

CARBON MARKET YEAR IN REVIEW 2020

BLOOMING CARBON MARKETS ON RAISED CLIMATE AMBITION

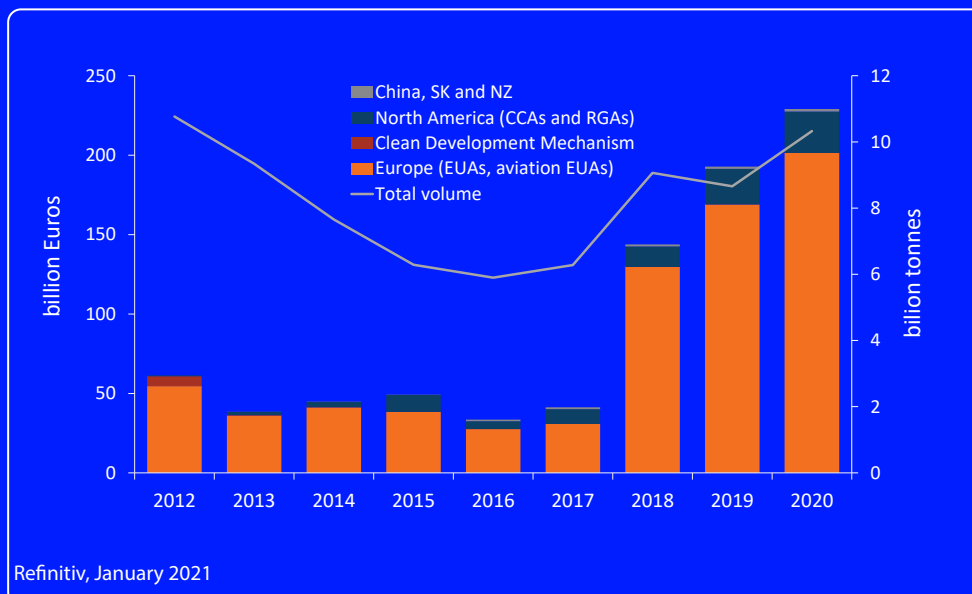
26 January 2021

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- The total value of global carbon markets grew nearly 20 percent in 2020, reaching €229 billion based on our assessment of traded volume and carbon prices. That marks the fourth consecutive year of record growth and more than five times the value in 2017. The major carbon markets saw prices rising on expected tightening of emission caps.
- The European Emissions Trading System (EU ETS) represents nearly 90 percent of global value and accounts for most of the record high global traded volume of 10.3 Gt. Over 8 billion emission allowances changed hands in the European carbon market in 2020, nearly 20 percent more than in 2019.
- European carbon prices fell rapidly in March when the economic repercussions of the Covid-19 pandemic hit the region, but later recovered to hit record highs when EU leaders solidified more ambitious greenhouse gas emission reduction targets for 2030 that will require a tighter ETS cap. The benchmark EUA contract ended 2020 at a record high of €33.44/t.
- Other markets followed a similar pattern: prices in North America's Western Climate Initiative (WCI) and Regional Greenhouse Gas Initiative (RGGI) as well as New Zealand's ETS crashed in March/April but recovered by Q4 2020. The WCI and RGGI grew by 16 percent in terms of overall market value from 2019, to €22 billion and €1.7 billion, respectively. New Zealand's market value rose to €516 million on higher average allowance prices, nearly 20 percent higher than in 2019.
- South Korea's carbon market experienced a major price crash but did not recover to pre-pandemic levels despite market tightening reforms coming into effect in 2021. A volume surge in this otherwise low-transaction market made for a total value 10 percent higher than 2019, at ~€829 million.
- The Chinese government published long-awaited rules for China's national ETS in Q4 2020, after President Xi Jinping's unexpected pledge in September to step up the climate change mitigation targets of the world's biggest emitter. We expect the first transactions in In China national ETS to take place in Q2 2021. Meanwhile, the eight Chinese regional pilot systems continued to operate in 2020. Despite pandemic-induced lower demand elevated average allowance prices led to a total combined market of €257 million, slightly higher compared to 2019.
- The International Civil Aviation Organization changed the baseline for its CORSIA programme, under which air carriers must offset emissions growth, to the pre-pandemic level. Given the industry's huge decline due to travel restrictions, airlines' international emissions are unlikely to surpass those levels anytime soon. This means that CORSIA will not create a major new source of demand for international emission reduction credits.
- Announcements of mid-century net zero targets were plentiful in 2020, the "year of ambition" of the Paris Agreement. More updates to 2030 national contributions are expected over 2021. Since carbon markets are tools to help achieve more ambitious climate targets, we foresee further increases in global carbon trading activity going forward.

World Carbon Markets 2012-2020, total value by segment, total volume



REVIEW OF CARBON MARKETS IN 2020

26 January 2021

This report presents Refinitiv's assessment of the world's major carbon markets in 2020. The aim is to show the main market trends and policy developments in global emission trading systems, and areas where such systems are emerging. We collect data from official sources (most notably carbon trading platforms such as ICE, EEX, KRX, and the Chinese carbon exchanges) and estimate the size of bilateral (over-the-counter) transactions. This gives us an estimate of the actual volume traded.

It covers the main regions in which there are existing or emerging emission markets: Europe (the EU ETS), North America (the WCI and RGGI, emerging market in Mexico), China (regional pilot ETS, emerging national ETS), South Korea (KETS), New Zealand and global transactions in the CDM market as well as developments toward the future international offset market for aviation emissions. In order to facilitate easy trend comparisons, we attempt to minimise changes in the report's scope from one year to another. However, sometimes we do need to update the sources of price and/or volume data to ensure that the analysis reflects actual market conditions.

For 2020, the source of information on traded volume changed in two of the markets we cover: New Zealand's ETS and China's pilot ETS. The former source was through 2019 a volume figure provided by the New Zealand government, which confirmed in 2020 that it does not represent traded volume as cited in our reports. We have thus estimated traded volume for New Zealand from data provided by brokerage firm OMF (see details in New Zealand section) and retroactively altered the volume estimates for 2019 on the basis of the updated data. Similarly for the Chinese pilot ETS, we have changed the sources on which we base estimates of over-the-counter transactions, such that 2019 volumes in this report (for comparison to 2020 volumes) are different than the ones listed for 2019 in last year's report. These changes in turn affect the cumulative total numbers for volume and value of carbon trading globally in 2019 - they are different in this report than in last year's report on that year.

We do not include trading in so-called voluntary (non-compliance) markets targeting individual consumers and companies (e.g. for offsetting the carbon footprint of flights) unless these overlap with mandatory/compliance programmes as they do in some of the Chinese pilot ETS and for CERs. We do include volumes from the UNFCCC platform for voluntary cancellation of CERs. For trades not documented on a trading platform, we multiply volumes with (average) prices at the time of transaction, which gives us an assessment of the overall value of the respective market.

Note that our numbers have often varied significantly from analyses that seek to assess the size and/or geographical scope of carbon pricing systems. Most important among these is the World Bank's annual report on the state and trends of carbon pricing. The World Bank looks primarily at the size of covered emissions in the various systems (issued volumes of allowances), not the traded volumes. This approach tends to show a much lower volume than in our assessment, which takes into account the fact that allowance and offset units typically change hands more than once during a year.

The carbon team at Refinitiv (formerly Point Carbon/Thomson Reuters) has published annual assessments of global carbon markets since 2006. These publications have consistently served as a reference in the world of carbon trading.

This report has been co-authored by the following team of analysts: Jon Berntsen, Hæge Fjellheim, Maria Kolos, Cathy Liao, Aje Singh Rihel, and Elizabeth Zelljadt.

1. Carbon Market Values: All-time Highs on Record Traded Volume

NEW RECORD: GLOBAL CARBON MARKETS WORTH OVER €200 BILLION

The total value of global carbon markets grew 19 percent in 2020, on higher traded volume and steady prices. Traded volume reached 10.3 billion tonnes (Gt) of allowances, 19 percent up from 8.7 Gt in 2019 (see Table 1.1). We estimate the value of these transactions at around €229 billion. The European Emissions Trading System (EU ETS), which accounted for almost 90 percent of the global market value, saw prices hit record highs of over €33 per tonne by the end of the year.

This might seem counterintuitive, given that the Covid-19 pandemic's unprecedented effects on the world's economies correlated with a significant *drop* in greenhouse gas emissions. In a cap-and-trade market, lower emissions mean less demand for emissions permits or allowances, which makes for lower prices. However, the urgent challenge of limiting global warming to well below 2 degrees compared to pre-industrial levels convinced decision makers to increase the ambition of their climate change mitigation measures - this led to carbon market reforms, including tighter emissions caps that make for *lower* supply of permits in the years to come. This prospect of lower permit supply under conditions of *growing* economic activity (as countries emerge from lockdowns and travel restrictions) makes for higher prices...and that prospect in turn makes for more carbon trading as emitters and speculators bet on how fast decarbonisation efforts will pan out.

Announcements of longer-term climate change mitigation efforts were plentiful in 2020 - declaring a mid-century "net zero" emissions target was a trend for governments worldwide. The EU

member states are about to make their 2050 net zero emissions target legally binding by passing the European Climate Law, and in December agreed on a more ambitious 2030 target of "at least 55 percent" below the 1990 emissions level. The last four months of 2020 also saw China, Japan, South Korea, Canada, South Africa and many smaller emitters commit publicly to some form of carbon neutrality goal around the timeframe of 2050, and several countries updated their ambitions for 2030 in line with the Paris Agreement.

Since carbon markets are tools to help achieve these more ambitious targets, we foresee further increases in global carbon trading activity going forward - especially in the world's highest emitting country China, where a long-planned national carbon market will soon see active trading and eventually replace the existing regional emission trading schemes currently operating on a pilot basis. Indeed, it was after September 2020, when Chinese President Xi announced that China would reach net zero emissions before 2060, that China passed two key pieces of legislation governing its national emissions trading system. These set long-awaited rules and infrastructure for carbon trading in the country's power sector, such that we expect active trading to begin in Q2 2021.

EUROPE: PANDEMIC-INDUCED CRASH, AMBITION-INDUCED BOOM

Prices for allowances in the world's biggest carbon market, the EU ETS, took quite a ride over 2020. Effects of the coronavirus pandemic drove the market during the first half of the year, with a price crash common to most commodities during this time. But during the second half of the year, long-discussed attempts to

Table 1.1 Global carbon market size 2018-2020

Refinitiv's assessment of volume and value of the major carbon markets from 2018 to 2020. Millions of tonnes (Mt), millions of euros.

	2018		2019		2020		Volume change 2019-2020	Value change 2019-2020	Share of total value
	Mt	€ million	Mt	€ million	Mt	€ million			
Europe (EUAs, aviation EUAs)*	7 754	129 736	6 777	168 966	8 096	201 357	19%	19%	88%
CERs (primary and secondary)	15	32	12	40	16	61	33%	53%	
North America (CCAs, RGAs)**	1 126	12 871	1 673	22 365	2 010	26 028	20%	16%	12%
South Korea	51	809	38	744	44	870	16%	17%	
Chinese pilot schemes (allowances and offsets)***	103	194	130	249	134	257	3%	3%	
New Zealand	23	299	30	433	30	516	0%	19%	
Total	9 062	143 847	8 660	192 797	10 330	229 089	19%	19%	

* Volume and value of EUAs excludes option positions

**The units traded in the Regional Greenhouse Gas Initiative are short tons, which are 0.907 metric tonnes. For unit consistency, we have converted RGGI's total volume figures to metric tonnes. All non-European transactions are priced in local currencies, for the sake of consistency we have converted values into euros.

***The value for Chinese market includes allowances only.

Source: Refinitiv, January 2021

strengthen Europe's climate change mitigation efforts came to a head in the bloc's highest decision-making bodies, culminating in more ambitious emission reduction targets being agreed. This caused allowance prices to rise over H2, reaching record highs by the end of the year - and in spite of emissions *dropping* an estimated 14 percent in 2020 compared to 2019.

Underlying these events, the Market Stability Reserve (MSR) supported allowance prices throughout the year as it sucked up the market's oversupply and provided confidence about the level of allowance supply during the pandemic-induced demand disruption. The benchmark contract (EUAs for delivery in December 2020) started the year at prices around €25/tonne, crashed to just above €14/t in March when Covid-19 hit Europe, then rose over the summer as the first pandemic wave faded and stimulus packages kicked in. It remained over €24/t for the rest of the year, reaching record high levels of €33.44/t in late December as lawmakers got serious about adopting more stringent climate targets for Europe, and amid positive sentiment from the availability of vaccines. Averaging nearly €25/t in 2020, EUAs continue to have the highest average allowance price compared to other trading schemes (see Figure 1.1). A total of 8.1 billion emission allowances changed hands in the European carbon market in 2020, nearly 20 percent more than in 2019.

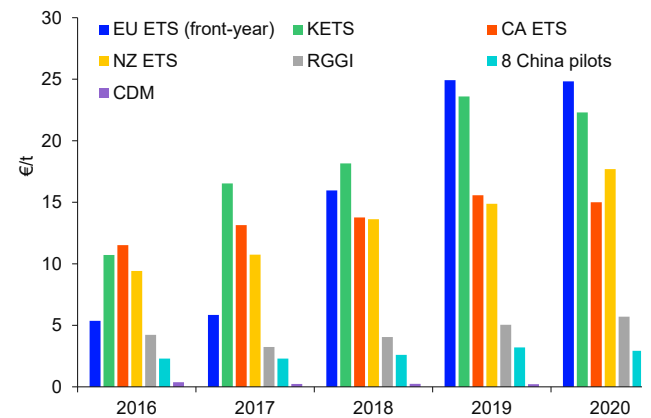
Major decreases in economic activity due to the pandemic caused climate-friendly developments in the European power market in 2020. Electricity generation dropped, as industries were affected by lockdowns and closures - combined with high carbon prices and healthy gas supply, this pushed coal down in the merit order and opened for renewable sources to account for a greater share of the power mix. Coal-fired power generation continued its downward trend all the faster, and was replaced by sustainable growth in solar and wind generation.

NORTH AMERICA AND NEW ZEALAND: COVID CRASH, REFORMS CAUSE RECOVERY

The two North American carbon markets followed a similar overall price trajectory as the EU, to the extent that allowance prices dropped in March when the economic effects of Covid-10 kicked in: due to lockdowns and travel restrictions, allowance prices in both the Western Climate Initiative (WCI, the trading system that covers power, industry and transport emissions in California and the Canadian province of Quebec) and the Regional Greenhouse Gas Initiative (the ETS among 10 eastern and mid-Atlantic US states that covers power sector emissions) hit their lowest levels for the year.

In the WCI this meant allowances for December delivery went below the programme's 2020 auction floor price of \$16.68/t during March/April due to intense selling by speculators liquidating their positions amid fears of a global recession. In RGGI, prices dipped to \$5.45/t and ended up at nearly \$8/t by the end of the year. The WCI and RGGI were worth €24 billion and €1.7 billion, respectively. Regulators of both programmes are set to review their respective rules and ambition this year - given that previous such reviews have resulted in a tightening of the caps and measures to reduce allowance surplus, prices in both programmes were on an upward trajectory throughout H2 of 2020 in expectation of a lower supply/demand balance in the longer term.

Figure 1.1: Annual average price per tonne



Source: Refinitiv

The same is true for New Zealand, where carbon market participants offloaded significant volumes of allowances around government shutdowns in March, pushing prices to NZ\$22/t - their lowest level for the year. But prices jumped to over NZ\$30/t in June when the government solidified ETS reforms going into effect in 2021, in particular raising the "fixed price option" - an amount emitters can pay per tonne in cash (rather than surrendering an allowance per tonne) to cover the previous year's emissions. That option, formerly at NZ\$25/t, constituted a de facto price cap on allowances - it is now NZ\$35/t and will disappear altogether as of 2022. NZUs gained more than 35 percent in 2020 to close the year at NZ\$37.55 (~€22). Overall traded volume in New Zealand was unchanged from 2019, but the higher average prices made for a market worth €516 million - nearly 20 percent higher than 2019.

PRICE COLLAPSE IN SOUTH KOREA

The Korean Emission Trading System (KETS) also experienced a price crash, but due less to the global pandemic than to the fact that the programme was already severely over-allocated: Korean allowance prices averaged around 40,000 won/t (~€30/t) throughout the beginning of the year despite the country being impacted by the pandemic. This was due to the programme's May compliance deadline: emitters shored up the permits with which to cover their 2019 emissions. Data released by the government in early May, however, revealed emissions from firms covered by the KETS had *decreased* in 2019 by 2 percent. The already oversupplied market then became more flooded with surplus as the pandemic's effect of decreased demand kicked in - allowance prices plunged almost 50 percent in the second quarter. Although new rules for the KETS's Phase 3 (from 2021 to 2025) came out in September and include a major tightening of the market, expectations that Korea's 2020 emissions were lower than expected due to Covid-19 limited the price recovery effect of lower allowance supply in the coming years. However, more Korean allowances and offsets changed hands than during 2019 - enough to make the total traded value of the market over 10 percent higher despite the much lower per-tonne prices. We attribute the surge in traded volume to the fact that oversupplied companies were offloading their allowances by selling them, rather carrying them into the next compliance year as they had in previous years. The total value of the KETS in 2020 was KRW 1 117 billion (~€829 million).

CHINA ON THE VERGE OF NATIONAL MARKET

Progress on China's national ETS - which has formally been in force for several years but has seen no trading because allocation rules, a registry and other logistics had not been set up - was set back even further by Covid-19, with all planning processes on a standstill as the country at ground zero of the coronavirus closed up for the first part of 2020. However, after President Xi Jinping unexpectedly committed China to become carbon neutral by 2060 and to peaking its emissions sooner than previously promised in September, regulators churned out rules for the national ETS in quick succession - the environment ministry published in early November the legal basis for the ETS, as well as a comprehensive set of rules on logistics including allowance registration, transactions, and the role of various agencies in e.g. enforcement.

At the end of December, the ministry released the allocation plan for the power sector, which is the only sector covered initially. The plan confirms that 2225 power generating units are covered by the national ETS, which we estimate together account for about 4 billion tonnes CO₂ annually or around 40 percent of China's total emissions. With these foundational rules finally in place, we expect trading in the national ETS to begin in Q2 of 2021.

The eight regional pilot ETS, meanwhile, continued to operate throughout 2020. Despite lower traded volume due to the pandemic, they collectively saw higher average allowance prices than in 2019. These brought their total combined market value up slightly from 2019 levels to €257 million.

GLOBAL MARKETS STILL IN LIMBO

Declaring a mid-century "net zero" emissions target was a trend for governments worldwide. The last three months of 2020 saw China, Japan, South Korea, Canada, South Africa and many smaller emitters commit publicly to some form of carbon neutrality goal around the timeframe of 2050, with the European Union about to enshrine its aim for net zero emissions by that year into law. Carbon markets are relevant to these net zero targets and the updated mid-term national contributions (NDCs) under the Paris Agreement because parties may make more ambitious commitments if they are able to take advantage of differences in mitigation costs through trading.

While the regional carbon markets grew in value largely on expectations of increased ambition of their parent countries/regions, the future of *international* emission trading remained uncertain in 2020. The annual global climate conference (COP26), at which decisions about trading of emission reduction credits among countries were supposed to be taken, was postponed to the end of 2021. Meanwhile, some countries set up bilateral deals in which one country pays to reduce emissions in another and apply those reductions to its own emission inventory - in the absence of UN-approved rules on such transactions, these deals may become de facto templates for taking advantage of differing abatement costs worldwide to achieve higher net reductions.

On the other hand, the global effort to limit growth of emissions from international aviation - a programme of the International Civil Aviation Organization known as CORSIA - saw new developments during 2020. With air carriers from participating countries obligated to offset emissions over 2020 levels, the programme's regulators

had been reviewing various offset standards to determine which ones would be eligible for airlines to compensate their future emissions growth. In early March, the organisation declared seven standards compatible with CORSIA's eligibility criteria - albeit with some restrictions.

This was overshadowed by the fact that the Covid-19 pandemic hit the aviation industry harder than most other economic sectors, as travel restrictions cut international air travel dramatically in 2020. Airlines thus lobbied for CORSIA's baseline - from which the emissions growth to be offset is assessed - to be calculated from *pre-pandemic* levels (2019) rather than the agreed average of the years 2019 and 2020. The group's council accepted this request in June, making it unlikely that CORSIA will be the source of demand for emission reduction units from e.g. reforestation or energy efficiency projects anytime soon: air carriers will not need offsets for years, as it will take a while for their emissions to exceed 2019 levels.

2. Europe

PRICES AND VOLUMES: ALL-TIME HIGHS FOR EUROPEAN CARBON PRICES

A total of 8.1 billion emission allowances (regular EUAs and aviation EUAs) changed hands in the European carbon market in 2020, nearly 20 percent more than in 2019. The value of the European Emission Trading System (EU ETS) market increased from €169 billion to €201 billion. The benchmark contract, EUAs for delivery in December 2020, ended the year at €32.72/t - €8.33/t higher than the start of the year. Over the course of the year, however, the benchmark contract averaged €24.80/t - this is on par with the 2019 benchmark contract's average price level in 2019. The record-breaking volumes and prices in 2020 occurred despite EU ETS emission declining estimated 14 percent year-on-year to 1.3 Gt.

The prospect that Europe's 2030 emission reduction target would be strengthened and the Market Stability Reserve (MSR) mechanism of the EU ETS were the underlying supportive factors behind the consistently elevated EUA prices in 2020 (see Figure 2.1). The MSR, which entered into force in January 2019, absorbs 24 percent of the estimated total number of allowances in circulation each year by cutting them out of the pool to be auctioned. It is intended to reduce the market's existing oversupply and to prevent a large surplus from building up when emissions are low. Indeed the MSR did just that in 2020 by withholding close to half of the volume originally planned to be auctioned.

Although there are still around 1.4 billion EUAs available in the market, the yearly deficit from reduced auction volumes, combined with expectations of further tightening going forward, kept prices to the mid-20s during most of the first quarter of 2020...

...and then came the effects of the coronavirus. In March, front-year carbon futures plunged 40 percent to €14.31/t, their lowest level since June 2018, as lockdowns as well as both demand and supply chain disruptions across industries caused dramatic damage to the European economy. According to the International Monetary Fund, real GDP in Europe fell by about 40 percent year-on-year in the second quarter of 2020.

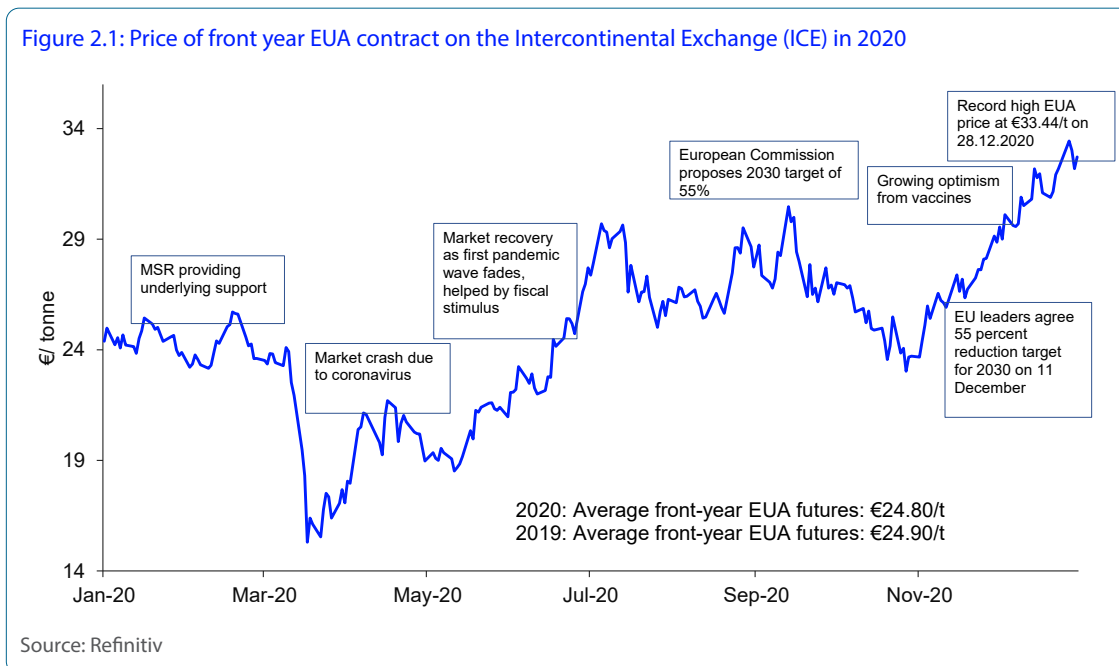
Thanks to unprecedented fiscal stimulus packages from governments, and to the fact that the first wave of Covid-19 ended towards the summer, global stock and commodity prices recovered from late May onwards. Major global stock indexes regained their pre-Covid-19 levels by the third quarter, while Brent crude prices recovered from lows around \$20/bbl to hover in the \$40's/bbl. The European carbon market also displayed this trend, with the benchmark contract rallying more than 100 percent from its lows in March to €30.81/t in June.

After a period of consolidation during the summer months, the fourth quarter saw a year-end rally that brought EUA prices up even more. News in early November of vaccines effective against Covid-19 led to global markets reaching all-time highs - including the EU carbon market. European leaders agreed in December to increase the EU's emission reduction target for 2030 to at least 55 percent below 1990 levels, as the Commission had proposed in September. Those prospects of a tighter future carbon market plus recovering overall economy caused the front-year futures contract for carbon to rise more than 40 percent from the beginning of November to a fresh record closing price of €33.44/t in late December.

POWER MARKET FUNDAMENTALS: FUEL SWITCHING, RECORD AMOUNT OF RENEWABLE ENERGY

The Covid-19 related slump in economic activity added to ongoing changes in the European power market in 2020. Electricity generation in the European Union's 27 member states (EU27) dropped more than 3 percent in 2020 to a total of 2 550 TWh, according to the European Network of Transmission Operators for Electricity (ENTSO-E). Lower electricity demand, combined with high carbon prices, pushed expensive coal down in the merit order - this opened for renewable sources to account for a greater share of the power mix. We estimate power sector emissions were down 170 Mt or 19 percent compared to 2019. Electricity generation from

Figure 2.1: Price of front year EUA contract on the Intercontinental Exchange (ICE) in 2020



Source: Refinitiv

lignite and hard coal continued a declining path, falling 19 and 22 percent year-on-year, respectively. The carbon-intensive fossil fuels were mostly replaced by solar and wind generation, up 8 and 18 percent respectively.

As shown in Figure 2.2, power generation in Europe became significantly less carbon-intensive in 2020. In Germany, generation from brown or soft coal (lignite) and hard coal (anthracite) fell by 19 and 27 percent, respectively. Generation from coal thus made up only 23 percent of the German power mix, down from 28 percent in 2019. Spain and Portugal generated half as much power from coal as they did in 2019. Other coal-heavy countries like Poland, Czech Republic, Hungary and Greece also posted unusually strong declines in the share of coal-fired generation, with most replaced by increases in gas-fired generation.

Nuclear power saw the largest decline in absolute terms among the European electricity sources, falling by 11 percent (80 TWh) due to pandemic-induced downward adjustments in nuclear output, plant closures (3.1 GW) and outages caused by low river levels. France, Europe's largest nuclear power producer, accounted for more than half of the drop in absolute terms - its nuclear generation declined 12 percent (44 TWh). Sweden and Belgium saw nuclear generation declining 26 percent (17 TWh) and 21 percent (9 TWh), respectively.

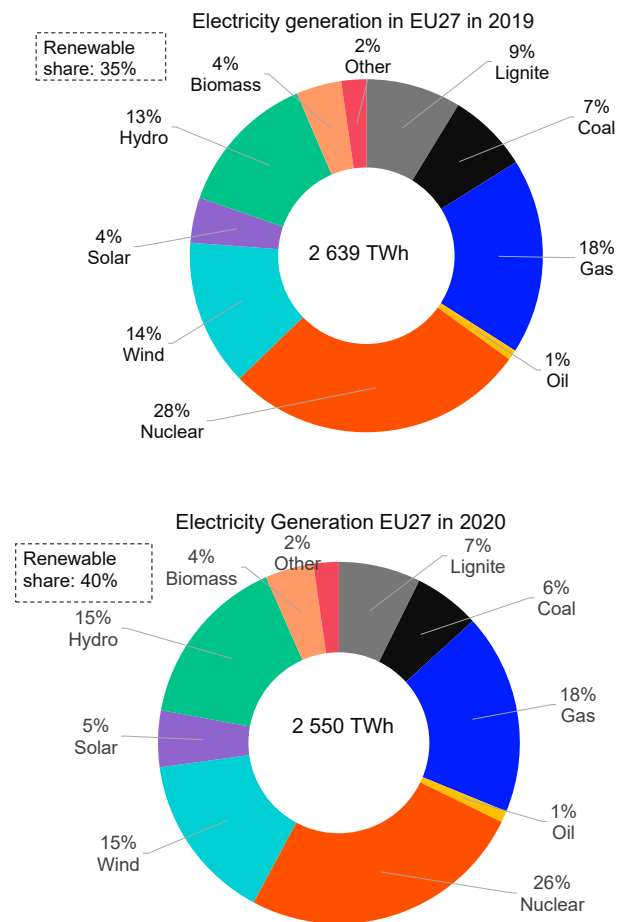
The share of natural gas in the EU's power mix was unchanged from 2019, at 18 percent of total power generation in the EU27. European gas prices were unusually low during the year, with the TTF front-year contract averaging €13.50/MWh compared to €18.18/MWh in 2019. Mild winter temperatures, steady inflows of liquified natural gas (LNG), and low demand due to the impacts of COVID-19 contributed to inventory levels at full capacity and low prices. Combined with record high costs for emissions and elevated prices for European coal, fuel switching economics were unusually favourable for gas. Gas-fired power plants ran near full capacity. Figure 2.3 shows historic operating margins for German coal vs. gas power stations. Our calculations for 38 percent efficient coal power plants' gross margins, including the cost of emission allowances, show that coal margins fell sharply into negative territory in 2020. The clean spark spread, on the other hand, reflects the margin for gas power producers with 55 percent efficiency continuing at profitable levels.

EUROPE GETS OUT OF COAL

In July 2020, Germany's Federal Council approved its coal exit law - a path toward phasing out coal-fired power generation in the country by 2038 at the latest. While closure of lignite capacity will for the most part take place between 2027 and 2038, hard coal closures have already started and are being implemented via auctions by Germany's Federal Network Agency. On 1 December 2020, Germany announced the results of the first round of its hard coal exit auctions. Nine units with a total of 4.8 GW hard coal capacity won bids and are closed from January 2021.

Mediterranean countries continued to permanently close coal power plants in 2020. Spain shut down 4.6 GW of capacity, with another 3 GW filing for permission to shut down. In Portugal, the utility EDP closed its Sines coal power plant and pulled forward coal phaseout by two years to 2021. Italy's Enel announced three coal power plant closures in 2021, in line with Italy's commitment to phase out all coal plants by 2025.

Figure 2.2: Share of renewable and gas increasing, replacing share of coal/lignite in 2020



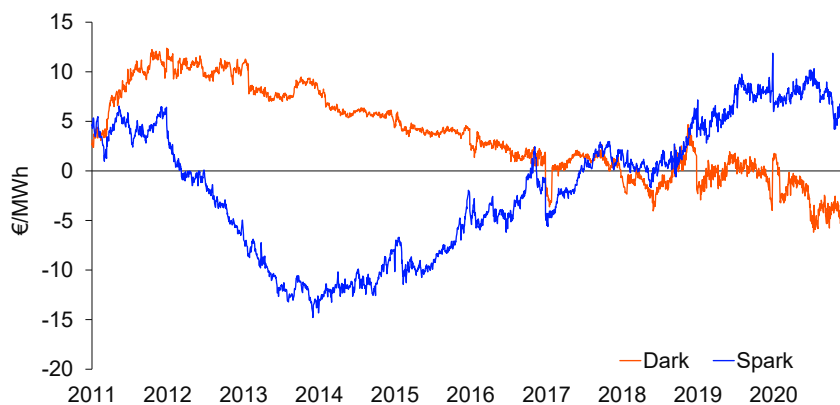
Source: Refinitiv estimates based on ENTSOE and national power statistics

In Eastern Europe, the Czech national coal commission recommended in late 2020 to phase out coal by 2038, on par with the Germany's timeline. Lignite generated 35 percent of the electricity produced in the Czech Republic in 2020. The Polish government agreed with trade unions in September to phase out coal mining by 2049. This is the first time Poland has set any sort of deadline on coal, which accounted for 72 percent of the country's electricity generation last year - down from 75 percent in 2019.

STEPPING IT UP: EUROPEAN CLIMATE LAW, MORE AMBITIOUS 2030 EMISSIONS TARGET

Going into 2020, European lawmakers had the roadmap to the European Commission's Green Deal fresh in their mind, as it had been presented on 11 December 2019. It embodied not only big changes to European climate and energy policies, but also a comprehensive growth strategy to make the EU's economy sustainable. The Commission was set to propose a European Climate Law containing a 2050 carbon neutrality goal as well as a 2030 target with higher ambition than the existing goal of cutting greenhouse gases 40 percent below 1990 levels.

Figure 2.3: Clean dark and spark spreads, front year contracts (Germany)



Source: Refinitiv

Exactly one year later, on 11 December 2020, European leaders agreed to strengthen the EU's 2030 target to "at least 55 percent" below 1990 levels. This is in line with the proposal put forward by the European Commission in September but falls short of the EU Parliament's call for 60 percent reduction target. The final negotiations between Commission and Parliament will take place in the first months of 2021, leading to the adoption of the European Climate Law inscribing binding targets for 2030 and 2050. Note that the resulting target is "net" (i.e. includes carbon sinks) and remains "domestic," meaning it does not allow for use of international emission reduction credits.

The significance for European carbon trading of moving from 40 percent to at least 55 percent below 1990 levels cannot be underestimated: the increased ambition will be translated into a tighter EU ETS cap with fewer allowances made available to the market. This "translation" will take the form of a 'fit for 55' package of legislative proposals that the EU Commission will put forward by June - see 'Outlook for 2021' below.

Looking back, the journey towards "at least 55" has in itself been a key market supporting factor throughout 2020. With the outbreak of the Covid-19 pandemic in Europe in March, market observers feared that economic recovery would trump climate action and that the Green Deal would be placed on the back burner. That did not happen.

Once the dust after the first wave of the pandemic settled, the Commission on 17 September presented its Climate Target Plan proposing a 2030 target of at least 55 percent reduction. During the prior eight months, it had been unclear whether the Commission would propose a 2030 target of 50 or 55 percent. In a tight vote on 7 October, the EU Parliament adopted its position on the European Climate Law, calling for a more ambitious target of 60 percent reduction below 1990 levels.

Member states had mixed reactions to the Commission proposal, with some calling for higher ambition and others resisting changes to the previous target of 40 percent emission reduction from 1990. The wide division within the block became evident at the Environment Council meeting on 23 October, where EU ministers could only agree on making the 2050 climate neutrality goal legally binding but punted the 2030 target discussion to the leaders

meeting in December. Poland was the main opponent to the more ambitious 2030 target and demanded more funding towards its energy transition in return for backing the tougher climate goal. The conclusions in the text of the unanimous agreement reached on 11 December, backing the "at least 55 percent" target, underline that it should be achieved taking into account the various national circumstances of member states in reducing emissions and recognise their right to decide their own energy mix.

UK "BREXITS" EU ETS, REMAINS 2020 COMPLIANT

Uncertainties around Brexit finally came to an end on 24 December 2020, when the UK and EU reached a trade agreement - the UK left the European Union on 1 January 2021 after 47 years as a member state. It was, however, already clarified in March/April 2020 that the UK would leave the EU ETS regardless of a trade agreement between it and the EU. British emitters covered by the EU ETS remained subject to its compliance requirements throughout 2020 and must report verified emissions in 2020 by 31 March 2021 - they must surrender allowances for these emissions by 30 April 2021.

After having been suspended in 2019 and the beginning of 2020 due to Brexit uncertainties, UK auctions of emissions permits resumed on 4 March when 5.7 million allowances were offered for sale. From then, the combined volume for 2019-2020 of 110 Mt was distributed partly as free allocation and partly at auctions spread out over the year 2020. The release of the pent-up UK supply in 2020 had a rather limited downward effect on carbon prices, however, as they garnered strong support from EU policy and the MSR intake.

The UK has been a net contributor to the market surplus in the EU ETS because of relatively strong emission cuts over many years, especially in the power sector. Therefore, removing the UK's portion of the overall EU ETS cap (supply) and its emissions (demand) will result in a lower supply/demand ratio overall. Our estimates suggest that removing the UK from the EU ETS makes for a market that is about 750 Mt tighter for the 2021-2030 period.

On the other side of the channel, UK emitters will become subject to a UK ETS, which according to the UK government will become operative and start auctioning sometime before the second quarter of 2021.

OUTLOOK FOR 2021: 'FIT FOR 55'

The key event for the EU carbon market in 2021 will be the June release of the European Commission's 'fit for 55' package of legislative proposals. Practically all climate and energy-related legislation will have to be revised in order to deliver the steeper downward trajectory of emissions necessary to achieve the 55 percent target in less than a decade. In addition to revising the EU ETS directive accordingly, the package will revise the Renewable Energy and Energy Efficiency directives and review effort-sharing in non-traded sectors.

The Commission will send this package of proposals to Europe's other two governing bodies, the Council and the Parliament, marking the start of several years of legislative discussions until a final framework for the EU ETS is adopted and implemented. As in 2020, the preparations leading up to the proposal in June and the policy deliberations afterwards will move the market and influence prices going forward.

The ETS specifically will be reviewed and changed along several dimensions:

- The **allowance budget will be decreased** to accommodate a 55 percent target. This requires adopting a more aggressive linear reduction factor (reducing the overall cap by more each year), possibly in combination with a rebasing of the cap to align it with actual emission levels. A change to the MSR might also be on the cards, affecting the annual supply-demand balances.
- The **scope of the EU ETS may expand** to include more sectors. The impact assessment accompanying the Commission's 2030 climate target proposal in September discussed expansion of emissions trading to the maritime, road transport and building sectors - this will be considered in the June proposal.
- The EU ETS review will **address competitiveness for European industries** in light of the bloc's increased climate ambition, and discussions on free allocation to industries will go hand in hand with a separate Commission proposal for a border carbon adjustment mechanism.
- **Financing and distributional effects will be a key point** of discussion in the negotiations over changes to the ETS, as Eastern European member states are concerned about their share of the emission reduction burden under the

new target. In order to achieve buy-in from these countries on cap-tightening measures, the set-up and rules for the Modernisation Fund (through which poorer EU member states receive money to modernise their infrastructure in the interest of lowering emissions) will be a key discussion point, as will the distribution of proceeds from allowance auctions.

Even though the devil is always in the details and fierce policy debates are inevitable, the fact that decisionmakers confirmed much more ambitious climate targets for 2030 in just a year - and a year featuring a global pandemic at that - ensures the key carbon market fundamental of overall policy stringency. Although 2050 is far away, the path towards carbon neutrality that is anchored in legislation gives long term confidence in carbon pricing as a tool in investment and abatement efforts.

Table 2.1: EU ETS by segment (excluding options market)

	2017		2018		2019		2020	
	Mt	€ million	Mt	€ million	Mt	€ million	Mt	€ million
EUAs auctioned	934	5,366	916	14,090	589	14,503	430	10,568
EUAs exchange traded	3,830	23,328	5,977	102,397	5,823	145,770	7,314	181,627
EUAs OTC	352	2,185	845	13,740	360	9,128	346	9,022
Aviation EUAs	5	34	6	104	6	137	6	140
sCERs exchange traded	7	2	7	2	3	1	3	1
Total	5,129	30,914	7,751	130,333	6,781	169,539	8,099	201,357

Table 2.2: 2020 Calendar for European climate and energy policy

January-June	Portuguese EU presidency	Portugal holds rotating presidency of EU Council, has the adoption of the European Climate Law as one of three key priorities during its tenure.
Early February	Public consultation deadlines on key EU climate directives	End of public consultation period for input on key EU climate legislation to put Europe on the path to a 55 percent emission reduction by 2030 - including the EU ETS Directive and the MSR review; the renewable energy directive; and the energy efficiency directive.
By mid-March	European Climate Law	Based on trilogue negotiations, the Council and Parliament could reach an agreement on the Climate Law, to enable formal adoption in time for the June package of legislative proposals to implement the new 2030 target.
18 March	Environment Council	Formal adoption of the European Climate Law could happen at this meeting.
25-26 March	European Council	Summit of EU leaders, who amongst other will discuss the 55 percent emission reduction target decision from 11 December 2020. In accordance with the Council conclusions from December, state leaders will revisit issues both of the Modernisation Fund and the distribution of effort between member states (Effort sharing regulation) and "adopt additional guidance" to the Commission's forthcoming legislation proposals.
21 June	Environment Council	Summit of EU environment ministers
24-25 June	European Council	Summit of EU heads of state and government
June	'Fit for 55' legislative package	The Commission will present a package of legislative proposals to make EU's climate and energy related legislation "fit for 55:" revision of the EU ETS including MSR review, Renewable Energy Directive, Energy Efficiency Directive, draft proposal on a carbon border adjustment mechanism.
July-December	Slovenian EU presidency	Slovenia holds rotating presidency of EU Council
14-15 October	European Council	Summit of EU heads of state and government
1-12 November	Global climate summit (26th United Nations Framework Convention on Climate Change Conference of the Parties - COP26 of the UNFCCC)	The UK government will host COP26, postponed from 2020 due to the Covid-19 pandemic. The summit will address the submitted nationally determined contributions (NDCs) and may agree on rules for international trading of emission reductions, finalising the Paris Agreement rulebook.
16-17 December	European Council	Summit of EU heads of state and government

3. North America

Both North American carbon markets grew in 2020 in terms of overall market value, for a combined €26 billion over the year. The volume traded in the Western Climate Initiative (WCI) was higher than in 2019, whereas it decreased in the Regional Greenhouse Gas Initiative (RGGI). Including allowance purchases at auctions, the WCI saw over 1.7 billion permits change hands, with a total market value of over €24 billion. RGGI saw 233 short tons (st) - 211 metric tonnes - trade over the year for a total market value just shy of €1.7 billion (see Table 3.1). Both markets - but especially the WCI - saw a huge sell-off and correlating drop in allowance prices in March, when pandemic-induced emission cutting factors (including stay at home orders in California) kicked in hard. Prices in both the WCI and RGGI have been creeping up since then, in RGGI's case even beyond where they were a year ago. Both stayed roughly within a \$3/t range in price fluctuation over the year. The WCI's benchmark contract started 2020 well above \$18/t and averaged \$17.45/t in December, having tumbled well below \$16/t in March and climbing from there, while RGGI's low March average was \$5.45/t and ended up at nearly \$8/t by the end of the year.

WESTERN CLIMATE INITIATIVE

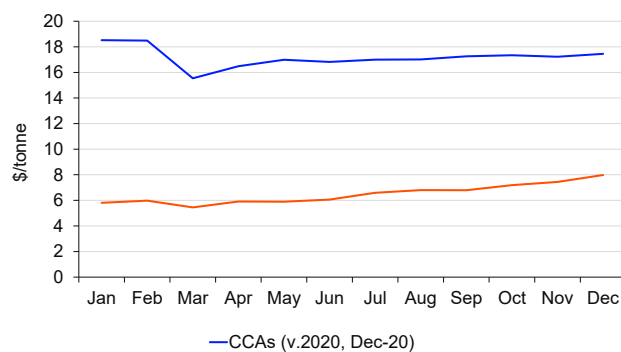
The global pandemic had a bearish impact on both the primary market (allowance auctions) and the secondary market for carbon in the WCI, as it did for most other commodities. The precipitous fall in the price of allowances (CCAs) on exchanges started in March, as lockdowns entered into force. CCA prices hit their lowest levels - below the 2020 auction floor price of \$16.68/t - during March/April, due to intense selling by speculators liquidating their positions amid fears of a global recession. Over 360 million allowances transacted on exchanges in March with this selloff, three times more than in February (see Figure 3.2).

This in turn strongly affected the subsequent auction of allowances: the WCI's Q2 auction in May was the first one in years that was *not* strongly oversubscribed with high clearing prices, instead featuring puny demand and clearing at its floor price.

One of the reasons for the lacklustre May auction was that in contrast to speculators, compliance entities had *increased* their holdings during the March/April sell-off: they took advantage of the cheap secondary market prices and gobbled up allowances there at prices below the auction floor price. This meant there was little appetite for allowances in the primary market: several big compliance entities that have participated at every auction reportedly skipped the Q2 one. With speculators also abstaining from purchases, demand for allowances was at record lows (see Figure 3.3).

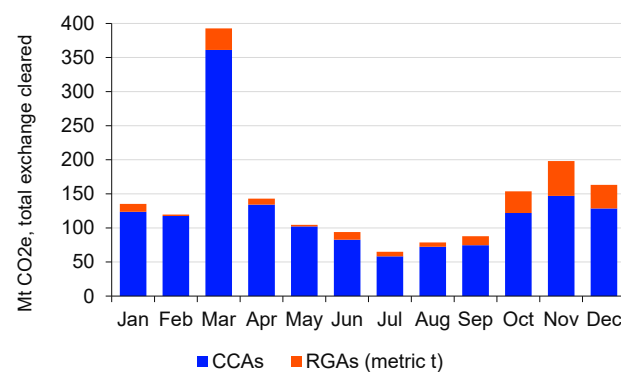
The rest of the year saw a slow recovery from the initial pandemic shock, with the Q3 auction in August still featuring low contracted volumes and clearing prices but the Q4 auction being oversubscribed for both current vintage and future vintage allowances. We attribute this to the fact that the November sale was the last chance to get permits for emissions in the WCI's third compliance period, which ran from 2018 to 2020: auctions from now on sell vintage 2021 allowances. It was also the last opportunity to purchase allowances under \$16.68/t, as starting

Figure 3.1: CCA and RGA prices in 2020



Source: Intercontinental Exchange (ICE) and Nodal Exchange

Figure 3.2: CCA and RGA traded volumes in 2020



Source: Intercontinental Exchange (ICE) and Nodal Exchange

from February 2021 the auction floor price will be increased by five percent plus inflation, which is estimated at \$17.71/t.

Expectations of a tighter cap were also reflected in the auction results, with the premium for future vintage allowances being quite high in December's sale: compliance entities' allowance needs are way down in the pandemic-induced emissions lull, but expected to increase when California's economy picks back up in the longer term. The proportion of compliance entities purchasing future vintage allowances at auction increased from 80 percent in August to over 90 percent in November, as firms hedged against a tightening ETS cap and the correlating higher prices in future years.

Beyond prices and volumes, observers were following all year a lawsuit brought by the Trump administration's Department of Justice against the state of California that *could* have had implications for the existence of the WCI as a whole. The suit argued it was illegal for California to have linked its carbon market to that of Canadian province Quebec, since treaties with foreign jurisdictions fall under the purview of the federal government only - not state governments or local jurisdictions - as per the US constitution. We predicted last year that this suit would have little market impact, and indeed a judge rejected it in July with the Trump administration appealing that decision in September and further hearings scheduled for early 2021 - since President Biden's

justice department is expected to drop the case, we continue to expect no market effects from it.

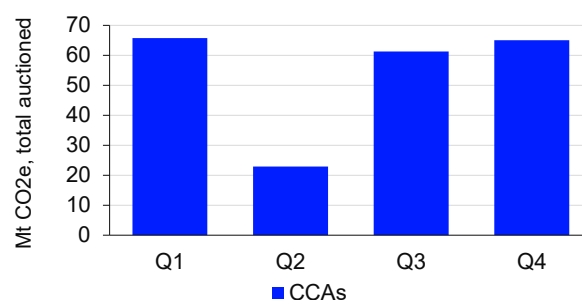
REGIONAL GREENHOUSE GAS INITIATIVE

The price of RGAs - the allowances traded in RGGI - experienced a dip in March as well, but not nearly as profound as that of the WCI. This is largely due to the fact that RGGI covers large electricity generating units only, whereas the WCI covers industrial facilities and the transportation sector. The latter two sectors are much more susceptible to emissions decreases associated with the pandemic, as stay-at-home orders and closing of production affect fuel use and industrial output (significantly lowering emissions from those sectors) whereas power generation on the east coast continued throughout the year. While initial responses to Covid-19 increased trading activity in the first quarter of 2020, RGAs changed hands less frequently in the second and third quarters. Volumes picked up again in Q4, with participants looking to obtain allowances before expected price increases in 2021.

One major reason for those expected price increases is that RGGI's periodic "programme review" occurs in 2021 - the previous programme review resulted in tighter caps. This time the review will apply to a much larger market, as 2020 saw the state of Virginia officially join RGGI. That happened formally on 8 July, after the state's legislature passed changes to the regulations necessary for becoming part of the 10-state carbon market. Inclusion of the populous, heavily coal-burning state with a 2021 cap of 27.2 million short tons increases the regional emissions cap coverage by almost 30 percent to over 75 million short tons and makes Virginia the second highest emitting state after New York in the market. RGGI activated 27 Virginia-based compliance accounts in the programme's tracking system in early January.

The main price driver for RGAs in 2020, however, continued to be the RGGI programme element known as its Emission Containment Reserve (ECR) - a mechanism somewhat resembling the market stability reserve (MSR) of the EU ETS in that it reduces the amount of allowances in circulation. Starting in 2021, RGGI states implementing the ECR are withholding allowances from circulation (i.e. not offering them at the quarterly auctions) if prices fall below a pre-agreed level of \$6/st. This ensures that a supply cut (which makes prices go up if demand remains the same) only occurs if it is unexpectedly cheap to reduce emissions.

Figure 3.3: CCA volumes auctioned in 2020



Source: Intercontinental Exchange (ICE) and Nodal Exchange

The ECR was adopted by all RGGI states except two small ones that together account for only a small portion of the cap - notably, it now applies to emissions from Virginia - and contains 10 percent of their total allowance budgets. This means that if RGA prices hit \$6/st or less in 2021, those states offer 10 percent *fewer* allowances at auction, essentially taking that volume out of circulation. This reduces the supply/demand ratio for allowances, which typically brings prices back up, which in turn incentivises further emissions cuts. The ECR's "trigger" price has been a primary driver of RGA prices throughout 2019 and 2020 because market players anticipated the \$6 level being hit, causing scarcity later on when fewer allowances are in circulation.

Indeed, the average RGA price on the secondary market exceeded the ECR trigger price for the entire second half of 2020 (see Figure 3.3), making for a lower available allowance volume in 2021. The first week of 2021 actually saw RGA prices at their highest levels *ever*, with the benchmark contract closing at \$8.84/st. This was likely due to the outcome of the Senate runoff race in the US state of Georgia, which was won by two democrats and thus ensured the Democratic Party holds majorities in both chambers of the US congress. As democrats have typically favoured more stringent climate legislation (possibly involving tight carbon markets at the regional level), the election result was interpreted as bullish for RGGI prices.

Table 3.1: North American carbon markets

	2017		2018		2019		2020	
	Mt	€ million	Mt	€ million	Mt	€ million	Mt	€ million
WCI	628	7 351	887	11 763	1 380	20 738	1 739	24 333
RGGI*	185	615	239	1 107	293	1 627	270	1 695
Ontario	110	1 272	n/a	n/a	n/a	n/a	n/a	n/a
Total	923	9 238	1 126	12 871	1 673	22 365	2 010	26 028

*The units traded in the Regional Greenhouse Gas Initiative are short tons, which are 0.907 metric tonnes. For unit consistency, we have converted RGGI's total volume figures to metric tonnes.

MEXICO

On 1 January 2020, Mexico became the first country in Latin America with a national ETS. The programme, which had been in the works since 2012, is now in a three-year pilot phase: 2022 constitutes the “transition year” in which the actual binding cap will be set. Compliance obligations enter into force for all covered emitters in 2023. The roughly 300 emitters in Mexico that generate over 100 000 tonnes CO₂ equivalent per year are covered - these are primarily in the power sector (accounting for about half the covered emissions), the oil and gas sector (35 percent of covered emissions), as well as several other industrial sectors for a total of 271.3 million tonnes covered emissions in 2020.

Given the emergency status the country was in for much of the year due to the Covid-19 pandemic, few new developments occurred in the Mexican ETS - regulators had planned to release offset protocols toward the end of 2020, but this has been pushed to 2021. The scheme’s rules specify that emitters may use credits from offset projects in Mexico to account for up to 10 percent of their compliance obligation.

Mexico’s carbon levy - a tax on the carbon content of certain fossil fuels - still applies nationwide during the ETS pilot phase. Its rate had equaled about \$3.50/tonne for the past few years, but due to the weakening of the peso against the US dollar it amounted to roughly \$2/tonne in 2020.

Further carbon taxes were implemented throughout the year at the *subnational* level, all entering into force in 2021: the state of Baja in May introduced a fuel levy on gasoline and diesel that analysts have calculated equals roughly \$7/tonne CO₂, the state of Jalisco in June announced a carbon tax but did not specify a rate, and the state of Tamaulipas announced a per tonne fee of MXN 250 (\$11.10). All of these apply starting in 2021 *in addition* to the existing federal carbon tax.

OUTLOOK FOR 2021

We expect both RGGI and the WCI to continue their current upward trajectory in prices, albeit possibly slowly and sporadically, given that both programmes’ caps are on a tighter trajectory through 2030 than they were through the end of 2020. However, the extent to which effects of the pandemic continue to play out in the markets in the shorter term - particularly in California, where they affect the WCI the most - remains to be seen. Gasoline refining in California, a major source of emissions in the WCI, remained much lower throughout 2020 than the previous year and does not show immediate signs of increase given the continued lockdown in the state.

4. China

Carbon market related developments in China were set back during the first part of 2020 as the country battled the Covid-19 pandemic, with progress on the national ETS falling further behind schedule and very little trading occurring in the regional pilot ETS. However, in September President Xi Jinping made an announcement seen as a major boost to global climate policy efforts: China's emissions will peak before 2030, and the country will become carbon neutral by 2060. Carbon markets will play a role in achieving these new more ambitious national targets, and indeed the national ETS legislation process sped up after this announcement: key governing documents were released at the end of the year. The existing pilot ETS saw low volumes (only 70.6 million allowances changed hands in all 8 regional programmes) due to the impacts of Covid-19, but due to higher average allowance prices across all regional markets, their total combined market value increased slightly from 2019 levels to €257 million. Thanks to a series of favorable policies, the Chinese carbon offset market saw a 46 percent boost in volume in 2020 with a total of 63 million Chinese Certified Emission Reductions (CCERs) changing hands.

MORE AMBITIOUS CHINESE CLIMATE TARGET

The announcement that China commits to peaking its emissions before 2030 and reaching net zero emissions before 2060 was unexpected, as these new targets had not been under public discussion domestically before the United Nations General Assembly on 22 September during which they were pledged. China's previous commitment was to peak emissions "around" 2030. President Xi re-affirmed the new medium and long term goals at the UK-hosted Climate Ambition Summit on 22 December as part of its China's enhanced nationally determined contribution (NDC, see section 7 of this report). Other elements of that updated NDC include reducing the carbon intensity of China's economy by more than 65 percent below 2005 levels by 2030 (previous NDC pledged 60-65 percent), increasing the share of non-fossil fuels in primary energy consumption to 25 percent (previous NDC pledged

20 percent), expanding forest coverage by 6 million cubic metres over 2005 levels (previous NDC pledged 4.5 cubic metres), and reaching 1200 GW of wind and solar capacity by 2030 - the latter represents a jump from some 415 GW capacity in 2019.

NATIONAL ETS PROGRESS

Progress on the long-awaited Chinese national emissions trading system was already behind schedule, as active trading has not begun yet despite the scheme having officially "entered into force" back in 2017. The Covid-19 outbreak slowed developments even further: major emitters in all eight sectors intended to be covered by the programme in the long term (the power sector is the only one covered initially) were supposed to submit 2019 emissions data by May 2020, and policy documents on final allocation and cap-setting were supposed to have been approved by Q2 2020. However, all such preparation was suspended in Q2 nationwide.

In Q3, however, the legislation process for the national ETS accelerated following Xi's landmark announcement during the UN Assembly. On 2 November, China's Ministry of Ecology and Environment (MEE) issued two key policy documents on the national ETS that establish regulatory authority and specify rules for market operation and design. The first, translated as *The National Measures for the Administration of Carbon Emission Trading (Trial)*, provides the legal basis for the ETS. A regulatory document translated as *Administrative Measures for the Registration, Trading, and Settlement of the National Carbon Emission Rights (Trial)* provides rules on the logistics of allowance transactions, including allowance registration, trading, settlement, and the role of the respective agencies responsible for these aspects of the programme.

On 29 December, after several rounds of discussions and revisions, the MEE officially released the allocation plan for the power sector, which uses benchmarking as the main method of allocating allowances to China's covered entities. The rule's four different

Table 4.1: China Pilots ETS trading summary in 2020

Pilots	2020 annual			Changes 2019-2020		
	Volume (Mt)	Value (€ Million)	Average Price (€/t)	Volume	Value	Price
Guangzhou	31.94	107.61	3.37	-30%	-1%	41%
Hubei	17.67	61.93	3.50	141%	134%	-3%
Tianjin	7.53	24.64	3.27	566%	1124%	84%
Beijing	5.32	34.81	6.54	-25%	-35%	-14%
Shanghai	3.91	19.04	4.87	-43%	-34%	15%
Chongqing	1.92	3.38	1.76	37%	9%	-20%
Shenzhen	1.35	3.38	2.50	-91%	-82%	96%
Fujian	0.99	2.18	2.20	-69%	-70%	-4%
Total	70.63	256.98	3.64	-19%	3%	27%

Note: Volume includes both exchange-traded volume and OTC transactions. Differences in the way OTC transactions were assessed/reported account for the difference in volume figures cited for 2019 in this report and last year's report on those same annual volumes.

benchmarks for electricity generation are tighter than in the last draft of the plan, which confirms that 2225 entities' emissions are covered by the ETS. We estimate that these together account for 4 billion tonnes CO₂ annually, or around 40 percent of China's total emissions.

PILOT ETS PERFORMANCE

All of China's 8 pilot emission trading systems were affected by the pandemic, with exchanges extending the annual break after the Lunar New Year holiday in 2020 by an additional week - the Hubei Emission Exchange, being at the center of the outbreak, closed for more than a month and re-opened on 23 March. In total, only 70.6 million allowances changed hands in all eight Chinese regional ETS including Fujian in 2020, compared to 87 million in 2019. The total market value still exceeded 2019 by a bit, however. This is due to higher prices per allowance in most of the pilots: the average price per tonne over 2020 was 28.6/t (~€3.60/t¹), up from 22.5/t (~€2.93/t²) in 2019 and bringing the total value of the pilots combined to CNY 2020 million (~€257 million).

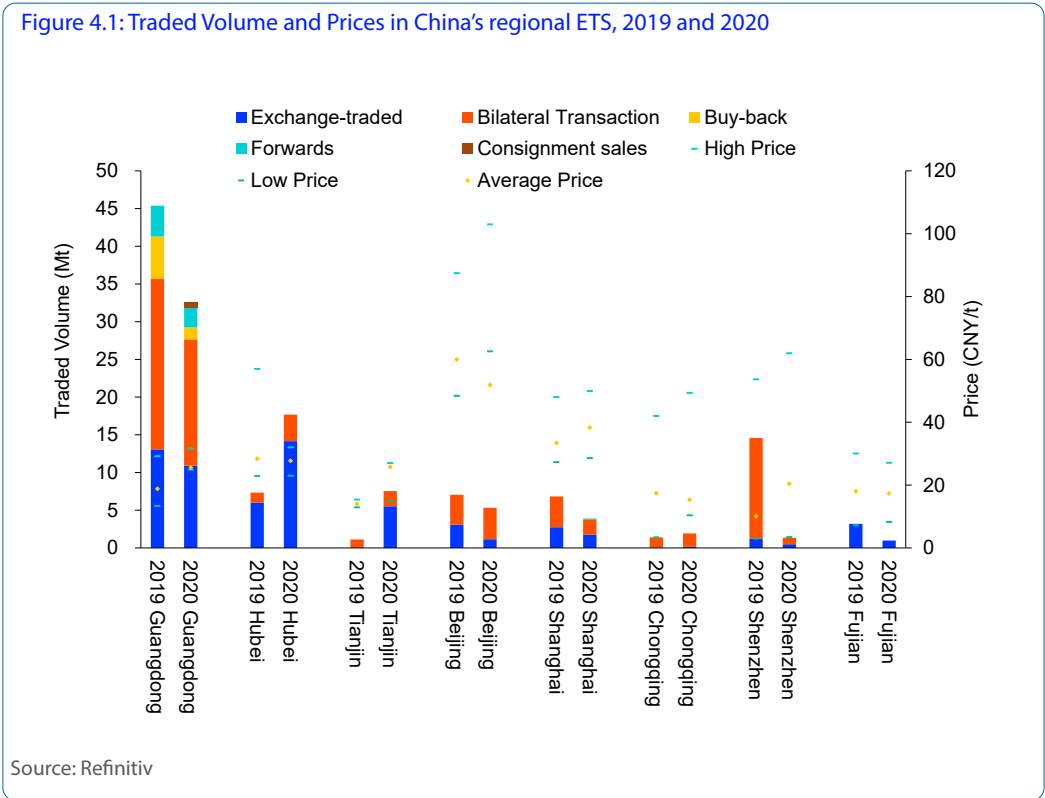
As shown in Table 4.1, most of the pilots experienced large pandemic-induced drops in traded volume. Only Hubei, Tianjin and Chongqing saw more allowances change hands than in 2019. However, Covid-19 affected mainly the *first half* of 2020, during which the traded volumes were less than half than the same period in 2019. The second half of the year featured a recovery, largely due to the fact that all pilots postponed their compliance due to the pandemic - the programmes require entities to surrender allowances to cover the previous year's emissions by June-July depending on the ETS, but those deadlines shifted several months

out. For Chongqing and Guangdong, compliance was not until the end of November, leaving room for the flurry of trading that typically occurs just before compliance to happen in H2 of 2020 instead. Chongqing saw 37 percent more allowances change hands in 2020 than in the previous year (see Table 4.1), but nearly half of those transactions occurred during the month before the postponed compliance deadline.

Guangdong continued to top the list in terms of liquidity: with nearly 32 million allowances traded, despite its traded volume being 30 percent lower than in 2019, it accounted for nearly half of the eight regional markets' collective volume in 2020. Important events in this market included the launch on 22 June of a new way of trading Guangdong Emission Allowances (GDEAs): the Guangzhou Carbon Emissions Exchange began offering consignment sales, in which the platform auctions off GDEAs on behalf of companies looking to sell them, essentially performing a brokerage service by way of a public auction format. On 6 July, the exchange auctioned nearly 700 000 GDEAs owned by three aviation companies on their behalf. There were 13 bidders and the average price bid was CNY 28.17/t (~€3.58/t).

Besides Guangdong, four other pilots saw decreases in traded volumes compared to the previous year, but Shenzhen's drop was particularly dramatic - having been the second largest regional market among the eight pilots in 2018 and 2019, Shenzhen ranked second-smallest in 2020 with only 1.35 million allowances changing hands. The main reason was a huge decline in the amount of over-the-counter bilateral transactions (see Figure 4.1) compared to the previous year - but given that prices for the province's allowances are markedly higher on exchanges than OTC, the average price in Shenzhen nearly doubled from 2019. Fujian's small regional market

Figure 4.1: Traded Volume and Prices in China's regional ETS, 2019 and 2020



¹The exchange rate is the average of 2020: CNY 1 = €0.127
²The exchange rate is the average of 2019: CNY 1 = €0.13

was also strongly affected by the pandemic-induced lack of trading, with no transactions taking place between mid February and the end of June. Less than a million allowances traded in Fujian in 2020.

On the flipside, trading activity picked up in Hubei and Tianjin compared to 2019 (Figure 4.2). The fact that volumes more than doubled in Hubei, despite the province being home to the Covid-19 outbreak's epicentre Wuhan, can be explained at least partially by a 5 percent increase in allocation in 2020 for 2019 compliance. Also, 35 more entities were covered in 2020 than in the previous year (373 vs. 338). In Tianjin's case, the growth in volume was due to the Tianjin Climate Exchange making organisational reforms to boost liquidity that caused it to be the busiest of the eight pilots during most of the summer.

As for prices, those in Beijing continued to be the highest among all pilots, reaching a record high of CNY 102.96/t (€13.1/t) on 20 October. However, this average was still lower than that of 2019 because a far greater portion changed hands cheaply via OTC transactions. This is in contrast to Shenzhen, where the opposite was the case as explained above.

As for the primary market, a total of 7 auctions were held in 2020 - these sold allowances for use in the Guangdong, Shanghai, Tianjin and Hubei pilots. Around 11 million allowances were offered, and about 7 million bids were successfully met (see Table 4.2): several of the auctions were undersubscribed, with only some of the allowances on offer being sold. While Guangdong's provincial government had planned to hold two allowance auctions, only one took place due to effects of Covid-19 that saw 400,000 allowances offered (see Table 4.2). Shanghai's October auction was only for emitters to meet compliance needs: the allowances purchased there could not be traded in the secondary market, which made for a clearing price (CNY 44.27/t or €5.62/t) nearly 16 percent higher than the annual average price in the Shanghai secondary market (CNY 38.3/t or €4.87/t).

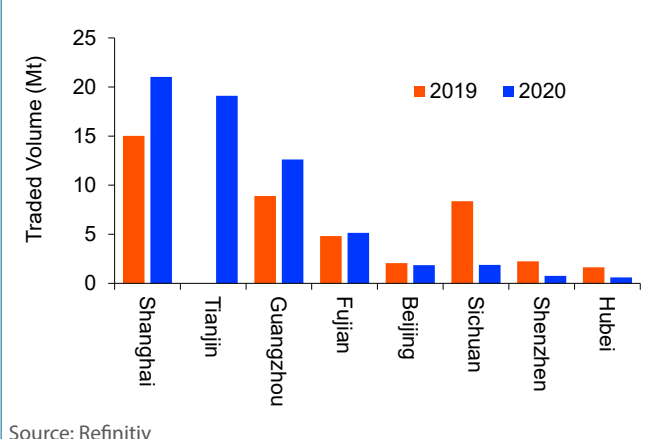
OFFSET MARKET

Trading of Chinese Certified Emission Reductions (CCERs) was up 46 percent year-on-year, with a series of 2020 climate policies laying the groundwork for a continued bullish trend going forward. Covered entities in the regional ETS can use CCERs for compliance, and did so to the tune of 63 million traded in 2020. Of these, Shanghai continued to have the most active CCER trading: with 21 million CCERs changing hands there, it accounted for one third of the total traded offset volume in all regional markets. The Shanghai

Table 4.2: Chinese pilot ETS primary market summary 2020

Pilots	Date	Volume Offered (Mt)	Volume Sold (Mt)	Clearing Price (€/t)
Guangdong	Apr.27	0.4	0.4	3.58
Tianjin	Jun.10	2	2	2.25
	Aug.28	1	0.81	3.33
Shanghai	Aug.28	2	2	5.03
	Oct.30	2	0.12	5.62
Hubei	Dec.9	2	1.12	3.5
	Dec.11	1.88	0.67	3.5

Figure 4.2: CCERs traded volume in regional markets in 2019 and 2020



Source: Refinitiv

pilot is among the most restrictive when it comes to offset use: only a tiny portion of entities' compliance obligation may be accounted for with such credits, and most of these must come from local offset projects. The high year-on-year growth in offset transactions there is likely due to the fact that the offset quota was raised from 1 percent in 2019 to 3 percent in 2020.

Apart from the pilot ETS, the Chinese government has accredited the Sichuan United Environment Exchange to offer CCER transactions - these are for voluntary purchases of CCERs, such as firms not covered by an ETS offsetting emissions for corporate social responsibility purposes or to fulfil "net zero" and "carbon neutral" pledges. In contrast to 2019 when plenty of entities took advantage of this venue, only 1.88 million CCERs traded on the Sichuan platform in 2020, 78 percent down from the 8.37 million in 2019. We attribute this drop in volume to the Covid-19 pandemic, as companies were concerned about staying in business at all, putting non-mandatory green measures on the back burner.

The future of CCER trading got two major boosts in 2020. In March, the International Civil Aviation Organization declared CCERs (along with other types of emission reduction credits, see section 8 of this report) eligible for use by airlines to offset their emissions growth under the global aviation emission reduction programme known as CORSIA. This means there will be demand for CCERs to offset emissions from flights between countries participating in CORSIA's first phase from 2021-2023, and beyond. More relevant to China specifically, the Chinese government has decided to allow offsets in the national ETS: according to the *National Measures for the Administration of Carbon Emission Trading (Trial)* released in November, CCERs may be used to account for up to 5 percent of compliance obligations in the upcoming Chinese carbon market.

Only exchanges in Shanghai and Beijing disclose CCER prices traded online. There, they ranged from CNY 9.5/t to 29.2/t (€1.18 - 3.7/t) and CNY 10.9 to 28.6/t (€1.38 - 3.63/t), respectively.

Beyond CCERs regulated by the national authority, some 2.8 million other locally recognised offset credits were traded under mechanisms developed by regional authorities (see Table 4.3). The disclosed prices for these offsets are typically much higher than those for CCERs because these local offset mechanisms constitute not only tools to reduce the cost of compliance in emissions trading programmes, but also support for local green companies.

OUTLOOK FOR 2021

On 5 January, 2021, the MEE released the document *Measures for the Administration of National Carbon Emission Trading (Trial)*, and officially announced that the country's national ETS is open for business now that its core pieces are in place. It also announced that the first compliance cycle of the national ETS (power sector only) is from 1 January to 31 December 2021. The Hubei Emission Exchange is the national registry and the Shanghai Environment and Energy Exchange is the national trading platform for the Chinese market - although neither has officially come online, we expect them to do so (i.e. become operational) during Q1. We also expect allowance allocation for the years 2019 and 2020 to take place in Q1, and trading to begin by Q2 2020.

The existing ETS pilots will operate in parallel to the national market. The allocation plan for the power sector, released in the last days of 2020, states that entities whose emissions are covered

by pilot ETS that are already in the process of 2019 and 2020 allocation will be *excluded* from the national ETS for those two years. Moreover, pilots may still develop their own carbon financial products. On 9 October 2020, the State Council formally approved the establishment of the Guangzhou Futures Exchange, which plans to offer carbon allowance futures.

Beyond these near term ETS developments, China's 14th Five-Year Plan (FYP) is expected to be released in March 2021. Given that all FYPs constitute detailed master plans for the country's economic and social development drafted through intensive multi-ministerial consultation with targets that direct national policy and resources toward strategic goals for the next five years, we will find out much more about China's climate change mitigation ambition and the extent to which carbon markets may be involved. There has been some discussion about setting absolute emissions caps in some provinces and some important industrial sectors.

Table 4.3: Traded volumes and prices of local offset in 2020

Offset Mechanism	Issued Province/City	Traded Volume (Tonne)	Price Range (€/t)	Allowed for Compliance
Forestry Carbon Sequestration (林业碳汇)	Beijing	38 389	1.75-7.74	Yes
PCER (机动车减排量)	Beijing	3 890	6.03-7.62	No
FFCER	Fujian	843 705	Not disclosed	Yes
PHCER	Guangdong	1 898 955	Auction clearing price: 4.57 €/t	Yes
STCER	Guangdong	2 200	Not disclosed	No

5. South Korea

The overall market value of the South Korean emissions trading system (KETS) increased in 2020 despite low prices due to growth in traded volume. Prices for Korean allowances (KAUs) fell 50 percent in 2020, although the second half of the year saw some price recovery on expectations of a tighter market in Phase 3 of the programme from 2021 to 2025. In 2020, Korea committed to a net zero emissions target by 2050, but its 2030 target of reducing emissions by only 24 percent below 2017 levels remained unchanged. We expect only a moderate price increase for 2021, as the market remains oversupplied.

PRICE PLUNGE AMID OVERSUPPLY

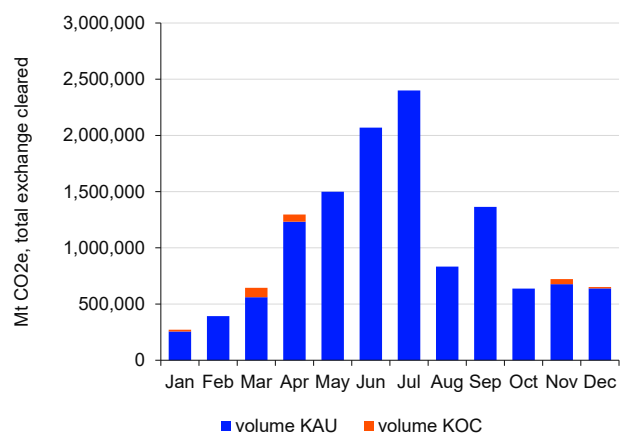
Almost 44 million Korean allowances (KAUs) and offsets (KOCs) changed hands in the KETS in 2020, about 16 percent more than in 2019. The total market value in 2020 was KRW 1,171 billion (~€870 million), up 17 percent year-on-year. Out of the 12 auctions held over the year, 7 were undersubscribed. Over 8 million KAUs were sold at auction in total. According to the Korean consulting firm Ecoeye, which tracks OTC transactions, exchange and auction volumes represented only half the traded volume in the KETS in 2020 (see Figure 5.1). Ecoeye's data shows that nearly 23 million KAUs and KOCs traded OTC (Table 5.1).

During the first quarter of 2020, KAUs traded at elevated levels (around 40,000 won/t or €30/t) as Korea's industrial entities banked KAUs from 2019 ahead of the May compliance deadline for the previous year's emissions. KAU prices moved downwards as emissions data released by the government in early May revealed emissions in covered sectors had *decreased* in 2019 by 2 percent. The already oversupplied market became more flooded with surplus as the pandemic's effect of decreased demand kicked in - KAU prices plunged almost 50 percent in the second quarter (Figure 5.2).

In September, amendments to the structure of Phase 3 of the KETS (2021-2025) reduced annual allocations by 4 percent, leading to some recovery in KAU prices on expectations of a tighter market to come. However, this was balanced by expectations that Korea's 2020 emissions would drop due to Covid-19 and its negative impacts on the Korean economy. On the last trading day of 2020, the price of KAUs stood at KRW 23,000 - 40 percent lower than the previous year. Prices for Korean offsets (KOCs) tracked the bearish developments in KAUs and dropped by almost 35 percent over the year, trading at KRW 26,000/t (~€19.5) on the last day of December.

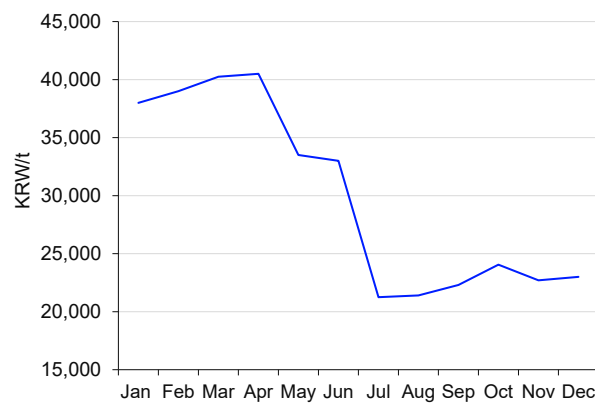
Despite the pandemic and the oversupplied market, more allowances and offsets changed hands than during the previous

Figure 5.1: KETS traded volumes (at KRX) in 2020



Source: Korea Exchange (KRX)

Figure 5.2: Korean Carbon Price in 2020 (KAU20, last trading day of month)



Source: Korea Exchange (KRX)

year - enough to make the total traded value of the market higher than in 2019 despite the much lower per-tonne prices. We attribute the surge in traded volume to the fact that oversupplied companies were offloading their allowances by selling them, rather carrying them into the next compliance year as they had in previous years.

A TIGHTER PHASE 3

The allocation plan for the KETS phase 3 (2021-2025) approved in September amends many of the programme's rules. Most importantly, it reduces annual allocation by 4 percent - this makes for a tightening of the over-allocated market. The extent to which

Table 5.1: KETS trading summary in 2020

	Exchange*		Auctions*		OTC**	
	Mt	€ million	Mt	€ million	Mt	€ million
KAU	12.6	270	8.2	185	19	342
KOC	0.2	6	-	-	3.5	66
Total	12.8	276	8.2	185	22.5	408

*source: Korea Exchange (KRX)

**source: Ecoeye

emitters may use offsets was halved, with offset credits permitted to account for 5 rather than 10 percent of entities' compliance obligations. The portion of the annual cap auctioned rather than given out for free increases from 3 to 10 percent. Phase 3 also expands the programme's coverage: additional firms in the construction industry and the transport sector are now included. The system now covers 685 companies (from 610 in Phase 2) accounting for almost 75 percent of national emissions (from 70 percent in Phase 2).

Power plants covered by the KETS get free allowances based on a benchmarking mechanism involving specific carbon intensity indices by which cleaner plants receive more allowances and dirtier plants fewer. In Phase 3, 60 percent of facilities will receive allowances based on benchmarking (instead of grandfathering), which is up from 50 percent in Phase 2. Also, higher benchmarks will apply for coal power plants, and lower ones for liquified natural gas.

2050 NET ZERO AND UPDATED NDC TARGETS

In October, South Korea joined a number of other countries pledging to become "carbon neutral" by 2050. Reaching this net zero target is dependent on a number of mid-term measures, including the 2030 emissions targets outlined in the country's Nationally Determined Contribution (NDC) as part of the Paris Agreement (see section 7 of this report). South Korea submitted its updated NDC to the UN in late 2020 - the revamped document states the country's emission reduction goal as an absolute target of 24 percent below its 2017 emissions (roughly 536 MtCO₂e/year in 2030) rather than the previous percentage reduction below a 2030 "business-as-usual" emission scenario - but given that the future emission trajectory is a projection, the change does not necessarily represent increased ambition.

Much of the intended reduction will involve cutting South Korea's dependency on coal for electricity: currently the carbon-heavy fuel produces 40 percent of the country's power, with renewables producing less than 6 percent. According to the 9th Basic Power Supply and Demand Plan, the government will ban construction of new coal power plants, decrease existing coal-fired generation capacity by 19 percent by 2034, and expand the solar and wind power sources nearly fourfold.

OUTLOOK FOR 2021

We expect emissions covered by the KETS to continue decreasing due to lower economic activity during the global pandemic. Ecoeye estimates that 2020 emissions covered by the KETS were up to 4.8 percent lower than those in 2019. With allowances for those emissions that didn't happen (15-21 million KAUs according to Ecoeye) carried over to Phase 3, the market will continue to be oversupplied. As traded volumes and prices have typically increased ahead of compliance deadlines in previous years, there may be a bullish trend in the KETS ahead of the June 2021 compliance deadline for 2020 emissions - but we do not expect a sharp rise in KAU prices given the dampening effect of Covid-19.

So far, the CDM has been the main source of offsets for the Korean market. Since there is no clarity on the status of CERs from the CDM going forward (see section 7), covered entities are uncertain whether and how long these units will continue to be eligible to satisfy their KETS compliance obligations. Government estimates indicate that KETS participants would buy 8-10 million CERs annually over the course of Phase 3 if they are still eligible.

6. New Zealand

The overall value of New Zealand's emissions trading scheme (NZ ETS) was €516 million in 2020, up nearly 20 percent from 2019 by our new volume metric. The higher market value was mainly a result of higher prices for allowances (NZUs) after the government announced major reforms to the NZ ETS in June. NZUs gained more than 35 percent in 2020 to close the year at NZ\$37.55 (~€22). Total volume came in at 30 million tonnes*, unchanged from 2019 (Figure 6.1). The ETS amendments include a 40 percent upward adjustment to the fixed price option (to NZ€35/t) and the switch to an absolute cap on emissions from the previous intensity-based limits.

MARKET OVERVIEW: BULL RUN IN H2 ON ETS REFORMS

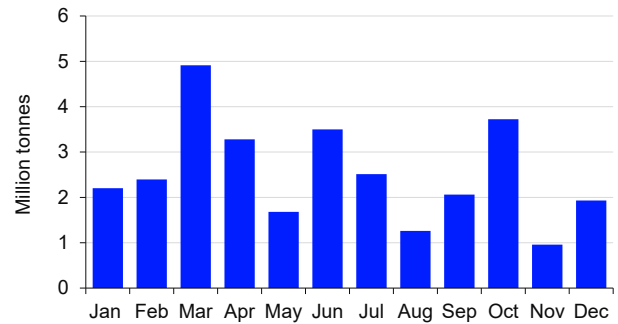
The price of NZUs fell in Q1 2020 on fears of lower demand for the units due to the pandemic's effects on the economy (see Figure 6.2). Market participants offloaded significant volumes of NZUs around government shutdowns in March, pushing prices to NZ€22/t - their lowest level for the year. This offloading made March the month with by far the highest volume of NZU transactions, even though typically May is the month with the most trading because of the programme's compliance deadline. Covered entities must account for their previous year's emissions by 31 May, either by surrendering the requisite amount of NZUs or by paying a certain amount per tonne of CO₂ known as the fixed price option (FPO).

The FPO, which is set by the government, is thus a de facto price ceiling - speculation about whether and to what extent the government would raise the FPO (or eliminate it altogether) has been the main price driver in the NZ ETS for years. The FPO stood at NZ\$25/t for 2019 emissions, but prices have been rising above that level every time there are indications the NZ government's ongoing ETS review will result in a higher FPO. Ahead of the surrender deadline in May 2020, the NZU price recovered somewhat and converged towards the FPO price.

Emitters chose the fixed payment option to meet about 20 percent of their compliance obligations in 2020 - meaning they paid a flat fee per tonne for one-fifth of their 2019 emissions and surrendered NZUs for the rest. This is down from 2019, when over 50 percent of the country's collective compliance obligation was satisfied via the payoff option. The drop in FPO use makes sense given the Covid-19-driven extremely low NZU prices during the months before the compliance deadline - NZU prices jumped to over NZ\$30/t in June when the government solidified ETS reforms. From 2021, the scheme has a fixed cap that is set five years in advance and updated annually on a rolling basis. Previously the programme operated without a specific cap, instead setting a limit on emissions from covered sectors (forestry, stationary energy, industrial processing, liquid fossil fuels, waste and synthetic GHGs) with covered entities having an obligation to surrender carbon units (or pay the FPO) for each excess tonne.

Emitters will still be able to pay a fixed price this coming May (for their 2020 emissions), but it is now NZ\$35/t - 40 percent higher than before. The FPO will be dropped altogether as of 2022, meaning entities will cover all of their 2021 emissions with NZUs. To facilitate this, the government will begin auctioning allowances

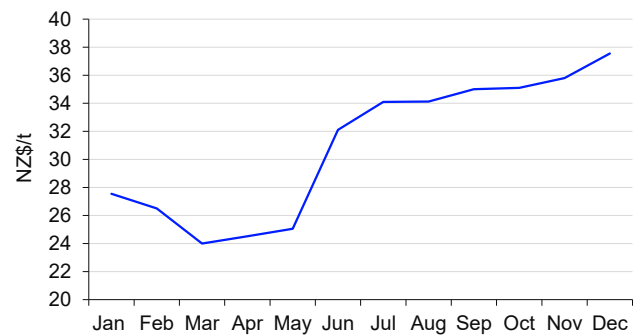
Figure 6.1: NZUs traded volumes in 2020*



Source: OMF, CommTrade

*We have changed the source of NZU transaction data for this and previous years, from the "transferred volumes" listed on the NZ Environmental Protection Authority webpage to estimates based on volumes provided by brokerage firm OMF. The latter accounts for roughly half of all NZU transactions, so we estimate total NZ volume at about twice the OMF total. The chart above represents the total traded volume. The government's definition of "transferred" does not constitute a carbon market transaction, such that figures for transferred units were four times higher than actual traded volume. We have retroactively adjusted 2018 and 2019 volume and value figures accordingly to allow for comparisons to 2020.

Figure 6.2: NZUs - spot end month prices in 2020



Source: OMF, CommTrade

to bring them into circulation as is done in the EU ETS, the WCI, and RGGI (see sections 2 and 3 of this report). The market will then also feature a cost containment reserve (CCR) that releases additional NZUs into the market if the auction clearing prices exceed a trigger price currently set at NZ\$50. The CCR trigger price will increase annually. Furthermore, the government will establish a "reserve" or minimum price at its auctions indexed to the market price of NZUs, intended to prevent auction prices from dropping below secondary market levels - like in the WCI and RGGI, bids below the reserve price are not awarded allowances at auction.

OUTLOOK FOR 2021 AND BEYOND

The first auction in the reformed NZ ETS is planned for March 2021, offering 4.75 million NZUs. The three subsequent auctions will offer the same volume, unless additional NZU are added from the CCR if the NZ\$50 trigger price is reached. We do not expect this to be the case, as government projections indicate 2021 supply will exceed demand by 2.6 million tonnes. However, some market players are already preparing for prices close to the CCR trigger, as they expect them to rise fast once the NZ\$35 fixed price option is removed after 2020 compliance is finalised in May. There is not much supply available outside of auctions, as most NZUs are held by forest owners who tend to bank them in anticipation of higher prices in the coming years.

The agriculture sector, which accounts for nearly half of New Zealand's greenhouse gas emissions, is not included in the ETS because the country's powerful farming/ranching interests argue that would kill their industry. Government officials instead declared in 2019 that they would work with stakeholders to develop a separate carbon pricing mechanism for the sector by 2025. In 2022, New Zealand's independent Climate Change Commission will review progress toward that separate mechanism, with the government retaining the right to include agriculture in the ETS before 2025 if it deems progress inadequate.

7. Paris Agreement

This section is normally reserved for a review of the year's carbon trading related developments in the United Nations Framework Convention on Climate Change (UNFCCC), the parent treaty to the Paris Agreement and its precursor the Kyoto Protocol. Each year, our discussion highlights decisions relevant to carbon markets at the various UNFCCC meetings and discussions - particularly the high-profile annual global summit on climate change (referred to as the Conference of the Parties to the UNFCCC or COP), which typically occurs in November-December.

Due to the global pandemic, none of the usual UNFCCC meetings took place in 2020. COP26, which would have been hosted by the UK in Glasgow at the end of the year, was postponed to the end of 2021 - so in lieu of reviewing the progress made on defining the global infrastructure for mitigating climate change, we take a look at other developments on this front and provide data on the market for offset units (CERs) from the Kyoto Protocol's clean development mechanism (CDM) which are still being traded worldwide.

BILATERAL DEALS IN LIEU OF ARTICLE 6

The rules for international carbon trading remain undefined, as parties have been unable to agree a final text of the Paris Agreement's Article 6 governing this issue. The main problem is how to avoid "double counting" or the situation in which the party purchasing emissions reductions and the party in whose jurisdiction the reduction takes place both take credit for those reductions. Parties are also at odds over the role of the CDM going forward (see below). With negotiations on the contentious points of Article 6 unresolved until COP26, individual parties have moved forward with bilateral transactions under their own terms. Switzerland, for instance, has signed agreements with Peru (October 2020) and Ghana (November 2020) to purchase units of reduction achieved in those countries in order to apply them toward its domestic emissions target. In the absence of globally agreed rules, such deals may serve as precedent and end up constituting an international carbon trading "template" for now.

FEW NDC UPDATES, MANY NET ZERO TARGETS

The year 2020 was supposed to be the "year of ambition," with updates to each party's nationally determined contribution (NDC) to mitigating climate change due by the end of the year. Nearly all parties submitted an initial NDC after Paris was agreed in 2015, and the pact requires that those be updated (and made more ambitious) every five years. Given the global pandemic, the timeline for submission of these more ambitious emission reduction targets has been relaxed, with only a few updated NDCs being officially submitted by year's end - and those in turn not necessarily representing much of an increased effort.

Announcements of *longer-term* mitigation efforts, however, were more plentiful - declaring a mid-century "net zero" emissions target was a trend for governments worldwide. The last four months of 2020 saw China, Japan, South Korea, Canada, South Africa and many smaller emitters commit publicly to some form of carbon neutrality goal around the timeframe of 2050, with the European

Union close to enshrining its aim for net zero emissions by that year into law.

In the absence of the postponed COP, the UK and UNFCCC held a virtual "climate ambition summit" on the fifth anniversary of the Paris Agreement (12 December) at which many parties made specific net zero commitments, formalised ones they had already made, or solidified them by making them part of domestic regulations or part of their NDC.

Carbon markets are relevant to these net zero targets and the updated NDCs because parties may make more ambitious commitments if they are able to take advantage of differences in mitigation costs through trading. For the amount of money Swiss citizens collectively pay in taxes on transport fuels or other measures to cut their *domestic* emissions, massive reforestation projects can be implemented in Peru that would sequester many more times the amount of carbon those fuel taxes would reduce (hence the bilateral agreement mentioned above). On a net basis, international carbon trading among parties can facilitate higher net reductions at lower net costs, which is why it is attractive to many parties and such a contentious issue in the global climate regime. Continued uncertainty over whether and how such trading will be allowed could disincentivise mitigation ambition: parties may be reluctant to take on enhanced targets if the opportunities for cooperation (which would lower the cost of doing so) remain undefined. Some 96 country climate pledges - about half of all NDCs - refer to the use of carbon pricing initiatives in meeting their targets.

CLEAN DEVELOPMENT MECHANISM IN 2020

The previous two COPs each failed to decide what becomes of the CDM now that the second commitment period of the Kyoto Protocol has expired and the Paris Agreement is the main venue under which international climate change cooperation takes place. The summit in Glasgow (which did not take place) was expected to result in some kind of verdict on the CDM, with parties that host CER-generating projects (especially Brazil) keen to keep the mechanism, others favouring some kind of partial carryover of certain CDM aspects, and others (Europe) pushing to eliminate it altogether. In this decision vacuum, the CDM Executive Board agreed in late 2020 to temporarily maintain the mechanism into 2021 pending a COP26 decision.

In early 2020, the International Civil Aviation Organization (ICAO) accepted the CDM as one of the standards from which air carriers may use credits to offset their emissions growth - albeit with various restrictions (see section 8 of this report).

CERs continue to be traded, as they are considered eligible offsets under various domestic carbon pricing schemes and carbon taxes in Colombia, Mexico, South Korea and South Africa. The last two countries turned out to be the biggest "users" of CERs for compliance purposes in 2020 to a government-mandated programme (KETS) and South Africa's carbon tax. South Korean emitters use CERs converted to domestic offsets called KOCs (see section 5 of this report). CERs are also purchased by voluntary buyers as an act of

offsetting to satisfy corporate social responsibility requirements or carbon neutrality targets.

To be used under regional schemes and for voluntary purposes, CERs have to be cancelled from the UN's registry. Close to 18 million CERs were cancelled to account for their use in the purposes described above - this represents a considerable *increase* from 10 million CERs in 2019, as in 2020 South Africa joined the list of active buyers. Increased cancellation also shows that voluntary carbon offsetting was not affected by Covid-19.

All these sources of demand for CERs add up to very little volume compared to the heyday of the CDM over a decade ago, where hundreds of millions of CERs changed hands each year. Only 3 million CERs traded on exchanges during 2020 (see Table 7.1) – the same volume as 2019 - while prices remained miniscule, ranging from 20 to 30 cents per tonne for Dec-20 delivery. Primary market volumes increased to 13 million tonnes in 2020, mostly due to more active CER use via cancellation from the UN registry. Only 70 million CERs were issued in 2020.

Table 7.1: CERs by segment

	2017		2018		2019		2020	
	Mt	€ million	Mt	€ million	Mt	€ million	Mt	€ million
Primary	11	18	8	30	8	39	13	60
Secondary	10	5	7	2	3	0.7	3	1
Total	21	23	15	32	12	40	16	61

8. International aviation

The International Civil Aviation Organization (ICAO) adopted its Carbon Offset and Reduction Scheme for International Aviation (CORSIA) in 2016 as a measure to meet its goal of carbon neutral growth. CORSIA was expected to provide an important source of demand for carbon offsets with its first voluntary phase starting in 2021. Emissions above a baseline calculated as the average of actual emissions in 2019 and 2020 will have to be offset by CORSIA members. However, with 2020's severe reduction in air travel due to the global pandemic, ICAO agreed to change the baseline year to 2019 emissions only. This amendment makes for low demand, given that aviation emissions are expected to remain subdued in coming years. The market for offsets in CORSIA after the pilot phase from 2021 to 2023 depends largely on how soon the aviation sector returns to its pre-pandemic activity levels. We expect demand for carbon offsets during the pilot phase of CORSIA to be insignificant due to Covid-19-induced continued lack of international air travel.

CORONA'S IMPACT ON AVIATION

The coronavirus dramatically affected the aviation industry in 2020 (see Figure 8.1): global air travel plummeted, causing huge economic losses for air carriers. The associated decrease in flight emissions (52 percent in 2020) has major consequences for CORSIA because fewer emissions mean less to offset, which in turn means less demand for offset units. CORSIA was expected to represent a large source of demand for emission units as international aviation grows: its pilot phase starts from January 2021, and so far 88 countries have agreed to participate from this first year. However, many of the ICAO member countries with the largest aviation sectors - Brazil, Russia, India and China - have not pledged to participate in CORSIA before the mandatory phase starting in 2027.

As per CORSIA's rules, airline operators covered by the scheme must offset emissions exceeding an established baseline, which was initially calculated as the average of 2019 and 2020 emissions. Seeing that the pandemic-caused decrease in aviation activity in 2020 would result in a lower-than-expected baseline (meaning higher-than-expected offsetting obligations relative to that

baseline), the ICAO Council decided in June to make only 2019 the baseline year for CORSIA's pilot phase (2021-2023). Removing 2020 from the calculation all but eliminates demand for offsets over the pilot phase, as aviation emissions are not expected to resume to 2019 levels before 2024. Based on the speed of recovery in the aviation sector, ICAO will later reassess the pilot phase baseline based on 2019 emissions.

PROGRESS ON OFFSET STANDARDS

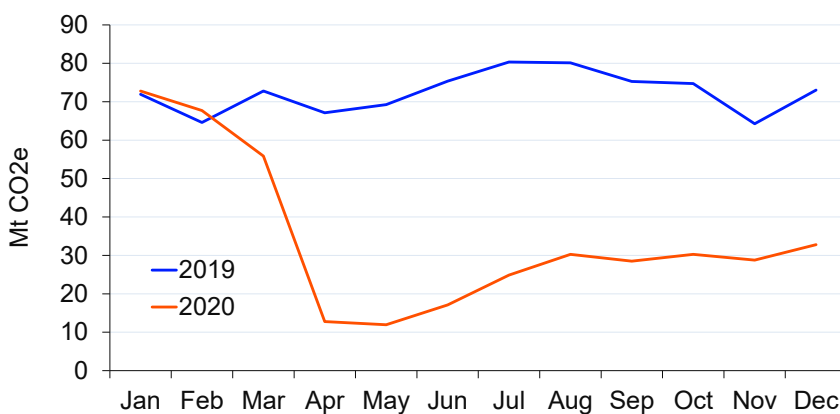
Outside of the challenges for air carriers from Covid-19, the year 2020 saw ICAO progress on important aspects of CORSIA: at its meeting in early March, it approved the first batch of offset standards that will be eligible under the scheme. After two rounds of submissions from carbon standards vying to become eligible, ICAO declared seven of the applicants compatible with CORSIA's Emissions Unit Eligibility Criteria. These are:

1. The CDM, excluding forestry projects
2. China GHG Voluntary Emission Reduction Programme
3. The Gold Standard (GS)
4. The American Carbon Registry (ACR)
5. The Climate Action Reserve (CAR)
6. Verra's Verified Carbon Standard (VCS)
7. Architecture for REDD+ Transactions (ART)

Two standards on the approved list (Verra and Architecture for REDD+) involve offsets from avoided deforestation projects (REDD).

The ICAO Council applied limits to the approved standards, however: only projects whose first crediting period starts in 2016 or later are eligible, and may only supply credits generated between 2016 and 2020. Units generated during the "Paris era" (after 2020) are not (yet) eligible - this avoids potential double counting of offsets given that rules for international carbon trading Article 6 of the Paris Agreement are not in place. The lack of clarity on the latter renders ICAO the first international institution to establish global "offsets quality benchmarks" under CORSIA.

Figure 8.1: Global aviation emissions



Source: RDC

Given the above limits, the total potential supply of offsets available to air carriers during CORSIA's pilot phase (excluding those from avoided deforestation projects) amounts to 569 million eligible emission units according to analysis by the group Ecosystem Marketplace.

OUTLOOK FOR 2021

Despite vaccination programs being implemented globally, 2020's coronavirus related reduction in international air travel is expected to continue. In a December report, ICAO forecast international aviation activity at around 70 percent of an equivalent non-pandemic scenario in the first half of 2021. That forecast projects the aviation sector returning to 2019 activity levels sometime in 2024. The ICAO Council will decide in 2022 whether to extend the

amended CORSIA baseline beyond 2023, reasoning that by then the long-term consequences of Covid-19 on global air travel will be more evident.

We find that the amendment of the baseline will delay the start of offset trading in CORSIA: with very little demand for offsets over the next few years air carriers have little incentive to begin procuring such units ahead of 2025 when they are required for offsetting emissions growth. Nevertheless, the infrastructure for purchasing activity is ready. In November, the International Air Transport Association launched the Aviation Carbon Exchange – a platform for airlines and other aviation stakeholders to offset their carbon footprint, most importantly those with obligations under CORSIA. The first transaction happened almost immediately after the launch, although it is not clear if the volume purchased has been earmarked for CORSIA compliance or for voluntary offsetting.

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