shift away from the use of oil over the longer term – a move that is not in Saudi Arabia's immediate interests.



Saudi Arabia will see a mixed impact from the specification changes

 **Aviation and road haulage**

The largest buyers of middle distillates – the aviation and trucking industries – are set to see unwelcome cost rises as the shipping industry increasingly competes for access to the same pool.

Airlines are particularly sensitive to sharp movements in the price of jet fuel: rising crude prices in the first half of 2018 were one of the biggest factors that affected their earnings, according to company statements.

A higher outright crude price in 2020, combined with wider distillate crack spreads, would put the airlines under significant pressure.

 **Russia**

As the world's largest producer of fuel oil, Russia's loss from the marine market moving on to cleaner fuels is clear.

While the specification change has incentivized the country's refinery modernization program, bringing down its fuel oil production, Russia was on track to export almost 35 million mt of the product in 2018. This number will not be reduced to zero in the near future.

Russia also faces the prospect of weaker demand for its heavy crude as refiners shift to lighter slates with a lower fuel oil yield.

 **Consumers**

The general public can expect a hit to their wallets from several different directions in 2020, but the direct impact of higher shipping costs on consumers should be limited.

Denmark's Maersk Line, the largest shipping firm in the world, currently burns on average around 0.874 mt of fuel for each forty-foot container it ships around the world, and with an initial spread of \$425/mt between fuel oil and 0.5% sulfur bunkers that would give a price difference of around \$370 per container. As an example, each of those boxes can hold about 10,000 pairs of shoes – so for a pair of trainers shipped from China to Europe, the consumer is looking at a price rise of less than 4 cents.



Agriculture is particularly reliant on low freight costs

A car carrier shifting 6,500 new Mercedes from Hamburg to Shanghai will consume around 1,050 mt of fuel along the way – so with that \$425/mt spread each of those cars' buyers could expect to pay an extra \$70 or so for their purchase.

A VLCC taking 2 million barrels of crude oil from northwest Europe to Singapore would get through about 4,500 mt of bunker fuel to get there – meaning a price increase of 96 cents/b.

All of that would seem manageable, even with several instances of these cost increases being repeated throughout various stages of supply chains and being passed on to consumers. But the financial impact won't stop there.

An estimated increase of \$7/b in the price of Brent crude driven by increased refinery runs in 2020 will be the impact most noticeable to consumers – at the pump as they refuel their cars, and in increased energy costs for industry. Some economists have gone as far as to suggest the changes in 2020, combined with other economic headwinds, may be enough to bring about a global recession.

 **Public health**

While the general public will suffer financially, they can also expect to see health benefits. Trucost, part of S&P Global, predicts that reducing the marine fuel sulfur limit to 0.5% should deliver significant public health benefits. Respiratory health in coastal communities in the developing world will see the strongest benefits – one study estimated that

making the change in 2020 rather than postponing it to 2025 would result in as many as 200,000 fewer premature deaths.

 **Agriculture**

The market for agricultural products is particularly reliant on low freight costs, and will feel the rise in fuel bills more than most as a result.

Arbitrage flows covering a longer distance are the most likely to come under pressure. Corn exports from Brazil and the US to Europe, Black Sea corn and wheat shipments to the Far East and biodiesel imports to Europe from China may all be under threat in 2020.

 **Metals**

The metals industry is another group that will face pressure on its raw materials after 2020.

The supply of anode coke, a key component in the anodes used to produce aluminum, will be restricted as low sulfur residues are taken away from coking units to produce low sulfur fuels. Higher-sulfur residues cannot readily be used to produce the product. Anode costs account for around 10-15% of aluminum manufacturing costs, and this change could add 1-2% to them, according to S&P Global Platts Analytics. That would add to the cost of increased freight rates for the transport of both finished metals and ore around the world. ■

# Iron ore derivatives: A tale of two exchanges

As iron ore has grown in importance among commodities, so has the need for more specialized trading instruments. Singapore's SGX and Dalian's DCE have become the central venues for iron ore trade, but each has carved out its own niche in the market.

By Petter Kolderup and Joseph Tong

In order to become the second-largest economy in the world, China has built up its infrastructure in a systemic, large-scale fashion since opening up in the 1970s. This process has also seen China increase steel output to become the world leader, accounting for half of global production.

Consequently, China is also the largest importer of iron ore – the key feedstock in steelmaking, importing 1.064 billion metric tons in 2018. This is not a small number, and iron ore, now the second-biggest commodity market in the world after oil, deserves substantial attention. The fast growth in iron ore imports, along with increased steel production, led to the breakdown of the traditional annual benchmark supply contracts between miners and steel producers. As China moved rapidly towards a more spot-based market, a need emerged for derivatives to manage price risk.

As exchanges play an important role in price formation and risk management, their development over the years has consequences for the market, especially for those companies exposed to the underlying physical trade. Increased liquidity will

drive down trading costs and improve price transparency. And given China's influence on the global economy, and the key position of iron ore as an essential commodity, what happens on the exchange matters to markets and consumers far beyond Singapore and Dalian.

## Singapore and Dalian

From 2009 a range of exchanges started listing iron ore futures. Over time two stood out. The Singapore Exchange (SGX) listed iron ore swaps in 2009, and the Dalian Commodity Exchange (DCE) listed iron ore futures later in 2013. The two venues have become central in iron ore derivatives trading, with monthly volumes peaking in March 2016 – at 7.6 billion mt traded on DCE and 231 million mt on SGX.



There are structural differences between the two exchanges, and their strategic approaches also diverge. DCE, as the long-standing onshore commodities exchange, offers members direct access to its digital trading platform. Yuan-denominated iron ore contracts are listed, which have been available for mainland traders as well as approved international entities since May 2018. Since listing the iron ore contract, DCE has attracted a big retail investor base in China. According to DCE, corporate clients represented only 2.4% of the investor population, accounting for 23.9% of the volume in 2018. The rest were retail traders transacting via the many securities brokers in China.

In contrast, SGX trades cash-settled, US dollar-denominated contracts, and the trader composition on SGX was 95% corporate clients and 5% others. Of the corporate clients, banks account for the biggest part, at 35%. Chinese traders with sufficient dollar reserves may also trade iron ore contracts on SGX with central clearing.

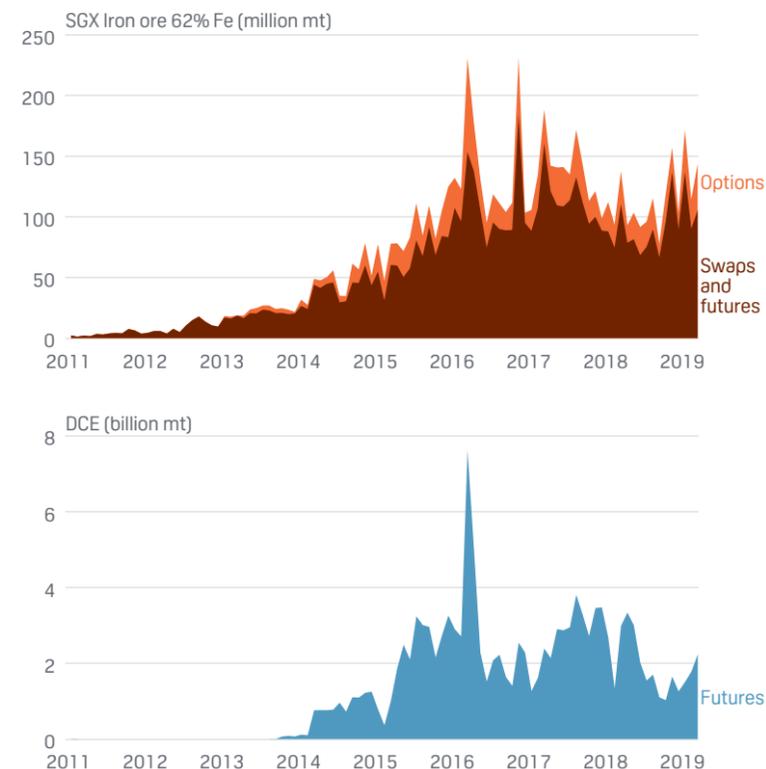
### Falling volumes

The volumes on both exchanges peaked in March 2016, coinciding with a sharp turnaround in iron ore prices, which broke a five-year negative price trend. Platts' IODEX dropped from \$193 per dry metric ton in February 2011 to reach a low of at \$38.60/dmt in December 2015, and rising to \$51.05/dmt entering March 2016. As the price bottomed out, the volumes slowly declined on DCE and SGX – more so on DCE. In 2015 the volume on DCE was 32.65 times higher than on SGX, in 2016 and 2017, 25.15 times higher. By 2018, the volume on DCE was 23 times higher.

In an attempt to regain momentum in volume growth, and to keep at bay other competing exchanges – such as the Chicago Mercantile Exchange (CME), Hong Kong Exchange (HKEX) and Intercontinental Exchange (ICE) – the two dominant exchanges have been introducing many new initiatives to attract more investors in iron ore. For instance, DCE embarked on an internationalization effort to draw in foreign investors from May 2018, trying to enhance trading volume through the onshore market. With internationalization, approved foreign entities can also dabble in this Yuan-denominated contract.

In the meantime, SGX has introduced a whole suite of derivatives contracts just for iron ore, with 62% Fe, 58% Fe, 65% Fe, lump premium swaps and iron ore

### IRON ORE FUTURES (MONTHLY VOLUMES)



Source: SGX, DCE

options. This whole suite of risk management tools was designed to appeal to a wider range of iron ore traders. Since the beginning of 2019, SGX options have seen a good upswing in volumes and open interest. Open interest in March was 80.5 million mt versus an average of 65.8 million mt in 2018. Open interest in SGX futures continue to be stable and 53.2 mt traded in March.

### Volume trends diverge

SGX and DCE have had differing degrees of success. The volume on SGX has increased over the past year, with open interest holding steady in the 62% Fe futures contract. The iron ore lump contract also had good growth in volumes, supporting the overall iron ore volumes.

For DCE, despite the internationalization effort, the volume has continued to drop with dwindling open interest. For instance, over the 5-month period after DCE launched the internationalization campaign, open interest dropped by 68%.

Several factors contributed to the gap in performance between the two trading venues:

### 1. Trader composition and drop in volatility

The two exchanges have attracted two very different clienteles. The considerably larger proportion of retail traders on DCE implies a prevalence of speculative trade, through Yuan-denominated accounts set up by Chinese securities companies. These retail investors tend to trade more frequently and can easily shift to another asset if iron ore does not provide adequate returns over a short period of time.

Conversely, a much bigger percentage of SGX participants are institutional traders with physical exposure. Mostly hedgers, the traders on SGX are more likely to have consistent physical cargos to hedge independent of volatility, implying a steady volume. Furthermore, there are many financial institutions trading on SGX and they are thought to be more sophisticated in terms of portfolio and risk management.

Iron ore monthly volatility reached 34% in April 2018, but fell off gradually to 18% in second half of 2018. This huge drop in volatility reduces the appeal of iron ore in investment allocation. Therefore, on DCE, many traders potentially shifted their holdings out of iron ore and into more conventional assets like stocks and bonds.

### 2. Political risk in China

Increased political risk in China during 2018 made it more difficult for speculators to read future supply and demand dynamics. This particularly affected iron ore futures volume on DCE. The China-US trade war reached full force with the implementation of steel tariffs in the beginning of June. This new political risk brought about an increased need to hedge, but also turned trading into gambling for speculators. As a result, increased trading volume was seen on the offshore SGX where dollar-denominated contracts are traded, and less interest was shown by both domestic and international traders on DCE. The heightened risk drove away retail investors, while institutional traders in the international market were still carrying out hedging activities as required by physical deals.

### DCE vs SGX OPEN INTEREST 2018



### 3. Investor suitability policy on DCE

In March 2018, DCE implemented an investor suitability policy for iron ore futures trading that applies to both domestic and international new investors. Certain requirements have to be met before being able to trade. For example, a participant's balance of funds must not fall lower than Yuan 100,000 on five consecutive trading days. The new regulations made it more costly and difficult to access the DCE market-place. In contrast, SGX has maintained a consistent framework for trading and account opening. In addition, participants on SGX tend to be more established and less vulnerable to changes in exchange rules.

### 4. Reduced risk appetite of retail investors

The Chinese stock market fell sharply in 2018, illustrated by the drop in the Shanghai Composite from 3392 points to 2494 points – a 26.5% fall. This meant many retail investors who speculated on Chinese stocks made huge losses on investment. With this, retail investors trading on the DCE also seemed to develop a reduced risk appetite for commodities, including iron ore, and trading volume and open interest fell as a consequence.

The makeup of the trading community is the most important factor behind the fall in open interest and trading volume on DCE. With retail investors representing the majority on DCE, volumes and open interest are likely to reduce during a period of low volatility, as retail investors focus on short term and are more flexible with changing investment holdings.

Also, the lack of exposure in physical trading implies they are merely speculators on the market, rather than traders with consistent hedging needs, even in periods of range-bound trading. On SGX, where there is sizable representation of institutional traders dealing physical cargos, participants' hedging activities are more consistent and less influenced by low volatility. With such a distinction in trader types, it was no surprise that the period of low volatility saw open interest and trading volume dwindle on DCE. It is also important to remember that most of the sizable international institutional investors already had access to DCE before the internationalization.

### Looking ahead

As the iron ore market develops, derivatives instruments serve a bigger-than-ever purpose for trading and risk management. Both traders and speculators need to use futures or swaps for managing price risk or achieving maximum return on investment. The exchanges, including DCE and SGX, are committed to continually introducing and maintaining a greater variety of instruments, spanning options and contracts for different grades of iron ore that are used by steel producers. For instance, DCE is planning to list iron ore options for the onshore market, so that volatility traders can have the instrument to invest in.



In terms of competition, DCE has recouped some lost ground, with both open interest and volume rising since the beginning of 2019. Specifically, open interest has rebounded from the low, and almost doubled since December 2018. Trading volume has increased significantly as well. Other exchanges like HKEX and CME are also vying to be the go-to place for iron ore trading. CME representatives told Platts they have noticed a growing interest in their ferrous derivatives products. For example, iron ore monthly volumes have more than doubled in 2019, compared to 2018. A lot of the trades are done in the US time zone. Mark Levin, a managing director at Seaport Global Securities, a US-based investment bank, said the company is monitoring the developments in iron ore derivatives. As China is slowing down, India could be a new growth factor in steel, while in the US, aging infrastructure will need to be replaced at some point. These are factors that could stoke American investors' appetite for ferrous derivatives.

Technology will play an additional role. DCE is already screen based, but off-shore exchanges rely in large part on broker-facilitated trades. Both the exchanges and the brokers are competing in developing a fairer, faster and more user-friendly screen for iron ore derivatives trading.

In early April 2019, DCE announced a series of changes governing trading on the exchange. Specifically for iron ore, DCE said that in the event of social unrest, war and natural disasters that affect iron ore production or import, the exchange reserves the right to enter into a special situations phase where the exchange manager can intervene and adjust market's opening and closing hours, as well as pausing or suspending trading, for example. The aim is to prevent excess volatility and speculation on the exchange. The policy change was introduced just before the iron ore price reached 5-year high in mid-April, on supply tightness coupled with firm demand. Volatility has returned to the market, and open interest and trading volume are on the rise again.

As the trading volume of iron ore reached highest level after a major trend reversal in March 2016, it is worth remembering that prices have now been in a three-year positive trend, and a future reversal could push volumes and open interest even higher. ■



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# Weighing the impact of Vale's dam disaster

The catastrophic dam failure at one of Vale's operations in January continues to cast a shadow over the global iron ore market. With end-user demand picking up during the second quarter and further straining the current supply of Brazilian fines, the sector has been forced to look for new solutions and alternative supply options. By Jun Kai Heng

On January 25, a Vale tailings dam in Brumadinho, part of its Southern Systems mining operations, collapsed, resulting in a massive loss of life and a significant impact on its iron ore supply chain over the longer term.

The company declared force majeure in the first week of February on a range of iron ore qualities after Minas Gerais state authorities ordered a production halt at Vale's 30 million metric ton/year Brucutu mine, alleging safety concerns. Vale later noted that maintaining supplies to the domestic market was its priority, and that it was giving preference to contractual commitments over spot market sales.

Initial concern from market participants was related to Vale's production of its medium grade fines, including the flagship Brazilian Blend fines (BRBF) as well as Standard Sinter Feed Guaiba (SSFG), given their reliance on Southern System fines for blending with high grade fines mined from the Northern Systems.

Marketed as a premium medium grade fines product,

Vale's Teluk Rubiah-blended BRBF was traded at high premiums of around \$5-6/dry metric ton against the S&P Global Platts 62% Fe IODEX in the third quarter 2018 and tradeable at a premium of over \$8/dmt in November 2018. End-users were seeking to capitalize on its low alumina and high Fe content to increase production efficiency, while staying within stringent environmental limits.

However towards the end of the last quarter of 2018, premiums for BRBF had been declining in the face of thin steel margins, sinking to a tradeable low of \$1.85/dmt on January 18. Market sources said that a more relaxed approach to environmental pollution had also resulted in steel mills being unwilling to pay higher prices for low-alumina fines. Vale currently produces several variants of its BRBF, with market sources valuing those blended at Teluk Rubiah in Malaysia with the highest premiums, due to better sintering consistency and blending compared to those blended at the northern Chinese ports for domestic use. At the northern Chinese ports During the same period, spreads between port-blended BRBF and Pilbara Blend fines (PBF) narrowed to levels around Yuan 5-10 per wet metric ton as compared to levels of around Yuan 5-10/wet metric ton in the previous two quarters.

In the week following the accident, industry participants saw with greater clarity the longer-term impact of the Vale incident with Chinese market participants returning from the Lunar New Year holidays. Expectations were of a significant reduction in production of Vale's Southern System fines, including those used for the blending of BRBF with Carajas fines. Platts observed increasingly high premiums for BRBF in the spot market, with premiums for BRBF strengthening to over \$6/dmt against the front month IODEX on February 8.

Market sources also reported rising demand for other similar Brazilian low-alumina fines, like Sudeste and IOC6 from Trafigura and CSN, with bid levels rising to over \$3/dmt from around flat to \$1/dmt in the following weeks after the accident. Sellers of Mauritanian TZFC fines also saw strong buying interest as buyers looked to secure alternative cargoes with low alumina and medium-to-high silica content. The typical specifications for Teluk Rubiah-blended BRBF are 1.5% alumina and 5% silica, with the silica content regarded as ideal for the raw feedstock blend for Chinese blast furnaces.

Amid an increase in market activity for Brazilian low-alumina cargoes, many market participants were adopting a cautious attitude due to existing high surplus volumes, and uncertainty over the operational status of Vale's other mines. Market sources said that a visible tightening in supply would only be present after March, when end-user demand was expected to pick up. Export data seen by Platts for the week of February 4 demonstrated a 54% dip on the previous week for volumes exported out of Tubarao, a main export port for Vale's Southern System products, to just over 940,000 mt. However, sources said that the declaration of port maintenances by Vale over the same period meant that further monitoring was required.

More clarity on Vale's export volumes was only attained in the week of March 11, with export data seen by S&P Global Platts demonstrating that export volumes out of Vale's Guaiba port in the south fell by 60% on the week, to 176,000 mt. Then, from March 18 to the week of April 15, Vale's export volumes out of Guaiba were at a weekly average of 264,000 mt, in contrast with a weekly average of 809,000 mt for the calendar year of 2018. In the week of March 25, export volumes out of Tubarao decreased by 36% on the week to 786,000 mt, before further declining to 351,000 mt in the week of April 8.

Vale's CFO Luciano Siani said in a conference call with analysts late March that the miner's average iron ore product mix was set to decline in terms of quality following the January 25 dam burst.

"With lower levels of wet (ore) processing, production of higher-value added products falls and so we need more high-quality

Carajas ore for blending to correct the quality of some products," Siani said. "We are committed to maintaining stable our offer of Brazilian blend fines (BRBF), our principal product." However, the offer of Carajas and niche products would decline, he said.

"Although it is unclear how long low loading volumes will continue, end-users are definitely looking to reduce their reliance on Brazilian low-alumina fines and alter their feedstock blends," a northern Chinese mill source said.

Several market sources said that, while higher premiums for alternative Brazilian fines were reflective of the current situation for iron ore supply, large-scale end-users were unlikely to use these options as a full direct replacement for impacted volumes of BRBF supply.

"A mill's main priority when it comes to iron ore procurement is stability, especially for those with massive blast furnaces where a significant alteration of the raw feedstock blend will have a detrimental impact on performance, as the accompanying coke blend cannot be adjusted so easily. There are not too many products in the market which have the same supply volumes and spot availability as mainstream Australian fines and BRBF," an end-user procurement source said.

"The supply of these alternative low alumina fines is definitely not sufficient to replace the estimated loss in BRBF supply and this is not taking into account many other technical differences like sizing, which require other changes in the blast furnace operations," the source added. "The use of these alternative options as an immediate direct replacement is more suited for smaller mills with high levels of flexibility for their feedstock options. For large-scale mills, a longer-term and gradual shift in feedstock to stable alternatives is needed."

Although the authorization of the resumption of operations at Vale's Brucutu mine by a Brazilian court on April 16 was expected to add 30 million mt of iron ore supply back into Vale's production volumes, market sources warned against being too optimistic.

"Vale has not changed their volume guidance due to reduced shipments in April from Ponta da Madeira as a result of bad weather. It remains to be seen which products iron ore from Brucutu feeds into, and when this supply becomes available in the spot market," an Asian trader said. "Vale has stated its priority to be its domestic Brazilian steel end-user demand, so it is unclear how much of a supply boost this announcement will have," the source added.

Market sources displayed mixed expectations of demand for higher-silica fines, as a replacement for the higher silica content



of Vale's Southern Systems-based products, in the longer run. "There are not too many sustainable high-silica alternatives in the market, so this could present an issue to end-users. South African Kumba fines are one of the closest in specifications to BRBF for non-Brazilian options, but the alkali content is a major issue for many blast furnaces," an eastern Chinese mill source said.

"The silica issue is not as serious as a shortage of low alumina, but it will have an impact on the coke rate and other production factors. However, there are some alternatives to work around it without a change in feedstock blends," an Asian mill source said.

Another significant impact of Vale's dam accident is the reduced supply for the pellet and pellet feed market. With Vale's declared priority the domestic market, shipments of around 11 million mt of pellet – a concentrated, direct-feed, high-iron product – are expected to be affected.

Market sources say that the reduced supply will have a smaller impact on Chinese end-users compared to other Asian and European mills, due to the availability of domestic concentrate that can be used for pelletization.

"Indian pellets are likely to see increasingly higher prices into the second half of the year. Although there are Chinese domestic options, they are still dependent on the extent of environmental controls. European mills have been heard inquiring about Indian pellet offers, which is only likely to push spot prices up higher," an international trader said.

The resumption of Anglo American's Minas Rio pellet feed concentrate production has eased some supply concerns, with expected production levels of 16-19 million mt in 2019. Several market sources pointed to new opportunities for Vale due to the creation of spare capacity from Oman. Vale's current distribution and pelletizing complex in Oman is targeted at regional Middle Eastern end-users, with its port in Sohar able to receive its Valemax iron ore cargoes from Brazil.

"Middle Eastern steel mills had switched over to supply from Vale after the Minas Rio pipeline was shut. With the resumption of production, these mills will be reverting back to prior contracts, leaving a surplus of iron ore from Sohar," an international trader said. "Vale has already begun selling its Carajas fines from the port of Sohar, a clear indicator of spare inventories," the source added.

The spread between high-grade and medium-grade fines saw little impact in the immediate aftermath of the Vale accident, as direct production cuts and halting of mine operations were limited to the Southern Systems, with no visible restrictions on Carajas fines production. In addition, the thin levels of steel margins in the first quarter of 2019 meant that demand for high-grade fines remained tepid, and the 65-62% Fe spread narrowed from \$14.10/dmt on January 28, to a year low of \$11.65/dmt on March 4.

Initial market expectations from sources were towards a possible increase in spot supply of Carajas fines, due to lower volumes of Southern System fines being available for blending at Teluk Rubiah and Chinese ports. On April 12, Vale sold a 170,000 mt cargo of

Carajas fines from Teluk Rubiah terminal, loading May 10-19 at \$110/dmt.

"While Vale's sale from Teluk Rubiah will ease supply constraints for Carajas fines due to delayed loadings at Ponta da Madeira as a result of poor weather, it is too early to say what Vale's new strategy will be with regards to its current problems," another international trader said.

"Loading rates at Ponta da Madeira have been at very low levels, and the impact of delayed shipments is likely to be felt as spring demand for iron ore is picking up," a trader said.

"In addition to delayed loading, there is concern over the spot availability of Carajas fines given Vale's public commitment to channel more Carajas volumes into its BRBF blending. Over the long run, this reduction in supply should support a widening of the high and medium grade fines spread," another trader said.

However in late April, several market sources who expected a longer-term trend of sales of Carajas fines from Asia rather than from Ponta da Madeira due to the current situation in Brazil.

"Vale does not have sufficient loading volumes from its southern ports to load all its contracted vessels beyond the near term, and is likely to use some of these empty vessels towards Ponta da Madeira to load Carajas fines," a source said. "Given the current high prices for Carajas fines, shifting volumes to Asian ports to reduce the duration in anticipation of stronger demand would be a very logical choice, especially with so much spare tonnage available," the source added.

"For May, the ratio of Valemaxes from Ponta da Madeira and Tubarao to Teluk Rubiah suggests that more sales of Carajas fines from Teluk Rubiah is very likely, given the much higher proportion of Carajas fines that is needed for blending BRBF," an international trader said.

"Supply of Carajas fines has been tight recently due to delayed loadings from bad weather at Ponta da Madeira. There are discussions on future sales of Carajas fines from bonded warehouses in Dalian and Yantai like BRBF into the Northeast Asian market to get around this issue," another international trader said.

Vale did not respond to inquiries from Platts at the time of publication about possible new marketing strategies from its existing distribution centers, and its subletting of contracted capesize tonnages from Brazil. ■



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# Insight from Shanghai



By Sebastian Lewis

In March, China's elite gathered in Beijing for the annual "two sessions" meeting of China's legislative bodies, the National People's Congress and the People's Political Consultative Conference.

While much of what happens at the two sessions is at best marginalia for all but the most dedicated of China watchers, the key themes of the meeting and the government Work Report, which outlines policy, priorities and targets for the coming year, is worthy of attention. As expected, the overall direction follows the 13th Five Year Plan released back in 2016: coordinated "innovation-driven development", environmental protection and plenty more "opening up". But as always with Chinese policy documents, the devil is in the detail.

## Slower growth over more debt

That economic growth will continue to slow is hardly a surprise. But this year's target of "6-6.5%" offers more leeway than last year's target of "around 6.5%". This is recognition of the uncertainties facing the economy in 2019, from domestic risks in the financial sector and excessive local government debt, to uncertainty around the global outlook and trade tensions with the US. The government does not want short-term growth if that means a buildup of debt that could pose a risk to long-term financial stability. Those hoping for a cheap hit of stimulus to boost demand for everything from

steel to diesel, should growth start sagging, will likely be disappointed in 2019.

## Tax cuts

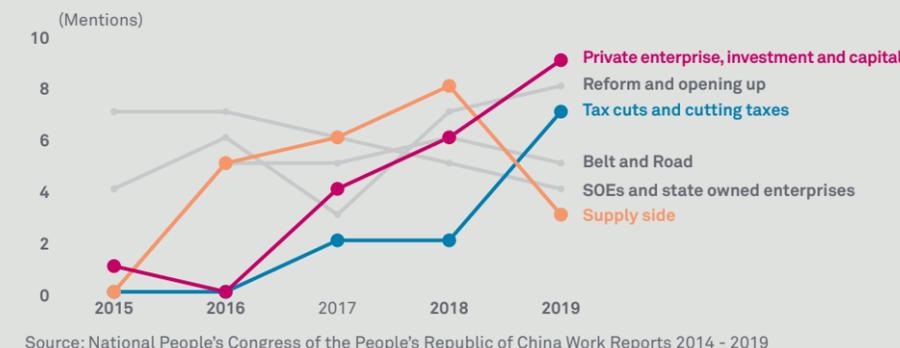
The focus has moved instead to supporting growth and employment by reducing costs for manufacturers and small businesses. VAT has been cut across a range of sectors and the amount of social insurance that companies need to pay to employ workers has been reduced. The China Iron and Steel Association (CISA) estimates that the VAT cut will reduce the tax liability of CISA member mills by around Yuan 22 billion (\$3 billion). But the main effect will be felt by consumers with lower prices supporting domestic consumption – albeit at a cost. The tax cuts will put pressure on government budgets at all levels. Local governments will be able to access special bonds to help balance their books, but overall, governments will have to tighten their belts in 2019.

## Elevating the private sector

There has always been tension at the heart of the Chinese model between the role of government and the private sector in the economy. This year the private sector appears to be in the ascendant with no less than nine mentions of private enterprise, investment and capital in the government Work Report, up 50% on last year. This should mean a more favorable environment for private business and startups, as well as increased lending to small and private businesses, which have historically found it hard to obtain finance.

## China's policy priorities evolve

S&P Global Platts analysed how often certain policy phrases occurred in the annual work reports delivered at the National People's Congress. There has been a steady increase in the occurrence of terms referring to the private sector and tax cuts and a decline in references to state owned enterprises. The government has had considerable success with its "Supply side" reforms since their inception in 2016 – notably in removing steel and coal overcapacity and reducing excess housing inventory – and they are now less of a policy priority. The phrase "supply side" only occurs three times in this year's work report.



## Reform of SOEs

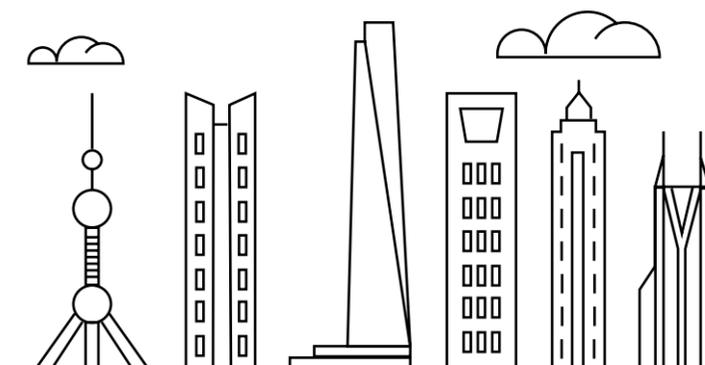
At the same time, the government will continue to reform the SOEs. This won't necessarily mean rolling back the state. But it should lead to a better managed, more profitable state sector, with fewer unprofitable companies that are a drag on the economy and a drain on government budgets.

Market reforms will continue in the energy sector with further development of electricity spot markets building on the pilot power trading schemes already underway in some regions. Creating more competitive electricity markets will help address the problem of idle renewable capacity as well as reduce the role of coal. Ultimately, it could help lower the cost of electricity for industry.

Where power leads, so oil and gas will follow. The government has experimented with setting up gas pricing hubs, but the dominance of the "three barrels of oil", as the Chinese oil and gas majors are often called, has impeded the development of competitive markets. In order to lay the groundwork for these, the government will create a new national oil and gas pipeline company from the transmission assets currently in the hands of the integrated SOEs. Separating distribution from sales of oil and gas is just the first step in allowing oil and gas markets to develop in China. The government also envisages opening up upstream oil and gas exploration to non-state capital. But without further detail, it's hard to judge how transformative introducing more competition into the upstream sector might be.

There is no letup in the battle against pollution as we move into the second year of the "three critical battles" (the others are guarding against financial risk and poverty alleviation). Structural adjustments and "supply side reform" will also continue, but the language is around strengthening and upgrading industry rather than removing overcapacity. Expect emissions reductions by upgrading steel plants and promoting the use of cleaner coal, rather than another round of coal and steel capacity cuts. Meanwhile, increasing utilization of solar, wind and hydro capacity and increasing the use cleaner fuels in heating in northern China will constrain the growth of coal.

Finally, if the government Work Report is anything to go by we may have reached peak "Belt and Road". The term is referenced just five times throughout the report, down from six mentions last year. Instead the talk is of defending economic globalization, free trade, and win-win development. ■





## New beer, new bottles

In response to rising prices for imported aluminum, Japan's breweries experimenting with "virtual beer" are choosing to swap their traditional metal cans for plastic bottles. Mayumi Watanabe reports

From relatively traditional roots, the Japanese beer industry became a hotbed of innovation in 2018. For over 100 years, legislation dictated that beer had to contain 67% malt, with the balance of 33% strictly water, hops, yeast, corn, rice, or more malt. But a revision of the country's alcohol laws – or “Shuzei ho” – which went into effect April 2018, allowed breweries to introduce a new gamut of flavors, including potato, fruit and spices. The revised legislation has also allowed the malt content in beer to be lowered to 50% from the earlier 67%.

The legislation opened ways to reduce input costs and create more innovative product lines offering new and different drinking experiences. With brewers facing a challenging domestic market due to Japan's declining population, they quickly embraced the opportunity. Products with fewer calories, less sugar and purine soon sprouted, as well as beer-tasting beverages with no alcohol, appealing to the health-conscious.

One liquor store owner said they were satisfied with the resulting sales. Instead of detracting from real beer sales, he said non-alcoholic “virtual beer” was contributing to sales of its more potent counterpart.

“After giving their liver a break with virtual beer, customers go back to drinking real beer the next day,” he said.

Virtual beer appears to be creating a new market, allowing customers to relax outside without going to a bar. Many offices do not allow non-alcoholic beer to be drunk at work, so instead people often take their drinks outdoors to unwind.

It's not the first time that Japan's breweries, steeped in hundreds of years of tradition, have decided to experiment: 2015 saw the launch of collagen beer, a brew with added collagen, targeting women who want to increase their intake of the natural protein.

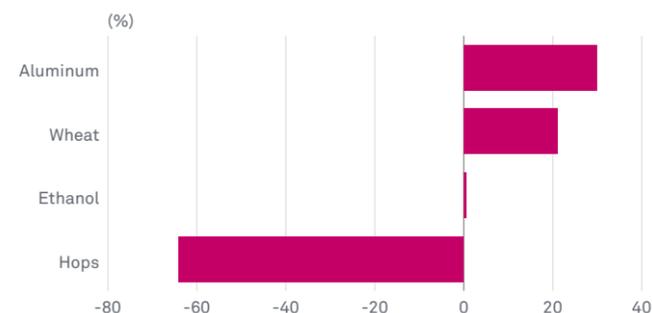
### Losing its fizz?

The rise of virtual beer has implications not just for the future of the beverage industry, but also for the aluminum that has traditionally been used to make beer cans.

The beverage sector in Japan uses 20–30 billion cans annually, driving total aluminum consumption of 400,000–500,000 mt/year. This consumption is drawn from primary aluminum, all of which is imported, as well as recycled cans sourced locally.

The cans are made domestically by melting the primary aluminum and used can feedstock, pressing the molten aluminum into sheets, and cutting the sheets into cans. Japanese can imports are marginal, at 50 million cans per year – or about a quarter of a percent at most.

### BEER INPUT COSTS, 2016 vs 2018



Source: S&P Global Platts, Japan customs data

The prices of key inputs for Japan's breweries changed significantly between 2016 and 2018. For example, between January 2016 and January 2018, the price of imported hops fell 64% to just ¥1,297/kg (\$11.77/kg), according to customs data.

Price movements in other materials, such as ethanol, wheat and aluminum, were less favorable (see chart). Although the aluminum used in cans typically only makes up 5–10% of total production costs, the “all-in” price of Japanese aluminum, including both the LME cash aluminum price and the S&P Global Platts CIF Japan spot premium, rose 22.8% between January 4, 2016 and January 4, 2018, reaching \$1,941.25/mt. As of April 17, the all-in price stood at \$1,935.25/mt.

The shift in Japanese aluminum prices reflects a drastic change in fundamentals. In 2015, aluminum supply was so abundant that, at times, using fresh aluminum was cheaper than recycling used beverage cans. Since then, the global aluminum balance shifted towards a deficit thanks to increases in demand from emerging market economies, as well as the closure of high-cost smelters in China and elsewhere.



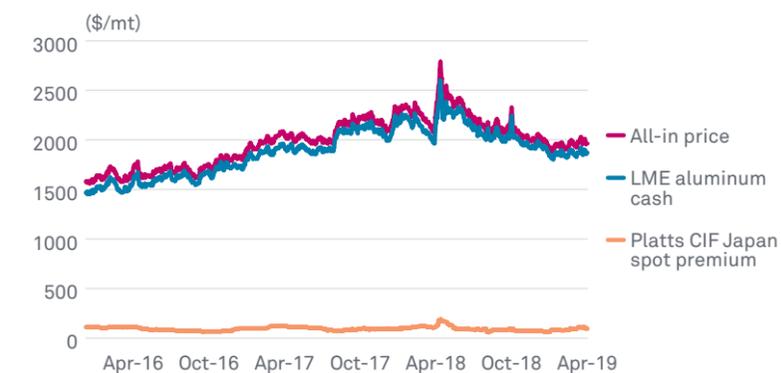
Since 2016, China's war against pollution has led non-compliant steel and non-ferrous metal production facilities to close, while the country's government has been discreet about new plant starts.

Then there was the US government's targeting of Russian aluminum producer Rusal with sanctions in April 2018 – a decision that was only reversed on January 28 this year. Within two weeks of the sanctions being imposed, benchmark LME aluminum prices rose by \$599/mt, or about 30%.

Rusal had previously been exporting 4 million mt/year to Japan, leading to concerns this supply could suddenly become unavailable. In the two weeks after the sanctions were announced, the S&P Global Platts CIF Japan spot premium ballooned from \$112.50/mt to \$187.50/mt.

Other, longer term factors have also been at play – including rising consumption from domestic auto manufacturers. The beverage industry's 400,000–500,000 mt/year aluminum consumption is larger than that of the automotive sector, which stands at about 300,000 mt/year. However, market participants forecast auto demand will outgrow that of the beverage sector. Kobe Steel forecasts Japanese aluminum sheet demand for cars will soar seven-fold from 2016 to 2025.

### JAPAN ALUMINUM PRICES



Source: LME, S&P Global Platts

Japan's total aluminum sheet production capacity is 2 million mt/year, which would not be enough to accommodate demand growth from the auto industry.

If brewers intend to continue using 400,000–500,000 mt/year of sheet metal for cans, they need to pay to sheet makers attractive processing fees to match that of automakers. Currently, automakers are said to be paying at least 30% more for their sheets.



**Coping strategies**

Challenged by higher aluminum prices, brewers have tried aluminum cans made of thinner sheets. In 2016, Kirin and Universal Can co-developed an aluminum can weighing just 13.8 grams, the lightest can on record in Japan. The Kirin-Universal can achieved a weight reduction of 0.8 grams, or 5%. If used more widely, the can would result in savings of roughly \$100 for every 70,000 cans.

To go even further, breweries have looked at substitutes. But cost is not the only ingredient for success when it comes to beer packaging: the material needs to provide strong protection from heat and light,

ease of transport, and should also be recyclable. Steel and glass are two potential alternatives. However, while steel can be less than quarter of the cost of aluminum, it is heavy by comparison, as are traditional glass bottles.

Of these criteria, recyclability has become increasingly important as environmental sustainability is now a key operating metric for beverage makers. Breweries are vocal about being green, and some plants aim for the full reuse and recycling of all resources. Japanese beer makers resell waste from breweries to livestock farms, while containers are recycled. Aluminum can be used for several life cycles, with cans being re-melted and used over and over again.

**PACKAGING MATERIAL PROPERTIES**

	Lightness	Protection	Cost	Recyclability
Aluminum	✓	✓	✗	✓
PET	✓	✗	✓	✓
Steel	✗	✓	✓	✓
Paper	✓	✗	✓	✗
Glass	✗	✓	✓	✓

Source: S&P Global Platts

**PACKAGING MATERIAL PRICE TRENDS**



Source: LME, S&P Global Platts

On a relative basis, PET is increasingly seen as an ecologically friendly resource. As of 2017, Japanese recycled plastics production stood at 2.06 million mt/year, according to the Japan Waste Management Institute. Of the total 2.06 million mt, around 26% of this is PET, while 20% is polypropylene, 16% polyethylene and 15% PVC.

In response, breweries made what some might consider a logical cost-control decision: to move towards plastic bottles made from PET. However, the move was confined to non-alcoholic virtual beer. Although there is no official explanation as to why, sources said was likely the non-traditional market segment was less hostile to change than drinkers of real beer, who had got used to sipping their beverages from aluminum cans during the past 30 years.

Non-alcoholic brews that now come in unusual PET bottles include Suntory’s All Free All Time and Asahi Brewery’s Asahi Dry Zero Spark. Both look like radically

different products compared with the traditional beers to which Japanese drinkers have become accustomed.

Outside the beer industry, PET and paper dominate the market for food packaging. If PET were to entirely replace aluminum in the beverage sector, as much as 500,000 mt/year of Japanese demand could be under threat. But sources suggest such a move is unlikely. One canmaker said aluminum will continue to comprise a major share of beer packaging.

The liquor store owner agreed. The overwhelming majority of buyers still reach out for aluminum cans, he said, rather than PET.

“The feel of aluminum cans and the taste of beer come together.” ■

**Additional reporting by Andrei Agapi, Hui Heng, Srijan Kanoi, Samar Niazi, Vanessa Ronsisvalle, Serena Seng with Takmila Shahid**

# Insight from Brussels



Siobhan Hall

The EU plans to invest billions of euros developing a “green label”, sustainable electric vehicle battery industry in a bid to challenge Asia’s market dominance.

The EU battery market could be worth up to €250 billion (\$282 billion) in 2025, with global demand for electric vehicles forecast to reach up to 900 million by 2040, the European Commission said in an update to its 2018 strategic action plan on batteries in April.

This means EU demand for lithium, nickel, cobalt, manganese and graphite as battery raw materials will grow significantly in the next decade, creating potential security-of-supply issues as production is concentrated in just a few countries outside Europe.

The EC wants to see the EU fully exploiting its own battery raw material resources to mitigate this supply risk, and requiring responsible mining practices for materials sourced outside Europe.

“It is projected that in 2025, provided a favorable regulatory and enabling framework is in place, and assuming that all ongoing EU projects are in place, EU lithium production could cover up to 30% of the world total,” the EC said.

It is also working with the European Investment Bank, “key industrial actors” and national governments to develop facilities to ensure lithium and graphite sourced in the EU can be processed in the EU.

China currently dominates the lithium-ion battery supply chain, including battery-grade refining and processing.

The EC also wants industry to re-use and recycle electric vehicle batteries, as part of its efforts to create a circular economy and optimize raw material resources.

The EC’s scientific research arm, the JRC, has estimated that recycling materials from electric vehicle batteries could provide about 10% of EU cobalt demand in 2030, if supportive regulation is put in place.

This would be higher than the share from EU mining.

## Better, cleaner EU batteries

The EU has just 3% of the global 147 GWh/year of lithium-ion battery production capacity, trailing behind both Asia, with 85%, and the US, with 12%, despite spending millions on research.

EC vice-president for energy union, Maros Sefcovic, remains optimistic that the EU sector can grow, however.

“I am convinced that EU car-makers will go for EU batteries, because they will be better, cleaner and made in Europe,” he said on April 9.

EU electric vehicle batteries would be made from responsibly-extracted raw materials, and use modern technology and software, for example to enable vehicles to supply electricity back into the EU grid for balancing, he said.

The batteries could be reused for electricity storage in homes and in industry, and then recycled, maximizing their value.

There would also be an advantage to just-in-time car-makers having the battery supply chain close to the car plants, he said.

The EC set up the European Battery Alliance with industry in October 2017 to promote investment and growth in this sector.

The companies and organizations involved have since announced up to €100 billion (\$113 billion) of total private investment in battery ventures, including producing primary and secondary materials in the EU, and building battery cell giga-factories.

Up to 30 such giga-factories will have to be built in Europe over the next 10 years to meet the growing demand from electric vehicles, according to the EC.

## Focus on research

The EU risks remaining at a competitive disadvantage in this sector unless it can develop and exploit breakthrough technologies, according to an April report by the EU Court of Auditors.

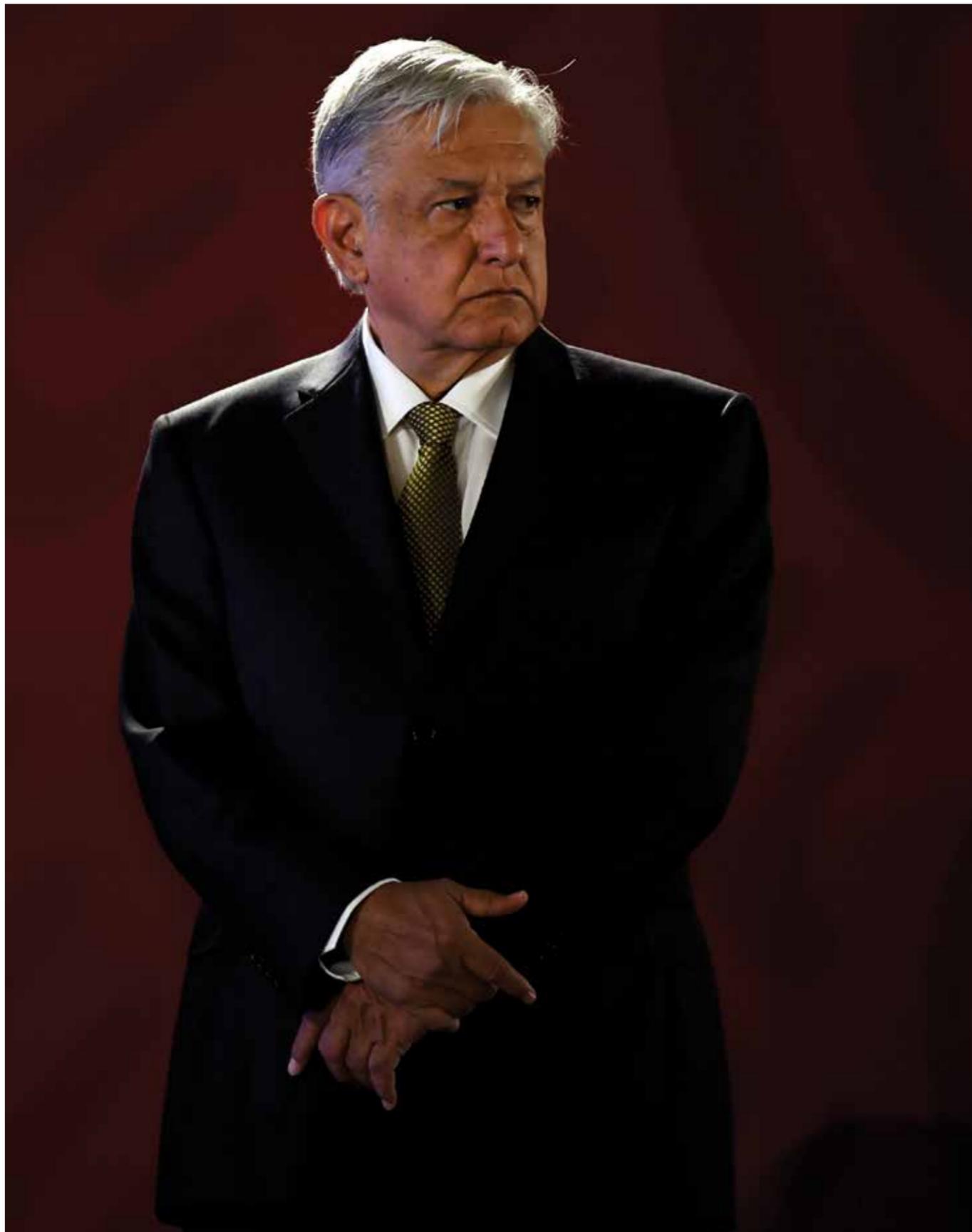
That could mean the EU needs to shift its focus from lithium-ion research to other options. The EU gave €315 million to battery research from 2014 to 2018 under its Horizon 2020 program, including €164 million – over half – to lithium-ion research.

Its latest Horizon 2020 call, open until April 25, offers a further €114 million for battery research this year, including around €30 million for advanced lithium-ion cells, €13 million for lithium-ion cell materials and transport modelling, and €2 million for a network of lithium-ion cell pilot lines.

It also earmarks some €25 million for solid state batteries for electric vehicles, plus €24 million for materials technologies for non-automotive battery storage, and €15 million for advanced redox flow batteries for stationary energy storage.

The EU will decide which projects will receive funding by the end of September. ■





# Mexico's gas market under siege

Still in the early stages of liberalization, Mexico's gas market is now in paralysis as the country's new president attempts to centralize control of the energy sector.

By J. Robinson

In December, Mexico's energy market reform turned five years old. The event was unceremoniously marked by the inauguration of Andrés Manuel López Obrador, or AMLO—a nationalist, left-leaning presidential candidate elected partly on a promise to dismantle it. While the recent growth of Mexico's reformed gas market has surpassed the expectations of many, it now faces new challenges ahead.

In an early move that rattled investors, president-elect López Obrador in October announced the cancellation of Mexico City's new international airport. The decision followed an unofficial, popular referendum on the project that AMLO called an exemplary exercise of democracy.

Referendums, which have been subsequently used to determine the fate of even major energy infrastructure projects, are now the hallmark of a president bent on redefining Mexico's sovereignty.

The emerging challenges to Mexico's natural gas market, though, extend beyond those posed by AMLO.

In the midstream, aging infrastructure at the country's gas processing plants threatens the viability of domestic production. For imported supply too,

tough environmental laws and land-use regulations in Mexico challenge the viability of critical gas transmission projects.

In downstream markets, supply scarcity, particularly in southern Mexico, continues to starve out many industrial users and power generators. Even across parts of central Mexico, where end-users are better served by a dense network of pipelines, access issues have dramatically increased fuel costs for end users.

Despite the challenges, Mexico's gas market has evolved rapidly following liberalization. In the upstream, private players have gained access to both onshore and offshore production blocs once exclusively reserved for development by state-owned *Petróleos Mexicanos* or Pemex. In the midstream, an enforced contract transfer program has seen more diversity emerging in shipping markets with CF Energía and smaller distributors entering a space previously controlled by the state.

## Centralizing control

Perhaps the biggest political challenge to Mexico's gas market under the López Obrador administration will come from a slowdown in the implementation of its energy market reform, and potentially, an outright reversal to certain policies enacted under it.

In mid-March, for example, Mexico's Secretariat of Energy, or Sener as it is commonly known, announced a sweeping organizational change to the *Comisión*

Federal de Electricidad or CFE – the state-owned power generator that controls over 85% the country's installed capacity.

The move reintegrated its six generating subsidiaries into one, potentially lowering operational costs, but simultaneously creating a single near-monopsony fuel purchaser for Mexico's gas-fired power plants. The change consolidates Mexico's competitive market for natural gas, but also creates a dominant state-owned market participant that is less likely to innovate.

Tightening his grasp on CFE, the president has also vowed to change the generator's existing pipeline capacity contracts, either through renegotiation or through legal action in the courts. While reform efforts saw CFE anchor many of Mexico's new gas pipelines, some of those projects have gone underutilized, leaving the utility responsible for capacity payments with little or no associated income from end users. AMLO claims that those contracts harm both the CFE and the national interest.

The push to centralize control has even extended into the market itself with the cancelation of auctions for new utility-scale power generation projects and delays to upstream oil and gas auction rounds.

On the power side, the president justified the move by claiming that utility-scale projects contracted to the lowest-priced generators would not sufficiently address Mexico's need for decentralized and distributed generation – particularly for communities not connected to the county's power grid.

The delay to oil and gas auctions, though, amounted to a more naked grab at power. At the time, the president said that exploration and development companies holding leases would first need to demonstrate their ability to increase production before more blocs would be awarded.

### Administrative changes

At agencies like Cenagas, Mexico's national gas-control operator, and the CRE, its energy regulatory commission, recent and high-level administrative changes could also have the effect

of slowing the growth of competition in Mexico's gas and power markets.

In late March, Mexico's senate rejected all 12 candidates nominated by AMLO to fill vacancies at the CRE, claiming that they lacked political independence and technical expertise and demonstrated anti-competitive views on how Mexico's energy markets should operate.

In early April, the president re-nominated 11 of those same candidates to fill the same CRE vacancies, in a move denounced by the opposition as a mockery of the selection process. The decision effectively forced the senate's hand, since a second legislative rejection of the nominees would give the executive authority to select any of the previously rejected candidates to serve at the agency.

Calls from AMLO's CRE appointees to prioritize energy infrastructure for sovereign use have caused alarm among investors. The possibility that Pemex and CFE could have right-of-first-refusal access to gas processing centers, refineries or pipelines, instead of those assets operating based on a market logic, raises serious questions about the capacity of Mexico's energy markets to become truly competitive in the months and years ahead.



### NATURAL GAS IMPORT ROUTES IN MEXICO



### Pipeline construction

Beyond political and regulatory difficulties, Mexico's gas market faces separate challenges to the development and maintenance of its midstream gas transport and processing infrastructure.

According to Sener, construction work on at least five natural gas pipelines has been suspended due to environmental regulations, land-use constraints, or some combination of the two.

In November, two key projects targeting additional supply to central Mexico were halted by TransCanada, one of the largest post-reform investors in Mexico's midstream industry. At the time, the developer said that social and legal uncertainties related to construction precluded further investment in the projects.

The Tuxpan-Tula and Tula-Villa de Reyes pipelines would have delivered nearly 1 Bcf/d of imported US gas to central Mexico. The projects were initially designed

to pull supply from the 2.6 Bcf/d Sur de Texas-Tuxpan pipeline, currently nearing completion off the Gulf Coast of Texas and Mexico. Upon startup, the new marine pipeline system will become the second major import route to Mexico, along with the Los Ramones system, also located in South Texas.

Another stalled project is northwest Mexico's Guaymas-El Oro Pipeline. The critical supply route saw its gas transmissions abruptly halted shortly after it began flowing gas in April 2017, when a local indigenous group, the Yaqui tribe of Lomas de Bacum, damaged the pipe over an unresolved legal dispute about land use.

### Processing infrastructure

Further upstream, Mexico's gas processing infrastructure is confronting its own mounting risks.

In late February, state-owned oil and gas company Pemex declare a force majeure at its Poza Rica gas

processing plant, ultimately resulting in a 27% cut in supply to affected industrial consumers.

An issue at the facility's cryogenic unit raises questions about the potential for further outages, disruptions or forces majeure at Mexico's aging gas processing centers.

In 2018, electrical outages affected operations throughout the year at the 880 MMcf/d Nuevo Pemex facility in southern Mexico. In January 2018, the 182 MMcf/d La Venta processing plant was shut for an entire month due to an extended maintenance.

For 2019, a decision by Pemex to assign its entire \$2.9 billion downstream budget toward the rehabilitation of its refineries effectively leaves no resources to cover planned, or potentially even unscheduled maintenance at its gas processing facilities.

Adding still more risk to Mexico's processing infrastructure is the fact that just three of its facilities—Cactus, Ciudad Pemex and Nuevo Pemex

process nearly 1.8 Bcf/d, or about 73% of Mexico's domestic gas supply, according to S&P Global Platts Analytics.

### Underserviced demand

One of the biggest challenges in Mexico's downstream gas market is access to supply, particularly for end-users across the country's southern and peninsular states.

In southern Mexico, a gas shortage that began last year hit a feverish pace during the autumn months when Pemex began halting gas supply nominations to industrial users in the country's south.

The move came as southern Mexico's dry gas production continued to decline, dipping to record lows at under 2 Bcf/d, according to Platts Analytics. Meanwhile, Pemex maintained its practice of reinjecting natural gas to its existing wells – a process known as enhanced oil recovery or EOR.



Currently, Mexico's domestic industry produces approximately 2.7 Bcf/d, according to Platts Analytics. Demand from Pemex alone, though, is about 1.8 Bcf/d of that total, leaving just 900 MMcf/d of marketable domestic production for the country's other end users.

Former Pemex CEO, Carlos Trevino, has estimated that in the southern region alone, nearly 1 Bcf/d of underserviced demand exists from power generators and industry.

Even for Pemex, Mexico's largest domestic gas producer, refinery consumption has been hard hit recently. In 2018, the producer's consumption fell 7% or about 130 MMcf/d compared to the year prior.

### LNG imports

With no existing gas storage infrastructure in Mexico, LNG imports have increasingly become a supply of last resort to end-users in southern and even parts of central Mexico. The Altamira and Manzanillo terminals, on the Gulf Coast and Pacific Coast, respectively, have been a key source of backup supply. Mexico's third Costa Azul terminal on Baja California, meanwhile, has largely gone underutilized due to its isolated location off the country mainland pipeline grid.

The biggest issue with LNG sendout, though, relates to transparency around its use and cost.

Currently, LNG supply in Mexico is used primarily for system-balancing purposes. At the end of each month, system operator Cenagas notifies shippers retroactively if their injection and withdrawal activity has created an imbalance.

Although shippers have an opportunity to repay the deficit in kind with gas, imbalance penalties and other usage fees have seen some shippers paying as much as \$19/MMBtu for gas supply, or more than six times the current price of gas at the US benchmark Henry Hub.

Increasing the availability of LNG supply is one solution that has offered the potential to help alleviate Mexico's supply shortage, particularly in the south. In 2018, Pemex proposed the installation of a fourth LNG import terminal in the southern state of Vera Cruz.

The floating storage and regasification unit or FSRU

was designed to supply 500 MMcf/d to the onshore grid through an interconnection at the Port of Pajaritos in Vera Cruz state.

In a surprise decision announced earlier this year, though, Pemex cancelled the project. While the reasons behind the cancellation were unclear, the move likely came at the behest of Mexico's new presidential administration, which had previously stated its budgetary priority to ambitiously grow oil and gas production at Pemex.

### Midstream challenges

A partial resolution to Mexico's gas supply shortage could come from the 2.6 Bcf/d Sur de Texas-Tuxpan marine pipeline, which is currently expected to enter service in April, according to Mexico's Secretary of Energy.

While only a small volume of the imported molecules are expected to reach southern Mexico, the pipe will move additional supply into central Mexico, effectively leaving more of the southern region's own production within its boundaries.

The midstream infrastructure issues in Mexico could potentially pose a longer-term challenge to the country's burgeoning gas market, especially those related to pipeline development and construction.

While the legal battle over some pipeline projects remains lodged in the courts, the outlook is even more bleak for projects that developers have simply halted based on a strategic commercial decision.

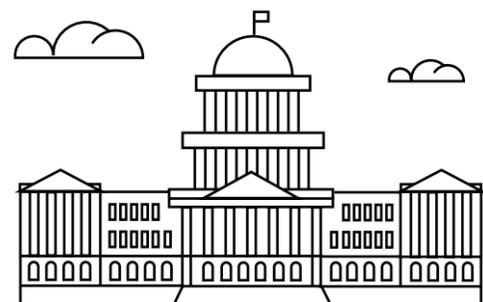
For projects like the Tuxpan-Tula and Tula-Villa de Reyes pipelines, a restart could depend on a decision by impacted communities to invite developers back to the negotiating table with well-defined, contract-based demands for remuneration.

On the political and regulatory side, potential challenges posed by the Lopez Obrador administration could be more fluid than they currently appear. By 2021, a changing political landscape in Mexico could see opposition parties regain control from Lopez Obrador's ruling coalition in congress – a move that would diminish the administration's capacity to slow reform and weaken the growth of competition in Mexico's energy markets. ■

# Insight from Washington



By Brian Scheid



For months, the Trump administration resisted calls to sanction crude flows out of Venezuela, fearing the US would be blamed for the ultimate collapse of the South American nation's once-mighty oil sector.

Venezuela's oil industry was already teetering towards disaster – there was no need for US policy to push it off the cliff.

By the time Trump administration officials unveiled sanctions on PDVSA, Venezuela's state-owned oil company, in January, the country's oil output had fallen below 1.22 million b/d, down roughly 800,000 b/d since President Trump's inauguration and roughly half the level of production when President Nicolas Maduro came to power in 2013.

Since the sanctions were imposed, output has sunk further, dipping to a 16-year-low of 740,000 b/d in March, according to an S&P Global Platts survey. And if the US chooses to impose secondary sanctions, which they also have been considering for months, Venezuela's oil output could fall to 500,000 b/d by the final quarter of 2019, according to S&P Global Platts Analytics.

Still, the Trump administration continues to stress that the decline is not due to US policy.

"This is a problem that is seven years on," US Secretary of State Michael Pompeo told reporters in April, pinning the blame squarely on Maduro.

The White House, which recognizes opposition leader Juan Guaido as Venezuela's legitimate president,

has said it will not lift sanctions on PDVSA until Maduro is removed from power, an outcome some have speculated may require military intervention as sanctions have yet to significantly weaken Maduro's grip on the presidency.

But the White House is also wary of the damage a prolonged sanctions campaign could do to Venezuela's oil industry, fully aware that the country's success post-Maduro hinges on the health of its oil production and exports.

The US has granted general licenses for some US companies in Venezuela's upstream sector, allowing them to continue their work while sanctions are in place. Under one such license, Chevron, Halliburton, Schlumberger, Baker Hughes and Weatherford International were authorized to continue work in Venezuela for at least six months. It also phased the sanctions in over time, although requirements barring direct payments with the Maduro regime created the ongoing, de facto ban on US imports of Venezuelan crude.

"Our sanctions are targeted in a way and they're structured in a way to preserve the assets of Venezuela," Francis Fannon, assistant secretary for the US State Department's Bureau of Energy Resources, said in an interview with Platts in March. "We certainly don't want to see them deteriorate."

But getting Venezuela's oil output back to the levels of just a few months ago, forgetting the 2 million b/d threshold the country held steadily above just a few years ago, could be a task measured in years, not months – and billions, not millions, of dollars.

The potential rebuilding of the sector may also arrive at an inopportune time. Will investors be keen to return to Venezuela when US shale continues to shatter output records, at a considerably lower risk?

"When you think about the fact that it's hard to get the majors to even think about investing in the Arctic or they don't want to do Canadian oil sands, they're not going to go back and do Orinoco," Amy Myers Jaffe, director of the Council on Foreign Relations' energy security and climate program, said in an interview. "That was even more expensive, and it's in a foreign country with political risk. How realistic is it that these companies would plunk down billions of dollars to go into Venezuela to do heavy oil?"

Output in the Orinoco, which covers roughly 19,000 square miles in central Venezuela and is divided into 36 blocks within four exploration areas, saw an immediate decline following sanctions due to the US embargo on diluent exports to PDVSA. Diluent, specifically naphtha, is used in the production and transport of heavy oil out of the Orinoco.

"Problems range from shortages in diluent used to make the heavy oil exportable, operational issues at upgraders and processing facilities (exacerbated by recent power outages), and a once again disrupted export picture, impacted by the latest round of sanctions," wrote Andrew Stanley, an assistant fellow with the Center for Strategic & International Studies, in a recent paper. "Absent of major investment and operational improvements (all tied to political change), things will likely deteriorate further."

Ed Morse, Citigroup's global head of commodities research, estimates that \$20 billion is needed for repairs to Venezuela's oil sector, including roughly \$10 billion for cokers that can process the country's heavy crude. "Where is that capital going to come from?" Morse asked. "No one knows."

PDVSA-controlled projects at Lake Maracaibo in the country's northwest and in the Maturin Basin in the east have already been plagued for years by a lack of maintenance and equipment mismanagement, and a steady deterioration of wells, refineries and ports. "Oil fields across the country suffer from a lack of everything – from operational rigs and equipment, to spare parts and experienced personnel for drilling operations," Stanley wrote.

In addition, it remains unclear who will buy Venezuelan crude if and when US sanctions are lifted. For example, US Gulf Coast refiners have effectively eliminated roughly 500,000 b/d of Venezuelan crude imports. Will replacement barrels become more permanent as time passes? China remains a major export market for Venezuela, but most of the oil shipped there is used to pay down massive debt. India, which remains the last major cash market for Venezuelan crude, has committed to a significant reduction in imports.

The Guaido government has recognized that the most logical first step to resuscitating Venezuela's oil sector is reversing many of the Chavez-era hydrocarbons laws which dramatically limited foreign investment in oil projects.

Ricardo Hausmann, an adviser to Venezuela's opposition government, said in March that the transition will include the creation of a new hydrocarbons law, which will allow private companies to both partner with PDVSA and to directly invest in oil and gas production projects. Companies with current investment arrangements in Venezuela's oil sector will be grandfathered into the new system, Hausmann said.

But when that new system will begin or how, exactly, the transitional government will get there, remains unclear at the moment. The future of Venezuela's chief economic engine depends, US officials have repeatedly said, on how long Maduro chooses to remain in power.

With sanctions pressure increasing, Venezuela's output continues to plummet as it loses available markets for its crude. But has Venezuela's oil sector hit bottom? Time will tell. ■

# 2019 S&P Global Platts Global Metals Awards

## Making the most of opportunities from challenges

By Anthony Poole

The 2019 S&P Global Platts Global Metals Awards celebrates its seventh anniversary by returning to its original location, 8 Northumberland Avenue, in the heart of London's West End.

The awards were developed to recognize those individuals and companies in the metals and mining sector who inspire others to transcend the limitations of technology, tradition, political and trade obstacles and demonstrate excellence in leadership, real innovation, safety, integrity and overall performance.

The last two years have provided a better climate for metals and mining after a lengthy period of harsh economic realities. But it has not been a time without challenges. Import tariffs on steel and aluminum—introduced in the US last year—and the threat of trade wars, especially between the US and China, kept market participants on the edge of their seats as the prognosis swung violently from uncertainty to hope and, occasionally, despair.

All of this was represented among this year's finalists and the new crop of winners.

This year's GMAS attracted 102 entries from 94 countries in 13 different categories. The four countries that provided the most finalists were the US, with 25, followed by India (19), Canada (12) and the UK (9). This year, the entries were whittled down to 94 finalists. Thoughtful evaluation was conducted by an impartial panel of independent judges, who recused themselves from scoring any entry which presented any potential conflict of interest: Alberto Hassan, former president & CEO, Orinoco Iron; David King, former CEO and director, London Metal Exchange; Jim Lennon, former chairman of commodities, Macquarie; Rana Som, former chairman, NMDC and Hindustan Copper; and Michael Setterdahl, acting CEO, Liberty Steel USA. The awards were presented at a black-tie gala on May 16 in London.

# Judging Panel

## 2019 S&P Global Platts Global Metals Awards



**Alberto Hassan**  
Former President & CEO,  
Orinoco Iron



**David King**  
Former CEO & Director,  
LME



**Jim Lennon**  
Former Chairman of Commodities,  
Macquarie



**Rana Som**  
Former Chairman,  
NMDC & Hindustan Copper



**Michael Setterdahl**  
Acting CEO,  
Liberty Steel USA



### METALS COMPANY OF THE YEAR

**RIO TINTO ALUMINIUM**  
Canada

**RioTinto**

There are no nominations for Metals Company of the Year. Instead, the judges select the Metals Company of the Year from the entire list of Global Metals Awards finalists. The award is given to one company that stands out for excelling in industry leadership and real innovation.

This year's winner, Rio Tinto Aluminium, also received Industry Leadership for Nonferrous Metals for its approach to sustainability, in part through its joint venture with Alcoa in ELYSIS, developing technology to produce carbon-free aluminum and for becoming the first and, so far, only company to receive chain-of-custody certification from the Aluminium Stewardship Initiative (ASI).

The judges were impressed that RTA has also been able to adopt the sustainable approach in upstream operations, such as bauxite mining. Through its partnership with Gumatj, RTA was able to establish the first mine in Australia to be wholly owned and operated by traditional, indigenous owners.

The mine is expected to provide around 100 full-time jobs and is supported further by RTA's A\$2.4 billion education fund for training to develop mine careers. In doing so, RTA helped enable this mine to be developed on a sustainable basis, while also exercising corporate and social responsibility for the benefit of employees and the local community.

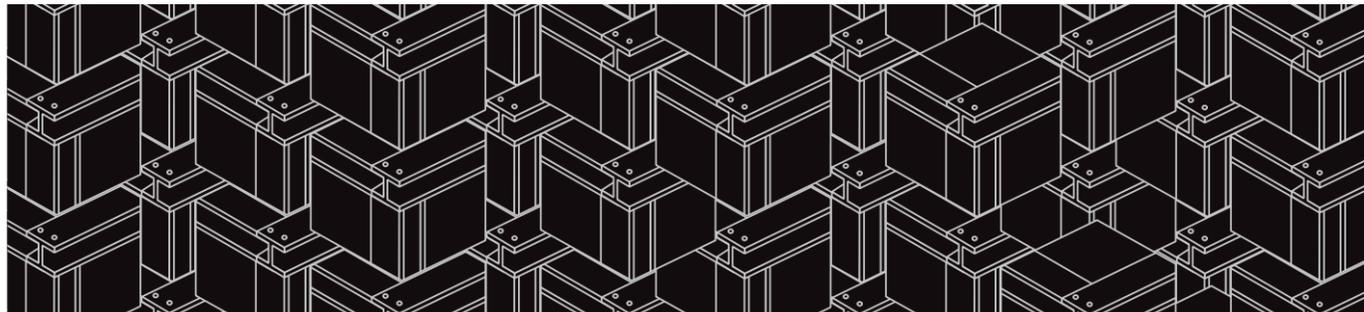
RTA's participation in the ELYSIS joint venture is forward-looking and could result in a significant reduction in the aluminum industry's carbon footprint in an era where climate change poses a very real threat to the global economy through rising sea levels, coastal flooding and the increasing frequency and severity of storms, threatening crop production and the collapse of ecosystems around the world.

The judges praised RTA for this forward-looking vision, while maintaining strong financial performance in challenging markets adversely affected by trade tariffs.

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#### CHIEF EXECUTIVE OF THE YEAR

**John Ferriola**  
Nucor Corporation  
United States of America



**NUCOR**

Having seized the opportunities presented by the biggest improvement in the steelmaking climate in the US in a decade, Nucor CEO John Ferriola noted earlier this year that the US administration “is taking the decisive and meaningful actions that American manufacturers need to compete on a level playing field. Tax reform, continued improvements to our regulatory approach and strong trade enforcement are giving businesses like ours the confidence to make long-term capital investments here in the US that create jobs and ensure our success for decades to come.”

Ferriola has spearheaded Nucor’s investments to expand its reach in product diversity and geography. Nucor has invested more than \$9 billion over the past decade to grow the company’s peak earnings power in its efforts to become a low-cost producer. Nucor has announced 10 significant growth projects over the last two years that represent total capital investment of approximately \$3.5 billion that will begin operations in 2019 and 2022.

The judges commended Ferriola championing the 26,000 people that work for Nucor, which the company describes as its strongest asset. He recognizes the contributions of every teammate at Nucor by placing each of their names at the front and back of its annual report every year, which takes up more than 20 pages.

Ferriola has also been a strong spokesman for the international steel industry and served as chairman of the World Steel Organization from October 2016-October 2017, elected by his peers in the industry.

Nucor’s strong balance sheet, industry-leading credit rating and planned growth strategy have given the company the ability to move quickly when the right acquisition or investment opportunity presents itself.



#### LIFETIME ACHIEVEMENT AWARD

**Gregg Mollins**  
Retired President and CEO of Reliance  
Steel & Aluminum Co.  
United States of America



**RELIANCE**  
STEEL & ALUMINUM CO

Gregg Mollins’ 42-year career in the metals service center industry – 32 years of which were at Reliance Steel & Aluminum Co – is a story of working from the bottom all the way up to the top. Mollins began his career as a warehouseman and rose to become the president and CEO of the largest metals service center company in North America from 2002 until December 2018. He gained expertise in all aspects of the business along this incredible journey.

Judges felt that Mollins’ outstanding contribution was his faithful execution of a decades-old strategic vision focusing on gross profit and inventory management. Mollins also implemented a strong acquisition strategy, which meant Reliance did not always seek successful companies to leave their managements and brand names intact. Under his tenure, every single company Reliance acquired became more profitable once it had implemented “the Reliance way.”

The judges were impressed that in his final year at Reliance, Mollins led the company to maximize its earnings potential, achieving record results in annual net sales, gross and pre-tax profit and earnings per share.

Under Mollins’ tenure, Reliance supported charitable causes and organizations. Historic flooding in the state of Texas in 2016 made Mollins realize that with a footprint in 39 states (now 40) any natural disaster could affect a Reliance employee. Mollins spearheaded the creation of an employee assistance fund, and Reliance Cares was launched in April 2017 – just in time to assist Reliance employees affected by Hurricanes Harvey and Irma.

The judges admired Mollins’ belief in treating people fairly and exhibiting the highest levels of personal integrity.



### CORPORATE SOCIAL RESPONSIBILITY AWARD

**NMDC**  
India

The Corporate Social Responsibility Award is made to a company that has gone out of its way to make a real, positive difference to local communities in often difficult circumstances. This year's award goes to NMDC, India's largest iron ore producer, with output of around 36 million metric tons in fiscal year 2018.

NMDC's key corporate social responsibility project has helped bring the liberating empowerment of education to children in one of the most socially and economically disadvantaged communities in India, including providing residential schools for over 900 orphaned students.

In fiscal 2018, NMDC spent Rupees 1.69 billion (\$23 million), which was close to 3% of its pre-tax profit for the year of \$890 million.

NMDC created what it calls an "Education City" in Dantewada Chhattisgarh. This includes the residential school, described above, a residential school for students of mixed abilities for 206; a polytechnic, with an annual intake of 126 students; a 1,000-seater co-ed hostel; a 1,000-seat auditorium and a teacher training institute, benefiting around 5,000 students.

The company also created a mid-day meal program of nutritious food for 8,000 students per day during fiscal year 2018.

The challenges associated with the NMDC's CSR program are mostly related to the areas where NMDC operates and the local communities living in them. Many of these areas are remote, with poor connections with other regions.

NMDC continues to expand the "Education City" and signed a memorandum of understanding for the implementation of a sports education program in government schools in Chattisgarh in February.

Judges honored NMDC for its exhaustive efforts to support local communities.



### DEAL OF THE YEAR

**Commercial Metals Company**  
United States of America



With the best economic climate in the metals and mining space in a decade, and an international war chest of trillions of dollars from hedge funds and private equity interests potentially available to invest in the sector, many analysts correctly predicted early in the year that 2018 would be a strong year for mergers and acquisition and consolidation in metals.

The judges were drawn to one of the biggest deals to occur in steel. On November 5, 2018 steel producer and recycler Commercial Metals Company closed on its acquisition of Gerdau's rebar assets in North America. It expanded CMC's geographical presence to become the largest national producer and fabricator of reinforcing steel in the US.

Judges were impressed by CMC board's determination to see the deal through, despite the many obstacles in its path. But the company was well-prepared. CMC began de-leveraging its balance sheet prior to this acquisition in anticipation of repositioning its portfolio. It maintained low leverage ratios prior to executing the deal with a Debt/Capitalization of 37%.

The proposed acquisition underwent intense anti-trust scrutiny from the Department of Justice, lasting 11 months, because of the size and concentration of CMC's and the acquired assets' rebar production.

The judges were impressed that within three months of this deal being concluded, the acquired assets had fully transitioned to CMC's operating systems, nine months ahead of schedule.

The acquisition closed just 25 days before the end of CMC's 2018-2019 first quarter, but in that period, the acquired operating assets contributed about \$12.5 million of operating income.



### PHYSICAL METALS SERVICE PROVIDER OF THE YEAR

**Reliance Steel & Aluminum**  
United States of America



Founded in 1939 and headquartered in Los Angeles, California, Reliance Steel & Aluminum Co. has evolved into the largest metals service center company in North America. The company provides value-added metals processing services and distributes a full line of 100,000 products including alloy, aluminum, brass, copper, carbon steel, stainless steel, titanium and specialty steel products to more than 125,000 customers in a broad range of industries.

Reliance has traded on the New York Stock Exchange since 1994 under the ticker symbol RS.

The judges' attention was drawn by Reliance's industry-setting performance over its 80-year history; in particular 11.53 B in net sales and 633.7M net income in 2018. The company has grown organically and through acquisitions and has completed 66 acquisitions in the 25 years since its IPO.

The 97% repeat customer achievement is a strong testament to the quality of Reliance's customer care. The company prides itself on quick delivery, metals processing and inventory management services. While the company serves many large OEMs, the majority of its customers are small machine shops and fabricators, requiring smaller quantities than mill-specified minimums, and intermittent deliveries over irregular periods.

Reliance generated \$664.6 million of free cash flow from operations in 2018 and it used these funds to invest in the business, including a record \$239.9 million in capital expenditures and \$77.6 million to complete three acquisitions.



### FINANCIAL METALS SERVICE PROVIDER OF THE YEAR

**Singapore Exchange**  
Singapore



Singapore Exchange pioneered the world's first iron ore swaps in 2009. At the time, the memory of the antiquated benchmark system of setting iron ore prices every year was still a fresh memory.

The highly-liquid iron ore marketplace continues to attract a wider pool of physical and institutional participation. Iron ore has emerged as Asia's first truly global commodity, following the oil complex in terms of size and economic importance.

In December 2018, SGX launched the world's first high-grade iron ore derivatives, and the judges noted the launch was at a time when China's pursuit of more environmentally friendly growth was spurring the increased use of high-grade iron ore in its steelmaking. This structural shift in environmental policy required innovation in delivering new risk management tools.

In fiscal 2018 (July 2017 to June 2018) was a milestone year for SGX by many measures. It delivered one of the best years in its history, with its highest revenue of S\$844.7 million (approx. US\$621.1 million) since its listing in 2000 and a 10-year-high profit of S\$363.2 million (approx. US\$267.1 million).

The judges honored SGX as it strives to remain relevant and competitive in a world where disruptive technologies are constantly changing the industrial landscape and the world of price discovery.



### INDUSTRY LEADERSHIP AWARD NONFERROUS METALS

**Rio Tinto Aluminium**  
Canada

This year's Aluminum and other base metals industry leadership award goes to Rio Tinto Aluminium for its ongoing quest to produce aluminum sustainably.

In April 2018, RTA became the first and, so far, the only company to receive chain-of-custody certification from the Aluminium Stewardship Initiative (ASI). It also became the first company to monetize sustainable aluminum, working with coffee machine maker and coffee retailer Nespresso, centred around ASI-certified metal for use in packaging and low-carbon products and, eventually, the future ELYSIS-based products.

Judges were impressed with RTA for its subsequent investment in ELYSIS, which is producing a carbon-emissions free technology for smelting. The technology has potential widespread implications for aluminum producers globally, as it can be retrofitted to existing smelters.

Judges were impressed that RTA has also been able to adopt the sustainable approach upstream in bauxite mining. Through its partnership with Gumatj, RTA was able to establish the first mine in Australia to be wholly owned and operated by indigenous owners. The mine is expected to provide around 100 full-time jobs and is supported further by RTA's A\$2.4 billion education fund for training to develop mine careers.

RTA and aluminum producers globally faced a challenging market in 2018, with the introduction of 10% import tariffs in the US, including against Canada and Mexico. Nevertheless, the company still managed an 11% year-on-year increase in gross revenue in 2018 to \$12.2 billion and achieved a 32% underlying EBITDA margin, or \$3.1 billion, from its integrated operations.

The judges have honored RTA for advancing its approach to sustainable aluminum production and bringing that strategy upstream to bauxite mining in Australia.



### INDUSTRY LEADERSHIP AWARD STEEL

**Nucor Corporation**  
United States of America

Nucor regularly reminds its 26,000 teammates that they are the "company's greatest asset." And those teammates are "dedicated to taking care of our customers by being the safest, highest quality, lowest cost, most productive and most profitable steel and steel products company in the world."

Nucor is the largest producer and recycler of steel in the US, with around 200 facilities in the US and Canada. Its 25 scrap-based steel production mills across 17 states in the US have annual production capacity of almost 27 million short tons.

Nucor is investing \$176 million in expanding product capabilities at its sheet mill in Kentucky. Its new 72-inch galvanizing line is expected to be the widest hot-rolled galvanizing line in North America and should allow the company to expand into segments of the automotive sector. It is also completing the construction of a cold mill complex at its Arkansas sheet mill that will expand its capability of producing advanced high-strength, high-strength low-alloy and motor lamination steel products.

These investments have been enabled by a strong financial performance, and 2018 proved to be a record year for Nucor. It earned \$2.36 billion (\$7.42/diluted share) in 2018, up almost 79% from the \$1.32 billion \$4.10/share) earned in 2017. Last year's earnings eclipsed the previous record of \$5.98/share set in 2008. Consolidated net sales rose to \$25.07 billion from \$20.25 billion in 2017.

All of this was achieved on shipments of 27.9 million st to outside customers, up just 5% from 2017.

The judges honored Nucor, recognizing that its latest investments give the company the opportunity to compete in markets that were previously closed to it.



### INDUSTRY LEADERSHIP AWARD RAW MATERIALS & MINING

**Hancock Prospecting**  
Australia

Under the leadership of Georgina Hope Rinehart, Hancock Prospecting has grown from a small exploration company with heavily mortgaged assets, many of which were under legal threat, into the largest and most successful privately-owned iron ore producer in Australia. Rinehart has headed the company as executive chair since 1992 and Hancock became an iron ore producer in 2007.

In May 2018 Hancock achieved the milestone of 55 million mt/year commercial production at its new Roy Hill mine in the Pilbarra, making it the largest, single iron ore mine in Australia. Roy Hill has a dedicated 344 km railway carrying five trains a day of iron ore to Port Hedland, with each train having a payload of just over 31,000 mt of ore – enough to fill a Handysize bulk carrier. Combined, the daily trains can fill two Panamaxes a day.

This flagship project is majority owned by Hancock Prospecting (70%) with minority partners Marubeni Corporation (15%), POSCO (12.5%) and China Steel Corporation (2.5%). Roy Hill has also achieved some notable firsts, including the world's first fleet of pink mining trucks and trains dedicated to breast cancer and its sufferers. And it has the highest level of female employees in all of Australian mining.

The associated world-class export loading facilities at Port Hedland have room for further expansion at Roy Hill.

Hancock is also a major player in Australia's agricultural sector, being a major producer of beef and dairy cattle.

The judges awarded Hancock for its rapid organic growth and its acquisition strategy. Last year it acquired junior miner Atlas Iron, making a \$390 million 42 cents/share winning bid, outbidding Mineral Resources and Fortescue Metals Group, which had held a 20% blocking stake in Atlas.



### INDUSTRY LEADERSHIP AWARD PRECIOUS METALS

**Polyus**  
Russian Federation

With the exception of more "industrial" precious metals like palladium and rhodium – palladium especially – the precious category came under continued pressure from surging US equities, rising bond yields and a strong US dollar for most of 2018, making it a challenging year for operators in the sector. Against this background, the judges were drawn to a company that managed to increase production and profitability and maintain its cost leadership among the world's top 25 gold producers.

Polyus, the largest gold producer in Russia, achieved a near 13% increase in production in 2018 to 2.44 million oz of gold from 2.16 million oz in 2017. But, despite this large increase, the judges noted Polyus managed to maintain its absolute cost leadership among the world's 25 largest gold miners. Polyus' all-in sustaining costs in 2018 were \$634/oz, placing it in the first decile of the global cost curve. In total cash costs, Polyus remained an absolute leader in 2018, equal to \$348/oz.

The company is dual-listed in Moscow and London, requiring high standards of corporate governance.

Polyus' 100% open-pit mines have the second longest life-of-mine average globally among gold producers at 29 years. It also has proven and probable reserves of 68 million oz of gold, ranking it third in the world by this measure.

Last year saw the ramp-up of Polyus' flagship Natalka mine, which has been brought to its design capacity of 10 million mt on an annualized basis. The judges noted Polyus continues to invest in innovation with its bioree process, using live bacteria.

Despite challenging markets, the judges anticipate Polyus will continue to increase production and remain a market leader on the cost-curve which will continue to serve the company well.



### INDUSTRY LEADERSHIP AWARD SCRAP & RECYCLING

**United Scrap Metal Inc**  
United States of America



This year, the judges' attention was drawn by United Scrap Metal, which has evolved from humble beginnings to the largest full-service industrial recycling companies in the US, owned by women, employing more than 300 people and serving more than 3,000 commercial companies on a national scale.

Marsha Serlin may have begun the company in 1978 with \$200 and a rental truck, but in 2015, she was appointed by US Commerce Secretary Penny Pritzker to the US Manufacturing Council, a clear recognition and acknowledgement of how far Serlin and her company had come.

The judges noted that USM fully understands that the scrap metal industry is a key component of the economy. The company managed to bring innovative solutions to utilities in helping them to dispose of their scrap and waste materials safely.

The US' more than 3,000 utilities are heavily regulated and easy targets for negative media. Utilities assume the responsibility for the safe disposal of their waste materials. In one case, USM was able to formulate a strategy to safely dispose of mercury-laced gas that regulators discovered after going unchecked for many years in thousands of job sites.

USM was able to identify the need quickly and created its Risk Management Recycling Program and provide utilities with a single source risk mitigation option.

The judges felt that USM stands out in the scrap world in also meeting the global needs of buyers of both nonferrous and ferrous scrap and other non-metallic commodities. Such buyers include prominent mills, foundries, buyers in many specialty markets and investment casting companies.



### RISING STAR COMPANY AWARD

**Champion Iron**  
Canada

**CHAMPION IRON**  
FIRST GRADE MINING DEVELOPMENT

Champion Iron caught the eyes of the judges for its remarkable turnaround of the Bloom Lake iron ore mine in Quebec, which the company bought from bankruptcy protection in April 2016. In February 2018 it recommissioned Bloom Lake, which now has a nameplate capacity of 7.5 million mt/year of 66.2% high-grade iron ore concentrate. This production profile has positioned Champion as one of the largest publicly-listed independent producers of high-grade iron ore globally.

Bloom Lake had a chequered history, with its predecessors sinking more than US\$4 billion into it. Since the purchase of Bloom Lake, Champion has overcome the operational challenges and the mine now competes on the global cost curve with total cash costs below US\$40/mt FOB. Under its previous ownership, Bloom Lake had cash costs of around US\$90/mt. Champion is poised to deliver a feasibility study this summer to consider an expansion that would more than double production to 16 million mt/year.

The company was led by the well-known mining entrepreneur, Michael O'Keefe as CEO until April 1 2019, who remains executive chairman of the board. David Cataford, former chief operating officer, has taken up the role of CEO.

Since February 2018 Bloom Lake has generated over C\$500 million in sales and C\$120 million in net income.

Bloom Lake has also created 450 jobs, both onsite and in the head office. The expansion could create an additional 500 jobs.

The judges honored Champion for its remarkable turnaround of Bloom Lake in such a short space of time, and putting it in a position to potentially double production of high-grade iron ore in a market where China's appetite for such ore is only increasing.



### BREAKTHROUGH SOLUTION OF THE YEAR

**ELYSIS**  
Canada

**ELYSIS**

ELYSIS is a Canadian company set to deliver a disruptive technology for the aluminum smelting industry globally, eliminating carbon dioxide releases into the atmosphere during smelting and replacing those emissions with oxygen, which has drawn the attention of the judges.

The name ELYSIS refers to the process of the electrolysis of alumina.

The new technology replaces carbon anodes, made from pitch and calcined petcoke, with inert anodes made with proprietary materials. Carbon anodes release carbon dioxide into the atmosphere in the smelting process as byproduct, whereas the inert anodes will release oxygen.

The technology can be retrofitted to existing smelters.

In June 2018, Alcoa, Rio Tinto and the government of Quebec jointly created a partnership structure called ELYSIS Limited Partnership. Additional funding came from the government of Canada and Apple, a user of aluminum in its iPhones, iPads, MacBook laptops and iMac desktops. Apple is further backing the project by collaborating with ELYSIS and providing its own unique technical expertise.

The judges also noted the collaboration with industry players and technology players.

The judges honored ELYSIS for its development of a technology that could disrupt the way aluminum is produced, bringing about widespread environmental benefits. The judges praised RTA for its forward-looking vision, while maintaining strong financial performance in challenging markets adversely affected by trade tariffs.

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**Andrew Pappas**  
Managing Director/Team Leader,  
Head of ABL Metals Group  
BMO Harris Bank N.A.



## Coeur Mining

Coeur Mining, Inc. ("Coeur" or the "Company") (NYSE: CDE) is a U.S.-based, well-diversified, growing producer of precious metals with five wholly-owned operations: the Palmarejo gold-silver complex in Mexico, the Rochester silver-gold mine in Nevada, the Kensington gold mine in Alaska, the Wharf gold mine in South Dakota and the Silvertip silver-zinc-lead mine in British Columbia. In addition, the Company has interests in several exploration projects throughout North America.

With over 90 years of mining experience, Coeur understands the importance of innovation, responsible mining and collaboration. The Company strives to integrate sustainable operations and development into its business decisions and

strategic goals. Coeur proactively conducts its business with a focus on creating a long-term positive impact on the environment, health and safety and socioeconomics of the communities in which Coeur does business.

Coeur understands that it is an integral part of the fabric of the communities in which the Company lives and operates. Coeur's integrated approach fosters a strong culture of corporate responsibility that enables its dedicated employees to engage in a wide array of sustainability initiatives across its locations. The Company's corporate responsibility efforts cover environmental, social and governance factors, and are overseen at the highest levels of the organization.



**Mitchell J. Krebs**  
President and  
Chief Executive Officer



## Jemison Metals

Jemison Metals is a young company in the field of metals service companies, but we are far from inexperienced. In fact, the combination of industry veterans driving a young energetic company has helped Jemison Metals form a refreshingly different culture.

Ours is a culture driven by an unshakable belief that our industry can no longer absorb the inefficiencies buried in our supply chain. Our focus is singular: we win bids in a sustainable fashion by identifying and driving out inefficiencies throughout our customers' supply chain.

While we thrive in the competitive bid process and embrace the value and the tradition of it, we encourage our clients

**Joe Ross Merritt**  
Vice President Commercial



to become less dependent on it as the sole mechanism for driving down costs and eliminating wasteful processes. Perhaps it is our relative youth among the myriad, old guard companies, but we have a propensity to dig deeper, to challenge conventional approaches, to think more creatively, and to aggressively pursue new avenues.

We have a reputation for being on-time, carrying the most efficient level of inventory, and delivering high-quality products with personal service. But, to us, those are just the ante to get in the game. Bids are won by doing more, by digging deeper, and by thinking smarter.



## NUCOR

With its origins in Ransom Olds' Oldsmobile company, Nucor's history extends more than a century into America's manufacturing past. Our success is a testament to the core values that have defined Nucor since day one: hard work, personal responsibility, a tireless commitment to innovation, a willingness to reinvent ourselves when our business demands it – and by doing it safely.

We pride ourselves on a unique corporate culture, which for more than 50 years has galvanized the loyalty and commitment of the Nucor family and fueled our growth into North America's most diversified steel and steel products company. With over 26,000 teammates in more than 300

**John Ferriola**  
Chief Executive Officer



locations, Nucor's is capable of producing more than 27 million tons of steel each year. In 2018, Nucor's net earnings exceeded \$2.3 billion, with revenue of more than \$25 billion. Nucor 's also North America's largest recycler.

Nucor has achieved success over the past five decades by building market leadership positions. In the last three years, Nucor has announced approximately \$3.5 billion in capital investments as part of its long-term strategy for profitable growth. Together, these projects will create nearly 1,600 direct jobs and at least another 8,000 indirect jobs.



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**Marsha Serlin**  
Chief Executive Officer  
United Scrap Metal

## United in purpose for 41 years

In 1978, as a single mother of two young children, Marsha Serlin began a career voyage by founding a metal recycling business with \$200 and a rental truck. While being a female in a predominantly male metal industry presented

significant challenges, her tenacity and unique approach differentiated United Scrap Metal (USM) while driving the ultimate success of the business. In 1989, upon graduation from college, her son Brad entered the business in an operational role where the real education would be gained. Learning the business by transitioning throughout all of the key facets, Brad eventually became President in 2006.

Today, entering their 41st year in business, Marsha, Brad and the USM team continue their growth through pioneering innovative, solutions-driven recycling programs built upon a foundation of ethical and sustainable practices. As a result, the organization and its leadership have earned over 50

Business and Industry related awards from organizations such as the Small Business Administration, Ernst & Young, RSM, Accenture, Exelon, Platt's Global Metals and the American Metal Market, to name a few. Other accolades include

achieving Great Place to Work Certification plus recognition as an outstanding supplier from some of the world's largest metal consumers including Alcoa, Aurubis, Luvata and Olin Corp.

With their initial roots in Cicero, Illinois (adjacent to Chicago), the USM team has built a strong presence throughout the United States by further expanding its reach in the past five years through opening greenfield regional processing facilities located in Philadelphia, PA; Richmond, VA; Charlotte, NC; St. Louis, MO; and Indianapolis, IN. Each operation services multiple customer segments and industry verticals. ISO 14001 IRIOS certification creates a focused effort on recycling solutions that help customers effectively manage the risks associated with metal and by-product disposition.

With 400+ team members across six locations nationally, the company's culture and dedication to quality and continuous improvement are reflected in a 98%+ retention rate over 5,000+ customers throughout North America. This substantial growth

is further supported by strong consumer partnerships, who recognize an unparalleled dedication to safety, compliance, as well as the consistent delivery of high quality ferrous and non-ferrous commodities. This runs the gamut from aluminum, brass, copper and all other non-ferrous metals. In addition, stainless steel, high-temperature alloys and steel grades offer a comprehensive approach. A balanced logistical approach leverages barge, rail and truck delivery to ensure the timely shipment of large volumes of each respective material grade. As a result, the company has been able to develop significant, award winning partnerships with some of the world's largest mills, foundries and specialty consumers.

Equally important to the company's success has been the expansion of their commitment to philanthropy, sustainability, diversity and making a positive impact in the lives of others. This blankets the communities in which USM lives, works and services. As a recycling company, USM not only seeks to be stewards of the environment through sustainable practices, but also looks to enhance the lives for those in our immediate environments and communities through extensive business group, trade association and philanthropic endeavors. Through nationwide recycling awareness and fundraising initiatives, USM has been able to raise millions of dollars for organizations such as Ronald McDonald House Charities, the American Red Cross, Scouting, Make-a-Wish Foundation, multiple Charter Schools and countless others.

The United team is proud to make a difference to its customers, consumers and local communities as it continues to build

upon its five core values of trust, commitment, loyalty, passion and performance. The challenge of continuous improvement, innovation and people development are driving the business forward with the same Entrepreneurial Spirit that Marsha possessed upon starting the journey forty-one-years ago.



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