The cost of emitting greenhouse gases rose sharply in 2021 in all major emission trading systems (ETS). EU emission allowances ended the year above €80/t – more than double their price at the end of 2020. UK allowances fetched an even higher price, following the launch of the new stand-alone UK ETS. In both North American markets (WCI and RGGI) permit prices rose 70 percent over the year.

In Europe, home to the largest carbon market by traded volume, the skyrocketing permit prices were due to increased climate change mitigation ambition that will lead to a tighter market balance. In addition, soaring natural gas prices led to more coal power generation, which spurred demand for allowances and made them more expensive.

China’s national ETS began seeing transactions in July. With most covered entities still becoming familiar with trading, the market featured limited liquidity and modest prices compared to the size of covered emissions and to other more mature ETS.

Across all markets, the emission allowance price rise was particularly strong in H2. Indexed to July, South Korean permits had gained more than 70 percent by year-end, UK allowances nearly as much. RGGI, EU and New Zealand allowances gained between 45 and 55 percent in this period.

Surging prices combined with a modest rise in volume led to a record high turnover of €760 billion. That represents a 164 percent increase from the €289 bn realised in 2020.
This report presents Refinitiv’s assessment of the world’s major carbon markets in 2021. 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, primarily carbon trading platforms such as ICE, EEX, KRX, and the Chinese carbon exchanges. When relevant, we estimate and add 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. Chief among these is Europe with its EU ETS, and since 2021 also the UK ETS. We do not include data from the Swiss ETS. In North America we look at the WCI, RGGI, and the emerging market in Mexico. In China we include the regional pilot ETS, offset trading (CCERs) and for the first time in 2021 trading in the national ETS. We also include South Korea (KETS), New Zealand (NZ ETS), and an assessment of what is left of global offset transactions from the old CDM market.

The report also comments on developments in international aviation emissions and related offset trading, in voluntary carbon markets, and on how the Paris Agreement Article 6 might affect carbon trading. These three chapters contain mainly qualitative information, but for future editions of the Year in Review our aim is to provide also quantitative data once the markets evolve and such data become available.

This report was written by the following team of analysts: Anders Nordeng and Ingvild Sørhus (Norway), Maria Kolos (Ukraine), Luyue Tan (China), and Lisa Zelljadt (USA).
1. Executive summary

Total turnover of global carbon markets grew 164 percent in 2021, partly on higher volumes but primarily on skyrocketing prices. Traded volume reached 15.8 billion tonnes (equivalent to 15.8 gigatonnes of CO₂), which is 24 percent higher than the 12.7 million tonnes (Mt) traded in 2020 - see Table 1.1. We estimate the value of these transactions at around €760 billion, compared to €288 billion in 2020.

CARBON PRICES ON THE RISE

Prices for allowances in cap-and-trade programmes worldwide are going up. The most significant example of this trend is the EU ETS, but the North American carbon markets (Western Climate Initiative or WCI, which includes the state of California, and the northeast’s Regional Greenhouse Gas Initiative known as RGGI) are also seeing ever higher carbon prices, as is the New Zealand ETS. South Korean allowance prices dropped during H1, then saw the fastest growth of all the major allowance units in H2 - see purple line in Figure 1.1. In the period July to December 2021, European allowance prices (red line) gained more than 50 percent. The yellow line shows prices in the UK ETS, which started trading in May and increased nearly 70 percent between July and December. China's national ETS started trading in July. Volumes were low, especially during the first months, and prices dropped before a rebound in late December. In Figure 1.1, which shows volume-weighted monthly average prices, CEAs (Chinese emission allowances) ended the year below July levels. In absolute prices this corresponds to an average of CNY50/t in July and CNY42.89/t in December. However, if we look at daily prices, we see that the CEA contract closed 2021 at 54.22 CNY/t (~€7.5), which is up 13 percent from the opening price on 16 July - see more details in Chapter 5.

Comparing annual average prices over the last five years, Figure 1.2 shows that UK allowances were most expensive on average, at €65/t, before the EU ETS at €54/t. Since all entities covered by the UK ETS were covered by the EU ETS until 2021, the comparison is less significant – the UK market started trading as such in May, so the British average does not include the early months of 2021 when prices were generally lower across the other markets.

Emission permits in New Zealand, the WCI, and South Korea averaged €30, €20, and €17/t, respectively. At the lower end of the range are the two ETS that cover the power sector only: RGGI at €9/t and China’s national ETS at €6/t.

The countries/regions these carbon markets are in have been moving toward more ambitious climate targets, and emission trading is set to play an important role in reaching them. The price rallies shown here are an effect of this, reflecting market participants’ expectations for a tight future supply-demand balance. We see a clear correlation between policies and prices.

<table>
<thead>
<tr>
<th>Table 1.1 Global carbon market size 2019-2021</th>
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<td>Refinitiv’s assessment of volume and value of the major carbon markets from 2019 to 2021. Millions of tonnes (Mt), millions of euros *</td>
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<td>Europe (EUA, aviation EUAs)**</td>
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<td>UK ETS</td>
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<td>North America (WCI, RGGI)</td>
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<td>CERs (primary and secondary)</td>
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<td>Total</td>
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*All non-European transactions are priced in local currencies, for the sake of consistency we have converted values into euros. 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.

** Volume and value include spot, auctions and futures. Option positions are not included.

*** Volume includes allowance units for pilot ETS, national ETS (for 2021), and CCER transactions. Value includes only allowances.

Source: Refinitiv, January 2022
European carbon saw a record rise in 2021. Starting the year at €33/t, the EUA reference contract (futures for delivery in December 2021) traded above €90 in early December. Combined with a 17 percent growth in traded volume, the turnover of the European Emission Trading System (EU ETS) grew from €260 billion to €683 billion, a 162 percent jump year-on-year. The EU ETS represents 90 percent of global turnover, despite covering a relatively modest volume of emissions (some 1.4 gigatonnes annually, compared to 4.5 Gt in the Chinese national ETS). The fact that a European Emission Allowance (EUA) changes hands many more times per year on average is sign of much higher liquidity and thus renders the EU ETS the world’s largest carbon market. The EU ETS is also much more mature, going on its seventeenth year, whereas allowance trading in China only began six months ago.

European carbon market participants anticipate a tighter supply-demand balance because of ongoing adjustments to make the EU ETS fit for the block’s new 2030 target of at least 55 percent emission reduction. That was the main price driver in 2021, in combination with a bullish European energy complex due mostly to extremely high natural gas prices. The gas shortage led to an energy crisis in Europe with strong margins for coal power generation: despite historically high coal and EUA prices, electricity generation from coal was highly profitable throughout H2. With limited supply of gas, a dwindling number of nuclear reactors, and little wind, coal has been running at near to full capacity - that has led to additional demand for EUAs.

Along with elevated prices, the EU ETS saw an influx of non-compliance traders, most notably hedge and pension funds. These financial or non-compliance entities are attracted by what has proved to be a profitable investment opportunity over the last three years. Some stakeholders argue financials’ speculative activity constitutes market manipulation and causes the higher EUA prices, but investigation by the European Commission and the European Securities and Markets Authority has disproved this concern.

Launch of the UK ETS

The UK ETS was launched in January 2021 as a result of the British decision to leave the EU and hence also the EU ETS, and the UK government’s desire to continue using cap-and-trade as an instrument to achieve its long-term abatement targets. Auctions and secondary trading (futures and spots) started in May. Since then, UK allowances took price direction from the EU ETS, but most often with a premium. On average over the year, the UKA had the highest price across all major carbon markets. The conditions for triggering the cost-containment mechanism were met in December and January, but on both occasions the UK ETS Authority assessed prices to be driven by fundamentals and therefore decided not to intervene in the market.

Steady Growth in North America

The year 2021 saw record volume and value for both the California-led Western Climate Initiative (WCI) and the northeastern Regional Greenhouse Gas Initiative (RGGI). Allowance prices rose 70 percent...
Over the course of the year in both programmes, and traded volume also hit record highs. Combined, the two ETS saw 2.7 billion metric tonnes change hands and were worth over €49 billion.

Allowances traded in the WCI averaged €18.43 in January and gained more than €12.50 to end the year at just under €31. Those traded in RGGI followed nearly the same path, averaging just under €8 in January and ending the year at €13.67.

Both programmes' caps are on a tighter trajectory through 2030 than they were through the end of 2020.

First Year of China’s National ETS: Limited Trading, High Compliance Rates

China’s national emission trading scheme became fully operational in 2021, obliging more than 2,000 power generators to surrender allowance units to account for their 2019-2020 emissions by the end of 2021. Official trading started in mid-July. Unlike other ETS, China’s emission cap (the overall supply of allowances) is not decided upfront but based on emission intensity. Some 179 Mt worth of Chinese emission allowances (CEAs) were transacted during the first five and a half months of trading in the national ETS, a modest volume compared to the much more liquid carbon markets in Europe and North America. Trading of national offset units (known as CCERs) saw a sharp increase from previous years at 170 Mt, due to the fact that compliance entities in the national ETS were allowed to cover a small portion of their emissions with CCERs instead of the more expensive CEAs.

There are also nine regional pilot emission trading systems in China, many of which have existed for nearly a decade, that also featured significant transaction volume. Most of the emitters covered by these programmes will gradually transition into the national ETS, starting with the power sector.

The first phase of the national ETS covered the power sector only, but its scope will expand in the coming years with sectors like cement and non-ferrous metals likely being included, possibly already for their 2022 emissions.

Raised Climate Ambitions Pushed Prices up in South Korea and New Zealand

Allowance prices in South Korea’s ETS experienced a severe drop in H1 due to a market surplus carried over from the previous year, and compliance for the period to which that surplus applied being due at the end of June. Prices began rising immediately after the compliance deadline. The country’s new higher emission reduction ambition was a key driver, helped by the decision to allow non-ETS compliance players to participate in the market. We expect bullish sentiment to continue further in the years to come. We also expect Korea to be a key source of demand for international carbon credits.

The New Zealand market saw a record increase in both traded volume and value in 2021, mostly due to long-planned amendments to the NZ ETS entering into force. Allowance prices boomed starting in June and reached record highs by the end of the year, as covered entities anticipated demand increases due to a set of supply-tightening policies adopted in 2021. We expect the bullish trend to continue in 2022, which will be the first time NZ ETS participants do not have the so-called fixed price option for compliance.

Growth in Non-compliance Carbon Trading

Beyond these geographically limited systems for trading emission allowances (permits) issued by governments (whether regional or national), there are signs of emerging global trading in emission offsets. Unlike allowance units that are issued annually in limited and generally pre-defined batches by their respective authorities (governments) under mandatory ETS designed to help the respective governing jurisdiction meet its emission target, offset units represent emissions avoided or removed by specific projects. The idea is that the ‘saved’ amount of greenhouse gas offsets the emissions of governments, companies or individuals who pay for that savings to happen when it otherwise would not have. This “offset market” allows such entities to compensate for their own emissions by helping to finance reductions elsewhere (in other sectors and/or in other countries).

The Paris Agreement foresees new forms of international trading under its Article 6, which sets rules for transacting so-called internationally traded mitigation outcomes (ITMOs). After years of disagreement, parties to the UN Framework Convention on Climate Change finally agreed on those rules at their 26th meeting in Glasgow in November 2021. We expect a body to govern the new mechanism for trading ITMOs to be set up over the course of 2022. Countries that want to offer emission reductions (generated by projects on their territory) have an interest in setting up the requisite regulatory infrastructure as soon as possible.

In parallel to the Paris Agreement Article 6, the global aviation industry is developing its own system for offsetting emissions from international flights. Known as CORSIA, it aims to keep net emissions from international air travel at 2020 levels. This requirement, adopted in 2016, was expected to generate huge demand for offsets given that international air travel was on the rise, but due to the dramatic decline in air travel during the global pandemic aviation emissions are nowhere near the levels expected when CORSIA was established. There will be no offsetting under CORSIA anytime soon. In terms of demand for carbon credits, all eyes are now on the sector’s rate of recovery. That said, several airlines are making voluntary commitments to reduce their carbon pollution, using offsets to cover their residual emissions.

Airlines are not the only source of demand in the voluntary carbon markets (VCM). Companies, organisations, and even individuals increasingly purchase units generated by projects that reduce emissions in order to become ‘carbon neutral’ or pursue a ‘net zero’ strategy. The VCM is still a fragmented market with several competing exchanges and much volume traded bilaterally. This edition of the Year in Review report is the first to cover voluntary markets. We do not (yet) attempt to assess overall turnover of this segment, but we provide some pricing and volume data that give an idea of trends in a market that has huge potential for growth.
2. EU ETS

A strong and persistent rally took Europe’s carbon price to new highs in 2021. Starting the year at €33/t, EUAs traded above €90 in early December. Volumes grew “only” 17 percent, but with the dramatic increase in price, the turnover of the European carbon market amounted to €683 billion, up 162 percent from 2020.

The two key drivers of this unprecedented price increase were expectations of tighter market balance, and a bullish energy complex – gas prices in particular rose to record levels in 2021. Parallel to the elevated prices, more non-compliance entities were trading carbon contracts - most notably hedge and pensions funds. Whether the high prices are luring these ‘speculators’ or they are the cause of the high prices is up for debate. A preliminary report by the European Securities and Markets Authorities (ESMA) dispels any notion of market manipulation by such actors, but some EU member states are nevertheless calling to curb market access for non-compliance traders.

PRICES AND VOLUMES

The turnover of the European Emission Trading System (EU ETS) increased from €260 billion to €683 billion in 2021, a 163 percent jump. A total of 12.2 billion emission allowances changed hands, up 17 percent from 2020. The lion’s share of transactions came from front-year futures (December 2021 delivery), but contracts further out on the curve (2022 and beyond) traded frequently and quite a bit of volume transacted during the weekly sales on the three EUA auction venues (EU common, German, and Polish platforms). Our assessment of EU ETS volume also includes transactions of aviation EUAs.

The price of the front-year futures EUA contract (Europe’s reference carbon price) surged throughout 2021, from €33/t in January to a record high above €90/t on 8 December - see Figure 2.1. Prices set new record highs on 62 out of 259 trading days in 2021. The reference contract ended the year at €80.22/t – more than double the 2020 closing price at €32.72/t. The average price over the year was €53.65/t, compared to €24.83/t in 2020.

Two main factors drove this persistent and strong price surge in 2021. First, the EU’s new more ambitious climate target for 2030 - and its accompanying policy proposals to recalibrate all parts of Europe’s climate and energy policy framework, including the EU ETS – created expectations of a much tighter market in the coming years. Second, the strong surge in gas prices and its spillover effect on the European energy complex made for an unusually high demand-supply ratio - mainly during Q4 of 2021.

PRICE SUPPORTED BY ‘FIT FOR 55’ DISCUSSIONS

In September 2020, the European Commission proposed to ramp up Europe’s 2030 emission reduction target from 40 to at least 55 percent below 1990 levels, a move endorsed by the 27 member states in the Council in December 2020, and embedded in the new European Climate Law in April 2021. On 14 July 2021, the Commission put forth a series of legislative proposals (the so-called ‘fit for 55’-package) to meet this more ambitious target, including reforming the ETS Directive - see summary of key proposals that will affect the EU ETS in the Fit for 55 section below. It should be noted that the Commission started drafting these files long before the new tighter overarching target was formally approved by lawmakers: the EU Parliament had favoured a 60 percent target, which would have meant even more carbon market recalibration. This process has now entered a phase in which the lawmakers are discussing concrete amendments to the various Fit for 55 proposals.

Since December 2020, when it became clear that the new target would be at least 55 percent if not higher, the anticipation of reduced supply of EUAs up to 2030 has lent considerable support to the EUA price. Even though none of the proposals that aim to implement it are yet approved, the 55 percent target as such is legally binding, and the market has priced in a tightening of the supply-demand balance.

Figure 2.1: Price of front year EUA contract on the Intercontinental Exchange (ICE) in 2021
NEW KEY DRIVER: GAS

After a cold spring, the 2021 restocking of gas storages in northwest Europe was delayed until May, when levels were around half of their 5-year average. Gas inventories increased during Europe's summer, but never recovered to seasonal norms due to limited pipeline flows from Russia and LNG cargoes directed towards Asia to cover high demand there. When winter heating demand kicked off in November, European gas inventories stood at only three quarters of the 5-year average. To attract gas flows to inventories, the benchmark front month TTF gas price spiked to record highs above €180/MWh in fourth quarter—averaging at €48/MWh over the year four times higher than 2020.

The record strong gas prices again led to record strong electricity prices. As a fuel for generating electricity, natural gas (together with anthracite or hard coal), has the highest marginal costs in the European merit order after accounting for emissions with European allowances. The gas shortage led to an energy crisis in Europe with rallying prices in the entire energy complex and unprecedented margins for coal power generation as illustrated in Figure 2.2.

These gas price developments were an important driver for the carbon price throughout most of 2021, but in October carbon decoupled from the rest of the European energy complex. The heavy sell-off in carbon occurred in stark contrast to a simultaneous steep rally in TTF gas prices when the front-month contract spiked. We believe this occurred because market participants were forced to sell EUAs to cover losses in gas and power markets. In addition, the surging energy prices caused more and more industrials in Europe to cut production amid rising concerns about demand disruption as well as worries about policy intervention in the EU ETS.

From the beginning of November, the carbon price saw an unprecedented rally where it added more than €20 in 20 trading days – this took the front-Dec allowance price to a record high of €90/t. The rally came on the back of supportive fundamental factors including (1) a colder than expected start of December, (2) more coal burn (favourable clean dark spread due to skyrocketing gas prices), (3) a tighter EUA supply due to delayed 2021 free allocation, and (4) the usual year-end pause from the weekly auctions.

Table 2.1: EUA trading by segment (excluding options), 2018-2021

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Figure 2.2: Clean dark and spark spreads Jan 2020-Dec 2021, 36% efficient coal, 50% efficient gas, front-month

The spread is the profit realised by a power generator after subtracting the cost of fuel and the cost of carbon allowances. The dark spread reflects the profitability of a coal-fired generating facility, the spark spread of a gas-fired facility. Given that coal emits over twice as much CO₂ per MWh generated as gas, it takes high gas prices, high carbon prices, or both to create a situation in which the dark spread is higher than the spark spread.
POWER DEMAND RECOVERY, COAL IN THE MONEY, LITTLE WIND

The demand for electricity in Europe changed completely in 2021, as economic recovery following the Covid-19 related slump in 2020 resulted in higher electricity generation in 2021. According to data from the European Network of Transmission Operators for Electricity (ENTSO-E), power generation in the European Union’s 27 member states (EU27) increased by eight percent year-on-year in 2021 to a total of 2,747 TWh. The increase in electricity demand, combined with the skyrocketing gas prices explained above, pushed coal-fired power generation up in the merit order. Exceptionally low wind speeds across Europe decreased renewable power generation, in turn boosting coal burn. As a result, emissions from power generation in the EU ETS have been higher in 2021 than in 2020 – we estimate an increase of 87 Mt or 15 percent in 2021 compared to 2020. These numbers exclude UK emissions for both years.

Electricity generation from lignite and hard coal rose by 39 and 19 percent year-on-year, respectively. Even compared to 2019 levels, power generation from coal rose by 8 percent despite Europe’s ongoing effort to phase out the fossil fuel. Coal ended up replacing the wind power generation, which fell by 1 percent in EU27. In Germany, Europe’s largest wind power capacity, combined electricity output from wind farms fell by over 9 percent.

As shown in Figure 2.3, power generation in Europe became significantly more carbon-intensive in 2021. The share of hard coal (anthracite) and brown or soft coal (lignite) in the EU’s power mix rose from 13 percent in 2020 to 16 percent. In Germany, generation from these two sources rose by 30 and 56 percent, respectively. Generation from coal thus made up 28 percent of the German power mix, up from 20 percent in 2020. Germany shut 1.5 GW coal capacity in 2021 under its coal exit plan. Other coal-heavy countries like Poland and Czechia also posted strong increases in the share of coal-fired generation.

In contrast, the share of natural gas in the EU’s power mix was unchanged from 2020, at 18 percent of total power generation in the EU27. This was a result of the exceptional rally in European gas prices explained above: the TTF front-year contract rose from €16/MWh in the beginning of the year to the yearly high at €139.6/MWh towards the end of December, averaging €34/MWh in 2021 compared to €13.50/MWh in 2020. Geopolitical tensions around the Nord Stream 2 pipeline added to the bullish pressure on gas prices. Given increased profitability, coal-fired power plants started replacing gas power plants. Our calculations for 38 percent efficient coal powerplants’ gross margins, including the cost of emission allowances, show that coal margins recovered from negative territory in 2021 rising above the gas power plants’ margins – see Figure 2.2.

As for industry, the last months of 2021 gave several examples of energy and/or emission intense companies that reduced output because of the high input costs. European steel mills, fertiliser manufacturers and others – whose rivals in other continents benefit from cheap energy – chose to limit production rather than run at a loss. Some of them pointed to carbon costs as a main competitive disadvantage, but evidence put forth by the European Commission suggests high energy prices are more to blame.

FIT-FOR-55

As the Climate Law entered into force in mid-2021, Europe is legally committed to reduce GHG emissions by at least 55 percent from their 1990 level by 2030. The continent’s climate and energy legislation will be completely revamped to achieve this more ambitious target, via a wide range of proposals known as the Fit for 55 package. Most of the legislative proposals were presented by the European Commission on 14 July, and a second batch of proposals came out in December 2021.

The EU ETS will be a key instrument in delivering the planned emission abatement. The Commission’s plans foresee it covering a wider share of the economy: CO2 emissions from the maritime sector – is set to be added to those already covered by the cap. Road transport and heating, on the other hand, may be placed into a separate ETS rather than being covered by the existing EU ETS.

Overall, the emission budget will decline more steeply than under the existing framework, through a combination of a one-off cap reduction and a more aggressive annual tightening. The cap

Figure 2.3: Power generation fuel mix 2021 and 2020

*Source: Refinitiv*
Review of carbon markets in 2021

(maximum allowed emissions) will decline from 1.5 billion tonnes in 2020 to 850 million tonnes in 2030. Compared to the start of the EU ETS in 2005 and adjusting for the current member states and sectors covered (many were not covered back in 2005), that corresponds to a 61 percent reduction in allowed emissions. The lion’s share of the abatement will be borne by the two biggest ETS sectors: power generation and industrial manufacturing.

Though the elements of Fit for 55 most relevant to the European carbon market are those pertaining to the ETS and its Market Stability Reserve (MSR) changes to the Renewable Energy Directive and the Energy Efficiency Directive are also important: increased ambition in these fields are part of the overall fit for 55-reform and will inevitably lead to reduced emissions and hence reduced EUA demand from Europe’s power sector.

Another relevant policy is the proposal for a carbon border adjustment mechanism (CBAM) or fee pertaining to the carbon intensity of imported goods. This measure is intended to gradually replace free allocation as the default protection against carbon leakage during the period 2026-2035. The Commission’s CBAM proposal eyes five sectors: iron/steel, aluminium, cement, fertiliser, and electricity. Importers of these products will surrender ‘certificates’ representing the amount of greenhouse gases emitted by producing goods in these sectors. This puts those goods on a level playing field with their European counterparts, as EU manufacturers of the same goods must buy permits for the CO₂ caused by their production under the EU ETS.

The CBAM is highly controversial internationally, with many of Europe’s trade partners characterising it as a thinly veiled protectionist measure and thus threatening to challenge it before the World Trade Organisation. But other trade partners like Canada and the UK are mulling similar systems themselves, citing the need to level the playing field when products made in countries with lax climate legislation and low CO₂ prices have a competitive advantage. The mere threat of seeing their exports subject to the EU’s CBAM has led neighbouring countries that export carbon-intensive goods to Europe (e.g. Russia, Ukraine and Turkey) to update and improve their climate policies. The EU has repeatedly said that the best CBAM is the one that never needs to be implemented. It wants the instrument to serve as carrot and stick to nudge trading partners into ramping up their climate change mitigation ambitions.

The process of tightening the EU ETS to make it “fit for 55” is now underway. In the European Parliament, rapporteurs and shadow rapporteurs from the various political groups started drafting amendment proposals in Q4 of 2021. The report on the Market Stability Reserve intake rate came out in early December, followed by the one on the CBAM file. Then, in mid-January, Peter Liese of the Parliament’s environment committee presented his report on ETS, which will be the reference point for the debate in the European Parliament going forward.

The European Council started preliminary discussions of the Commission’s ETS revision proposals under the Slovenian presidency in 2021, with several capitals speaking out against creating a parallel ETS for road transport and heating. The Council is expected to enter a more detailed discussion on the ETS revision and other files under the French presidency (January-June 2022). This year will be the crucial period for political negotiations to process the fit for 55 files and put Europe on the road to implement its new 2030 climate ambition.

Amid the prevailing high energy prices across Europe, and with carbon prices reaching €90/t in December, some member states and other stakeholders called for market intervention and/or for postponing the whole Fit for 55 process. Other member states (and the Commission) pointed out that climate ambition must prevail (the 2030 target is legally binding). They argue that transitory energy prices should not stand in the way, and that Europe has set aside funding to tackle energy poverty.

DID SPECULATION DRIVE UP THE PRICE?

Ever since the EUA price started increasing in the second half of 2018, hedge funds and pension funds have shown growing interest in EUAs as an investment object. Evidence of this can be found in data on option positions of different types of market participants released weekly by ICE, EEX and other carbon exchanges. Member states thus asked the Commission to investigate speculation in the carbon market, and some proposed banning non-compliance entities from participating.

The European Securities and Markets Authority (ESMA) is currently looking into accusations of “speculator manipulation” of the EU ETS - it delivered a preliminary report in November 2021 that found no evidence of market manipulation based on the positions of different types of market participants on ICE and EEX, the two key exchanges for EUAs. The ESMA report stated that “the growing number of market participants appears in line with the observed expansion of the EU ETS market.” ESMA is due to present a more detailed study of the EU ETS in early 2022.

The near tripling of the EUA price in 2021 also led to doubts over whether Article 29a of the EU ETS Directive will be triggered: this somewhat obscure part of the legislation gives the European Commission the authority to intervene in the market to calm prices if they rise too far too fast. Given that it says intervention is warranted only when the EUA price is more than three times the average price of allowances during the two preceding years for more than six consecutive months and not fundamentally driven, we find a triggering of Article 29a highly unlikely.

OUTLOOK 2022: GAS AND POLICY REMAIN KEY DRIVERS

The fact that emissions rose in 2021 will affect the Total Number of Allowances in Circulation (TNAC) for 2021 due to be published mid-May. That will reduce slightly the Market Stability Reserve’s intake from September 2021 to August 2021, showing the dampening effects of the MSR.

Gas prices will likely continue to influence the EUA price into 2022. The current gas price level points to very little coal-to-gas switching in the European power mix. However, an easing of gas prices could
lead to more gas-fired generation in Europe's power mix and thus have a bearish impact on EUA prices. Though prices typically go up around “compliance season” in the EU ETS, the year 2022 could see this trend exacerbated. Covered entities must report their 2021 emissions by the end of March, and compliance (surrendering EUAs to cover those emissions) must be done by end of April. With the 2021 increase in emissions, due both to post-covid recovery and more coal burning, we could see stronger than normal price support running up to compliance this year. A delay in allocation that occurred in 2021 may cause nervousness around receiving free permits in 2022, which in turn leaves industry reluctant to sell potential surplus allowances and could thus add to the tightness in the market.

On the policy front, 2022 will feature tough negotiations among EU lawmakers on the details of the ‘Fit for 55’ proposals. We foresee wrangling about the degree to which elements of the ETS will have to be changed to achieve the more ambitious target. The Commission wants a 4.2 percent annual reduction factor out to 2030 and also a one-off cap reduction, something that could likely happen in 2025. It proposes to keep the intake rate of the Market Stability Reserve at 24 percent instead of reverting to a default 12 percent, but with a lowering when the market gets closer to “balanced,” a so-called buffer MSR.

Signals from the European Parliament so far suggest these questions are not at the front of debate: a draft report by the Parliament’s ETS rapporteur on 14 January did not challenge any of these fundamental parameters for alteration/tightening. The member states in the Council, however, have not yet delved into these details. The Polish government has said it will try to water down the proposals, but it may have trouble finding allies in that endeavour as the power play between European capitals is changing. Czechia and Hungary have often sided with Warsaw on questions of energy/climate, but the former has a new, more pro-European government and Hungary’s Victor Orban is facing an uncertain election on 3 April.

Whereas previous ETS reforms saw a fault line mainly between “pro-climate” north-western Europe and a more “pro-coal” south-east, that picture is becoming more nuanced. As the ongoing energy crunch plays into the Fit for 55 discussions, some countries (including western member states) are voicing concerns over non-compliance entities’ participation in the market - this could continue to figure in EU Council discussions. If the Council pursues a watering down of the changes to the MSR, that would be a downside risk for EUA prices.
3. UK ETS

Since the UK is no longer part of the European Union, its carbon market has also been spliced from that of the continent – facilities located in the UK that were covered by the EU ETS are now covered by the UK ETS. Hence this year marks the first time we cover UK emission trading not as part of the EU ETS but as a separate stand-alone emission trading system. UK allowances (UKAs) took price direction from the EU ETS, but most often with a premium. On average over the year, the UKA had the highest price across all major carbon markets. The conditions for triggering the cost-containment mechanism were met in December and January, but on both occasions the UK ETS Authority assessed prices to be driven by fundamentals and therefore decided not to intervene in the market.

LAUNCH OF THE UK ETS

The UK launched its own ETS on 1 January 2021 as a direct effect of Brexit. Modelled on the EU ETS, the UK ETS is meant to be a key instrument for the UK to achieve its long-term carbon abatement targets. Except for a few new entrants, the roughly 2000 covered entities were previously part of the EU ETS - their last compliance there was in early 2021, for 2020 emissions. The scope of the UK ETS mirrors that of the EU ETS, covering energy intensive industries, power generators and aircraft operators. Transactions and holdings are tracked in the UK registry, where market participants have operator holding accounts. Unlike the EU ETS, the UK ETS has a price floor, currently at £22/tonne (~€25).

The emission cap for 2021 was set at 156 million UK allowances (UKAs), of which 86 million were offered on bi-weekly auctions that started in May. The rest was distributed for free to covered entities. The current cap trajectory foresees a gradual reduction down to 118 million UKAs in 2030.

PRICES AND VOLUMES

Secondary trading started with UKA spot and futures contracts on 19 May 2021. In contrast to the EU, the UK system has no accumulated surplus, a difference that made market participants uncertain how prices would evolve. From the outset UKA prices traded with a premium to the EUA market, but the spread between the two markets quickly narrowed even though UKAs continued to mimic EUAs - see Figure 3.1. In October and November, the premium for UKAs widened because of the unusual developments in the European energy complex - electricity prices surged even higher in the UK than on the continent.

Some 251 million UKAs transacted as spot and futures contracts (mainly as December 2021 futures). In addition, 84 million UKAs were sold at auctions. In total, this makes for a traded volume of 335 Mt – only 2.5 percent of the 12 billion EUA transacted volume. Turnover amounted to £19.5 billion or approximately €23 billion, see Table 3.1 - this is 3.3 percent of the €683 billion EUA turnover. Even when adjusting for relative size (UK covered emissions are roughly 100 million tonnes vs. 1.4 billion for the EU) and the fact that trading did not begin until mid-May, the UK ETS is less liquid than its counterpart.

COST CONTAINMENT MECHANISM

Given persistently high prices in H2 of 2021, some market observers expect a market intervention to boost supply. Since the UK ETS is a new system in which operators have not had the chance to accumulate allowances through banking (none were issued before 2021), the UK’s Greenhouse Gas Emissions Trading Order foresees various measures to cut the risk of high prices. Of these, the most relevant is the Cost Containment Mechanism (CCM) that seems...
to be inspired by the EU ETS Directive’s Article 29a (see EU ETS chapter). It allows (but does not oblige) the UK ETS authority to intervene in the event of extended price spikes, with the UK ETS Authority communicating monthly the exact level warranting an intervention. An additional condition is that the price rise may not correspond to market fundamentals. Possible intervention measures include redistributing allowances between the current year’s auctions, bringing forward auctioned allowances from future years to the current year, and drawing allowances from the market stability mechanism account.

With the elevated price levels in September, October and November, the Cost Containment Mechanism (CCM) was triggered in December. The UK ETS authority concluded that the price level was indeed a result of market fundamentals and decided not to intervene. It reached the same conclusion in January.

**LINKING?**

During the Brexit negotiations, the UK government expressed interest in eventually linking up with the EU ETS - but it has not pursued that idea since 2020. A link between the UK ETS and the EU ETS makes sense on many fronts (not least to boost liquidity) and in theory should be relatively easy given that the UK has based its scheme on the EU model. Still, such linking would need to be part of a political agreement between the UK and the EU – a process that will inevitably involve more than mere hashing out of logistical details. As per the EU ETS Directive, linking must occur through a formal treaty between the EU and the UK - linking of the Swiss ETS and the EU ETS took almost a decade.

**OUTLOOK FOR 2022**

We expect the UKA market will continue to look to the EU ETS for price direction in 2022. However, towards compliance for 2021 emissions, UKAs will likely trade at a premium to EUAs, given uncertainty whether UK emitters have sufficient allowances to surrender for compliance. We expect the 2022 compliance season to feature higher prices for EUAs as well, but the difference in the UK ETS is that there is no oversupply in the market. Further out, once UK emitters start to build more significant UKA reserves, we foresee a decoupling of the two markets unless London and Brussels agree to link their emission trading systems.

Given that the conditions for the Cost Containment Mechanism were triggered twice so far without leading to any market intervention, we find it unlikely that market intervention would occur in 2022 – especially because from February and for the remainder of 2022, the trigger price will no longer be two, but two-and-a-half times higher than the average for the 2-year reference period. With a higher trigger price, it is less likely that the CCM will be triggered - the perceived lower risk of market intervention is likely to bolster UKA prices.

### Table 3.1. UKA trading in 2021. Auctions and exchange.

<table>
<thead>
<tr>
<th></th>
<th>Mt</th>
<th>£ million</th>
<th>€ million</th>
</tr>
</thead>
<tbody>
<tr>
<td>UKAs auctioned</td>
<td>84</td>
<td>4 310</td>
<td>5 054</td>
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<tr>
<td>UKAs exchange traded</td>
<td>251</td>
<td>15 158</td>
<td>17 793</td>
</tr>
<tr>
<td>Total UK</td>
<td>335</td>
<td>19 468</td>
<td>22 847</td>
</tr>
</tbody>
</table>
4. North America

MARKET DEVELOPMENTS

The year 2021 saw record volume and value for both North American carbon markets, with permit prices rising 70 percent over the course of the year in both programmes (see Figure 4.1) and traded volume also hitting record highs. Combined, the two programmes saw 2.7 billion tonnes change hands and were worth over €49 billion - see Table 4.1.

Note that the monthly volumes in Figure 4.2 show exchange transactions only. Both WCI and RGGI conduct quarterly auctions in the primary market (freshly issued permits). These volumes are shown in Figure 4.3.

The volume growth was particularly stark in the smaller of the two markets, the Regional Greenhouse Gas Initiative (RGGI), as it represents a trend reversal: even though the state of Virginia joined RGGI in 2020, fewer RGAs changed hands that year than in 2019 - but 2021 saw nearly double the 2020 volume, largely due to more activity in the secondary market.

At the dramatically higher prices, this volume growth made for correspondingly huge increase in market value for both markets - especially since more transactions took place toward the end of the year, when prices were highest (see Figure 4.1). November was the most active trading month by far for both markets. Given that the deadline for WCI entities to surrender permits for all their emissions in the three-year compliance phase 2018-2020 was 1 November 2021, we do not attribute the volume surge to impending compliance requirements that are so often the reason for increased market activity. Rather, news about stronger mitigation efforts from the global climate summit in Glasgow, which took place in November, likely accounted for much of the bullish market sentiment and increased trading.

The larger Western Climate Initiative (WCI), which covers emissions from California and the Canadian province of Quebec, saw nearly 2.3 billion tonnes change hands in 2021 for a record total market value of over €45 billion.

Prices in both the WCI and RGGI rose steadily over the course of the year, with CCAs averaging €18.43 in January and gaining more than €12.50 to end the year at just under €31.00. RGA prices followed nearly the same trajectory, averaging just under €8.00 in January and ending the year at €13.67.

This year-long bull run and consistently high traded volume compares starkly with 2020, which featured a major pandemic-induced sell-off and correlating price drop in March, particularly in the WCI. Measures to prevent the spread of Covid-19 - including lockdowns that made for severely reduced transport emissions in otherwise fuel-guzzling California - had kicked in hardest during that time, causing reduced demand for permits in the face of lower emissions. Two of the WCI’s quarterly auctions that year were undersubscribed, meaning not all allowances on offer were sold. Developments in 2021, in contrast, do not reflect expectations of further economic effects of the pandemic: the rising allowance prices and record volumes in both programmes occurred despite several states going back and forth on mask mandates, quarantine requirements, and other restrictions linked to economic activity (and therefore emissions).

Moreover, all the WCI auctions in 2021 sold out (see Figure 4.3) at record clearing prices. This is doubly significant because the CCAs that went unsold at the undersubscribed auctions in 2020 were “saved” and added to the offerings of auctions occurring in 2021. That extra volume was expected to have a bearish effect on prices given the larger than usual auction supply - the fact that it did not reflect the ongoing market sentiment of recovery in 2021, in spite of ongoing pandemic circumstances.

RGGI’s auctions were also oversubscribed, with each one clearing at a new all-time high. The Q4 auction in December saw a clearing price high enough to trigger the programme’s Cost Containment Reserve (CCR) for the first time in six years. A price spike prevention tool, the CCR opens up an additional batch of allowances to auction participants if the clearing price exceeds a pre-agreed threshold deemed high enough to warrant additional allowance supply, in this case $13/ton in 2021. The trigger level will increase by 7 percent per year thereafter. The size of the CCR is 10 percent of the regional cap each year.

POLICY DEVELOPMENTS

A legal action, started under the Trump administration and perceived by some market players as a potential “threat” to the entire WCI, finally ended for good in 2021. The lawsuit, brought under the
Trump administration’s Department of Justice (DOJ) back in 2019, 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 since 2019 that this suit would have little market impact given that trading itself was not challenged but rather the linkage of California to Quebec, and indeed a judge rejected the case in July 2020. Trump’s DOJ appealed that decision in September of that year, which saw the case get delayed until January 2021 with the Biden administration not pursuing it. In April, a federal court dismissed the appeal altogether. With the current US federal administration friendly toward climate change mitigation efforts at the regional and local level, no such threats of abandoning North American carbon markets are on the horizon.

Political developments affecting RGGI have to do with participating states rather than actions at the US federal level: changing party majorities in some northeastern states have the potential to affect RGGI’s size going forward, depending on whether RGGI-opposed Republicans or RGGI-supporting Democrats win out.

Specifically, the Democratic governor of Pennsylvania, Tom Wolf, attempted to bring his state into RGGI - given the Republican majority in Pennsylvania’s legislature, he sought to do so via executive action rather than through legislation. The state’s environmental regulators proceeded with creating a market-based carbon reduction regime intended to link to RGGI under their authority to implement emission reduction measures under existing law (the state’s Air Pollution Control Act). The proposal would see Pennsylvania join RGGI in 2022 with a 78-million short ton cap, which would nearly double the size of the programme in terms of covered emissions. Currently, New York is the biggest RGGI emitter followed by Virginia which joined in 2020.

The likelihood of Pennsylvania joining went back and forth over 2021, with an independent regulatory review commission recommending in March that the state’s Department of Environmental Protection delay implementation of the RGGI regulation for one year, but then approving a finalized version of the regulation (still with the 2022 start) in September. The Pennsylvania Senate in November sent a resolution to Governor Wolf’s desk that would prevent him from implementing the regulation - the state’s house of representatives then sent the same resolution in December. As of the end of 2021, Wolf was expected to veto these. A procedural dispute between the state’s legislative bureau and its environment department in mid-December revealed conflicting interpretations of the timeline for implementing the regulation, leaving it unclear at the time of publication (January 2022) whether Pennsylvania will (as foreseen by the regulation in question) be part of RGGI’s Q2 auction in March 2022. Adding to the uncertainty, Wolf is leaving office in January 2023. Pennsylvania’s current front-running Democratic gubernatorial candidate, its Attorney General Josh Shapiro, has said he may not support joining RGGI if elected in November 2022.

The other major RGGI participation dispute involves opposite conditions: Virginia’s new Republican governor wants to take his state out of RGGI by executive authority. In contrast to Pennsylvania, however, Virginia’s participation since 2020 was the result of an act passed by the state’s then-Democratic majority legislature. Thus, removing Virginia from RGGI will be difficult for the same reasons joining RGGI is difficult for Pennsylvania. The mere announcement by governor-elect Glenn Youngkin in early December, however, caused a five percent drop in the price of RGGI’s benchmark contract (vintage 2021 allowances for delivery in December 2021) on exchanges.

One other state made moves in 2021 to join RGGI: North Carolina’s Environmental Management Commission decided in July to start a rulemaking for implementing a carbon cap-and-trade programme, to be aligned with RGGI. Given that the state’s legislature is majority Republican, we find participation of the state in RGGI unlikely in the near future.

MEXICO

For Mexico’s national ETS, 2021 marked the second year of operation in its pilot phase with a cap of 273.1 million tonnes CO₂. The move to a compliance regime, where caps are binding, is in progress - 2022 is considered the “transition year” and entities will have to surrender allowances to cover their emissions from 2023.

Developments toward this compliance start were slow over 2021, as the administration of President Andrés Manuel López Obrador has not prioritized climate change mitigation or carbon markets. The country’s environmental ministry SEMARNAT has yet to publicly release new information about elements of the transition to the ETS’s mandatory phase. For instance, while it has declared that companies will be able to use domestic offsets to account for up to 10 percent of their compliance obligation, SEMARNAT is only working on approving offset protocols from forestry, methane, and transport projects - projects in these offset types do not produce nearly enough supply to satisfy potential demand, according to local experts. Large emitters such as oil and gas companies have begun engaging in pre-compliance trades.
OUTLOOK FOR 2022

We expect both the WCI and RGGI to continue their bullish trend as the need for climate action becomes more apparent in North America - droughts, wildfires, hurricanes and other erratic weather have spurred the perception that mitigation action is imminent in the US - especially under the Biden administration as a reversal of the status quo during the previous four years under Trump. As we noted last year, both programmes’ caps are on a tighter trajectory through 2030 than they were through the end of 2020. We pointed out then that it is unclear to what extent effects of the pandemic will play out in the markets in the shorter term - but 2021 has shown that traded volumes and prices are high despite ongoing concerns about supply chain disruptions, travel restrictions, and other Covid-related factors.

Table 4.1: Volumes and turnover WCI and RGGI 2018-2021

<table>
<thead>
<tr>
<th></th>
<th>2018</th>
<th>2019</th>
<th>2020</th>
<th>2021</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mt</td>
<td>€ million</td>
<td>Mt</td>
<td>€ million</td>
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<tr>
<td>WCI</td>
<td>887</td>
<td>11 763</td>
<td>1 380</td>
<td>20 738</td>
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<tr>
<td>RGGI*</td>
<td>239</td>
<td>1 107</td>
<td>293</td>
<td>1 627</td>
</tr>
<tr>
<td>Total</td>
<td>1 126</td>
<td>12 871</td>
<td>1 673</td>
<td>22 365</td>
</tr>
</tbody>
</table>

*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.
5. China

China’s national emission trading system (ETS) became operational in 2021, obliging more than 2,000 power generators to surrender allowance units to account for their 2019-2020 emissions. Unlike other similar systems, such as the EU ETS, China’s emission cap (the overall supply of allowances) is not decided upfront but based on emission intensity. Issuance of Chinese allowances (CEAs) for the first period (2019-2020) was slightly higher than what was needed, especially since emitters were allowed to cover up to 5 percent of their needs with offsets (CCERs) that tend to be cheaper. So far, trading has been limited compared to the much more liquid carbon markets in Europe and North America. The Chinese pilot ETS – some of which have been active since 2013 – continue operations, but most of them saw dropping volumes as power sector emitters turn increasingly to the national ETS.

**NATIONAL ETS NOW OPERATIONAL**

Trading in China’s national ETS – the largest in the world in terms of covered emissions – began on 16 July 2021. Only power generators have a compliance obligation for now, but the scope will expand in the coming years with sectors like cement and non-ferrous metals likely to be added. However, power generation is such a large contributor to China’s overall greenhouse gas output that in its current scope the ETS covers annual emissions close to 4.5 billion tonnes (Gt) of CO₂ per year or around 40 percent of China’s total emissions. All power plants emitting more than 26,000 tCO₂ per year are covered, which is more than 2,000 compliance entities, including those generating combined heat and power, as well as captive power plants of other sectors.

The big difference between China’s ETS and other carbon trading programs is that the former is intensity-based, with the cap being adjusted according to actual production levels. While the EU ETS and other programs hold covered entities accountable for their absolute emissions measured in tonnes and decide the overall cap many years into the future (2030), Chinese firms’ compliance obligation relates to their carbon intensity, measured in emissions per unit of production (in the power sector, this is per unit of electricity generated) and is thus not pre-set to a fixed declining trajectory over time.

China started pilot emission trading systems in selected cities and provinces in 2013, to gather experience in view of creating a national system. These are still operational, with emitters complying by surrendering allowance and offset units unique to their individual program – see pilot volume and value data below.

After being politically announced in 2017, the national ETS was officially launched in early January 2021 when the Chinese Ministry of Ecology and Environment (MEE) published key ETS policy documents. Regulated entities were obliged to surrender allowances for their 2019-2020 emissions in 2021. In July 2021, trading commenced on the platform operated by the Shanghai Environment and Energy Exchange (SEEE). Besides the SEEE, 2021 saw activity on China’s two other major carbon market institutions: the Beijing Green Exchange is the national trading platform for voluntary carbon credits (VERs) but also the domestic offset units entities covered by the national ETS may use for compliance (CCERs). The China Hubei Carbon Emissions Exchange serves as interim registry of transactions and holdings until an official national ETS registry is established.

Trades are conducted electronically, and only spot transactions are allowed - no futures or other derivatives. Transactions are referred to as either listed trades (trades on screen at the exchange) or OTC bulk trades (bilaterial OTC trades which cleared on exchange at the end of each session). The latter occur in minimum batches of 100,000 allowances by mutual agreement. Currently, only covered entities may trade - financial institutions and other non-compliance entities are not yet allowed to participate in the market, although the Chinese government has indicated this may change at a later stage.

![Figure 5.1: Chinese national ETS: daily traded volumes, 16 July – 31 December](source: Refinitiv)
FIRST SIX MONTHS OF TRADING: MODEST VOLUMES, STABLE PRICE

In total, transactions of allowances (CEAs) on the SEEE amounted to 179 million in 2021 (the period 16 July to 31 December). Turnover (volume multiplied by price) amounted to just over €1 billion. Most transactions were bilateral (over-the-counter or OTC), and thus not strictly traded on the exchange, but they are cleared on the exchange at the end of the trading session and thus logged as transacted volume. A smaller volume was traded “on screen” on the exchange - see Figure 5.1. Trading of CEAs was very thin compared to the vast size of covered volume (some 9.1 billion CEAs in circulation for the years 2019 and 2020) and compared to other emission trading systems. Volumes picked up somewhat in late November when the end-of-year deadline for surrendering allowances for 2019-2020 compliance drew near.

ETS transactions occurred in two distinct stages, with those taking place during July – September representing a “learning and preparing” phase and real trading starting from October to mid-December. Most companies were not ready to participate in the ETS on the first day of trading, in part because many of them were unable to open their accounts in time. Instead, they observed and/or participated in trainings. Most transactions in this period were below one hundred tonnes. By the end of September, however, some large state-owned enterprises had completed their company carbon asset management and trading strategies: 30 September saw some large OTC transactions. With covered entities having received their allowances gradually from the MEE over the course of the year, the market became more active starting in October as those with a shortage began to search for CEAs both on-screen and in block trades. Holders of surplus allowances had little incentive to part with their extra CEAs, so available supply remained limited which kept prices stable.

The regulatory framework of the national ETS allows companies to cover up to five percent of their compliance obligation with CCERs, which tend to be much cheaper than CEAs. A large share of covered emitters used the maximum allowed amount of CCERs for compliance and banked their received CEAs for future use – this further limited supply. Prices fluctuated between CNY 30/t (~€3.96/t) and CNY 59/t (~€7.69/t), see Figure 5.2.

The CEA contract closed the year at 54.22 CNY/t (~€7.5), up 13 percent compared to the opening price on 16 July, and up nearly 6 percent compared with the closing price on that first day of trading.

Including both listed and OTC trades, the weighted average price of CEAs in 2021 was 43.85 CNY/t (~€6). A total of 179 million tonnes changed hands over the 114 trading days in 2021, 148 million of them OTC.

This trading under the national ETS in 2021 comes on top of China’s existing carbon market activity: the nine regional pilot ETS and trading of carbon offsets units. The two latter elements are described below - Table 5.1 provides an overview of the types of transactions.

In terms of regulatory and policy developments related to emissions trading, the legal basis for China’s national ETS has been working its way through various government institutions for years and was temporarily completed in 2021 with the publication of three batches of regulatory texts:

- **Regulation Measures for the Administration of Carbon Emission Trading (trial)** took effect from 1 Feb 2021 marking the establishment of the national ETS. Its provisions relate to allowance allocation and registration, monitoring, compliance and penalties, as well as supervision and management. It is a departmental regulation, subject to future review and revision.
- In May, the MEE published three other key policy documents necessary for the start of trading: **Rules for the Registration and Management of Carbon Emission Rights (trial)**, **Rules for the Management of Carbon Emission Rights Trading (trial)** and **Rules for the Settlement and Management of Carbon Emission Rights (trial)**.

![Figure 5.2: CEA prices in 2021](image)

*Figure 5.2: CEA prices in 2021 (UNIT: €/t) Exchange Rate: 1 EUR= 7.6364 CNY*

### Table 5.1: China’s carbon market – main segments 2019-2021

<table>
<thead>
<tr>
<th>Pilots</th>
<th>Volume 2019 (Mt)</th>
<th>Value 2019 (€ Million)</th>
<th>Volume 2020 (Mt)</th>
<th>Value 2020 (€ Million)</th>
<th>Volume 2021 (Mt)</th>
<th>Value 2021 (€ Million)</th>
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<tr>
<td>CEAs</td>
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<td>N/A</td>
<td>N/A</td>
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<td>Pilots (combined)</td>
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<td>257</td>
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<td>286</td>
</tr>
<tr>
<td>CCERs</td>
<td>43</td>
<td>N/A</td>
<td>63</td>
<td>N/A</td>
<td>170</td>
<td>N/A</td>
</tr>
<tr>
<td>Total*</td>
<td>130</td>
<td>250</td>
<td>134</td>
<td>257</td>
<td>412</td>
<td>1289</td>
</tr>
</tbody>
</table>

*Total volume includes allowance units transacted in pilot ETS, national ETS (for 2021), and CCER transactions. Value includes only allowance units: as CCERs are mainly traded OTC, there is no publicly available source for prices. Transactions of local offset units in the separate pilots are small, not included in our assessment.
In October, the MEE published a notice allowing covered entities to use CCERs to account for a greater portion of their compliance obligation.

**PILOT SCHEMES CONTINUE, WITH DECREASED LIQUIDITY**

China’s regional pilot markets are still operational, running in parallel to the national ETS. Large emitting companies in various sectors other than power generation are still regulated by the respective regional programmes, though some captive power plants in Beijing and Guangdong are gradually shifting to the national ETS in 2022. The pilot markets’ role will decrease as the national ETS develops and an increasing number of entities shift to being covered by it rather than their regional ETS.

As for allowance prices in the pilot systems, those in Beijing continued to be the highest - they reached a record of €8.07/t in 2021 (higher than the national ETS’s €5.62/t) followed by the Shanghai pilot’s high of €5.28/t. Shenzhen and Fujian pilots ranked lowest in pricing, at less than €3/t - only half the level of the national ETS. Traded volumes in most pilot markets dropped, as their emitters turned to the national ETS. Collectively, 64 Mt traded in the pilots in 2021, compared to 179 Mt in the national ETS (July-December). Three smaller pilot markets (Chongqing, Shenzhen and Fujian) bucked the trend, witnessing instead a jump in volumes – see Figure 5.3.

**SURGE IN OFFSET TRADING**

CCERs are offset units generated from Chinese climate change mitigation projects and are eligible for use both in the ETS pilots and in the national ETS. Some 1,315 projects were accredited before the Chinese government stopped approving new CCER projects in 2017, citing a need to enhance the relevant regulatory framework. Firms covered by the national ETS may use CCERs to account for up to five percent of their compliance obligation - with 2021 being the first year of compliance, this created a huge new source of demand for credits that were formerly used mainly for voluntary purposes.

The status of offset units, both domestic and foreign, is linked to the international climate negotiations on Article 6 of the Paris Agreement, which provides a framework for international trading of mitigation outcomes. World leaders were finally able to agree on a rulebook during the COP26 climate summit in Glasgow in November 2021 (see more on this in Chapter 10), which could open new sources of offset supply for China as well as the potential to export credits for domestic reductions. The Chinese government may purchase (or allow entities covered by the ETS to purchase) UN-certified mitigation units, known as ITMOs, from abroad for compliance with emission targets. It may also export CCERs as ITMOs to other countries.

CCER trading surged in 2021, mainly because these units can be used for compliance in the national ETS. According to the ‘Notification on the first Compliance Cycle for China’s National Carbon Market’ issued in 2021 by the MEE, there were approximately 40-50 Mt worth of CCERs circulating before November. Of these, roughly 33 Mt were cancelled for compliance, leaving 7-17 Mt of CCERs available in the market.

Comparing the pilots, CCER transactions increased most in Beijing, Shanghai, Tianjin and Sichuan (see Figure 5.3). The Beijing pilot

![Figure 5.3: CCER trading in pilots 2021 and 2020](source: Refinitiv)

**Table 5.2: Chinese pilots ETS trading summary 2021**

<table>
<thead>
<tr>
<th>Pilots</th>
<th>2021 annual</th>
<th>Changes 2020-2021</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Volume (Mt)</td>
<td>Value (€ Million)</td>
</tr>
<tr>
<td>Guangdong</td>
<td>28</td>
<td>137</td>
</tr>
<tr>
<td>Hubei</td>
<td>7</td>
<td>30</td>
</tr>
<tr>
<td>Tianjin</td>
<td>6</td>
<td>23</td>
</tr>
<tr>
<td>Beijing</td>
<td>6</td>
<td>48</td>
</tr>
<tr>
<td>Shanghai</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>Chongqing</td>
<td>7</td>
<td>24</td>
</tr>
<tr>
<td>Shenzhen</td>
<td>6</td>
<td>9</td>
</tr>
<tr>
<td>Fujian</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>Total</td>
<td>64</td>
<td>286</td>
</tr>
</tbody>
</table>

Note: Volume includes both exchange-traded and OTC transactions. Differences in the way OTC transactions were assessed/reported account for the difference in volume figures cited for 2020 in this report and last year’s report on those same annual volumes.
revamped its CCER exchange and now offers contracts based on which program the unit will be used under (national ETS, Beijing pilot, other pilot) instead of a categorisation based on project type. This made it easier for the regulated emitters across the country to purchase their CCERs from the Beijing Green Exchange.

In addition to standard CCERs, some pilots also offer offsets unique to their region that are only accepted within their ETS. The limited transactions of such units are not included in this year-in-review assessment, but details can be found on the offset page of the Eikon China app.

OUTLOOK FOR 2022

The national ETS’s first compliance cycle in 2021 was unique in that it applied to the two prior years (emissions during the period January 2019 to December 2020). Going forward, the cycle will be annual, but according to government sources the forthcoming allocation plan might still group 2021 and 2022 together as one period. However, the same four cyclical deadlines will apply:

- 30 April: reporting 2021 emission data
- 30 June: third party verification of that data
- 30 September: allocation of CEAs to emitters
- 31 December: compliance deadline (surrender allowances)

We estimate final verified emissions for the two-year period to have been 8.68 billion tonnes, against a known total allocation of 9.01 billion CEAs. This leaves a surplus of 360 million CEAs going forward into the 2022 compliance year - according to government sources, the MEE is pondering whether to eliminate that surplus to avoid market imbalance. This will be clarified in the upcoming 2021-2022 allocation plan draft for the power generation industry.

Further ETS-related actions the Chinese government will take in 2022 pertain largely to its legal status. The measures on allowance allocation, monitoring, compliance and penalties that took effect from February 2021 is subject to future review - its rules are now in effect but are set to be replaced by upcoming higher-order legislation. The key document will be *Interim Regulations for the Management of Carbon Emissions Trading*, which will set the rules for trading of CEAs and CCERs. Until this is issued by the State Council, the MEE lacks the authority to impose strict sanctions on regulated entities that fail to comply with trading regulations.

We expect separate *Management Measures for China’s Certified Emission Reduction (CCER) Trading Rules* to be published by the MEE in 2022, replacing the previous version published in 2012.

Though the compliance cycle of 2019-2020 was completed successfully with a 99.5 percent compliance rate, individual incidents threw up regulatory issues to be addressed in 2022. A case of data fraud in Inner Mongolia revealed the need for improved monitoring, reporting and verification. The MEE is looking into this with support from the National Reform and Development Commission and potentially other bodies such as China’s Securities Regulatory Commission. We expect a document on ensuring the quality of carbon market data to be released in 2022.

The emissions intensity benchmark for the power sector, upon which compliance requirements are calculated, will decrease around 8 percent from its 2019-2020 allocation level (0.877tCO$_2$/MWh) to reflect the improvement in the Chinese coal fleet’s overall efficiency and to counteract the above-mentioned allowance surplus in the first compliance period. We expect a final 2021 benchmark / emission cap (the number of CEAs issued for 2021) to be released in mid-2022.

The stricter benchmark makes for an annual allowance shortage of around 80 Mt in 2022 by our estimates, in contrast to the estimated 360 Mt surplus in 2021. We expect non-compliance entities like financial institutions to be allowed to participate in trading sometime in 2022 or 2023.

Another important question to settle is whether CEA transactions should be subject to value added tax (VAT). For more on these recent regulatory clarifications, see our analysis ‘China national ETS price and volumes jumped ahead of compliance deadline: but many questions remain unsolved’ (21 December 2021).

In terms of sectoral scope, the national ETS is set to be expanded to aluminium and cement, possibly already in 2022. We see two possibilities, either that 2022 aluminium and cement emissions will be accounted for by December 2023, or that 2022-2023 will be grouped together, with an emission deadline in December 2024, following the example of power sector emissions whose first compliance in 2021 was for the period 2019-2020. We expect a decision to be made sometime in the second half of 2022.
6. South Korea

The Korean Emissions Trading System (KETS) experienced a severe price drop in H1 of 2021 due to a market surplus carried over from the previous year, and compliance for the period to which that surplus applied being due at the end of June. Immediately after the compliance deadline, prices began rising for several reasons: South Korea's new higher emission reduction ambition, previously agreed tightening of ETS rules in the new phase and allowing non-ETS compliance players to participate in the market. We expect bullish sentiment to continue further on in the third trading period. We also expect Korea to be a key source of demand for international carbon credits, as reaching its more stringent national mitigation goals will likely require carbon credits from overseas.

KETS IN 2021: HIGHER VOLUMES, LOWER VALUES

In 2021, 51 million Korean allowances (KAUs) and offsets (KOCs) changed hands in the Korean Emission Trading System (KETS) - 18 percent more than in 2020. The total Korean market value, however, was eight percent lower than in 2020, at KRW 1,077 billion (~€798 million). None of the eight allowance auctions held in 2021 was fully subscribed - a total of 11 million KAUs was auctioned, vs. 8 million in 2020. According to the Korean consulting firm Ecoeye, which tracks carbon market transactions, about half the 2021 volume (25 Mt) traded OTC rather than on exchanges.

Prices remained at record lows during H1 of 2021, with the 2021 KAU vintage dropping from an average monthly price of KRW 20,000 (~€15) in January to KRW 16,000 (~€12) in June on the Korean exchange KRX. The KAU 2020 vintage went as low as KRW 14,000 (~€10) in June. As Figure 6.1 shows, however, prices have been on a dramatic rise since July: KAU21 prices reached close to KRW 34,000 (~€25) in December, or almost 70 percent higher vs. the start of 2021, with a continuing upward trajectory.

This price path is due to the combination of two factors: the pandemic-induced economic slowdown that decreased overall Korean emissions in the last two years, and the end of the KETS’s second phase (2018-2020). June 2021 was not only the compliance deadline by which emitters had to surrender units to cover their 2020 emissions, but also the end of the KETS’s second trading period. That period saw a huge surplus of allowances building up, mainly because the emissions from KETS companies decreased about 6 percent in 2020 vs. 2019 due largely to the pandemic - this created a surplus of over 20 million tonnes. To prevent the surplus from carrying over into the KETS’s third period (2021-2025), regulators had set rules limiting the number of KAUs firms may hold on to entering the new phase to a mere percentage of the amount sold in the last phase. Volumes surpassing the allowed limit are cancelled. This created a selling boom, as emitters with excess allowances tried to sell them at any price rather than lose them to cancellation. The few short companies took advantage of the situation to scoop up large volumes of permits at rock bottom prices ahead of the end of the July compliance deadline. June saw the highest volumes sold and the lowest prices over the year – see figures 6.1 and 6.2.

The Korean government attempted to halt the continuous price decline by setting a temporary ETS price floor of KRW 12,900 after prices dropped below the trigger price of KRW 17,438 in April. It repeated these measures in June with a temporary price floor of KRW 9,450 on the Korean Exchange (KRX). It tried reducing supply as well: after the January allowance auction was undersubscribed, Korea's environment ministry postponed further sales of KAUs to reduce the number of allowances in circulation. Around 5.6 million KAUs were offered for sale in June, but less than one percent of the volume on offer was sold (Figure 6.3).

Price recovery started immediately after 2020 compliance was over, as all eyes are on the KETS’s third phase of which 2021 is the first year. Phase 3 features several changes that increase the

<table>
<thead>
<tr>
<th>Table 6.1: Volume and value in KETS 2019-2021</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>KAU exchange*</td>
</tr>
<tr>
<td>KAU auction*</td>
</tr>
<tr>
<td>KAU OTC**</td>
</tr>
<tr>
<td>KOC exchange*</td>
</tr>
<tr>
<td>KOC OTC**</td>
</tr>
<tr>
<td>Total</td>
</tr>
</tbody>
</table>

*Source: Korea Exchange (KRX)
**Source: Ecoeye
demand/supply ratio and make for higher prices. Most significantly, Korea’s government has raised the ambition of the country’s 2030 emissions target to 40 percent below 2018 levels (vs. previous 24.4 percent below 2017, see below section on NDC for more details), with the ETS cap trajectory tightening accordingly even though expected recovery from the global pandemic makes for higher emissions in the coming years. Moreover, emitters must now purchase 10 percent of their permits from the government at auction, up from only three percent in the previous phase (i.e. free allocation has been reduced from 97 to 90 percent). Indeed, starting from July 2021, the average auction subscription rate was about 75 percent, up from 1 percent in June.

Another bullish factor is that non-compliance entities may now trade KAU.s. With the exception of a few public banks, non-covered entities such as brokers or trading houses had been banned from participating in the KETS - as of late December 2021, 20 firms were granted access to allowance trading on exchanges and OTC offset trading. We expect the entry of financials to boost liquidity and facilitate the upward price trend - but to a limited extent, as each non-compliance entity is only allowed to hold up to 200,000 KAU.s at a time. Their combined total theoretical demand is thus limited to 4 million units, which is about 30 percent of the total volume traded on the KRX in 2021.

OFFSETS’ ROLE IN KETS IN 2021 AND BEYOND

Given the surplus of compliance units ahead of the end of the second period, there was no demand for offsets in H1 of 2021 - indeed no KOCs changed hands on the KRX during that time. Offset trading resumed from H2, and KOC prices went from KRW 25,000 to 33,000 (~€18-24). Close to 4 million offsets traded in 2021, approximately the same amount as in all of 2020. About half these trades took place on the KRX, which contrasts starkly with 2020 when the vast majority (96 percent) of offset transactions happened OTC.

As of 2021, firms may only use offsets to cover up to five percent of their compliance obligation - down from 10 percent in the previous phase. The new offset rules also scrap the requirement that at least half the offsets a firm uses for compliance come from projects in Korea. The non-Korean offsets firms may use are CERs from the Kyoto Protocol’s old Clean Development Mechanism that have been cancelled from the UN registry – the Korean government “converts” them into International Korean Offset Credits (i-KOCs) for use in the KETS. It completed the first batch of such “issuance” of international offsets in March 2021. Only 400,000 i-KOCs traded on the KRX in 2021.

With a clear definition of what counts as an ‘international offset’ finalized at COP26 in November 2021, Korean regulators may allow emitters to use those units for compliance to the KETS. The KETS could then be a source of demand for internationally transferred mitigation outcomes (ITMOs, see Chapter 10 on international negotiations) going forward.

IMPACT OF MORE AMBITIOUS CLIMATE GOALS

In late 2021, South Korea pledged it would cut greenhouse gas emissions 40 percent below 2018 levels by 2030 - a significant rise in ambition from the previous target of 24.4 percent vs. 2017 levels by the same deadline. Given the country’s expected economic recovery post pandemic and its relatively low emission reduction potential in the short term compared to other countries in the region, the stricter target could make for a higher reliance on reductions generated elsewhere – according to its own government’s estimations, Korea may need to acquire 35.1 million international units by 2030 to meet its updated mitigation target. Officials are in discussions with counterparts in Vietnam, Peru, Myanmar, and Sri Lanka as potential suppliers of carbon credits under the Paris Agreement’s rules.

OUTLOOK FOR 2022

Local experts forecast emissions of KETS-covered entities will increase by eight percent in 2022. A tighter third trading period of the KETS in line with meeting Korea’s more ambitious new climate pledge makes for a bull market going forward. We anticipate an offset supply squeeze until 2024, when new rules on post-2020 CERs issuance and cancellation should be ready and implemented. KETS participants evidently share this expectation, as Ecoeye reports buying orders are rapidly increasing, pushing offset prices towards KRW 35,000 (~€25.5). In 2022, the Korean government will offer a total of 25.8 million allowances (vintage 2021 and 2022).
7. New Zealand

The New Zealand market saw a record increase in both traded volume and value in 2021, mostly due to long-planned amendments to the NZ ETS entering into force. The price of New Zealand allowance units (NZUs) started booming in June and reached record highs by the end of the year, as covered entities anticipate demand increases due to a set of ETS tightening policies adopted in 2021. We expect the bullish trend to continue in 2022, which will be the first time NZ ETS participants will not have the fixed price option for compliance.

SKYROCKETING VOLUMES AND PRICES

Over 81 million NZUs changed hands over 2021: some 26 million were sold at auctions and 55 million transacted on exchanges - see Figure 7.1. It was the first year NZUs were auctioned, and total volume was three times that of 2020. The reason for the heightened market activity is the country's overhaul of its ETS: several long-planned changes went into effect as of 2021, including auctioning as the means for putting allowances into circulation. Previously, emitters were allocated allowances based on their carbon output and intensity-based benchmarks. The 2021 auctions took place quarterly, with the first one in March.

But the secondary market accounted for a huge chunk of volume growth as well: exchange-traded volume increased by 82 percent in 2021, from only 30 million tonnes in 2020.

NZU prices were influenced strongly by the expiry of the so-called fixed price option (FPO), under which covered entities could pay a fee for every tonne of greenhouse gas emitted rather than surrender an NZU. The FPO constituted a de facto price ceiling on allowances and had thus been the primary driver of NZU prices over the past several years. The FPO was NZ$35/tonne (~€20) in May 2021, the compliance deadline for covering 2020 emissions, and no longer exists as an alternative mode of compliance. A record number of covered entities (80 percent) chose to pay the FPO rather than surrendering NZUs for their 2020 emissions, given that the price of the latter was higher than NZ$35/t during H1 of 2021.

A steep rise in the price of NZUs began immediately after the last compliance under the "old" rules – from June 2021 market participants started looking toward 2021 compliance in May 2022, when the FPO will no longer be available and other market-tightening reforms kick in. NZU prices skyrocketed from NZ$37/t (~€22) at the end of May to over NZ$68/t (~€41) by end of December (Figure 7.2) - this dramatically impacted total market value for 2021, making it almost five times higher than 2020 at €2,505 million.

ETS REFORMS

The FPO was replaced by a cost containment reserve that releases extra allowances (up to 7 million in 2021) at auctions when NZU prices exceed NZ$50 (~€30). Parallel to this price "ceiling," regulators set an auction price floor at NZ$20 (~€12). All four auctions held over 2021 were fully subscribed, with September’s breaking through the price ceiling and releasing the extra 7 million permits, which increased Q3 auction volume to almost 12 million NZUs.

Table 7.1: NZ ETS by segment 2018-2021

<table>
<thead>
<tr>
<th></th>
<th>2018</th>
<th>2019</th>
<th>2020</th>
<th>2021</th>
</tr>
</thead>
<tbody>
<tr>
<td>NZUs auctioned</td>
<td>Mt</td>
<td>€ million</td>
<td>Mt</td>
<td>€ million</td>
</tr>
<tr>
<td></td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>NZUs exchanged</td>
<td>23</td>
<td>299</td>
<td>30</td>
<td>433</td>
</tr>
<tr>
<td>Total</td>
<td>23</td>
<td>299</td>
<td>30</td>
<td>433</td>
</tr>
</tbody>
</table>
In August, the New Zealand government updated the cost containment reserve trigger price and auction floor price for 2022 – the former is now NZ$70 (~€42) and the latter NZ$30 (~€18). The reserve trigger is preset to go up by 12 percent annually to reach NZ$110.15 (~€66) in 2026. The price floor increases 7 percent per year. Some of the ETS reforms kick in a few years down the line, such as an increase in volume auctioned starting from 2024 and a tightening of the scheme’s overall cap from 2025.

TOUGHER TARGET MAKES FOR MORE CARBON CREDIT PURCHASES?

New Zealand updated its national pledge to mitigate climate change under the Paris Agreement shortly before COP26 in Glasgow – it commits to reducing its net emissions by 50 percent below gross 2005 levels by 2030, up from the 30 percent it had pledged six years prior in Paris. The new target means New Zealand can emit 571 MtCO$_2$e over the 2021-2030 period, as opposed to the previous pledge’s 623 Mt budget for the same timeframe. New Zealand plans a number of domestic measures to reach this goal, the stricter ETS being one of them. It is also one of the few nations explicitly open to meeting its emission reduction target using carbon credits from abroad. The country may purchase internationally transferable mitigation units (ITMOs, see Chapter 10) to help meet its target, though whether this would be in the context of its ETS (covered entities using ITMOs to account for their compliance obligations) remains to be seen.

OUTLOOK FOR 2022

The government will auction 19.3 million carbon allowances over 2022 - 300,000 more than in 2021. It will be offering over 4.8 million NZUs at each of the four sales. NZ ETS participants have until 31 May to surrender permits for their 2021 emissions. We expect prices to continue rising, given the lack of FPO in this new compliance year, and volumes to stay high given the new interest in the market amid expected emissions growth from pandemic recovery.
8. International aviation

The International Civil Aviation Organization (ICAO) in 2016 set a goal of carbon neutral growth, aiming to keep net emissions from international air travel at 2020 levels. As per the programme adopted to achieve this goal, known as the Carbon Offset and Reduction Scheme for International Aviation (CORSIA), air carriers must offset their greenhouse gas output above that baseline level. Carriers are only obliged to offset emissions rise from flights to and from countries that are participating in CORSIA. Participation is not mandatory until 2027, but European countries and the US are enforcing CORSIA requirement since the pilot phase started 1 January 2021. Airlines operating covered routes must monitor and report emissions, and by 2025 surrender offsets to compensate for emissions that surpass a 2019 baseline. This requirement was expected to generate huge demand for emission reduction units (offsets) as international air travel is on the rise. However, due to the dramatic decrease in international air travel during the pandemic, aviation emissions are nowhere near the levels expected when CORSIA was established - hence there will be no offsetting under CORSIA anytime soon. In terms of demand for carbon credits, all eyes are now on the sector’s rate of recovery. That said, several airlines are making voluntary commitments to reduce their carbon pollution, using offsets to cover their residual emissions.

FIRST YEAR OF CORSIA

Although 107 countries including all of Europe and the US are participating in CORSIA’s pilot phase (2021-2023), many countries with important flight hubs at the centre of emission-intense international routes are not - those include Brazil, Russia, India and China, which all have fast-growing aviation sectors. ICAO made a decision in the midst of the collapse of global air travel in 2020 to alleviate future CORSIA compliance burden on air carriers: the baseline was initially calculated as the average of 2019 and 2020 emissions, but seeing that the pandemic-caused crash in aviation activity in 2020 would result in a much lower baseline (meaning higher offsetting obligations relative to that baseline after recovery), ICAO voted to make the baseline 2019 only, meaning it will take much longer for the sector’s emissions to even exceed the baseline and therefore need to be offset. The pilot phase is thus unlikely to result in demand for offsets from airlines. For more information see our report “CORSIA’s baseline change and implications for offset demand”, where we discuss several scenarios for aviation emissions recovery and offset demand from CORSIA.

SUPPLY: ELIGIBILITY STANDARDS

Meanwhile, ICAO continues to develop the infrastructure needed for air carriers to comply with CORSIA’s requirements. Its Technical Advisory Body (TAB) reviews applications from offset standards wanting to have their carbon credits deemed eligible for air carriers under CORSIA. The TAB was set up in 2020 and evaluated several standards’ applications, recommending some to the ICAO Council for approval and sending others back for review.

In January 2021, following a previous rejection, the Global Carbon Council (GCC) became the eighth offset standard whose carbon credits will be eligible to air carriers under CORSIA. Three other applicants, CERCARBONO, ProClima, and REDD.Plus were turned down by the TAB.

Even without further eligible offsets, CORSIA supply is already well above existing demand. Our estimates indicate that a relatively quick recovery or post-pandemic “bounceback” of international air travel makes for only about 43 million tonnes CO₂-equivalent needing to be offset - in other words, emissions over 2021-2023 from routes between participating countries will exceed 2019 emissions by only 43 million tonnes. That will be the demand side. Back in 2020, with six standards approved at that time, the non-profit analyst Ecosystem Marketplace estimated the supply side volume of CORSIA eligible offsets at 386 million units, with another 183 million units in the pipeline.

The outcome of COP26 in November 2021 also affected CORSIA supply in that it finalised rules for trading carbon credits - including offsets used for CORSIA compliance. Units traded “for international compliance purposes” (CORSIA is international and requires compliance) must be backed by corresponding adjustments to the accounting of the country the offset project is located in. In other words, if an airline buys carbon credits to offset its emission growth in 2021-2023, the country in which that mitigation took place cannot count it toward its own national target under the Paris Agreement - otherwise, both the airline and the country are claiming to have reduced that amount of carbon even though the mitigation only took place once. This requirement of corresponding adjustments does not apply to all offsets, but it does to CORSIA-eligible ones. Given that countries won’t take losing credit for emissions reductions lightly, CORSIA-eligible units can be expected to cost more than other “regular” ones. For more on this, see Chapter 10.

DEMAND: WILL FLIGHTS RETURN TO PRE-PANDEMIC LEVELS?

The Covid-19 pandemic paralysed aviation both in 2020 and 2021, but we see signs that international air travel is set to pick up in 2022. Our aviation emission analysis takes ICAO data on seat capacity factor as a measure for overall flight activity. We combine this with data and forecasts from aviation statistics provider RDC to estimate emissions from international aviation. Based on these two sources, we estimate global aviation emissions to have been 575 million tonnes CO₂-equivalent in 2019. That includes flights between airports located in different countries, both participants and non-participants in CORSIA - it also includes flights between member states of the European Union. Dropping to 208 Mt in 2020, international aviation emissions started recovering in Q3 of 2021, then took a new hit from the emergence of the omicron variant in Q4 bringing the 2021 annual total to 202 Mt - a mere 35 percent of 2019 emissions.

Figure 8.1 shows emission trends month-on-month over the last years, and ICAO’s projections for 2022. A normal year (2019 in blue) reflects some seasonal variation, but 2020 (red) witnessed a sharp drop in March and April when major pandemic-related travel restrictions kicked in worldwide. The year 2021 (yellow line) features a more stable curve inching upward before the omicron variant caused a new drop in December. We used ICAO seat
capacity projections (low and high) to model how emissions may evolve in 2022 for a cumulative total of 350 - 370 Mt over the year. This range - over 150 Mt higher than 2020 emissions - is of course subject to all kinds of factors including new covid variants and risks associated with them, availability of vaccines, travel restrictions imposed by different countries, tourist activity, and willingness of companies to replace current remote communication with a return to business travel.

NON-COMPLIANCE INTEREST IN CORSIA

Even though demand may not exceed supply anytime soon, developments in the CORSIA “market” are closely watched by corporate and other actors interested in offsetting to reach carbon neutrality targets or other climate goals. Private sector interest in such offsetting is on the rise (see Chapter 9 on voluntary carbon markets), and in the absence of any rules on international carbon trading prior to the decisions adopted at COP26 in November 2021, ICAO’s CORSIA was the only global scheme with internationally approved offset eligibility guidelines. A number of exchanges introduced standardised contracts or tokens based on CORSIA eligibility (CBL’s GEO, AirCarbon’s CET), and most buyers of these contracts are not air carriers. To entities looking for offset standards they can assume are “high quality” because they are recommended by an international panel of experts (ICAO’s TAB), it is irrelevant that the standard is designed for an aviation offset program.

With the deadline for air carriers to surrender CORSIA-eligible offset units to cover above-baseline emissions (should they even have any) in the 2021-2023 period not until 2025, we may not see much interest from compliance operators over the next couple of years unless there is a considerable increase in aviation emissions. However, we expect increasing voluntary demand from airlines, as many operators make reduction commitments beyond CORSIA obligations to demonstrate their willingness to contribute to the overall emission reduction effort. In late 2021, the International Air Transport Association (IATA, the main airline lobbying group representing some 290 airlines in 120 countries) adopted a 2050 net zero commitment. Emissions that cannot be reduced at source can be eliminated via high quality offsets. This would add to the existing non-CORSIA demand from airlines.

OUTLOOK FOR 2022

The ICAO’s 41st Assembly is set for September – October 2022, and it will feature a decision on CORSIA’s baseline beyond 2023: either to keep the 2019 baseline or revert to the average of 2019 and 2020 emissions. Scapping the latter was a reaction to the dramatic drop in international air travel due to the pandemic that all but ruined many carriers and required huge government bailouts in 2020. It was meant to be temporary and to be revisited this year. During the assembly meeting, ICAO Council members will decide what will be the baseline for CORSIA’s second phase 2024-2026. Going with the original 2019/2020 average would considerably boost the demand for CORSIA eligible carbon units.

The extent to which international aviation will recover (return to pre-pandemic levels) will surely determine whether ICAO decides to revert to the original baseline or not. The fact that the assembly takes place towards year-end should give member state governments more time to assess the sector’s condition.

Meanwhile, airlines will also be watching European climate policy very closely. The EU is defending its right to include aviation emissions under its emission trading system (EU ETS), but at the same time Europe wants to encourage and assist CORSIA as a global programme. The European Commission proposes to keep intra-EU aviation under the EU ETS, put flights between EU and other CORSIA participants under CORSIA, and (with some exceptions) apply the EU ETS to flights between Europe and countries that have not signed up to CORSIA (this way nudging them to do so, to avoid their carries from falling under the more costly EU ETS). It remains to be seen if the European Parliament and the Council lawmakers go along with the Commission’s proposal. How to deal with aviation emissions to and from Europe is one of many questions that will be decided as part of the ongoing Fit for 55 process, a vast package of legislative proposals to recalibrate Europe’s climate and energy framework (see more on this in Chapter 2).
9. Voluntary Carbon Market

This is the first edition of the Year in Review to include a chapter dedicated to the voluntary carbon market (VCM) - the trading of offsets, also known as carbon credits or emission reduction units. Companies, organizations, and even individuals increasingly purchase units generated by projects that reduce emissions. Often called offset projects, such mitigation activities track their greenhouse gas reduction or removal compared to a business-as-usual scenario and generate credits or units per tonne CO$_2$-equivalent avoided or removed. Those in turn are purchased by entities with the aim to offset or neutralise their emissions - they use them to make “carbon neutrality” or “net zero” claims. Note that the VCM is still a fragmented market with several competing exchanges and much volume traded bilaterally. We do not have a full overview of volumes and values, and therefore do not include this segment in our assessment of total global carbon turnover.

VOLUNTARY MARKETS ON THE RISE
Market analyst Ecosystem Marketplace provides regular assessments of the overall size of the voluntary market. According to its last analysis from Q4 2021, the voluntary carbon market turnover hit $1 billion in early November 2021, setting it on course for an all-time high annual value. Traded volumes reached a record high as well – almost 300 million tonnes changed hands between January and November. This represents a considerable increase vs. 188 million tonnes in 2020 and 104 in 2019 (full years). There was also a solid increase in the average volume-weighted price of offsets: $3.5/t (~€3/t) in 2021 vs. $2.5/t (~€2/t) a year before.

Trading of emission allowances for compliance purposes (in emission trading systems such as the EU ETS or the WCI), takes place mainly on exchanges - participants place anonymous bids and offers, and transactions are secured by a clearinghouse function. Transactions of offsets in the voluntary carbon market, on the other hand, take place mainly “over the counter” (OTC) on a bilateral basis. Exchanges for voluntary offsets do exist, most notably CBL/Xpansiv, but since these represent only a limited share of total VCM transactions there is no source for an aggregated view of traded volumes and prices. Over the year 2021, voluntary market players increasingly switched from OTC to more centralised marketplaces.

CBL, the largest platform for voluntary offsets, handled a volume of units amounting to over 113 million tonnes in 2021 for an aggregate turnover of more than $400 million. According to Ecosystem Marketplace’s assessment, that represents about 40 percent of total volume and total value of the VCM.

GROWING INTEREST IN HIGH-END OFFSETS
The platforms that offer carbon credits to voluntary buyers have started introducing special contract types or tokens, incorporating a set of qualities corresponding to specific buyers’ demand. CBL and AirCarbon launched contracts eligible for use in CORSIA, a mechanism established by the International Civil Aviation Organization (ICAO) to offset international aviation’s emissions growth. CORSIA-eligible contracts were intended for air carriers needing to comply with their ICAO requirements, but with the pandemic-induced drop in air travel (and correlating lack of emissions to offset), there will be little demand for such units in the short term (for more information see Chapter 8). The platforms also feature “nature-based” offsets, i.e. carbon credits exclusively from projects in the area of agriculture, forestry, and other land use (as opposed to those generating credits from e.g. energy efficiency measures at industrial facilities). These are often popular with firms making marketing claims related to carbon neutrality that involve offset project co-benefits like biodiversity and sustainable land use.

The CBL exchange launched a futures contract for CORSIA-eligible offsets (labelled as ‘GEO’) in March 2021. The futures contract started trading at $2.4/t and had increased almost four-fold by late December, trading at about $7/t. The nature-based contract, known as N-GEO, started at $6/t in late July, and traded at $14/t at year end (Figure 9.1). Together, these two contracts represent approximately 14 percent of the offset volume traded on CBL.

Figure 9.2 shows total volume traded on CBL, including the GEO, N-GEO and standard offset contracts called voluntary emission reduction or VER contracts - 2021 traded volume has more than tripled vs. 2020. By the end of December 2021, VER contracts were trading at about $5-10/t, depending on the project type – forestry projects were typically at the high end of this range.
CRYPTO COMPANIES AND THE VCM
Crypto currency operators became involved in voluntary carbon trading during 2021, apparently with the goal of cancelling or “burning” old offset credits that were generated long ago by project types no longer considered high-quality. Taking these off the market by cancelling/retiring them leaves a smaller but higher-quality supply to satisfy growing demand and therefore raises offset prices. Klima Dao, a crypto organisation creating the on-chain offset demand, was launched in October 2021 and has since retired at least 15.5 million carbon units from the registry of VCM aggregator Verra. In collaboration with technology firm Toucan Protocol, it converted these units into so-called Base Carbon Tonnes (BCT), which are then minted on the blockchain. Holders of BCTs can do whatever they want with them, but most deposit them in the Klima Dao treasury in return for “$KLIMA tokens,” a kind of derivative product that can be traded on the blockchain. The original BCTs can also be traded and can be used as offsets if retired permanently (“burned”) by Klima DAO.

It is doubtful whether this process achieves the goal of “cleaning up” offset supply by removing credits from low-quality old projects - VCM buyers typically don’t purchase units lacking environmental integrity anyway, so they would have remained unsold.

WHAT COP26 MEANS FOR THE VCM
Although the UN climate negotiations are by and for parties to the Paris Agreement and not corporate entities participating in voluntary emissions trading, one outcome of this year’s climate summit likely boosted VCM growth. Negotiators finally agreed on rules governing trading of mitigation units among countries, including that they can be used for purposes other than meeting national climate change mitigation targets. Companies offsetting emissions by buying units voluntarily constitutes one such use.

A unit authorized under the Paris Agreement rules (in this case Article 6, see Chapter 10) is called an internationally traded mitigation outcome (ITMO) - project developers can request the government of the country their project is in to authorise the offsets it generates, and VCM participants that buy them can legitimately claim to have internationally recognised units as per the Paris Agreement under the UN. However, the act of authorising ITMOs requires the host country to deduct or “ignore” that amount of mitigation in its own accounting toward its national climate targets, so that only the entity that bought the ITMO takes credit for it - otherwise the country and the buyer of the ITMO are claiming to have reduced a tonne of greenhouse gas even though the actual mitigation only took place once.

Given that countries are unlikely to forego credit for mitigation that took place in their territory, ITMOs will most probably be priced accordingly. Firms are free to buy “regular” (non-ITMO) offsets at lower cost to make carbon neutrality claims and many will likely continue doing so as before. What claims they can make about those units’ contribution to global climate change mitigation, however, is under discussion among organisations devoted to keeping transparency and integrity of the VCM.

Proponents of voluntary carbon markets founded two separate initiatives in 2021, both of which are set to be influential in the years to come. The Taskforce on Scaling Voluntary Carbon Market (TSCVM), is a private sector coalition of voluntary carbon market stakeholders attempting to define and standardise criteria for units traded in the VCM, i.e. set benchmarks for their “quality.” The Voluntary Carbon Market Integrity Initiative (VCMI) aims to agree on rules that will help ensure project integrity and transparent transactions.

Though the VCM is made up of private sector actors and does not directly contribute to countries reaching their climate change mitigation goals under the Paris Agreement, it does indirectly contribute to overall higher climate change mitigation ambition. By investing in carbon projects, voluntary offset buyers sponsor emission reduction projects that help achievement of mitigation goals in the countries they take place in. This in turn allows those countries to increase their mitigation ambition in the longer term.

OUTLOOK FOR 2022
We expect interest in the VCM to keep growing, boosted by an increasing number of companies worldwide taking on carbon neutrality goals and other climate commitments that involve the use of carbon offsets. With larger firms transacting larger volumes, trading platforms have an incentive to offer more standardised contracts resulting in higher liquidity - this in turn makes for higher transparency in the trading process.

After naming board members in September 2021, the TSCVM aims to establish offset eligibility guidelines and principles for offset standards, suppliers, and validation and verification bodies during 2022. The VCMI has announced it will come up with “rules” for voluntary carbon trading based on the COP26 outcomes by April 2022.
10. The Paris Agreement, Article 6, COP26

The year 2021 saw more carbon market developments at the UN level than the past several years combined. After four years of failed attempts to finalise the rules of the Paris Agreement’s Article 6, which governs international transfer of emission reduction units among parties, negotiators decided on a final text. This happened at the 26th conference of the parties to the UN Framework Convention on Climate Change (COP26) in Glasgow, Scotland in November 2021. The summit was originally scheduled for 2020 but was postponed due to the Covid-19 pandemic.

LONG-AWAITED AGREEMENT ON ARTICLE 6

Overall, the summit featured leaders of the Paris Agreement signatory states promising to ramp up their climate change mitigation. There were also important declarations of cooperation - including one between giant emitters China and the US to jointly enhance greenhouse gas reduction efforts. For carbon trading, however, the finalisation of the Paris Agreement’s Article 6 text was the most important outcome - it sets the rules for how countries may use trading to help achieve their national climate targets and affects how firms will seek to achieve corporate carbon reduction targets.

The final rules include safeguards to prevent “double counting” of emission reductions, i.e. a situation in which one country pays another to reduce emissions, but then both countries count that reduction toward their national climate change mitigation goal. Article 6 creates a unit called an Internationally Traded Mitigation Outcome (ITMO) representing an amount of reduced/avoided emissions, which by definition requires the seller country to deduct or “ignore” that amount of emission reduction in terms of reaching its declared national climate target. These accounting requirements, called “corresponding adjustments” ensure that each unit of emission reduction is only taken credit for once - meaning credited to one party, the party that paid for it.

The adopted text specifically creates a new carbon crediting mechanism reminiscent of the Kyoto Protocol’s CDM. The extent to which carbon credits “left over” from the CDM may be transitioned into this new mechanism, and whether projects started as CDM projects can continue to generate credits usable under the new mechanism, had been the main sticking point in the past years of negotiations over Article 6. Particularly Brazil and India (both host countries to CDM projects) were keen to see as much of the CDM and its credits transferred to the new arrangement as possible, despite the fact that many of the credits were generated before the Paris Agreement and were from projects arguably viable without carbon finance. The rules adopted in Glasgow establish a cut-off date of 2013 for such credits to be usable in the new system, a move generally seen as a concession to CDM carryover proponents.

MUCH CARRY-OVER OF CERS, BUT WILL ANYONE WANT THEM?

While some characterise this concession as a disaster because the vast quantities of these old credits will flood the market, others consider it a worthwhile “sacrifice” assuming that in the end few entities will actually use such tarnished units. In any case, having rules established and adopted means countries can finally trade emissions units under the auspices of the UN, with clear guidelines and requirements upon which to base transactions. Without a decision on Article 6 in Glasgow, parties would have had to rely on bilateral agreements setting up ad hoc rules.

The finalised Article 6 text also affects the fast-growing voluntary carbon market (see Chapter 9) even though the rules of the Paris Agreement apply only to its parties (countries), not private entities like companies or other institutions. This is because corporate entities looking to offset their carbon footprint by purchasing internationally recognised carbon units will be interested in using ITMOs for that purpose: having been accredited by governments under the auspices of the UN, ITMOs will be considered of highest ‘quality’ among offset units. The extent to which private entities will end up buying ITMOs remains to be seen, however, as corresponding adjustments (the selling country foregoing credit for those reductions, as explained above) will make them more expensive than “normal” offsets firms typically use for reaching carbon neutrality goals.

In fact, the extent to which anyone will end up using ITMOs is likely to be low in the near future, as only a few smallish emitters such as Switzerland and New Zealand have said they would contemplate meeting their national climate commitments through reductions purchased from abroad. This may change, however, as under the logic of the Paris Agreement, countries are expected to deepen their targets to limit climate change - Article 6 puts in place a framework for more cross-border cooperation to reach these goals.

National governments need to set up the infrastructure necessary for making the corresponding adjustments required for an emission reduction unit to be an ITMO - and the developers of the emission reduction projects seeking to have their units become ITMOs must apply to those national governments to do so. The body administering the new mechanism and helping determine how much of the CDM carries over (i.e. how many CERs may become ITMOs) has yet to be set up, and the targets to which countries and companies are applying these units do not lie in the near future - most are mid-century carbon neutrality goals or at the nearest by 2030.

FINAL YEAR OF CER TRANSACTIONS

In the glory days of the Kyoto Protocol mechanisms in the early 2000s, CERs (the unit of the CDM-offset-mechanism) were global offset units - both for governments of industrialised countries who used them for Kyoto compliance, and for European companies which used them for compliance in the EU ETS. In terms of transacted volume and value, the “CDM market” ranked second to the EU ETS. Since 2013, interest plummeted and over the last years trading has been even more meagre on exchanges (some bilateral transactions are still taking place). ICE Endex, which used to be the leading platform, discontinued its CER contract in March 2021. Table 10.1 shows traded volume and value for 2018-2021.
OUTLOOK FOR 2022

We foresee the body to govern the new international carbon trading mechanism being set up over the course of 2022, likely modelled loosely on the CDM’s Executive Board. Countries that want to offer emission reductions (generated by projects on their territory) as ITMOs have an interest in setting up the requisite regulatory infrastructure as soon as possible. Project developers in those countries in turn have an incentive to push governments to certify their projects’ reductions.

It will be interesting to see how the demand side develops compared to these “supply-facilitating” actions - will more countries consider using emissions reduced abroad to meet their national targets, now that there is an internationally agreed way to do so that prevents double crediting? Will air carriers subject to CORSIA offsetting requirements, which can only be satisfied with ITMOs, start buying them now even though they aren’t “due” until 2025. Will corporate buyers interested in UN-certified offsets to reach their voluntary carbon neutrality goals seek to use ITMOs for this purpose, even though they don’t have to? We expect developments at ICAO meetings in 2022, as well as within the Taskforce on Scaling Voluntary Carbon Markets and the Voluntary Carbon Market Integrity Initiative, to influence the answers to the latter two questions.

Meanwhile, the continued growth in volume and value of existing carbon trading programmes shows the increasing relevance of markets as a tool for emission reduction, especially cap-and-trade systems in Europe, California, South Korea, and, since 2021, in China. We expect to see more countries and regions looking at the potential for ETS to reach their climate change mitigation goals.

Table 10.1: CERs by segment 2018-2021

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