

CARBON MARKET MONITOR

America to the rescue

Review of global markets in 2015 and outlook for 2016-2018

Looking back ...

11 January 2016

Some 6.2 gigatonnes worth of emission allowances and offsets were traded globally in 2015. Traded volumes contracted 19% from 2014. Because of higher prices in most markets, the total value increased 9% to €48.4 billion.

The North American markets grew 121% in terms of volume and 220% in terms of value. Transport fuel emissions were included in California, and we observed a high turnover rate of future vintage allowances.

European volumes continued to drop in 2015, partly because of the ongoing 'backloading' (withholding of auction volumes), partly because of lower price volatility.

... and looking forward

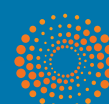
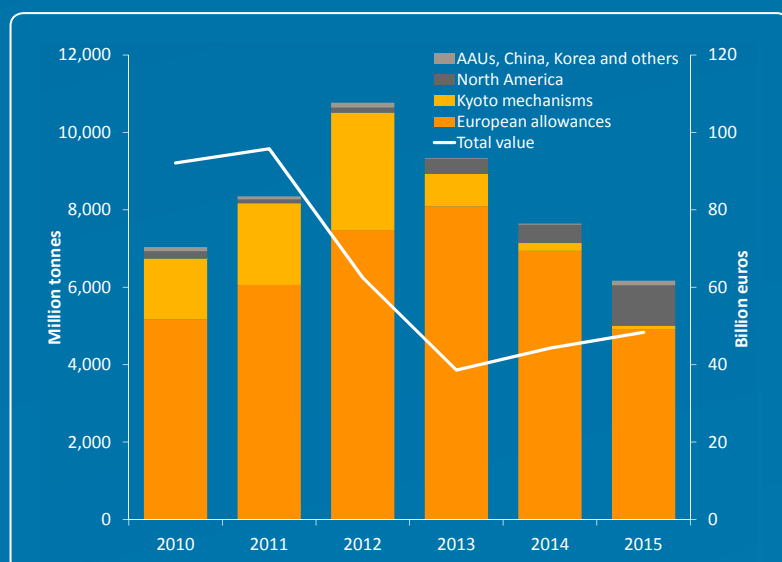
We expect volumes to rise slightly in 2016. Assuming prices to also end higher than in 2015, we forecast the overall value of carbon markets to grow by a quarter. We believe emission trading will remain modest in China and South Korea, despite the huge emission volumes covered by their emission trading schemes. In terms of transactions, Europe and North America will continue to represent more than 95%.

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World Carbon Markets 2010-2015

Total value, volumes by segment.



THOMSON REUTERS

REVIEW OF 2015 AND OUTLOOK 2016-2018

11 January 2016

This report presents Thomson Reuters' assessment of the world's carbon markets in 2015 and our forecast for 2016-2018. The aim of this exercise is to show the main trends in the major carbon (emission) markets. We collect trading data from the major carbon exchanges (ICE and EEX) and estimate the size of over-the-counter transactions (not conducted on exchanges). This gives us an estimate of the actual volume traded.

We then multiply the volume by the (average) prices at the time of transactions, which gives us an assessment of the overall value of the various markets.

As for the forecasts, we first establish projections for each individual market, based on current trends, before adjusting for market and/or policy assumptions that we believe will change in the years to come.

The report covers the major emission markets: Europe, North America, the Chinese pilot schemes, South Korea, Kazakhstan and CDM. In order to facilitate easy trend comparisons we seek to minimize changes in the scope from one year to another. However, sometimes we do need to update the selection of market segments, to ensure that the analysis reflects the markets that are currently important, either because of actual trading, or because of anticipation of future trading.

This means that some markets that used to be important are no longer covered, e.g. Australia whose Carbon Pricing Mechanism was abolished in 2014, and the Joint Implementation mechanism whose offset units are no longer eligible in the EU ETS.

For this current edition we have decided to discontinue the coverage of New Zealand, where trading volume is very limited.

The Carbon Team of Thomson Reuters Commodities Research and Forecasts (previously known as Point Carbon) has published annual assessments of global carbon markets since 2006. These publications have consistently been seen as references in the world of carbon trading.

Note that our numbers have often varied significantly from other analysts who do similar studies. Most important among these is the World Bank's annual market assessment. The World Bank looks at issuance and available units of emission allowances and offsets in the various markets, rather than the actual transaction volume. This approach tends to give a much lower volume than our assessment since it does not take into account that allowance and offsets units, on average, change hands more than once during a year.

Thomson Reuters Commodities Research and Forecasts

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Our carbon team (previously known as Point Carbon) offers an unrivalled knowledge of emission trading dynamics that positions us as the number one supplier of in-depth market intelligence. Our staff includes experts in international and regional climate policy, mathematical and economic modelling and forecasting methodologies.

Thomson Reuters Commodities Research and Forecasts (TRCRF) has more than 30,000 clients, including the world's major energy companies, leading energy intensive manufacturers, financial institutions, organisations and governments, in over 150 countries. The carbon team is located in Oslo, Norway (Head Office), Washington D.C., Beijing, Seoul and Kiev.



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1. America to the rescue

GLOBAL VOLUMES SHRINK IN 2015, BUT BOOM IN NORTH AMERICAN TRADING LIFTS TURNOVER

Seen as a whole, the world of carbon trading was characterized by two opposite trends in 2015: volumes continued to contract and prices continued to increase. Traded volume dropped by 19 percent, from 7.6 Gt CO₂ worth of transactions in 2014 to 6.2 Gt in 2015. The overall turnover increased 9 percent from €44.3 to €48.4 billion. See Table 1.1.

Europe remains by far the dominant market, with 80 percent of the volume and 77 percent of the value. European volumes, at 5 Gt, dropped for a second consecutive year, from its peak level of 8.1 Gt in 2013. We attribute the contractions in 2014 and 2015 to the ongoing backloading of 900 Mt from the auctions in 2014-2016 and lower price volatility in the market.

European carbon prices rose over the year, from an annual average of €6/t in 2014 to €7.7/t in 2015. This was not enough to prevent

the value of European transactions to contract by 8 percent to €37.5 billion.

The once-important segment of CERs – the units issued under the UN-led Clean Development Mechanism (CDM) – traded only 185 Mt in 2015, approximately 2 percent of global volume. In terms of value, its share is even smaller.

CALIFORNIA CAPS CAR EMISSIONS

Arguably the most interesting trend in 2015 was the rapid growth of carbon trading in the California/Quebec market known as Western Climate Initiative (WCI), and in the Regional Greenhouse Gas Initiative (RGGI) market that consists of a group of U.S. states. Despite having huge cap-and-trade schemes for many years already, North American transactions used to be modest, especially when compared to Europe. Although still nowhere near European

Table 1.1 Global carbon market size 2013-2018

Thomson Reuters' assessment of the volume and value of the major carbon markets from 2013 to 2015, and forecasts for 2016-2018. Volumes in millions of tonnes (Mt). Thousand megatonnes = one gigatonne (Gt). Values in millions (m) of euros. Thousand million = one billion (bn).

	2013		2014		2015		2016		2017	2018
	Final figures		Final figures		Final figures		Forecast		Forecast	Forecast
	Mt	€ million	Mt	€ million	Mt	€ million	Mt	€ million	Mt	Mt
Europe (EUAs, aviation EUAs)*	8 092	36 045	6 942	40 694	4 960	37 460	5 343	46 873	5 799	5 133
CERs*	727	316	185	110	100	80	90	102	74	53
ERUs	112	24	18	2	0	0	0	0	0	0
North America (CCAs, RGAs, offsets)	389	2 100	472	3 320	1 042	10 633	1 216	13 047	1 412	1 514
South Korea (KAUs and offsets)	0	0	0	0	1,2	11	19	170	28	50
Chinese pilot schemes (allowances and offsets)	3,8	26	24	123	65	165	70	145	176	236
Other markets**	16	82	1,3	0,8	2	4	3	6	2	2
Total	9 340	38 593	7 642	44 250	6 170	48 353	6 741	60 343	7 491	6 988

* Like other carbon units CERs trade both in a primary and a secondary market. The former comprises initial transactions from project developers to first buyers. The latter comprises subsequent transactions (exchange trading and bilateral trading), mainly for compliance use in the EU ETS. When we look at the various segments in-depth we consider secondary CER trading as part of the European market (Section 2), whereas primary CER trading is dealt with separately in Section 7.

**This category includes formerly covered units from smaller markets such as New Zealand and Australia in 2013. From 2014 onwards Kazakhstan only.

Volume (Mt) – change, shares, total and selected markets

	2014	2015	Change in 2015 (%)	Share of total in 2015
Europe	6 942	4 960	-29 %	80 %
North America	472	1 042	121 %	17 %
Chinese pilot schemes	24	65	171 %	1 %
Total	7 642	6 170	-19 %	

Value (m €) – change, shares, total and selected markets

	2014	2015	Change in 2015 (%)	Share of total in 2015
Europe	40 694	37 460	- 8 %	77 %
North America	3 320	10 633	220 %	22 %
Chinese pilot schemes	123	165	34 %	0 %
Total	44 250	48 353	9 %	

levels, North American carbon trading grew rapidly in 2015, when market volume increased from 472 Mt to 1,042 Mt (up 121 percent), and value increased by a full 220 percent to €10.6 billion. North America now represents 17 percent of global volume and 22 percent of global turnover.

The most important reason for the strong American growth in 2015 was the fact that WCI expanded its scope to also include transport fuel emissions. This alone increased the emission coverage from 165 Mt to 403 Mt. The increased number of allowance units in the primary market created more liquidity that spilled over and generated more trading also in the secondary market. The second most important reason was increased trading of future vintage allowances in the WCI. The injection of 41 Mt of Vintage 2018 allowances into the primary market combined with a high turn-over rate of these allowances in the secondary market accounted for 30 percent of total volume in North America carbon markets.

ASIA: HUGE EMISSIONS, LITTLE TRADING

One interesting observation from the market comparison is the limited activity in the Asian emission trading schemes, including the Chinese pilot schemes, the first of which started in 2013. In total the seven pilots cover emission of some 1,100 tonnes of CO annually.

That is more than half the size of the European cap at roughly 1,800 Mt, and much more than the 403 Mt capped in WCI. And yet, in terms of trading, China represents only 1 percent of volume and an even smaller share of the global turnover.

We see something of the same playing out in South Korea where a national cap-and-trade scheme was introduced one year ago. Trading has been extremely quiet, with only a few transactions producing a volume of some 1.2 Mt and value of €11 million. In other words, only some 0.2 percent of the 543 Mt issued for 2015 changed hands. This contrasts sharply with the more liquid Europe and North American markets where units typically change hands three times or more over a year.

The emerging Asian carbon markets are very recent creations and have not yet acquired the same level of maturity. This can to some extent explain why many compliant companies are reluctant to engage in a market that they struggle to understand. In South Korea there is also widespread conviction that the current allocation is insufficient to meet actual needs (i.e. that the Government has set the cap too tight).

A third and possibly even more important explanation is the limited role assigned to financials and middle-men. In Europe much of the trading is done by banks and commodity traders, in other words, companies which are not themselves subject to emission reduction obligations.

PARIS REASSURED MARKETSS

All carbon markets are (at least in principle) instruments for driving emission reductions. They have been created and put in place by lawmakers and regulators, and can be modified as a result of political pressure, e.g. to make them more or less ambitious. That is also why market participants have to pay attention to the broader picture in domestic and international climate policy.

Table 1.2: Fuel prices

Closing prices for key fuel price contracts on last trading day of December 2015, compared to December 2014

Contract	Price	Change
EUA Dec-15	€8.29/tonne (7.48)	11%
German power front year	€26.61/MWh (32.87)	-19%
Front month Brent crude oil	\$37.28/bbl (57.33)	-35%
Summer-ahead NBP gas	30.83 pence/therm (46.50)	-34%
Year ahead coal contract	\$42.00/tonne (66.91)	-37%

By far the main climate event in 2015 was the summit in Paris in December, which led to an agreement whereby nearly all countries in the world take on some kind of commitment to curb their emissions. As the final text was presented, observers were surprised to see that it contains clear support for the creation of new international mechanisms for “transfer of mitigation outcomes” (code for market) based on the models of CDM and JI (the so-called flexible instruments from the Kyoto Protocol).

The regional and national emission trading schemes that dominate the world of carbon today (Europe, North America, China and South Korea) all operate independently of the UN system, so strictly speaking they are not directly affected by the outcome of Paris. Nevertheless, if countries jointly follow-up on the intentions and promises made in Paris, this must over time lead to higher ambitions in existing and new carbon markets emerging around the world. With an important caveat for the high uncertainty attached to any predictions on a market like this, we thus think that the value of the global carbon market will continue to increase over the next years.

CARBON OUTPACED OTHER ENERGY COMMODITIES

Split between a drop in volume and a modest rise in value, it might seem difficult to conclude whether 2015 was a good or bad year for carbon trading. One useful approach can be to compare it to other energy commodities such as oil, coal or power. In this perspective carbon stands out as an uncontested champion. Whereas the reference oil contract lost 35 percent in 2015, and German power dropped 19 percent, European Union Allowance units (EUAs) gained 11 percent between the closing of 2014 and the closing of 2015.

2. Europe

In 2015, the EU's carbon market saw a 29 percent rise in the average EUA price of compared to the previous year, continuing the upwards trend from 2014. Traded volume on the other hand dropped by 29 percent. The interplay of these developments caused the overall market value to shrink 8 percent year-on-year to €37 billion.

The sharp drop in transacted volume clearly shows that the drop in 2014 was not ephemeral. The downward trend is related to the ongoing "backloading" exercise that reduced auction volumes by 400 million and 300 million allowances in 2014 and 2015 respectively, and will reduce the 2016 auctions by 200 million units. In the secondary market, exchange-based transactions were down by 32 percent to 3.9 Gt in 2015, while the volume of over-the-counter (OTC) transactions dropped by 37 percent compared to the previous year (see Table 2.1).

MARKET INTERVENTIONS SUPPORTED PRICES

In 2015, the European carbon price increased for a second consecutive year. The front-year carbon price rose from a 2014 average annual level of €6/t to €7.7/t in 2015. Higher prices and an higher auction volume (some 108 m more units) explain why government auction revenues increased 50%, from €3.2 billion in 2014 to €4.9 billion in 2015.

On the last trading day of December, the price of the benchmark front-year carbon contract ended at €8.29/t, up €0.81/t (11%) from the 2014 closing price of €7.48/t.

We estimate that the price increase in 2015 resulted in a greater use of gas-powered plants at the expense of coal-burning ones, leading to emission reductions in the power sector of around 15-18 Mt.

The price increase came largely as a result of the backloading decision, which created annual supply shortages for the years 2014-2016 (on an aggregate level the market is still long by more than 2 billion allowance units). Meanwhile, the EU signed into legislation the so called Market Stability Reserve (MSR), which added further

fuel to the bullishness. Together the two measures dispelled doubts about EU leaders' willingness and ability to curb the surplus of emission allowances. One effect of this was higher prices; another was a reduction in market volatility, leading to a drop in the traded volumes.

UP ON POLICY, DOWN ON FALLING POWER PRICES

As 2015 began, the eyes of the market were on EU member states and the European Parliament, which deliberated on a landmark reform of the carbon market – the European Commission's proposal for a Market Stability Reserve (MSR). The MSR is a non-discretionary mechanism intended to reduce the oversupply in the carbon market and maintain a balance between supply and demand in the future. It does so by automatically withdrawing and releasing allowances through the market's regular auctions based on the accumulated supply-and-demand balance in any given year.

The political debate honed in on the date when this mechanism should be made operational. Another important question was what to do with the 900 million allowances that the EU has delayed from auctioning in 2014-2016, through backloading. The original decision on this in 2014 had stipulated that these allowances were to be released into the market in 2019 and 2020, but during the MSR talks it became clear that many preferred to set them aside in the MSR.

At the start of the year, the Dec-15 carbon contract stood just above €7/t. From there, the price jumped up and down as the policy signals swung from ambitious market reform to political disagreement and back. In late January, the debate proved contentious when a vote in the Parliament's industry committee ended without a decision on any of the discussion points. Sentiment reversed in early February upon the presentation of a compromise proposal, something that pushed the carbon price up toward the €8/t level. The Parliament's environment committee then decided to call for the MSR to start in 2018, and to set aside the backloaded allowances in the reserve.

Table 2.1: EU ETS s by segment

	2014		2015		2016 (forecast)		2017 (forecast)	2018 (forecast)
	Mt	€ million	Mt	€ million	Mt	€ million	Mt	Mt
EUAs Auction	528	3 173	636	4 910	760	6 696	941	947
EUAs exchange traded	5 720	34 380	3 907	30 161	4 133	37 193	4 421	3 806
EUAs OTC	450	2 702	284	2 191	287	2 586	260	223
EUAs options	234	385	129	168	158	354	172	152
Aviation EUAs	10	54	4	30	5	44	5	5
sCERs exchange traded	97	39	37	11	30	9	26	22
sCERs OTC traded	28	11	13	6	10	3	6	4
Total	7 067	40 744	5 010	37 477	5 383	46 885	5 831	5 159
Without CERs	6 942	40 694	4 960	37 460	5 343	46 873	5 799	5 133

LATVIA BROKERED COMPROMISE ON MSR START DATE

However, rifts emerged among member states in the Council. In late February, Poland marshalled a group of eight Eastern European member states to push for a late start of the MSR, in 2021. Key member states such as UK, Germany and France all wanted an earlier start, but the Polish-led coalition was large enough to form a blocking minority in the Council, and therefore seemed to dent all hopes of an early start. This sent the carbon price back toward €7/t. When Latvia, which held the rotating presidency at the time, seemed to accept the Polish position in its proposal for a Council position the carbon price plunged further, reaching €6.28/t in mid-March.

Events took a new turn in April, when the Czech Republic defected Poland’s coalition and the Council reached an agreement for a 2019 start of the MSR. A key component of the deal was an amendment stipulating that richer member states will contribute a greater proportion of their future auctions to the MSR, a deal-sweetener that led to a de-facto transfer of ETS auction revenues from richer to poorer member states.

The new Council position aligned well with the Parliament, leading the two co-legislators to reach a conclusive MSR agreement on 5 May. The final text calls for the MSR to start withdrawing allowances from the market in 2019 and for the 900 million backloaded allowances to be set aside in the reserve. It further stipulates that any allowances that remain unallocated by 2020 will be placed in the MSR. The text also calls on the European Commission to consider how such unallocated allowances can be used to alleviate the risk of carbon leakage beyond 2020.

The MSR agreement helped the carbon price climb to around €7.5/t in early May, but the positive sentiment was partly offset by concerns over the Greek debt crisis. Market confidence was restored once the third bailout package was signed in July, and in combination with the relative shortage of allowances as a result of the backloading, this pushed the carbon price higher, leading it to break above €8/t in early August.

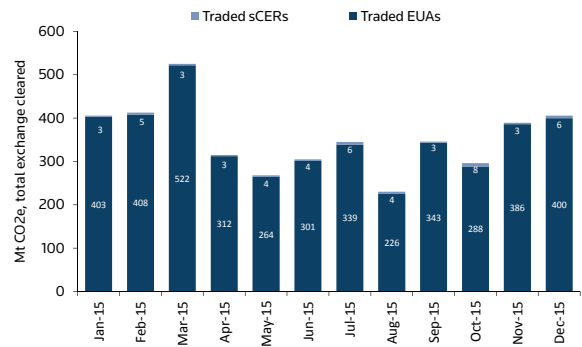
FALLING POWER PRICES WEIGH ON CARBON

Throughout the second half of 2015, falling power prices exerted bearish pressure on carbon prices, thereby diminishing the positive effect of the shortage of auction supply. In September, the front year German power price dropped to a 12-year low because of concerns that growing renewable capacity caused oversupply in the power market. .

The carbon price then jumped in October, touching €8.71/t, a level that eventually proved to mark the peak in 2015. The spike came on the back of strong utility demand that manifested itself in highly oversubscribed government auctions and several instances of large over-the-counter “block” trades. It was also helped buy a short-lived stabilization of the German power price.

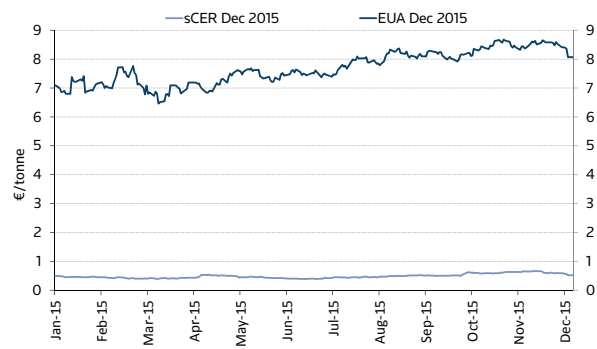
Toward the end of the year, the carbon price came under renewed pressure from the German power market, which tumbled again, curbing demand for allowances. The Dec-15 carbon contract expired on 14 December at €8.07/t. Since 15 December onwards the Dec-16 contract has been the new reference. This contract closed the year at €8.29/t.

Figure 2.1: EUAs and CERs volume month-on-month .



Source: Thomson Reuters Point Carbon

Figure 2.2: EUA and CER prices.



Source: Thomson Reuters Point Carbon

AVIATION EUAS TRADE AT SMALL DISCOUNT

Aviation allowances (EUAs) traded at a small price discount to EUAs. The spread between the front year EUAA and EUA prices stood at €0.31/t in the beginning of 2015, but narrowed over the course of the year to €0.11/t. Last year, airlines had to report emissions and surrender allowances for both 2013 and 2014. The data showed that, as expected, airlines received fewer EUAs than they needed to cover their emissions, which has led them to purchase EUAs to close the gap.

WE EXPECT MODEST GROWTH IN 2016

Th We base our forecast for the traded volume in Europe on the Commission’s proposal for the market set-up in phase 4 as put forward on 15 July 2015. We have seen a trend reversal in European traded volumes during the past two years. From its inception in 2005 to the peak year of 2013 the EU ETS showed a near continuous growth in traded volumes (except in 2010). In 2014 volumes fell 13 percent, and the decrease continued for a second consecutive year in 2015. We think this is related to a general saturation of the market in combination with speculative capital having left the EU ETS.

Up until early 2014 regulatory uncertainty regarding backloading

and the market stability reserve caused high price volatility and attracted speculators hoping for the ‘big wins’. Now that they have both been decided (backloading is also implemented) market participants find themselves in an atmosphere of much higher regulatory certainty. This has caused price volatility to decrease significantly (see Figure 2.3), which is probably an important reason why trading activity calmed down in 2015.

Another calming effect comes from the fact that the core of the phase 4 debate will revolve around carbon leakage – the question of how many free allowances will be given to industrial companies. This has likely caused some industrial companies to hold on to their allowances while waiting for the rules to be determined.

We expect only modest growth in EUA transactions over the next three years. In 2016, we expect a volume of traded allowance around 5.3 Gt, 7 percent up from 2015.

This year’s auction volume will be higher compared to 2015, given that only 200 million allowances are withheld through backloading. We estimate 760 million allowances will be auctioned in 2016, up 19 percent from 636 million in 2015. In addition we expect 158 million allowances to be traded as options.

The vast majority of trading – 4.4 billion allowances - will be generated in the secondary market.

When estimating 2016 trading volume we discovered that the ratio of annual secondary trading volume to annual cap rose significantly between 2008 and 2014 (see Figure 2.4). Eight years ago allowances handed out to European compliance companies changed hands on average 1.6 times over the course of the year, a turnover ratio that increased steadily to 5.1 times, before the slow-down in 2015 decreased the ratio to 3.4. We expect the current ratio

Figure 2.4: Turnover rate (ratio of cap vs traded volume)



Source: Thomson Reuters Point Carbon

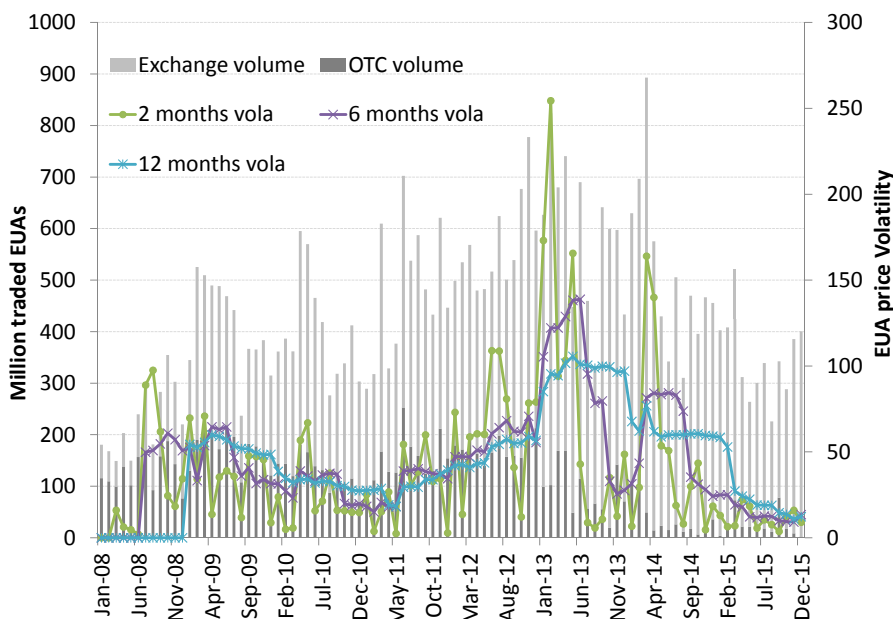
to continue through to 2018.

In 2017, we forecast an overall traded volume of EUAs of 5.8 Gt, decreasing to 5.1 Gt in 2018.

Higher OTC transaction costs have driven the EUA trading more heavily onto exchanges. In 2015, OTC transactions represented some 7 percent of total traded EUA volume. We expect an equal share of OTC trading in 2016, before the downward trend is re-established, lowering the share of OTC trades to 6 and 5 percent for 2017 and 2018, respectively.

In contrast, we expect 4.1 Gt of EUAs will trade on exchanges in 2016, increasing to 4.4 Gt in 2017. Over the next three years we expect a consolidation in EUA transactions and this will likely be

Figure 2.3: High volatility tends to cause high liquidity.



Source: Thomson Reuters Point Carbon

reflected in stable demand for options in the range of 160 Mt per year for the next three years.

We are currently finalising our price forecast for this year, but for now we have used an average EUA price of €9/t in 2016, some 17 percent higher than the average 2015 price of €7.7/t. Based on that we forecast cumulative EUA transaction value will be €47 billion, a 25 percent increase from the 2015 value of €37.4 billion, yet shy of the 2011 all-time high EU ETS valuation at €76 billion.

POLICY IN 2016 AND BEYOND

The review of the EU ETS Directive will take centre stage during 2016. On 15 July 2015 the European Commission published a proposal for changing the directive before the start of the fourth trading period (Phase 4) in 2021. Member states have already started discussing the Commission proposal in Council working

groups. Meanwhile, the European Parliament has appointed Ian Duncan of the Environment committee (ENVI) to be its rapporteur in charge of the file.

Originally scheduled for a first exchange of views in the Industry committee (ITRE) and in ENVI in January and February respectively, the timeline was recently postponed, and it now seems a first report will be presented to ENVI on 20 May, to be followed by more discussions over the summer and autumn, before a committee vote in December. The full plenary vote is tentatively scheduled for February 2017.

In parallel to the Parliament process described above, member states will have to find a common Council position as a basis for negotiations with the Parliament. Once the two co-legislators reach an agreement, the final rules can be adopted by both institutions.

3. North America

There are two conventional cap-and-trade programs in North America – the Regional Greenhouse Gas Initiative (RGGI) and the Western Climate Initiative (WCI). RGGI caps emissions from generation of electricity in nine north-eastern states. The WCI encompasses California and Quebec and covers a wide range of sectors that account for about 80 percent of their overall emissions.

CLOSE TO TWOFOLD INCREASE IN TRADING IN 2015

The total traded volume of North American allowance and offset units in 2015 was 1042 Mt, more than twice the amount traded in 2014 (see Fig 3.1). The 121 percent increase is largely attributable to the WCI's phase-in of emissions from retail fuel sales. This scope expansion increased both auction volumes and consecutive trading (secondary market) on the InterContinental Exchange (ICE).

In the North American carbon markets seen as a whole, the primary market consists of auctioning allowances and project developer offset sales, and the secondary market involves exchange trading and over-the-counter trading of allowances and offsets already in circulation.

The WCI uses California Carbon Allowances (CCAs) that are fully fungible both in California and Quebec. CCA auction volumes increased by a full 185 percent year-on-year, that's 340 Mt in 2015 compared to only 119 Mt in 2014.

Auction volumes of RGGI allowances (RGAs) on the other declined, from 71 Mt in 2014, to 65 Mt in 2015.

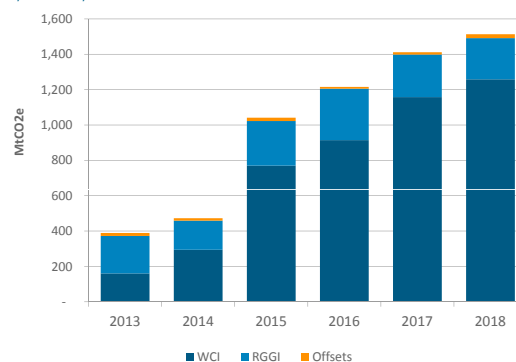
Secondary trading of CCAs was 334 Mt in 2015, up 92 percent. Secondary trading of RGAs was 139 Mt, up 48 percent from 2014.

We estimate 2015 total market value for North America at €10.6 billion (\$11.6 billion), an increase of 220 percent from €3.3 billion in 2014. The growth, again, is attributed mainly to the inclusion of retail fuel suppliers in the WCI scope.

ONTARIO TO START IN 2017

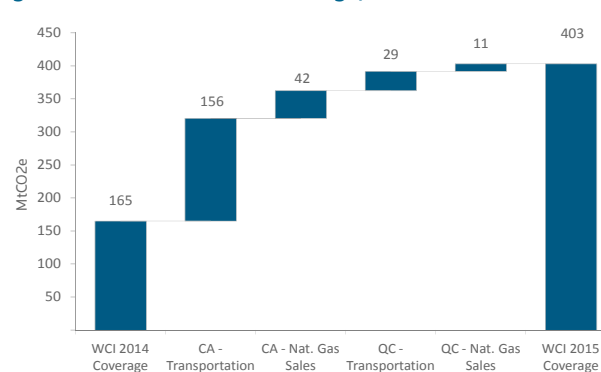
In 2016 we expect the North American carbon markets will grow on the back of higher secondary market trading, which is estimated to increase from 617 Mt to around 800 Mt from 2015 and 2016. In the primary markets there will only be minor changes in auction volume this year compared to 2015. We expect the total volume traded in 2016 will grow to around 1,220 Mt, up 17 percent from 2015 levels of 1,042 Mt.

Figure 3.1: Historical and Forecast volumes
CCAs, RGAs, offsets



Source: Thomson Reuters Point Carbon

Figure 3.2: WCI Emissions Coverage, 2014 v. 2015.



Source: Thomson Reuters Point Carbon

We expect the market value to increase as well, from €11.6 billion to €14.2 billion on the back of higher allowance prices and a higher turn-over-rate (how many times auctioned allowances trade in the secondary market) in both the WCI and RGGI carbon markets. We apply the turn-over-rate in the second half of 2015 to 2016 and 2017.

Ontario will start its own cap-and-trade program in 2017, with plans to link with WCI in 2018. Adding Ontario we estimate the total volume traded in North America will increase to around 1,400 Mt in 2017.

Table 3.1: North American carbon markets

	2014		2015		2016 (forecast)		2017 (forecast)		2018 (forecast)	
	Mt	€ million	Mt	€ million	Mt	€ million	Mt	€ million	Mt	€ million
WCI	294	2 641	770	8 957	914	10 826	1 158		1 258	
RGGI	164	591	252	1 475	291	2 110	241		233	
Offsets	14	88	19	201	10	111	13		22	
Total	472	3,320	1,042	10,633	1,216	13 047	1 412		1 514	

In 2018 we expect WCI auction volumes to contract due to a tighter emissions cap, however, we expect secondary volumes to grow due to a higher turn-over-rate because CCAs will be fully fungible with Ontario carbon allowances (OCAs), which will foster liquidity in the broader WCI market. We therefore estimate the total volume traded in North America will climb to about 1,500 Mt.

WCI IN 2015: TRANSPORTATION ADDS HUGE VOLUMES

The WCI used to only cover emissions from power and industrial sectors, before it phased-in emissions from transportation and natural gas fuel sales to end-users in 2015.

We estimate 2015 WCI emissions coverage was 403 Mt compared to only 165 Mt in 2014, meaning fuel suppliers added 239 Mt to the program (see Fig 3.2). As coverage increased in 2015, so did the emissions cap and auction volume. Some 340 Mt were auctioned in 2015, compared to just 119 Mt in 2014.

Current Auctions, which offer past and current year vintage allowances, were fully subscribed and increased by 212 percent from 2014-2015 – from 90 Mt to 252 Mt. The value of Current Auctions was €3.4 billion (\$3.7 billion) in 2015, compared to €742 million (\$986 million) in 2014.

Advance Auctions, which offer future vintage allowances 3-years ahead of the current year, were close to being fully subscribed with 99 percent of the 42 Mt of the vintage 2018 (V18) allowances offered at Advance Auction was purchased. The value of Advance Auctions was €463 (\$505 million) in 2015, compared to €297 million (\$394 million) in 2014.

Some 11 percent of the CCA volume traded on ICE was transactions of the benchmark December 2015 (Dec-15) contract for vintage 2015 CCAs. The contract was steady throughout the year, with a weighted average price at \$12.76/t, compared to \$12.08/t in 2014. Future vintage CCAs comprised 62 percent of total ICE volume for the WCI. The high volume of future vintage CCAs is explained by a specific arbitrage opportunity that consists of buying the front-month contract and selling the December contract. This is a large-volume thin-margin play for entities with a lower cost of capital than the market as a whole.

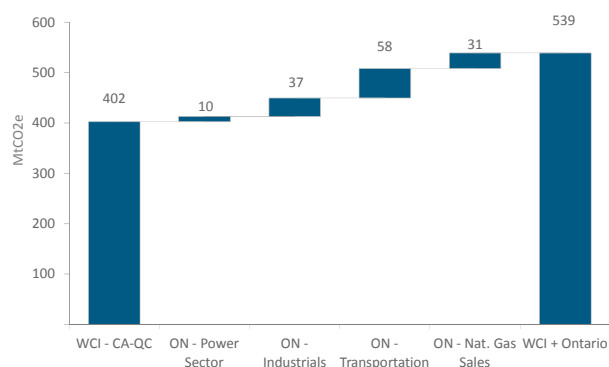
CARBON OFFSETS REMAIN MARGINAL

In 2015 the California Air Resources Board (CARB) issued an estimated 16 Mt of tradable California Carbon Offsets (CCOs) in 2015 (this figure does not include invalidated CCOs and CCO estimates for the forestry buffer pool). We estimate CCO traded volume was 19 Mt in 2015, based on information provided by brokers and project developers.

Quebec's Ministry of Sustainable Development, Environment, and Fight Against Climate Change (MDDELCC) issued its first offsets in 2015. Three projects received a total of close to 0.2 Mt worth of offset units.

By the end of 2015, the MDDELCC had seven offset projects listed in its registry – five from landfill gas projects and two from Ozone Depleted Substance (ODS) destruction. Cumulatively, the seven projects are expected to generate approximately 1.3 Mt, about 0.26 Mt per year.

Figure 3.3: Emissions coverage: WCI plus Ontario in 2017.



Source: Thomson Reuters Point Carbon

POST-2020 REGULATORY PLANS

In 2015 Quebec announced its 2030 target of cutting emissions with 37.5 percent below 1990 levels. CARB is pursuing post-2020 plans based on the 2030 target to cut emissions with 40 percent compared to the 1990 level, as expressed in the State Governor's Executive Order B-30-15. We expect California lawmakers to introduce and pass legislation extending cap-and-trade into the post-2020 period sometime between 2016 and 2017, after a similar bill failed to pass during the 2015 legislative session.

ENTER ONTARIO

For 2016 we forecast a WCI volume just above 900 Mt, up 19 percent from 2015. Although the auction volume is expected to remain largely flat, the entry of more future vintage CCAs into the secondary market from Advance Auctions of V19 CCAs and QCAs should increase the market's overall turn-over-rate.

We expect the market will grow in 2017 because of Ontario's plan to start cap-and-trade that year. The province plans to link with the broader WCI in 2018. In Ontario we expect the onus of the bulk of auction volume to be placed on retail fuel suppliers as is the case in Quebec and California. As such, our cap estimates for Ontario assume the portion that could be freely allocated to retail fuel suppliers will instead be offered at quarterly auctions. We also assume Ontario adopts Advance Auctions and offers 10 percent of its 2020 allowance cap at these auctions in 2017. Figure 3.3 shows the increase of emissions coverage that Ontario will bring in 2017 under these assumptions.

As Ontario plans to go-it alone in 2017, we expect ICE will provide a product for Ontario Carbon Allowances (OCAs) for that year. We expect a lower turn-over-rate in 2017 for Ontario's portion of ICE trading than in 2018 when the market is linked to the broader WCI in California and Quebec. We also expect all three jurisdictions will continue to inject future vintage allowances into the market via Advance Auctions and offer 10 percent of the 2021 allowance cap at these auctions.

RGGI IN 2015: INCREASED SECONDARY TRADING

In RGGI market activity continued to accelerate in 2015, with a turn-over-rate of 2.88 compared to 1.33 in 2014. The traded volume was 291 Mt, compared to 252 Mt in 2014. Auction volume comprised 26 percent and ICE volume comprised 74 percent of total RGGI

volume. The value of the RGGI market was €1.5 billion in 2015 (\$1.6 billion) compared to €591 billion in 2014 (\$785 billion).

Despite a huge surplus of RGAs (we estimate the supply to demand ratio at 2.5:1 in 2015), the benchmark (V15 Dec15) RGA contract on ICE increased significantly from \$5.44 at the start of the year to \$7.49 at the end of the year.

Artificial scarcity, sometimes referred to as “real market balance” in European carbon jargon, was the main reason for the steep rise in RGA prices in 2015. After the Q4 2015 auction non-compliance entities held an estimated 35 percent share RGAs in circulation and a 56 percent share after accounting for 2015 emissions compliance (56 percent of surplus RGAs).

If there is any indication that the market was tight in 2015 it is this: the market completely depleted the 9 Mt held in the Cost Containment Reserve (CCR) allowance pool and secondary market prices on ICE increased well above \$6.0 CCR trigger price – the price necessary for auctioning CCR allowances. This marks the second straight year in which RGA prices at auction and on ICE have exceeded the CCR trigger price.

RGGI FORECAST

We expect the CCR allowance pool of 9 Mt to once again get depleted in 2016. The 2016 primary auction volume decreases slightly due to a tighter cap; however we expect secondary trading on ICE to increase more. We forecast an increase in secondary trading mainly because we apply the high turn-over-rate observed in the second half of 2015 to the whole period of 2016-2018. Despite this, the declining emissions cap and auction volume results in lower trading volume from 2017 onwards, with volume decreasing from 291 Mt in 2016 to 233 Mt in 2018.

We forecast the value to increase from €1.5 billion in 2015 (\$1.6 billion) to €2.1 billion in 2016 (\$2.3 billion), but to decrease each year from 2016-18 despite higher RGA prices. We expect the total value of the RGGI market to decrease from €2.1 billion in 2016 (\$2.3 billion) to €2.0 billion in 2018 (\$2.1 billion).

Table 3.2 WCI and RGGI auction calendar

2016 RGGI Auctions	
March 9	Vintage 2016: 13,520,594
June 1	Vintage 2016: 13,520,594
September 7	Vintage 2016: 13,520,594
December 7	Vintage 2016: 13,520,594
2016 WCI Auctions	
March 9	Vintage 2013: 1,073,347 Vintage 2014: 537,971 Vintage 2016: 69,944,509 Vintage 2019: 8,657,552
June 1	Vintage 2016: 68,320,899 Vintage 2019: 8,657,552
September 7	Vintage 2016: 68,320,899 Vintage 2019: 8,657,552
December 7	Vintage 2016: 68,320,899 Vintage 2019: 8,657,552

4. China

2015 saw a proliferation of domestic offset project development in the Chinese carbon market. The pipeline now contains over 340 registered projects, with close to 900 projects waiting for the registration stage.

Already we have seen several Chinese carbon traders making their way into financial and equity markets. Several carbon asset firms have listed on a platform for over-the-counter (OTC) equity transactions. Securities analysts have also started to follow the carbon sector, mainly due to the connections between carbon and the renewable energy market.

On the policy side, the most important event during the year was the U.S.-China Joint Presidential Statement on Climate Change. A key element in this announcement was that China will start its nationwide carbon market in 2017, and the announcement was later re-affirmed by Chinese officials at the Paris climate summit.

NATIONAL ETS TWICE THE SIZE OF THE EU ETS

The launch of nationwide emission trading scheme will stand out as the main event in the years to come. Set to include eight major industries, the Chinese ETS will cover some 4 Gt annually. In other words, this will be a major expansion from today's situation in which seven pilots are covering some 1.2 Gt in total.

While the configuration of the national scheme is still opaque, it is confirmed by top bureaucrats that China will start the national market in 2017. It is also quite certain that the following sectors will be covered by the scheme: power, oil and gas, chemicals, iron and steel, non-ferrous metals, paper, building materials and aviation. The specific sub-sectors are still yet to be clarified.

According to a top official from the National Development and Reform Commission (NDRC) speaking at the Paris climate summit the national scheme will cover 4 Gt of emissions. This will make China the world's largest carbon market in terms of capped

emissions. In comparison, emissions covered under the EU ETS are on the order of 1.8 Gt per year.

Given the recent announcement, implementation of the national scheme is very likely, and the questions ahead are really when and how it will happen. The NDRC has ordered companies with over 26,000 tonne CO₂ emissions in power and industrial sectors to report their emissions dating back to 2011. In order to ensure data quality, the reported data is required to be verified by third-party validators.

We do not expect much change in terms of data transparency in the current pilot schemes in 2016. However, we do expect the national scheme will bring in a drastic improvement in the availability of fundamental data on the part of the climate change regulator (the NDRC). That said, transparency in the sense public accessibility is not likely to reach the same level as in Europe or California.

PILOT TRADING: MORE EXCHANGE, LESS AUCTIONS

In 2015 the Chinese pilot schemes traded over 30 million allowances. Nearly 29 million allowances transacted on exchanges in the seven pilots (see Table 4.1 and breakdown in Figure 4.1). Hubei alone accounted for nearly half of that volume. While exchange trading has doubled in volume from last year, the number of total transacted allowances is only slightly higher as auction volumes declined this year. Guangdong was the only pilot to host auctions in 2015, selling slightly more than 1 million allowances over three auction sessions.

As in 2014, Hubei continues as the most liquid market with about 14 million allowances traded, accounting for nearly half of all the traded volume among the seven pilots. Meanwhile, Guangdong emerged as the second most traded pilot in the year, after the regulators introduced several methods such as repos and swaps to boost liquidity. There have been unconfirmed rumours that two or more foreign firms have been driving trading in Guangdong, one of the pilots that accepts foreign participants.

Table 4.1: Chinese carbon markets

Aggregate trading of allowance units in the seven pilot schemes. Each scheme has its own allowance unit (that is only accepted in that particular jurisdiction). Offset units are issued under a national standard (common to all pilots), but some pilots have chosen to only accept offsets generated from projects within their jurisdictions).

	2014 *		2015		2016		2017	2018
	Historical		Historical		Forecast		Forecast	Forecast
	Mt	€ million	Mt	€ million	Mt	€ million	Mt	Mt
Allowances			30	115	32	92	100	100
Auction			1	5	4	8	40	40
Exchange			29	110	28	84	60	60
Offsets			35	50	38	53	76	136
China Total	24	123	65	165	70	145	176	236

* 2014 do not distinguish between allowances and offsets (the "China Total" for 2014 includes both unit categories)

Table 4.2: Issued CCER projects. As per end-of-year 2015.

Project stage	Category	# of projects	Number of units issued
Credits issued	1	18	4,461,918
	2	3	641,185
	3	79	25,006,409
Credits issued total		100	30,109,512
Issuance announced	1	3	243,900
	2	1	84,686
	3	14	4,440,823
Issuance announced total		31	18
Grand total		18	4,461,918

BOOMING OFFSET MARKET

Compared to the lacklustre market for emission allowances, the market for domestic offsets, known as CCERs, is booming. Nearly 800 companies (some of them are under the same conglomerate) have developed 1,170 projects in the pipeline.

More than 300 projects have reached registration, and some 240 monitoring reports have been submitted and published online.

In total, over 35 million CCER (Chinese offset units) are issued to 118 projects (including 9 million that have issuance announced but not yet published, see Table 4.2). While all of the issued credits can be traded over local exchanges in seven pilots, the 33 million Category 3 (Pre-CDM) projects face restrictions in compliance use and will struggle to find buyers.

So far, fewer than 5 million Category 1 (new projects) credits have been issued. Demand was high for these units, especially before the surrender deadlines for 2014 compliance in June and July 2015 (some pilot schemes demand surrender by the end of June, others in July).

Meanwhile, most of the recent additions to the pipeline recently are Category 1 projects. Once registered, these projects can expect to see issuance for the next seven years. Thus, with a steady increase of projects the market risks oversupply, a pattern also observed in the heyday of CDM. Against this backdrop, we think it is very unlikely that the CDM-registered projects will be allowed to convert to domestic CCER pipeline.

One key question to follow going forward is whether the offset units issued for use in the pilot schemes will also be eligible in the national ETS.

The pilot exchanges introduced spot offset trading in 2015. Shanghai has the most active offset trading, where over 14 million CCERs have been traded on the exchange this year. Not all traded offset units are eligible in all pilots.

It is worth noting that the development of the CCER projects have

triggered interest from the securities industry. Sell-side equity analysts who follow China's rapidly growing renewable sector have started to gaze at carbon. To them CCERs have a material impact on the financial return of renewable projects, thus affecting the corporate value of the owners. Besides, the prospect of the national scheme has started to show its impact on companies in the whole carbon value chain, from utilities to low carbon device manufactures.

This year, a few emerging carbon asset management companies have listed on the OTC equity platform. Compared to the main equity market, the OTC platform has a lower threshold for listing. We expect more companies will follow the path. Not only are carbon companies entering the equity market, listed renewables companies have also started to highlight the impact of carbon on their core business in their investor communications. As a result, renewable equity analysts have put carbon on their radars.

NATIONAL ETS SET TO COVER ALL PROVINCES

All eyes are now on the national scheme. Preparations such as collecting data and drafting regulations are being carried out by various central and local government agencies, most notably the National Development and Reform Commission (NDRC). Although very little of this is accessible for public scrutiny, we are still able to make a few qualified predictions.

First, we expect the national scheme will eventually cover all the provinces and cities without exceptions. If a carbon market covers only part of the country, the market will be vulnerable to loopholes. For instance, a steel producer in a covered area may attempt to register its emissions under another plant within the same conglomerate located in a nearby non-compliance province. Such loopholes can only be avoided if the scheme adopts nationwide coverage.

Second, we expect carbon will play a bigger role in the Chinese economy. More companies will be exposed to carbon costs, at the same time more niche carbon service providers will emerge. Those newcomers can bring technical and financial knowhow to the market.

If we have learned something from the pilot schemes, it is that authorities have a tight control on the domestic carbon market. While we may not see a huge improvement on pilot data transparency in 2016, we think the authorities are well aware that the national scheme is set to meet headwinds if market participants cannot access accurate and relevant fundamental data.

In this report, we divided the trading volumes and values into two categories: allowance trading, which includes auctions and exchange, and offset trading, which includes primary project deals and secondary exchange trades.

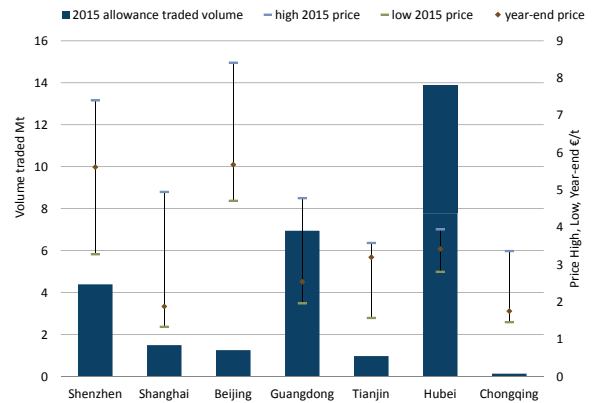
Our forecast volume for 2016-2018 and values for 2016 are displayed in Table 4.1. It is worth noting that primary CCER trading is hard to track precisely and the numbers only represent our best intelligence.

Overall, we expect traded volume will be flat in 2016 compared to 2015 as we believe market participants will continue to wait for policy updates about the national scheme in 2017. We expect more trading of offsets than of allowances in 2016. Already, offsets were traded actively in Shanghai in the last quarter of 2015. Besides, more issuances from primary CCER market will also boost secondary offset trading in 2016.

When the 4 Gt of emissions will be covered by the national scheme in 2017, we have, for the sake of simplicity, assumed that auctions will be in the order of 1 percent of capped emissions and exchange-trading in the order of 1.5 percent. We assume all exchange-trading to be in the form of spot contracts, as we do not expect derivatives such as futures and forward contracts to be allowed.

In our value estimation, we have assumed the average prices for auction allowances, exchange allowances, and secondary offsets to be €2.5, €3.5 and €1.5 per unit, respectively. The weighted average secondary allowance price will be lower in 2016 than in 2015, according to our assessment, mainly due to banking of allowances and lenient caps throughout the pilots. Overall we expect annual traded volume will stay at around 60 Mt in 2016 and jump to 160 Mt in 2017 and 240 Mt in 2018, mainly as a result of the national scheme. Needless to say, all assumptions of future volume and value of a national emissions trading scheme in China are highly uncertain.

Fig 4.1: China's seven schemes exchange-trading volume and price in 2015



Sources: Thomson Reuters Point Carbon

5. South Korea

The offset (KCU) spot market started at a price of 10,100 KRW/t (€7.8/t) on its launch day 6 April and has been rising since then. On 30 December, the KCU price closed at 13,700 KRW/t (€7.8/t). KCUs have traded three times more actively than KAUs. Some 920,717 KCUs changed hands in the KRX market (including over-the-counter transactions), compared to only 321,380 KAUs.

The issuance and trading of Korean offset units follow a two-steps procedure. First the offset is issued as a KOC that represents one metric tonne of saved emissions. KOCs can only be traded bilaterally (not on exchanges). However, the KOC units cannot be used for compliance purposes. For that to happen, the KOC must first transform into a KCU by the regulator. Only compliance entities can ask for transformation. KCUs can be transacted by registered emission trading participants on the KRX, i.e. compliance entities and the three designated banks).

To date 7.1 million KOCs are known to be issued (see Table 6.1). Most of this volume comes from conversion of Korea originated CERs through cancellations in offset registries. In general, information about offset projects and credits' issuance is hard to come by, because of the Government's non-disclosure policy. We do know that a batch of CERs that was recently cancelled in the CDM registry is now awaiting approval for conversion into KOCs at the next Emissions Certification Committee meeting. The batch includes some 460,000 CERs generated by the Belgian chemicals company Solvay at their installations in South Korea.

HUGE DEMAND ALSO FOR OFFSET UNITS

The offset (KCU) spot market started at a price of 10,100 KRW/t (€7.8/t) on its launch day 6 April and has been rising since then. On 30 December, the KCU price closed at 13,700 KRW/t (€7.8/t). KCUs have traded three times more actively than KAUs. Some 920,717 KCUs changed hands in the KRX market (including over-the-counter transactions), compared to only 321,380 KAUs.

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Table 5.2: Korean offset issuance (KOC units)

N2O reduction	3,128,478
SF6 reduction	2,471,007
Renewable power generation	1,168,283
Landfill gas recovery	186,717
Fuel switch	147,540
Total	7,102,025

Source: South Korean Ministry of Environment/Emission Certification Committee

Table 5.3: Korean offset projects (number of projects)

Renewable power generation	28
N2O reduction	16
SF6 reduction	9
Fuel switch	3
Landfill gas recovery	4
Bio CNG generation and use as fuel	1
Total	61

Source: South Korean Ministry of Environment/Emission Certification Committee

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Table 5.1: Korean carbon markets

	2015		2016 (forecast)		2017 (forecast)	2018 (forecast)
	Mt	€ million	Mt	€ million	Mt	Mt
KAUs	0.3	3	11	102	16	26
KCUs	0.9	8	8	67	12	24
Total	1.2	11	19	170	28	50

CONTINUED RESISTANCE TO THE KETS

The Korean government submitted its international climate pledge (known as INDC) to the UNFCCC on 30 June. The national target has been set as a 37% reduction in 2030 compared to a business-as-usual projection for that same year. In other words, the target is not measured against historical emissions (i.e. a fixed number), but against a hypothetical figures (what future emission would be in the absence of mitigation measures). The target consists of two separate elements: reducing domestic emissions by 25.7% and the use of international market mechanisms accounting for another 11.3%. The KETS is a crucial instrument for achieving these two elements.

Several of the industries with capped emissions are campaigning for the abolishment of the KETS. They argue that imposing a cost on emissions puts them at competitive disadvantage and creates a risk of carbon leakage. The strongest opposition comes from non-ferrous metal and petrochemical companies, both of whom have sued the government for unfair practice. Hyundai Steel's lawsuit was dismissed by a Seoul court in December; other rulings are expected in the months to come.

Other industries have contented themselves to lobbying, requesting both a review of the national reduction target, and a more generous allocation of allowances to the covered entities.

Next up on South Korea's carbon horizon is the monitoring, verification and reporting of 2015 emissions. These data need to be submitted to the Ministry of Environment by end of March. Following that, compliant companies shall submit allowances plus offset credits equivalent to their 2015 emissions by end of June.

MARKET OUTLOOK 2016 AND BEYOND

We expect the market to become more vibrant shortly before the deadline of compliance, when companies will likely be eager to trade their shortage/surplus. We assume approx 2 percent of the 2015 allocation will be traded (11 Mt). Since only 0.3 m KAUs was traded last year, we expect the rest of this volume to transact in 2016. We assume a slightly higher transaction share for 2016 and 2017 allocations, at 3 percent and 5 percent respectively. We assume prices will remain at current levels in 2016, and forecast a market value for KAU transactions of €102 m.

We also expect offset trading to be more active in the years to come as more KOCs come to market. So far 7.1 Mt worth of KOCs issued. We assume some 10 m will be issued in 2016, 12 m in 2017 and 15m in 2018. This will come both from CDM conversion and from new projects. We expect most KOCs will be converted into KCUs that will eventually be traded on KRX.

REGULATORY OUTLOOK FOR 2016

The KETS has caused strong tensions within the government, with the Ministry of Trade, Industry and Energy questioning the allocation decisions made by the Ministry of Environment (MoE). According to recent news story in Carbon Pulse, the control of the allocation process is about to pass to the Ministry of Strategy and Finance, with an anonymous government official claiming that "the environment ministry has mismanaged the [Korean carbon] market".

The review of the KETS rules will be continued. The MoE has set up an Emissions Trading Committee that is doing preparatory research and is expected to present a draft for stakeholder discussion. While we could see changes in the allocation, we expect the Government will keep its national target of a 37 percent emission reduction by 2030, now that this has been linked to the Paris Agreement.

6. Kazakhstan

In 2015, carbon trading increased in Kazakhstan's cap-and-trade scheme that covers about 60% of the country's emissions. Caspiy Commodity Exchange (COMEX), the only authorized trading platform, reported a three-fold times rise in value to almost €3.6 million. Traded volume increased by 56% year-on-year to a total of 1.9 million tonnes worth of Kazakh emission allowances. As market participants have become more acquainted with emissions markets, average prices for Kazakh quotas (KZQ) quintupled from €0.6 in 2014 to €3 in 2015.

Trading dynamics in 2015 followed 2014 year's pattern, with active trading occurring from March to August 2015, and a stalemate for the remainder of the year. Similarly to the previous year, trading was closely linked to the compliance cycle. The second half of the year experienced a major overhaul in the scheme design amid continued uncertainty over its further duration.

KAZAKH ETS ENTERS PHASE 3

There have been worries that the Kazakh ETS might be abolished, effectively if not legally, as a result of a recent Government reshuffle. The only that seems clear at this moment is that the Kazakh ETS entered its third trading period on 1 January 2016, as foreseen under current legislation. By default this period will run for five years, with a quota allocation for the whole period based on verified 2013-2014 averages.

Annual average allocation for the ETS calculated from an emissions baseline for 2016-2020 stands at 149 Mt, in other words slightly

down from 153 Mt in 2015. The allocation is in line with the country target of a 5 percent reduction from 1990-levels by 2020. The number of recipients (the compliance companies covered under the scheme) is down from 166 to 139. The new entrants reserve is significantly restricted to 22 Mt for the period 2016-2020.

WE EXPECT TRADING TO REMAIN MODEST

Forecasting transaction volume for 2016-2018 remains difficult as we expect the struggle between fossil fuels and renewables to impact trading dynamics. The government has announced that it wants to shift from a resource-based to a "green economy", something that will be a huge challenge in a country that depends heavily on oil and metals export revenues. Indeed, oilfield exploration remains high on the agenda, despite falling international oil prices. In the energy sector, some of the institutional barriers for access of renewable electricity generators have been removed. If investment capital materializes, we expect an increased share of renewables in power generation. On the other hand, coal-fired power generation will remain dominant for the next five years, with power companies set to become the major players in field of carbon trading.

We expect an increase in traded volume in early 2016 as companies will be eager to secure enough allowances to cover their 2015 emissions. Over the whole year we forecast trading of some 3 million units and subsequent banking of unused phase 2 units into phase 3. We forecast traded volume to drop to 2 million per annum in 2017 and 2018 due to a projected economic slowdown.

7. CDM

Only a few years ago the flexible mechanisms created under the Kyoto Protocol – CDM and JI – represented the second and third largest market segments in the world of carbon trading. At its peak the CDM represented roughly 20 percent of overall traded volume. JI lost its importance after the EU ETS stopped accepting its credit units (ERUs) in 2014. Europe also significantly tightened the eligibility criteria for CERs, which explains the sharp drop in volumes and values over the last couple of years. Some 50 m CERs traded in the secondary market in 2015 (in Europe), and we estimate that an equal number traded in the primary market (as initial transactions from project developers to first buyers).

The Paris climate summit (COP21) did not deal much with the CDM, and effectively postponed revision to the second half of 2016. Many observers were happily surprised by the decision to set-up a new international market mechanism after 2020 (based partly on CDM), yet we believe this will have little immediate effect on today's CDM market.

We expect market conditions will not change much in 2016. Looking further ahead, the most important question coming up is whether international aviation might become a source of demand. If the International Civil Aviation Organisation (ICAO) agrees on significant emission reductions, and if it designates CERs as an eligible carbon credit currency – two big ifs – it would be a boon to a market where buyers have been largely absent for several years.

SUPPORTIVE BUYING

The demand for CERs continues to be low, although there were some initiatives to support CDM projects from governments (like Norway, Switzerland and Germany) and institutions (World Bank). Norway purchased some 7.6 million CERs through the Nordic Environment Finance Corporation (NEFCO) in 2016, at prices between €2.0 – 4.0/t. This is significantly higher than average market price. An additional batch of 4.9 million units was purchased in mid-December. Another 29 million Euros have been earmarked for CERs in 2016, meaning the country may buy about 10 million CERs next year based on the average price quoted in its previous transactions.

The World Bank purchased 8.7 million CERs at a price of \$2.4/t as a result of its first tender conducted in mid-2015 via the bank's Pilot Auction Facility (PAF). A second tender is planned with \$21 million assigned for CERs purchase, which could amount to 8 million CERs,

assuming the World Bank keeps purchasing at approximately the same price as during the first tender.

SUDDEN DEMAND FROM AUSTRALIA

In the autumn of 2015 Australian landfills suddenly showed interest in CERs. Back in 2013 they collected millions of dollars from customers in view of a transfer to the Australian government as part of the Australian Carbon Pricing Mechanism. When the mechanism was dismantled in 2014 they were left with money that could not easily be given back to each individual customer, the government therefore decided that the landfill owners should use this money on climate activities or buy international climate credits.

This autumn many landfills decided to buy CP1 (Kyoto Protocol 1st commitment period) credits that were about to expire, and acted swiftly to meet the deadline to transfer this type of CDM credits (18 November 2015). CP1 units were much cheaper than CP2 units (close to 75 percent discount). The landfills bought some 22 million CP1 CERs. Even if these units are now ineligible for Kyoto compliance purposes, Australian companies can still use them for domestic obligations, by cancelling them from the UN Registry.

Last year Korean compliant companies showed increasing interest in CERs converting them into domestically eligible units – KOCs. At least some 6.7 Mt of Korean CERs were converted through cancellations in the central UN offset registry and in the New Zealand offset registry.

Based on these and other minor CERs transactions, we estimate that close to 50 million primary CERs have been purchased during 2015 (see Table 7.1). By primary market we mean initial transactions, from abatement projects issuing units to the first buyers.

SECONDARY MARKET REDUCED BY HALF

Historically CER trading was much more active in the secondary market, i.e. the subsequent transactions of units already in circulation. This encompasses exchange trading and over-the-counter (OTC) transactions. With a few minor exceptions such as New Zealand, the secondary market has in effect been focused on the EU ETS, where compliant companies could use CERs to cover a certain share of their emissions.

Secondary transactions amounted to 50 million CERs market in

Table 7.1: CERs by segment

	2014 (historical)		2015 (historical)		2016 (forecast)		2017 (forecast)	2018 (forecast)
	Mt	€ million	Mt	€ million	Mt	€ million	Mt	Mt
Primary	60	60	50	63	50	90	45	30
Secondary	125	50	50	17	40	12	29	23
Total	185	110	100	80	90	102	74	53

2015 (some 37 million units traded on exchanges and some 13 million units traded over-the-counter). This is less than half of the volumes traded over the previous year.

The most plausible explanation for this is that fewer European companies have a need for credits and/or don't have much left of their credit limit. We expect secondary transactions to shrink over the next years to 37 million CERs in 2016, 29 million CERs in 2017 and 23 million CERs in 2018.

The price for Dec-2015 CERs varied during the year, increasing to 65 eurocents towards the end of the year compared to some 50 eurocents traded at the beginning of 2015. We attribute this mainly to a short term squeeze in the supply of CP2 CERs. The value of the 2015-traded secondary CERs equalled €16 million (€10 million traded on exchanges and €6 million traded over-the-counter). See more details on secondary CER trading in Table 2.1 in the section on Europe.

CANCELLATION PLATFORM

In September, the Executive Board (the CDM EB) launched a cancellation platform that aims to enhance the voluntary market by being a match-making service that allows buyers and sellers to bypass third parties and avoid brokerage fees. The platform is still in an early phase of operations, and only 8,255 CERs had been cancelled by the end of December. Over the first three month of operation, the average price paid per tonne worth of cancelled CERs was around \$2.0. As of now, close to 30 projects are listed on the platform, with offers ranging from \$1.0/t to \$4.0/t.

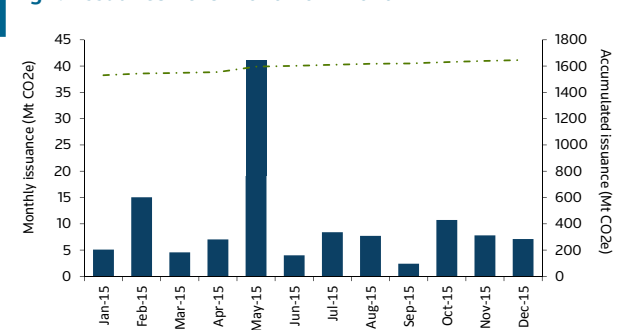
We expect much of the volumes cancelled from the CDM Registry to be channelled to the domestic markets, indirectly allowing the use of CERs for compliance purposes; in particular the Korean scheme that converts cancelled CERs to Korean offsets. Out of almost six million CERs cancelled from the UN registry, about 2 million units have been used for conversion to KOCs – Korean offset unit eligible under the Korean ETS (KETS). In addition some 4.7 million units have been cancelled from the New Zealand's registry; these have also been converted into KOCs.

The Korean market currently sees demand for offset units (KCU) close to \$10.0/t, this is many times the price currently paid for CERs. Starting from May next year KOCs will be allowed for trading at the KRX exchange, which would likely increase liquidity. Up to now KOCs have been traded OTC only. The estimate annual offset demand for the Korean market may reach as high as 55 million tonnes. Some of this demand (not all) could be met by conversion of Korea-sourced CERs and we therefore expect continued high demand and price premium for Korean CERs.

So far we have not seen much space for CDM projects in the Chinese domestic market. Most provinces banned pre-CDM credits (i.e. credits generated before the registration of the project by the CDM EB) to be used for compliance. In theory, in order to switch to the Chinese market, a CDM project owner will have to completely deregister his project from the CDM. We have witnessed only two deregistration cases so far, none of the deregistered projects are in China.

We don't expect any deregistration of Chinese CDM projects,

Fig 7.1 Issuance 2015 month-on-month



Sources: Thomson Reuters Point Carbon

Fig 7.2 Issued to whom

Country	Amount issued (Mt CO ₂ e)	Project-type	Amount issued (Mt CO ₂ e)
China	960	Industrial processes	843
India	211	Renewable energy	457
Republic of Korea	135	Energy efficiency	141
Total three	1,306	Total three	1,441
Share of total issuance	79%	Share of total issuance	88%

since they cannot be used in the domestic scheme, and the CCER market is oversupplied anyways. Moreover, almost all the projects currently coming to validation under the Chinese scheme are newly developed projects using - methodologies approved by the NDRC.

ISSUANCE AND PROJECT INFLOW

Over 121 million CERs have been issued to the CDM projects during 2015, which is higher than in 2014. About 105 million of them are CP2 CERs. With prices around issuance cost CDM project owners do not hurry to issue or transfer credits, unless they have an assured buyer. Hence, a lot of credits are sitting in the CDM registry, and few credits are available for exchange trading. Issuance in 2016 will largely depend on the purchasing activity and willingness to cancel CERs, in particular the demand for the CERs convertible into Korean KOCs.

According to the UNFCCC, 75 CDM projects started validation in 2015, while only 104 projects got the approval of the CDM EB. We do not expect those numbers to rise in 2016.

NO SALVATION FROM THE PARIS SUMMIT

While a mid-year draft explicitly mentioned CDM as a potential post-2020 mechanism, the final text of the Paris Agreement did not mention CDM directly. The agreement opens for use of

internationally transferred mitigation outcomes (ITMO) that is likely to build on the framework and experience from both the CDM and JI. The Subsidiary Body for Implementation (SBI) delayed reviews of both CDM and JI until May 2016, while a decision on forestry projects under the Kyoto Protocol was postponed till the 22nd Conference of the Parties (COP22) in Marrakesh in November 2016.

Furthermore COP21 encouraged the CDM EB to explore the opportunities for financing through the international institutions, such as the Green Climate Fund (GCF). GCF approved its first batch of financial support in November, disbursing \$168 million to eight projects, none of which are CDM. The next meeting of the GCF board is set for March 2016.

OUTLOOK: WILL AVIATION BE A SOURCE OF DEMAND?

In 2016 we forecast primary transactions of 50 million CERs, as we expect CER purchases from Norway as well as Germany, which set aside about €20 million for acquiring CERs generated by nitric acid projects. We also expect possible primary CER purchases from Australian buyers, as well as second tender planned by the World Bank and more CER conversions for Korean domestic market.

One demand source that could potentially emerge and become important is international aviation. This sector is set to get its offsetting mechanism ready in 2016 under the auspices of the International Civil Aviation Organization (ICAO). The mechanism is supposed to take effect from 2020 and help the sector in achieving emissions reduction and carbon neutral growth. Oeko Institut, a German research institute, estimates potential demand for international carbon credits from the aviation sector to be in the order of 3.3 billion units in the years 2021 – 2035. Late 2015, Mexican airline company Aeromexico announced it agreed to purchase an undisclosed volume of CERs to meet future emission reduction goals to be adopted by the sector.

We assume that from 2020 onwards airlines will become subject to some emission reduction targets, and that it seems likely that they will be able to use CERs to cover at least a part of their obligations. ICAO is also considering other offset standards for compliance purposes, such as for example offsets coming from projects avoiding deforestation (REDD). A decision on the market based mechanism for the aviation sectors is scheduled to be adopted at the ICAO Assembly in September and October this year.

8. Expectations summary: modest trading in Asia

FOR 2016 WE FORECAST MARKET VALUE TO INCREASE BY A QUARTER GLOBALLY, BUT TO DROP IN CHINA

If we return to the master table we forecast growth in all major markets in 2016 (see selection of markets in table below). On an aggregate level we expect volumes to rise to around 6.7 Gt, up 9 percent from 6.2 in 2015. We also expect prices will continue to rise, most notably in Europe, which still represents the lion's share of global carbon transactions. The combined effect of these two trends leads us to an aggregate value estimate in the order of €60 billion in 2016, up by a quarter from the 2015 value.

If our assumptions prove correct, we will see the European market grow 7 percent in terms of volume, mainly due to higher auction volumes, now that the effect of backloading is less pronounced (only 200 Mt withheld in 2016, compared to 400 Mt in 2014 and 300 Mt in 2015).

In North America we expect volumes to increase 17 percent because of heightened activity in the secondary market. We expect the overall value to increase 23 percent as a result of higher prices and a higher turnover ratio. Ontario is set to join WCI in 2017 and this will bring additional volume and value to the North American market for years to come.

Despite all the interest surrounding the Chinese pilot markets, we only expect trading of some 70 Mt in 2016 (8 percent up) and we foresee values to drop by 12 percent, from €165 m to €145 m. We believe average Chinese allowance prices will drop in 2016, as market participants should realize that there is a high volume of banked allowances in most pilot schemes as a result of lenient caps in the early years.

Once the nationwide emission trading scheme is introduced we

expect the volume to grow substantially, to 160 Mt in 2017 and 236 Mt in 2018.

DOES ASIA NEED TO LET IN THE TRADERS?

As is clear from the table below Asia does very little carbon trading despite the huge emission volumes capped by their schemes.

So, does bigger equate to better? Is the limited trading a problem for the Asian markets? At the end of the day the success of an emission trading scheme should be assessed not on the number of transactions, but on how well it delivers emission reductions. This is basically a question of how tight (ambitious) the cap is set by the politicians who created the scheme in the first place.

Both China and South Korea have clearly sought to avoid "over-speculation" in their nascent emissions markets. The Chinese pilot schemes only allow spot trading (no futures contracts), and Korea has effectively closed the market to everyone but compliance companies and three state owned banks. Generally speaking both countries have been focused on avoiding rapid price movements, a deep-rooted worry both for the compliance companies and for market regulators.

In short, Beijing and Seoul might have been wise in choosing a cautious approach. Nevertheless, the situation is clearly not ideal, at least not in South Korea, where there is huge demand for both allowance and offset units, but none are offered. If brokers, aggregators and other middle-men had been allowed to participate, there is every reason to expect a much better liquidity, in the interest of all market participants.

Table 8.1. Historical and forecast volumes, selected markets.

	2014		2015		2016		2017	2018	2018
	Final figures		Final figures		Forecast		Forecast	Forecast	Forecast
	Mt	€ million	Mt	€ million	Mt	€ million	Mt	Mt	Share of total volume
Europe (EUAs, aviation EUAs)*	6 942	40 694	4 960	37 460	5 343	46 873	5 799	5 133	73 %
CERs	185	110	100	80	90	102	74	53	1%
North America (CCAs, RGAs, offsets)	472	3 320	1 042	10 633	1 216	13 047	1 412	1 514	22%
South Korea (KAUs and offsets)			1,2	11	19	170	28	50	1%
Chinese pilot schemes (allowances and offsets)	24	123	65	165	70	145	176	236	3%
Total	7 642	44 250	6 170	48 353	6 741	60 343	7 491	6 988	

Carbon Calendar 2016

Selected events

Date	Event
March	China to finalize its 13th Five-Year-Plan (2016-2020).
17-18 March	Spring European Council. EU heads of state and government to discuss inter alia the outcome of the Paris climate summit.
30 March	Opening of the Africa Carbon Forum in Kigali, Rwanda.
31 March	Deadline for reporting emissions in Chinese pilot ETSs and in South Korea's ETS.
1 April	European Commission will release verified 2015 emissions in EU ETS.
22 April	Paris Agreement opens for signature in UN Headquarters in New York. Once a Party (country) has signed, it can ratify.
16-26 May	Negotiations of the UNFCCC subsidiary body. The ad hoc group on the Paris Agreement (APA), tasked with preparing the implementation of the agreement in 2020, will have its first meeting. Discussion on modalities for the new market mechanism.
20 May	Draft report on EU ETS phase 4 revision to be presented to the Environment committee (ENVI) of the European Parliament. This will mark the beginning of a long series of discussions and amendments. The final report is scheduled for adoption by ENVI on 8 Dec, then plenary vote early 2017.
25-27 May	Carbon Expo in Cologne, Germany.
31 May	Certification of Korean ETS emission reports for 2015 by Ministry of Environment. Once the certified emission reports will be made public, the Ministry will allow stakeholders and market observers to gauge whether the 2015 allocations of emission allowances were sufficient or not.
27 Sept – 7 Oct	International Civil Aviation Association (ICAO) General Assembly to consider a global market-based measure (MBM) for international aviation to be implemented from 2020.
7-18 Nov	UNFCCC COP 22 Climate Summit, Marrakesh, Morocco, focussed at preparing for implementing of the Paris Agreement. The detailed rules for the new market mechanism for sustainable development are scheduled for adoption at the session.

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