Emissions Trading Worldwide

International Carbon Action Partnership (ICAP)
Status Report 2017

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Editorial Team

Marissa Santikarn, Alexander Eden, Lina Li, Johannes Ackva, William Acworth, Martina Kehrer, Oliver Lübker, Julia Melnikova, Mariza Montes de Oca, Kateryna Stelmakh, Charlotte Unger, Kristian Wilkening and Constanze Haug.

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Marco Aurélio dos Santos Araujo (Brazil), Jean-Yves Benoit (Québec), Chen Zhibin (Sinocarbon), Mary Jane Coombs (California), Matthew Cowie (New Zealand), Lynda Danquah (Canada), Sean Donavan (Mexico), Johannes Enzmann (European Commission), Victor Escalona (Mexico), Jason Hollett (Nova Scotia), Huang Xiaochen (Sinocarbon), Cécile Goubet (France), Huang Dayue (Chonqging Low Carbon Consulting), Ai Kaibu (Japan), Sun-Yeong Kim (Republic of Korea), Marat Latypov (Russia), Stéphane Legros (Québec), Pongvipa Lohsomboon (Thailand), Vivian Vieira de Macedo (Brazil), Anaïs Maillet (France), Akiko Miura (Tokyo Metropolitan Government), Antje Mosler (Switzerland), Nicolas Muller (UNFCCC), Sachiko Nakamura (Tokyo Metropolitan Government), Il-Young Oh (Republic of Korea), Megan O'Toole (Vermont), Heather Pearson (Ontario), Saul Pereyra (Mexico), Qian Guoqiang (Sinocarbon), Huy Luong Quang (Vietnam), Kathleen Rich (Canada), Juan Pedro Searle (Chile), Gulmira Sergazina (Kazkahstan), William Space (Massachusetts), Sophie Wenger (Switzerland), Tony Usibelli (Washington State), Zeren Erik Yasar (Turkey), Alfred Alexandre Yameogo (Québec), Olga Yukhymchuk (Ukraine)

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Foreword

Over the last year, policymakers working with Emissions Trading Systems (ETS) have been steadily consolidating and improving their systems, adapting policy to their political and economic reality. At the same time, emerging systems have built upon other's experiences and are taking a learning-by-doing approach to build a new generation of ETS.

After the international success of Paris in 2015, and the ratification of the Paris Agreement in September 2016, climate policymakers around the world are adjusting to the reality of the new international climate regime. The essence of the Paris Agreement is that Parties determine their own contribution to fight climate change, with the overall objective of keeping global warming below 2 degrees Celsius. Paris is thus not a blueprint for success, but rather a commitment to act and to ratchet up ambition over time. Now that the agreement is in force, it requires implementation at home. With this in mind, governments at all levels need tools they can trust to drive real and verifiable emissions reductions in their own national contexts.

One proven and cost-efficient instrument is putting a price on carbon. Economists have long championed carbon pricing as a simple and elegant solution to climate change as it encourages polluters to internalize the cost of fossil fuels on the environment, economy and wider community. In this context, the attraction of carbon pricing through an ETS is clear: put a limit on your emissions and let market forces find the most cost-effective means of reduction. Over time, economists predicted that a unified global carbon market would emerge, triggering the necessary investments to transition to a low-carbon economy.

However, the real world is somewhat different to textbook assumptions. Experience has shown us the challenges of implementation in an imperfect world of unexpected political and economic fluctuations. Policymakers have pragmatically faced these challenges, working with stakeholders to design, test, implement and improve measures to drive long-term change. The pioneering EU ETS stands out in this regard, as over the last decade it has continued to evolve in response to lessons learned and new circumstances. With a system-wide review now underway to prepare for its fourth phase of operation post-2020, the EU ETS continues to set the tone for the progressive evolution of ETS policy in Europe and around the world. Indeed, with a decade of experience and a track record of implementation in 21 distinct systems covering 35 countries, emissions trading has now graduated from theory to practice. In the process, a body of practical knowledge and know-how has been gathered, which is in turn guiding the evolution of these systems. Here are five key lessons from current practice:

1. Emissions trading needs to be integrated into a broader climate policy mix

The cap in an ETS ensures that climate targets are met. This makes a well-designed system highly effective in driving emissions reductions. However, experience has also shown that in order to reach long-term climate goals, the reduction trajectory needs to be designed to work in concert with other policies. A smart policy mix is necessary to realize ambitious climate action. ETS can be the central pillar of a government's climate change framework, reducing emissions at the lowest cost. And yet, goals like leveraging energy efficiency potentials and fostering low-carbon technologies will require a suite of complementary policy instruments operating alongside the ETS. A well-designed ETS can work together with these measures to drive innovation and transform energy systems. Even where ETS is not intended to do the 'heavy lifting' in terms of reducing emissions, it can also be a reliable backstop as it guarantees emissions are capped at a given level. This is the case in Tokyo, for example, where policy encouraging energy efficiency improvements plays a more prominent role in driving mitigation efforts.

2. Market stability can be managed

Lower than expected carbon prices in some systems have sparked discussions about appropriate price levels and policy goals of an ETS—a conversation we have also taken up at ICAP last year. A challenge that each jurisdiction must face is how to deliver policy predictability while retaining enough flexibility to let the system respond to changing circumstances. Tools to manage the allowance market have now become good practice in ETS design, and different systems have chosen different approaches. In the EU, interventions such as the Market Stability Reserve target the supply of allowances, whereas North American systems have rather focused on mechanisms controlling the allowance price. However, in Europe there is an ongoing debate on the long term effectiveness of the supply-based measures, and the potential benefits of introducing a price floor are once again being examined. In a different approach, the Korean ETS was designed from the outset to have an allocation committee with considerable flexibility to intervene to stabilize the market. After the first eighteen months of operation, prices there have settled around the upper spectrum of ETS prices. Looking ahead, the lessons these approaches yield will also support other jurisdictions navigating this issue.

3. Auctioning revenues can amplify the benefits of emissions trading

By the end of 2016, ETS worldwide had generated close to USD 30 billion in public revenue by auctioning a share of their allowances. Existing systems have used this revenue to amplify the mitigation effect of the ETS by funding additional climate and energy programs, such as investing in public transport or renewable energy. Other systems have used the money to allay concerns about higher prices on households and broader environmental justice

issues by helping those communities most affected by climate change. Auctioning revenue gives governments an additional tool to respond to the concerns and priorities of their constituents. The visible signs of these benefits, from a new railway system to lower energy bills, can also help build public support for ETS.

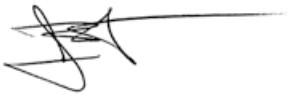
4. ETS is evolving to meet the needs of emerging economies

Possibly the most exciting developments in ETS are currently taking place in emerging economies in Asia and Latin America. Innovative systems are being designed that can reduce emissions, limit local pollution, and transform energy systems against the background of a growing economy. In 2017, all eyes will be on China as it launches the world's single largest carbon market. China has not only learned from the international experiences of other systems but also generated local lessons through its pilot systems. Mexican policymakers are also considering launching a system as early as 2018, building on an existing national carbon tax, GHG emissions registry and a recently launched ETS simulation. By adapting ETS to new circumstances, these systems will continue to drive the evolution of ETS design in the coming years.

5. Connecting and collaborating are key

As systems continue to evolve and a new generation of ETS emerges, international cooperation will be crucial to the carbon pricing—and climate policy—success story. Article 6 of the Paris Agreement sends a strong signal to carbon markets and encourages Parties to cooperate to achieve their NDC targets. However, a clear accounting framework with quantifiable targets will be crucial to the success of these cooperative ventures. Progress on ETS linking is also being made. California and Québec have operated a common market since 2014, and the newly launched system in Ontario intends to join this market in 2018. Saitama and Tokyo have linked their systems, and the EU has continued to expand its ETS membership since its inception in 2005, recently concluding linking negotiations at a technical level with Switzerland. New regional networks are also beginning to form, such as the trilateral carbon pricing dialogue among China, Korea and Japan that involves ETS policymakers from all levels of government including the city of Tokyo.

International dialogue and collaboration are crucial in stimulating mutual understanding and the gradual convergence of diverse systems. In support of this process, ICAP continues to foster the constructive exchange of ETS experience and knowledge, enabling policymakers to benefit from the valuable lessons learned by others, and contributing to the common understanding of emerging ETS best practices.



Jean-Yves Benoit
Co-Chair of the International Carbon Action Partnership, Steering Committee Director, Carbon Markets Division, Québec Ministry of Sustainable Development, Environment and the Fight Against Climate Change

Marc Allessie
Co-Chair of the International Carbon Action Partnership, Steering Committee Director, Dutch Emissions Authority (NEa)

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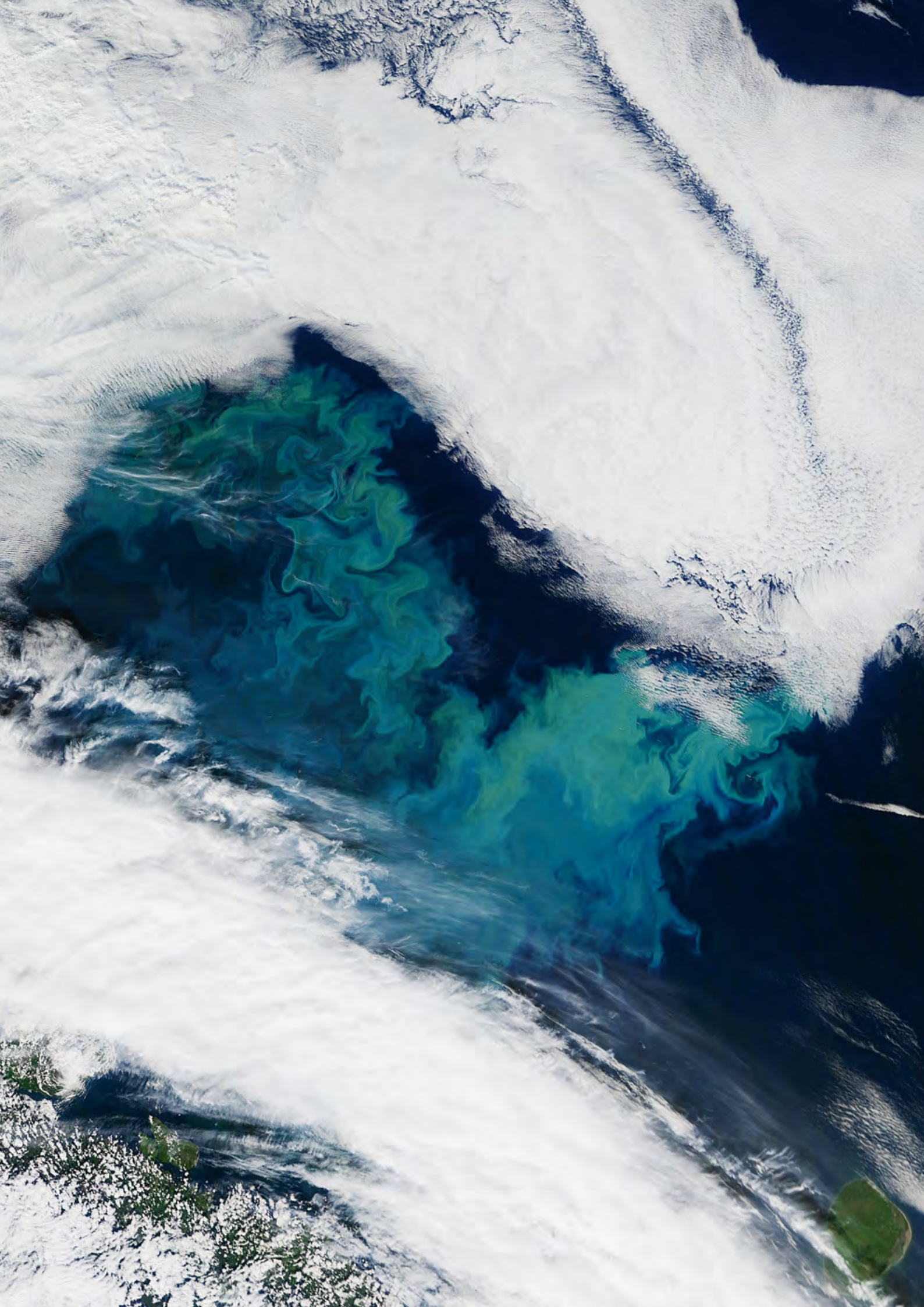


Practitioner Insights
Designing Cap-and-Trade

In this section, ETS policymakers from around the world discuss new trends in emissions trading, drawing on their own practical experiences and the latest carbon pricing research. Focusing on the EU ETS, Cécile Goubet and Anaïs Maillet from the French Ministry of the Environment, Energy and Marine Affairs look at the role a carbon price floor could play in delivering an effective and predictable carbon price signal for European companies. Mexico is on the pathway to a national ETS. Victor Escalona, Sean Donavan and Saul Pereyra, of the Secretariat of Environment and Natural Resources in Mexico, outline Mexico's domestic carbon pricing framework, including the recently launched ETS simulation. Qian Guoqiang and Huang Xiaochen from Sinocarbon Innovation & Investment Co. Ltd. provide a behind-the-scenes look at China's progression from seven ETS pilots to the world's largest ETS in 2017. Also in Asia, Il-Young Oh from the Ministry of Strategy and Finance in the Republic of Korea shares her insights into the national carbon market, whose allowance price has continued to rise in the first eighteen months of operation. Akiko Miura from the Tokyo Metropolitan Government reviews the first compliance period in the Tokyo Cap-and-Trade Program, which has driven a 25% decrease in emissions compared to base-year levels. Finally, Nicolas Muller from the UNFCCC offers an international perspective for ETS policymakers, outlining the potential for cooperative approaches to carbon markets in the Paris Agreement and the importance of setting clear, quantifiable targets in Parties' Nationally Determined Contributions.

The EU ETS

The EU ETS Carbon Price: Closing the Gap Between Expectations and Actual Price Delivery

Cécile Goubet and Anaïs Maillet
French Ministry of the Environment, Energy and Marine Affairs

The ongoing question of how to reconcile short term and long term price signals

For more than ten years now, the European carbon market (or EU ETS) has been operating in Europe to incentivize greenhouse gas (GHG) emissions reductions within the industrial and power sectors.

As a market based mechanism, it is sometimes forgotten that the European carbon market is primarily a public policy instrument designed to achieve climate targets. In theory, the way it is supposed to work is simple: a cap is set, determined by political commitment, to reduce our GHG emissions by 20% in 2020 and 40% in 2030. As there is a strong need to unlock energy efficiency improvements and investments in innovative low-carbon technologies, complementary policies are also implemented.

The GHG emissions cap is set to achieve those GHG emissions reductions targets. Accordingly, installations covered by the EU ETS are supposed to make their operational and investment decisions based on their anticipation of what the level of constraint (i.e., the carbon price) will be in the short and long run. An installation will reduce its emissions as long as its abatement costs are below the carbon price signal sent by the market. Consequently, low-cost emissions reductions are the first to be achieved and more expensive options will be unlocked as the level of scarcity (and therefore the carbon price) rises through the years.

However, over the past few years, a range of factors have caused the price of allowances to dramatically decrease from EUR 28 to less than EUR 5 (see Figure 1). With such a low price signal and strong uncertainties regarding the evolution of the carbon price, the "market design" of the current EU ETS is not sufficient to trigger the necessary investments (see Figure 2 on EU ETS prices compared to other systems). The current EU ETS carbon price, which is the international representation of European climate ambition, does not reflect the full cost of our policies and measures.

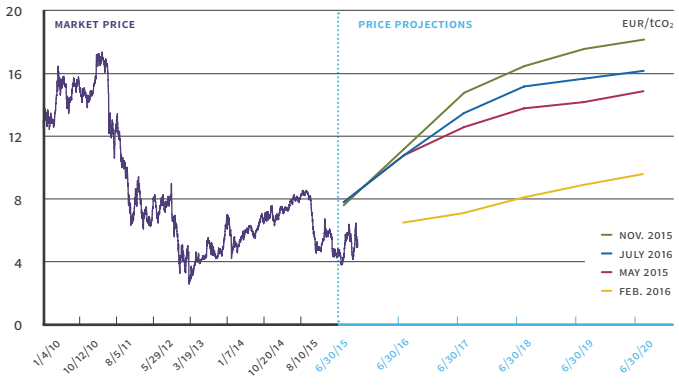


Figure 1: EU ETS price projections have systematically been above realized prices.
Source: based on Thomson Reuters' consensus of analysts.

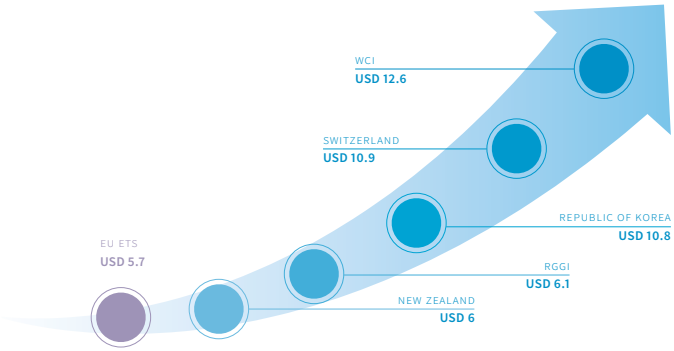


Figure 2: Carbon prices in the EU ETS compared to other ETS (April 2016).
Source: based on Thomson Reuters, ICAP.

Consequences are many: loss of attractiveness for investments in renewable energy and energy efficiency, increased costs of support mechanisms for renewable energy, weak government revenues from auctions (while these revenues are meant to fund the energy transition), and an increased risk of locking in carbon-intensive technologies.

Until now, several reforms have been proposed to deal with these issues: in particular, the 'backloading' reform in 2014 and the establishment of the 'Market Stability Reserve' in 2015, which will come into force in 2019. However, complementary action is needed as price forecasts do not anticipate any substantial increase in prices before 2030 (Thomson Reuters, 2016[1]; FTI Consulting, 2016[2]). The current reforms for the post-2020 scheme are not perceived by market actors to be capable of significantly strengthening the EU ETS either (Thomson Reuters, 2016[3]), which is partly reflected in the current low prices.

> "A carbon price floor in the EU ETS would effectively complement past reforms by creating an effective and predictable price signal."

1 Thomson Reuters (2016). California Dreaming—Implications of an EU ETS price floor, Point Carbon

2 FTI Consulting (2016). Wake up! Reforming the EU Emission Trading Scheme (ETS): Comparative evaluation of the different options http://www.fticonsulting.com/~/media/Files/us-files/intelligence/intelligence-research/wake-up-launch-event-2016-presentation.pdf

3 Thomson Reuters (2016), Carbon Market Survey, May 2016

The potential benefits of a price floor

A carbon price floor in the EU ETS would effectively complement past reforms by creating an effective and predictable price signal. It would send an immediate signal to trigger low-carbon investments, and ensure that the price trajectory is consistent with EU climate objectives in the medium and long term. By giving agents incentives in the short, medium and long term to invest in clean technologies, the price floor would avoid the risk of lock-in and smooth the cost of transitioning to a low-carbon economy over time, rather than deferring most mitigation efforts to the future.

A price floor that is higher than current price levels should lead to additional emissions reductions. For example, a price floor trajectory starting at EUR 11 in 2017 and reaching EUR 30 in 2030 is estimated to lead to additional emissions reductions of between 300–400 Mt (Thomson Reuters, 2016[4]). If the price level was sufficient to trigger a switch from coal to gas for electricity production, then emissions reductions in the electricity sector alone would be higher than 100 Mt CO_2/year (RTE-ADEME, 2016[5]).

Furthermore, a carbon price floor is an effective solution to deal with so-called "complementary policies", such as measures for energy efficiency and renewables, as such policies can trigger emissions reductions within the EU ETS that the system is not prepared for. If the impact of these policies on the EU ETS is not accurately estimated and if the cap is not adjusted accordingly, they can lead to an increase in the surplus of allowances and a price drop. A carbon price floor can mitigate some of these effects. More broadly, with a carbon price floor at auctioning, the supply of allowances can be partly adjusted in light of any exogenous shocks, such as an economic crisis, so that prices remain close to a trajectory consistent with long-term objectives.

Lastly, compared to current price levels and projections, a carbon price floor would significantly increase Member States' revenues from auctioning and can guarantee a certain level of additional government funding, which may then be used to fund the energy transition.

The idea of price control in the EU ETS has raised a number of issues, including the fear that the EU ETS could be considered a tax, which would require unanimous approval by all Member States. However, a legal analysis of this issue (Wemaëre, 2016[6]) concludes that a carbon price floor would not be a fiscal provision. The idea of a carbon price floor has also provoked mixed opinions from the sectors covered by the EU ETS. Indeed, the impact of a stronger carbon price on producers largely depends on their ability to pass costs through to consumers. For instance, the potential for cost pass through is very high in the case of power generation, whereby companies are able to increase prices to reflect the carbon price with little risk of carbon leakage. Thus, some major actors in the electricity sector have sent very positive signals in favor of a carbon price floor. However, the ability to pass costs through to consumers can be low for some industrial sectors that are deemed exposed to a risk of carbon leakage. For those sectors, a strong carbon price cannot be separated from efficient measures against carbon leakage.

"What matters is the carbon price signal that covered installations see today and anticipate tomorrow. The European carbon market needs to deliver a price signal which is increasing over time in order to trigger investments."

An effective carbon price signal should be the first concern for the post-2020 reform

Theoretically, a carbon market is the best tool to achieve climate targets at a reasonable cost, especially when public authorities cannot know the abatement costs for covered sectors. But ultimately, what matters is the carbon price signal that covered installations see today and anticipate tomorrow. The European carbon market needs to deliver a price signal which is increasing over time in order to trigger investments. This should be the primary topic of discussion for the current post-2020 reform.

4 Thomson Reuters (2016). California Dreaming—Implications of an EU ETS price floor, Point Carbon

5 RTE-ADEME (2016). Signal Prix du CO_2. Analyse de son impact sur le système électrique européen. http://www.rte-france.com/sites/default/files/etude_signal_prix_du_co2.pdf

6 Wemaëre, M. (2016). Why a carbon price corridor is not a tax. The Shift Project

Mexico

Mexico's Carbon Pricing Policy: Advancing on an ETS

Victor Escalona, Sean Donovan and Saul Pereyra
Mexican Ministry of Environment and Natural Resources (SEMARNAT)

Building on its international recognition as a pioneer on climate change policy, the Mexican government has advanced a legal and institutional framework to establish a price on carbon as an economic instrument aimed at GHG mitigation. The Mexican climate policy framework has been in place for some years, but has gone through several reengineering processes with the objective to give legal certainty to carbon pricing instruments and strengthening the goals associated with GHG emissions reduction.

The publication of the General Law on Climate Change in 2012 represented a breakthrough for climate change policy in the country. Strategic planning instruments have been prepared or updated based on this General Law. Furthermore, it mandates the creation of the National Emission Register (RENE). The RENE regulation, published in 2014, places mandatory emissions reporting requirements on industries and facilities that emit more than 25,000 tons CO_2e per year. RENE came into effect in 2015, and spring 2017 will mark the third year of reporting obligations. Entities are required to report to the Mexican Ministry of Environment and Natural Resources (SEMARNAT). Reporting facilities also have to verify their GHG reports in order to ensure robust and accurate data, which will be used as a basis for any future national ETS. Currently, standards for verification, validation, and direct measurement are being developed in line with international best practices in order to have a robust system recognized at the international level that can facilitate future cooperation.

Furthermore, in an effort to set an initial price signal on carbon in 2013, and despite some industry resistance, the Mexican Congress approved a carbon tax based on fuel consumption. Under the 'Polluter Pays Principle', the objective is to ensure consumers of fossil fuels pay some of the costs associated with the negative externalities of GHG emissions. As of July 2016, the revenue from the carbon tax was more than MXN 20,803 billion (EUR 904 million) following its entry into force in January 2014. Although the taxation policy in Mexico does not allow for the earmarking of any tax revenue, this indicates that by using climate instruments there could be potential funds for climate-related activities.

International cooperation as a key element of Mexican climate policy

Mexico has a strong record of international cooperation for climate protection. Some cooperation efforts support (directly or indirectly) the task of setting a price on carbon, either by moving forward with the current carbon tax or working towards the implementation of a national ETS.

One example is Mexico's cooperation with its neighbors in the North American region. In June 2016, Mexico, Canada, and the United States issued a Leaders' Statement on a North American Climate, Clean Energy, and Environment Partnership that indirectly addresses the subject of emissions reductions, for instance, by promoting the advancement of clean and secure power and showing global leadership in addressing climate change.

> "Mexico has a strong record of international cooperation for climate protection."

Mexico is also collaborating with North American jurisdictions that currently implement emissions trading at the subnational level. In 2014, it signed a Memorandum of Understanding (MoU) with the State of California and later in 2015 signed another MoU with Québec with the objective to, among others, work together to fight climate change. This includes activities that support the implementation of an ETS in Mexico, as well as technical cooperation to strengthen the GHG reporting system. In August 2016 at the Climate Summit of the Americas, Mexico also issued a Joint Declaration with the Canadian provinces of Ontario and Québec with the intention to strengthen cooperation on climate change activities, with a specific focus on carbon markets and the expansion of these instruments.

In October 2015, President Enrique Peña Nieto joined the Carbon Pricing Panel, and Mexico became a partner of the Carbon Pricing Leadership Coalition, a World Bank initiative to advance the carbon pricing agenda.

Mexico is also involved in international cooperation efforts across the Atlantic, engaging with Germany and other members of the European Union, with regular technical and high-level political knowledge sharing seminars on carbon pricing, and particularly emissions trading.

Mexico's ETS simulation exercise: improving corporate readiness

In August 2016, SEMARNAT and the Mexican Stock Exchange signed an MoU to implement an "ETS Simulation Exercise" as a capacity building tool for the private and public sectors. The objectives of this exercise are to:

- Promote dialogue among stakeholders;
- Build capacity for ETS operation in facilities and companies, as well as in government and regulatory bodies;
- Learn lessons from the simulation to help policymakers design the ETS regulations.

Over 140 companies were invited and so far 50 have confirmed their participation. Some of the sectors invited are: power generation, oil and gas, chemical, cement and glass. Other governments

such as the state of California, the provinces of Québec, Ontario, and the Mexican state of Jalisco are also expected to participate as observers.

The path forward: building on the legal framework to establish an ETS

Mexico's 2012 Climate Change Law established goals and outlined steps towards reducing emissions throughout the country. While the law establishes many policies, from the creation of a green fund to the promotion of educational campaigns, two important points stand out in relation to carbon pricing:

1) The mandate to establish the national emissions registry (the aforementioned RENE); and
2) The authority to establish a voluntary ETS.

Additionally and as a result of the Energy Reform, the Power Sector Law gave the Ministry of Environment the authority to establish emissions reduction obligations for the power sector. Finally, the Energy Transition Law promotes the sustainable use of energy and outlines some emissions reductions mechanisms from clean energy generation and consumption. In terms of carbon pricing, it states that the Ministry of Environment shall:

1) Establish emissions limits (cap) considering different technologies for power generation; and
2) Create a flexible mechanism to comply with the emissions limits.

> "Building on its international recognition as a pioneer on climate change policy, the Mexican government has advanced a legal and institutional framework to establish a price on carbon as an economic instrument aimed at GHG mitigation."

Upon this legal basis, the Federal government is working on paths forward to establish carbon pricing through further regulation, guidelines, and standards. Numerous options are being analyzed for the regulatory framework needed for an ETS, from changes in the law to specific regulations and complementary standards.

Carbon tax and emissions trading compatibility

As a leader on the Carbon Pricing Panel, President Enrique Peña Nieto has repeatedly highlighted that carbon pricing is an effective strategy for Mexico to reduce emissions and meet its Paris Agreement commitment of a 22% reduction in GHG emissions by 2030. The Mexican carbon tax varies from USD 0.30 (EUR 0.28) to USD 2.42 (EUR 2.28) per ton of carbon dioxide. This tax is primarily applied to gasoline and diesel emissions, as natural gas is exempted.

However, one of the major issues being discussed by the Mexican government is ensuring the compatibility of any future ETS with the current carbon tax. In collaboration with the German Government and researchers at the Massachusetts Institute of Technology (MIT), SEMARNAT is currently exploring pathways towards more efficient carbon pricing. Their analysis includes the economic and environmental effects of different scenarios for both a carbon tax and emissions trading.

Next steps: designing the elements of a future ETS

Establishing an ETS implies several important steps. In order to achieve an effective, efficient and affordable system, Mexico is currently working on the following elements of an ETS:

Offset policy development

Both the current carbon tax and the Climate Change Law include provisions for offset credits. However, these provisions need to be elaborated in order for a robust carbon offset market to develop in Mexico, as the current regulation provides little detail on the type of projects that can be registered in the RENE. Thus, SEMARNAT will begin evaluating various approaches to the development of specific protocols for offset projects. Also, an offset registry will also be developed as part of the National ETS Registry.

Emissions trading regulation

Additional design elements or provisions of an ETS must also be prepared. Most likely, these will take the form of a regulation adopted by SEMARNAT outlining the details of the program. The regulation will include definitions, program scope, the carbon budget, compliance obligation procedures, allocation, and other necessary provisions.

SEMARNAT has established the goal of publishing a draft ETS regulation by 2018, building on the lessons learned from the ETS simulation exercise and the knowledge gained through international cooperation efforts.

China National ETS

Momentum Builds for Launch of China's National ETS

Qian Guoqiang and Huang Xiaochen
SinoCarbon Innovation & Investment Co. Ltd.

This year, the world's attention is on China, which will launch its national emissions trading system (ETS). Driven by an ambitious high-level political target, preparations are now well under way for the implementation of the world's largest ETS.

Indeed, China's national strategy and policy mixture is moving more broadly towards a low-carbon development pathway. In 2016, China emerged as a global climate leader by ensuring that climate change stayed on top of both the international and China's domestic agenda. Together with the United States, Europe and other major partners, China contributed significantly in paving the way for the rapid ratification of the Paris Agreement, the landmark UNFCCC international climate treaty. Last year in Marrakech, China also stimulated global confidence by reiterating its steadfast commitment to the Paris Agreement, regardless of changes in other countries' climate policies. Domestically, China's highest political level has endorsed a "new normal" for China's economy, committing the country to a low-carbon development pathway. Steps have already been taken to mainstream climate policies into its national development strategies.

Pilot systems continue to mature and innovate

The success of the seven ETS pilots has allowed China to experiment with a variety of ETS designs in order to build a robust national carbon market by adopting a learning-by-doing approach. After three years of operation, the allowance markets of the seven pilots have started to mature.

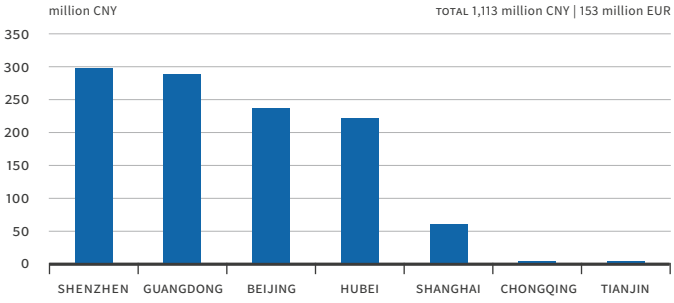


Figure 1: Accumulated market value of China's ETS pilots in 2016

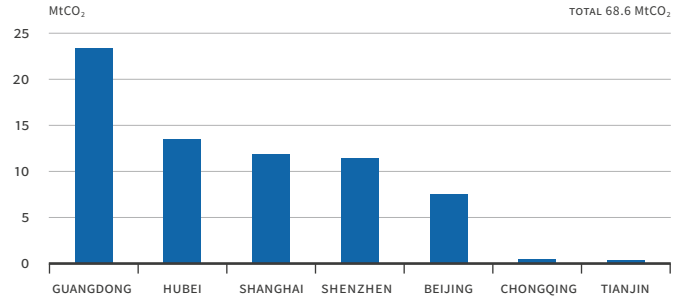


Figure 2: Accumulated market volume of China's ETS pilots in 2016

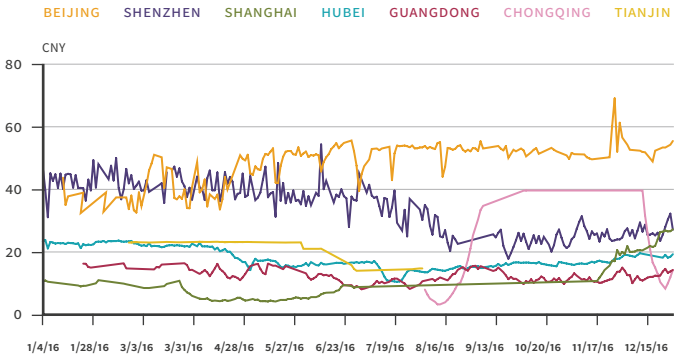


Figure 3: Carbon prices (CNY) in China's ETS pilots in 2016

As of 31 December 2016, the accumulated trading volume of the spot market[1] (see Figure 2) in all the pilots accounted for 68.6 $MtCO_2$, with a total value of CNY 1.1 billion (EUR 151 million) (see Figure 1). Guangdong made up the largest share of the trading volume (23.4 $MtCO_2$), while Shenzhen had the greatest total trading value (CNY 298 million [EUR 40.7 million]).

Figure 3 shows developments in the allowance prices of the seven pilots throughout 2016. Beijing had the highest allowance price, peaking at CNY 69/tCO_2 (EUR 9.42). The clear carbon price drop after the pilots' compliance deadlines around the end of June,[2] suggests that compliance deadlines continue to influence prices.

The pilot exchanges are vying to be the officially authorized carbon financial derivatives trading platform for the national ETS, as well as attempting to secure a competitive advantage in the national market. To achieve this, some pilot exchanges began to develop innovative financial products that serve a similar purpose to carbon financial derivatives. The Hubei exchange started offering 'spot forward contracts' as of April 2016 and the Shanghai exchange began offering 'forward delivery contracts' in December 2016. Since its launch, the trading volume of Hubei forward contracts has already reached 255 $MtCO_2$. Although these products have only been launched very recently, the trading volume is already much larger than the accumulated volume of the overall spot market, reflecting the potential of a carbon financial derivatives are still strictly regulated and partially prohibited by the China Security Regulatory Commission (CSRC).

China's national ETS poised for launch

It is an immense challenge to build a carbon market of the scale and complexity necessary to suit China's national circumstances. Nevertheless, the country has set itself an ambitious work plan. China's National Development and Reform Commission (NDRC) had an extremely busy schedule in 2016, and is currently focusing on the following four elements:

(1) *The legal basis*

NDRC is endeavoring to pass an ETS Regulation at the State Council level. The draft regulation has been submitted to the State Council, which is being reviewed by the Legislative Affairs Office. The NDRC is also working to issue a number of supplementary technical rules, including rules on trading, offsets and the reporting and verification of GHG emissions.

(2) *Data for the national ETS*

Based on the adopted reporting guidelines and interim verification guidelines, provincial Development and Reform Commissions (DRCs) have already submitted verified historical emissions data for 2013–2015 for all companies considered to be included in the national ETS and whose annual energy consumption exceeds 10,000 tons of coal equivalents. All provincial authorities also had to select and commission qualified third party verifiers to verify the data before submitting it to the NDRC. Based on this information, the NDRC and provincial DRCs will jointly announce the list of covered companies, which will also provide the basis for the national allowance allocation.

(3) *Allowance allocation*

In December 2016, the State Council approved the national cap setting and allocation framework, illustrating general principles, design thinking, basic allocation methods (benchmarking and historical intensity) and the allocation procedures. According to the framework, allocation will be done jointly by the national and provincial authorities. Before launching the ETS in 2017, the NDRC is working on issuing draft allocation methodologies, holding trial allocations, as well as improving allocation methodologies and consulting with stakeholders.

(4) *National registry and trading platforms*

The construction of the national registry and trading platforms is mainly based on maximizing existing infrastructure. Currently, work is focusing on upgrading and optimizing the nine approved exchanges (including the seven exchanges of the existing pilots) to serve as trading platforms for the national ETS. The China Certified Emissions Reductions (CCER) Registry System will be expanded to include Chinese national allowances. However, there is much that can still be done to strengthen the CCER system.

Ongoing improvements beyond 2017

Based on experiences from both the domestic pilots and international ETSs, China is taking a step-by-step approach to build its national ETS. The launch is a critical first step in building a fully-fledged carbon market. The mandatory first phase (2017–2019), serving as a trial phase, will help participants become familiar with the system in order to cultivate a healthy carbon market. This also gives authorities the opportunity to discover and solve problems, enabling them to improve the system design, as well as general ETS management and regulation. This will be followed by the full implementation phase (2020–), where policymakers will consider extending industry coverage, improving and increasing benchmarking, raising the percentage of auctioned allowances, and developing a mature carbon financial derivatives market. Following the launch, particular attention will be needed in five key areas:

(1) *Allocation plans*

Given the complex nature of allocation and its power to influence the allowance price based on the different supply and demand dynamics of allocation methodologies, policymakers will need to keep an eye on the design and performance of the allocation plans. Monitoring, assessing and improving the allocation methodologies should be a priority for both the national and provincial authorities.

(2) *Manage and regulate the carbon market*

Provincial DRCs are the competent authorities that will mainly deal with the daily operation, management and regulation of the ETS, as well as interacting with the regulated companies. It will take some time for them to get fully prepared to play the role of competent authorities, including clarifying internal processes and establishing an adequately staffed team. Relying on the pilot ETS experiences, competent authorities in the pilot regions will have an advantage over the non-pilot regions. Fujian province, which also started its provincial ETS in December 2016, will also generate practical experiences to learn from.

(3) *Define offsetting rules*

As the main offsetting instrument, CCERs will play an important role in the national carbon market. As of 31 December 2016, 2,742 CCER projects had entered the project pipeline (see figure 4), 861 projects were approved, and 254 projects had issued an estimated 53 million CCERs. It is still not clear whether all these CCERs will be eligible for compliance under the national ETS, or whether certain restrictions will be imposed.

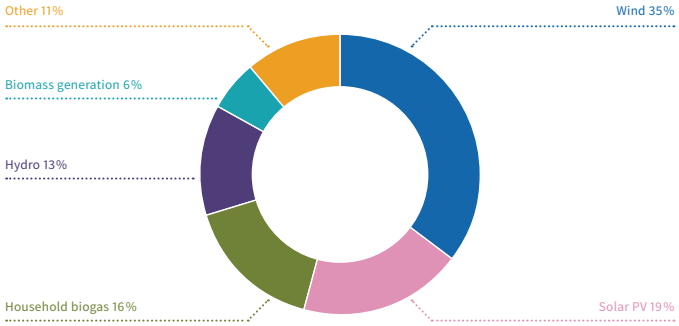


Figure 4: Distribution of registered CCER projects by category

(4) *Compliance and law enforcement*

Once the carbon market kicks off in 2017, it will be followed by a challenging first compliance period in 2018. Both competent authorities and companies will need to be well prepared in advance to ensure an organized and interactive compliance period. Additionally, punitive measures and law enforcement remain as last resort measures to ensure compliance. Once the State Council ETS Regulation enters into force, local DRCs will need to consider which departments will enforce the ETS or whether law enforcement teams need to be established.

(5) *Regular assessment and improvement*

It is essential to initiate an open process to monitor and evaluate the yearly performance of the carbon market in its trial period. This is vital for policymakers to understand where and how the ETS could be improved both more broadly and in response to specific design concerns. A well-grounded ongoing evaluation will ensure that the most constructive feedback can be gained from the learning-by-doing process, which has thus far served China well.

1 The 'spot market' here refers to the secondary market (online and over the counter trading) as well as auctions. CCERs are excluded.

2 For Hubei, it was mid-July, while Chongqing postponed its compliance deadline to 18 November.

3 The following sectors will be covered under the national ETS: petrochemicals, chemicals, building materials, iron and steel, nonferrous metals, paper making, power and domestic aviation.

The Korean ETS
State and Trends of the Korean ETS

Il-Young Oh
Ministry of Strategy and Finance of the Republic of Korea

Overview of emission trading in Korea

In a decisive effort to reduce GHG emissions, the Republic of Korea enacted the Framework Act on Low Carbon and Green Growth in 2010. As a relatively small number of major companies were responsible for more than 60% of Korea's emissions, the government first decided to introduce the innovative Target Management Scheme (TMS) in 2012, which set reduction targets for individual companies, but did not allow for emissions trading. While the TMS operated successfully, the next step was to drive cost-effective emissions reductions by implementing an ETS. Therefore, Korea enacted the Act on the Allocation and Trading of Greenhouse Gas Emission Permits, and launched the Korean ETS (KETS) in January 2015.

International climate change negotiations reached a successful conclusion in Paris in December 2015. In order to support the Paris Agreement with an ambitious national commitment, Korea set its 2030 GHG reduction target to reduce emissions by 37% from business-as-usual levels, and communicated this goal as part of its Nationally Determined Contribution (NDC) to the UNFCCC.

With the revision of the Framework Act on Low Carbon and Green Growth in 2016, the Korean government restructured its climate governance architecture. As part of this effort, the operational structure of the KETS has been reorganized. The national GHG reduction target is now supervised by the Office for Government Policy Coordination, which is also responsible for setting sector targets in alignment with the long-term national target. The Ministry of Strategy and Finance has taken the role of the overall management of the KETS and is also responsible for developing the allocation plan and operating the emissions trading market. The implementation tasks of the ETS are carried out by four ministries: (i) the Ministry of Trade, Industry and Energy; (ii) the Ministry of Agriculture, Food and Rural Affairs; (iii) the Ministry of Environment; and (iv) the Ministry of Land, Infrastructure and Transport. These ministries are directly responsible for controlling the allowances allocated to industries and companies in their relevant sectors.

Current status of the KETS

The first and current phase (2015–2017) mainly focuses on the successful establishment or 'soft landing' of the KETS, as well as providing participants with the opportunity to become familiar with the system. In this regard, 100% of allowances for the first phase were allocated for free, with allocation based on both grandfathering and benchmarking approaches. In the lead up to the implementation of the KETS, 1.6 billion Korean Allowance Units (KAUs) were allocated in advance, while 6.4 million KAUs were additionally allocated during 2015. The responsible ministries can cancel up to 22.4 million KAUs to account for factors such as installation closures or inaccurate emissions reports. By the end of 2015, there were a total of 525 companies participating in the KETS and 524 had submitted permits for compliance. In order to give companies some flexibility in compliance, banking and limited borrowing approaches are allowed when there is a surplus or a shortage of allowances.

To increase the flexibility of the system and to drive additional emissions reductions outside of the KETS, credits from external offset projects based in Korea are permitted. As of September 2016, a total of 72 domestic offset projects were certified and had generated 14.8 million certified Korean Offset Credits (KOCs). While KOCs can be traded, they must be converted to Korean Credit Units (KCUs) of a specific vintage before they can be used for compliance. Meanwhile, in order to certify external offset projects, 22 domestic methodologies have been developed and a further 211 methodologies of the Clean Development Mechanism (endorsed by the UNFCCC) have been adopted.

The monitoring reporting and verification system of the KETS is designed to ensure accurate and verified emissions reports. Covered entities are required to submit an emissions report, which must be verified by an independent third party. The ministry responsible for each covered entity (one of the four relevant ministries) then evaluates the verified report. Finally, the Emission Certification Committee under the Ministry of Strategy and Finance confirms the report based on the evaluation. Korea now has 19 independent verification agencies and 207 certified verifiers.

A healthy trading market

The emissions trading market in Korea is now well established and showing positive developments. To facilitate the market for allowances, the Korean government designated the Korea Exchange (KRX) as an allowance exchange, and trading began in January 2015. During the first phase of trading (January 2015 to June 2016), the total volume of transactions were 12.27 million units. KOCs made up around two thirds of all traded allowances (61%), while KCUs accounted for 24%, and KAUs made up the remainder (15%). KAUs and KCUs were mainly traded on the KRX, while KOCs were traded over the counter.

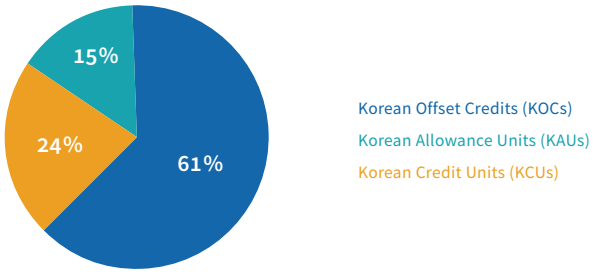


Figure 1: Trading volume of units on the Korean carbon market—% of total (Jan 2015 to June 2016)

"The emissions trading market in Korea is now well established and showing positive developments."

Since the start of trading, carbon prices in the KETS have been following an upward trend. In January 2015, the starting of price for KAU2015s was KRW 8,185 (EUR 6.50). By the end of 2015, the price had risen to nearly KRW 10,000 (EUR 7.94) and on 30 June 2016 the closing price had reached KRW 17,000 (EUR 13.50). The price for KCU2015s has followed a similar path. In April 2015, KCU2015s started at KRW 9,933 (EUR 7.89). By the end of 2015, the price had risen to nearly KRW 12,000 (EUR 9.53), and on 30 June 2016 the closing price had reached KRW 18,500 (EUR 14.69).

Overall, the total value of units traded between January 2015 and June 2016 was KRW 1,781 billion (EUR 1.4 billion). Over this period, the average price of KAU2015s was KRW 16,309 (EUR 12.95), and the average price of KCU2015s was KRW 15,599 (EUR 12.39). Trading activity was highest during the first half of 2016, when a significant share of the total transactions took place (80% of KAU trades and 60% of KCU trades). Therefore, the average price of units over this period is close to the final price on 30 June 2016, and the difference between them was relatively small.

Through complementary policies and activities, the government has also provided ongoing support to ETS participants. To raise awareness of the KETS and ensure the smooth implementation of the system, the government held a series of workshops with KETS participants. Additionally, through the "Greenhouse Gas Reduction Equipment Support Program for ETS Participants", a total of KRW 4.98 billion (EUR 3.95 million) has so far been provided to small and medium enterprises in the form of grants, subsidies and tax benefits, targeting investment in low-carbon equipment.

International cooperation

To share experiences and knowledge of ETS, Korea is currently engaging with international partners in a range of cooperative projects. In 2015, The Republic of Korea and the European Union (EU) forged a memorandum of understanding to conduct cooperation projects on ETS. The three-year Korea-EU cooperation project was then officially launched in July 2016. In accordance with the mutual commitment, EU experts attended technology workshops in Korea, covering topics such as benchmark factor development, carbon price modelling development and new GHG mitigation technologies.

To explore East Asian cooperation on carbon markets, Korea, China and Japan made a decision to share their knowledge of ETS policy. To launch this promising cooperative initiative, a first seminar was held in September 2016, where policymakers exchanged ETS knowledge and practical experiences. The successful seminar is now scheduled to be held annually.

Outlook for the KETS

To ensure the effective ongoing operation of the KETS, the first two trading periods will each last three years before moving to five-year trading periods. This will help Korean policymakers to detect and resolve unexpected problems in the early stages, as well as giving them the opportunity to promptly respond to trends in the global carbon market. Furthermore, it will provide flexibility and enhance predictability for participating companies in the long term.

"The first and current phase (2015–2017) mainly focuses on the successful establishment or 'soft landing' of the KETS, as well as providing participants with the opportunity to become familiar with the system."

The first phase, which lasts until 2017, mainly focuses on the 'soft landing' of the system. Starting from the second phase, more emphasis will be placed on expanding the number of industries that apply benchmark-based allocation. For those industries that still need to apply grandfathering, incentives will be provided through allocation, based on their emissions reductions.

Korea plans to gradually introduce auctioning into its ETS. For the first phase, all allowances have been freely allocated. However, in the second phase, 97% of allowances will be freely allocated and 3% will be auctioned, while in the third phase at least 10% will be auctioned. The revenue from auctioning will be provided to participating companies to invest in environmentally-friendly facilities. Furthermore, the Korean government is considering a plan to allow international CDM offset credits generated by Korean businesses to be traded on the domestic market during the second phase.

Tokyo Cap-and-Trade Program

Reflecting on the First Compliance Period and the Way Forward

Akiko Miura
Tokyo Metropolitan Government

In order to promote the reduction of greenhouse gas emissions within Tokyo, in 2010 the Tokyo Metropolitan Government (TMG) launched the Cap-and-Trade program for large-scale business facilities. Based on the Tokyo Metropolitan Environmental Security Ordinance, Tokyo strives to become the city with the lowest environmental impact in the world.

The end of September 2016 was the deadline for meeting the obligations of the first compliance period. Here, we would like to share the outcomes of the first compliance period, and reflect on some of our recent international engagements.

Outcomes of the first compliance period

Over the first five years of operation (FY2010–FY2014), Tokyo's Cap-and-Trade program led to a remarkable drop in emissions from covered facilities in Tokyo. Total emissions for FY2014, the last year of the first compliance period, were 25% lower than base-year emissions.[1] Emissions reductions in FY2014 were even greater than in FY2011, when significant energy savings were necessary after the power crisis following the Great East Japan Earthquake.

These reductions were achieved despite an increase in the size of covered facilities—the floor area in FY2014 increased 1% over the previous year and 4% over the base year.

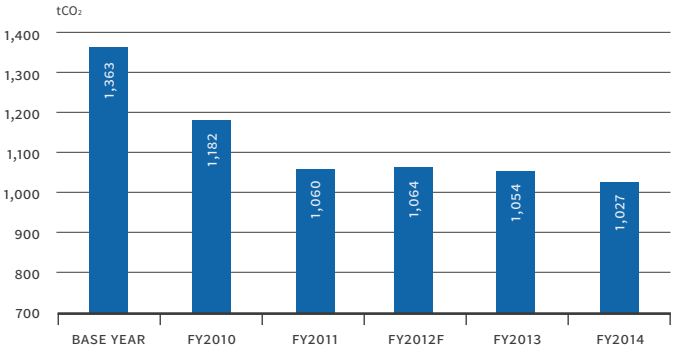


Figure 1: Changes in total CO_2 emissions of covered facilities in Tokyo

Total reductions made throughout the first compliance period (see figure 1) amount to approximately 14 million tons over five years—the equivalent of five years' worth of CO_2 emissions from 1.3 million households or 20% of Tokyo's total households.

All covered facilities have successfully achieved their emissions reduction targets for the first compliance period. Significant reductions were made through proactive energy saving efforts, such as introducing LED lighting or high efficiency equipment. Indeed, 90% of facilities were able to meet their reduction targets through such 'in-house' initiatives. The remaining 10% of covered entities (124 facilities) met their reduction targets through emissions trading, with a total 192,700 tCO_2 of credits traded in the first compliance period.

Looking ahead, it is projected that many facilities will also be able to fulfill their obligations in the second compliance period through internal reduction strategies. Over 70% of facilities achieved emissions reductions in FY2014 that have already exceeded their reduction targets for the second period.

In order to reduce CO_2 emissions from the commercial and industrial sectors, which make up 50% of the total CO_2 emissions from the Tokyo area, TMG has implemented several complementary measures. Emissions from large facilities are covered by the Tokyo Cap-and-Trade Program, while emissions from small and medium–sized facilities[2] are covered by the Tokyo Carbon Reduction Reporting Program, which obliges facilities to account for their emissions and encourages them to implement their own low-carbon measures. As Tokyo's Governor Yuriko Koike commented in November 2016, Tokyo's climate change policies, including the Cap-and-Trade Program and assistant measures for small and medium-sized facilities, will help the city to achieve its ambitious goal of reducing CO_2 emissions by 30% by 2030 compared to 2000 levels.

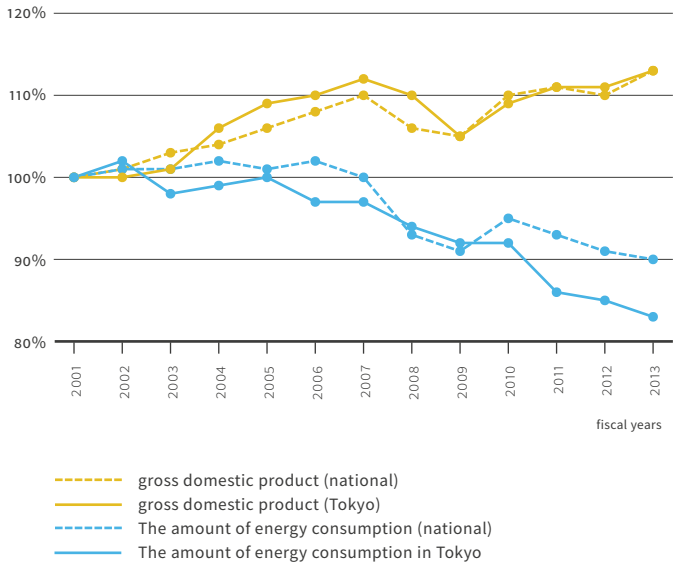


Figure 2: Energy consumption and economic growth in the Tokyo area

1 Base-year emissions for the first compliance period are based on the average emissions of three consecutive years between FY2002–FY2007.

2 Business facilities whose energy usage during a one-year period is less than 1,500 kiloliters (KL) (in crude oil equivalents).

"All covered facilities have successfully achieved their emissions reduction targets for the first compliance period."

Figure 2 shows that Tokyo is already making significant strides to achieving this goal, having decoupled energy consumption and economic growth in the Tokyo area since FY2001. This indicates that both economic growth and energy efficiency improvements have been successfully realized in Tokyo. To make Tokyo more sustainable and economically vibrant, TMG continues to advance measures fostering both energy consumption reductions and economic growth.

International cooperation

The successful outcomes of the first compliance period illustrate the effectiveness of the Tokyo Cap-and-Trade Program. TMG hopes to contribute to the development of the world's climate policy measures by sharing our experiences with other countries and cities around the world, particularly with our regional neighbors in Asia. TMG is working to promote the introduction and good management of Cap-and-Trade programs in Asia, and has welcomed many government delegates, academics and other experts from Asian countries to learn from Tokyo's experiences with emissions trading. Here are two major examples of recent cooperation initiatives that TMG has taken part in.

Forum of Carbon Pricing Mechanism in China, Japan and Korea

Cap-and-Trade is steadily becoming established in Asia. Tokyo initiated its Cap-and-Trade Program in 2010, Korea's national carbon trading market started in 2015, and China developed carbon trading pilots in five cities and two provinces in 2013 with plans to start a nationwide carbon market in 2017. Under such circumstances, it is important to exchange knowledge and ideas about ETS among these countries. With this in mind, the "Forum of Carbon Pricing Mechanism in China, Japan and Korea" was initiated in 2016. The aim of the forum is to gather officials from national and local governments, as well as academics from each country, in order to share experiences regarding carbon pricing mechanisms (including ETS) and explore future developments.

At the initial meeting held in September 2016, TMG shared our experiences and lessons learned so far. The Tokyo Cap-and-Trade Program was presented as an example of best practice—the first system of its kind to be introduced in Asia, which has succeeded in delivering drastic CO_2 reductions. The active discussion between these three regions has just started, and they are on the path toward further cooperation.

Policy-making support to Malaysian cities in the field of climate change measures

In response to a request from the Japanese Ministry of Environment, TMG has been participating in a project to foster sustainable low-carbon cities, targeting the building sectors of Putrajaya and Iskandar in Malaysia. TMG has proposed the introduction of a Carbon Reduction Reporting Program for small and medium–sized facilities in these cities. Such a program can help collect data and raise industry awareness, creating an enabling environment for the introduction of a Cap-and-Trade program.

TMG and Malaysian cities have held biannual joint workshops on Carbon Reduction Reporting Programs and energy saving approaches for buildings in Tokyo and Putrajaya, The workshops were attended by officials from local and central governments from Malaysia, as well as TMG officials.

TMG has a great deal of policy-making knowhow and techniques for low-carbon development that could be applied in other cities in Asia and around the world. International cooperation offers a unique opportunity for Tokyo to share its experiences and encourage the development of climate change and carbon pricing policies around the world, and we look forward to taking the initiative in this field.

"Over the first five years of operation (FY2010–FY2014), Tokyo's Cap-and-Trade program led to a remarkable drop in emissions from covered facilities in Tokyo."

UNFCCC
Carbon Pricing under the Paris Agreement

Nicolas Muller
United Nations Climate Change Secretariat

The Paris Agreement entered into force on 4 November 2016 and countries are already looking at the next challenge: how to implement their nationally determined contribution (NDC) under the agreement. Putting a price signal on carbon is a straightforward approach to address the climate crisis as it not only discourages emissions but also incentivizes investment in emission reductions. In addition, it can be a tool to curb emissions at lower cost, offers emitters more flexibility in when and how they reduce their emissions, and encourages a cooperative approach to mitigating climate change.

It is no surprise that we have witnessed a growing interest in recent years in policy instruments that set a price signal on carbon. We have also seen an increasing diversity of carbon pricing approaches being applied, including not only ETSs, but also carbon taxes and payments for quantified emission reductions. Increasingly, countries are blending the features of these instruments to get the best of both worlds: a stable and predictable price signal combined with flexibility. But countries are also looking at opportunities for collaboration beyond their borders.

Unlike its predecessor, the Kyoto Protocol, the Paris Agreement establishes a bottom-up framework that encourages all Parties to play a role in controlling and reducing their emissions, including through carbon pricing and cooperative approaches. For policymakers interested in carbon markets, how provisions on cooperative action are further developed in subsequent Conferences of the Parties will be of key interest. Firstly, the Paris Agreement broadly recognizes the important role of carbon pricing in fighting climate change. Secondly, both Articles 4 and 6 of the Paris Agreement also encourage cooperative action by allowing the submission of joint NDCs and by recognizing the use of an array of voluntary cooperative approaches by Parties to the Agreement.

"The Paris Agreement entered into force on 4 November 2016 and countries are already looking at the next challenge: how to implement their nationally determined contribution (NDC) under the agreement."

At the domestic level, policymakers are still faced with one essential question: how to design a carbon pricing approach that fits under the provisions of the Paris Agreement. Currently, the agreement only contains high level principles, while details to enable their practical implementation are still under negotiation. But policymakers should already ask themselves: (i) how will their approach to carbon pricing enable the achievement of their NDC and (ii) how will they be able to demonstrate progress towards their NDC using carbon pricing under a part of the agreement called "transparency framework for action and support" (Article 13).

"At the domestic level, policymakers are still faced with one essential question: how to design a carbon pricing approach that fits under the provisions of the Paris Agreement."

Article 6: Cooperative approaches & carbon pricing

While preparing for carbon pricing domestically, many countries are also considering using the approaches in Article 6 of the Paris Agreement. In Article 6.4, the Paris Agreement establishes a mechanism to contribute to the mitigation of greenhouse gas emissions and support sustainable development. Like the Kyoto Protocol's flexibility mechanisms (the Clean Development Mechanism and Joint Implementation), this new mechanism only recognizes emission reductions that are real, measurable and additional, verified by designated operational entities and under international supervision. Nevertheless, the context in which the mechanism would operate is different as all Parties with NDCs can now use article 6.4, as long as they avoid double counting given that all Parties have NDCs. Still, a number of points are under negotiation, such as: (i) whether oversight will be centralized; (ii) whether the mechanism is only for implementing NDCs; and (iii) who will be in charge of ensuring the different provisions are met, including those on sustainable development benefits.

Article 6.2 of the Paris Agreement relates to internationally transferred mitigation outcomes (ITMOs) and may be relevant to unit transfers between ETSs. Some aspects of Article 6.2 are, however, still under negotiation as countries strive to strike the right balance between simplicity and quality assurance. On the one hand, countries may wish to limit the extent to which international rules surrounding the use of ITMOs will apply to them. On the other hand, countries may want to ensure that ITMOs exchanged are of a certain quality and can be trusted. Negotiations on article 6.2 are also considering the level of oversight regarding the use of ITMOs, whether such oversight would be centralized or decentralized and, on a more technical level, at which point will ITMOs be checked for compliance: upon the generation, transfer or the use of such units?

Nationally Determined Contributions: Quantifiable targets

The new landscape which emerges with the Paris Agreement is geared towards implementing the NDCs in a transparent way that avoids double counting, including when cooperative action

results in the transfer or sharing of outcomes. A key challenge for making adjustments to avoid double counting is that NDCs are expressed in different ways: while some establish economy-wide absolute carbon budgets, others are defined as a deviation from business-as-usual or defined as intensity targets. Avoiding double counting would occur at the level of NDCs. Therefore, policymakers interested in future ETS linking may wish to ensure that their systems sit on a robust basis: a properly quantified NDC.

Indeed, strong accounting and tracking will be needed on many levels. Clearly quantified NDC targets are crucial to know how much needs to be achieved and to measure progress. Quantifiable targets give policymakers a clear starting point and end point. With this information, policymakers can know how fast they need to decarbonize and can regularly keep track of the distance to their target. Depending on the role the domestic policy will play in achieving the NDC, these targets will also indicate how much a country's carbon pricing instrument needs to achieve and, in the case of emissions trading, can help inform the cap setting process. Therefore, even in the absence of further guidance on NDCs, countries may want to further elaborate and better quantify their NDC for their own sake.

ETS Map

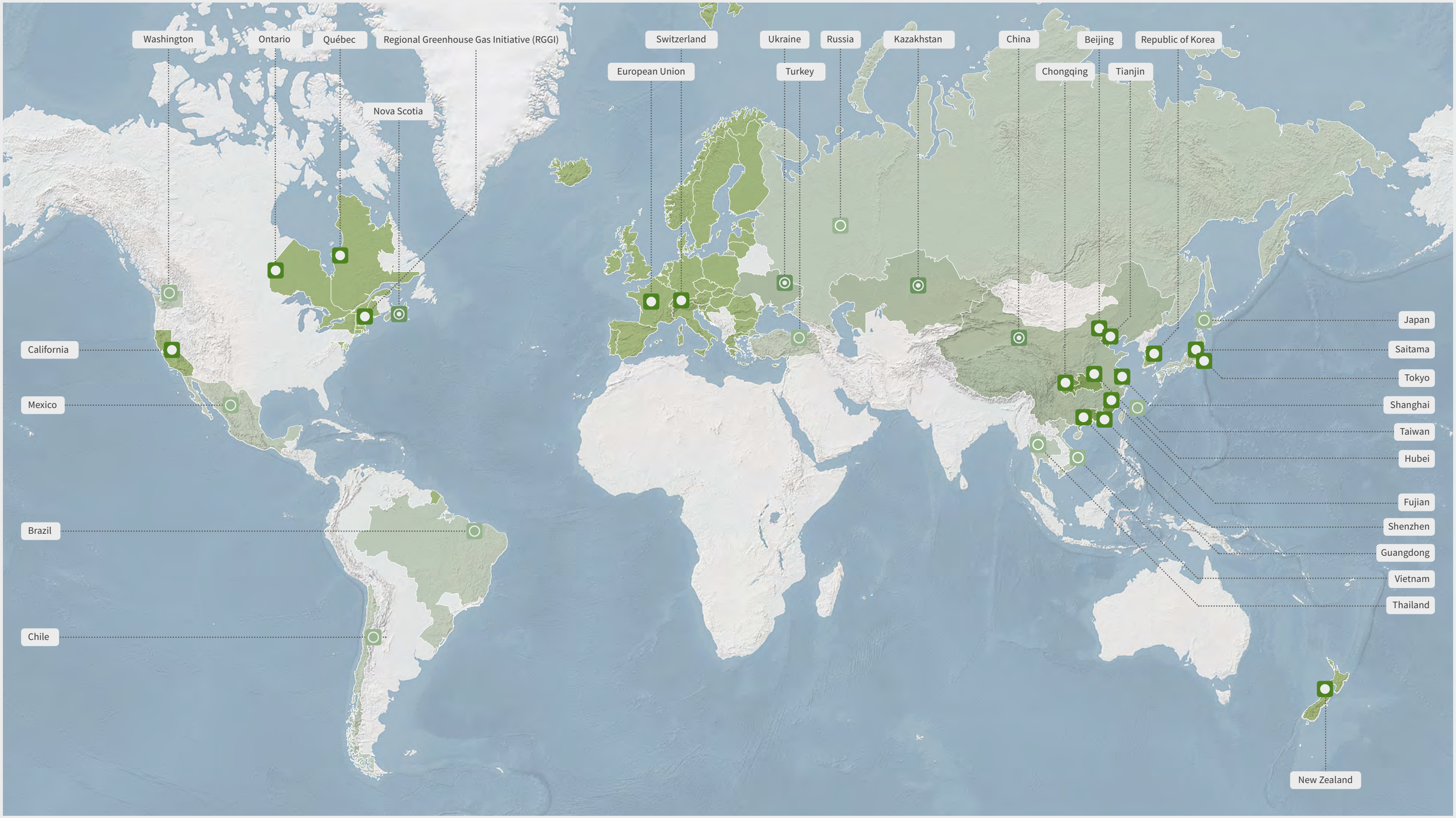
State of Play of Cap-and-Trade Worldwide

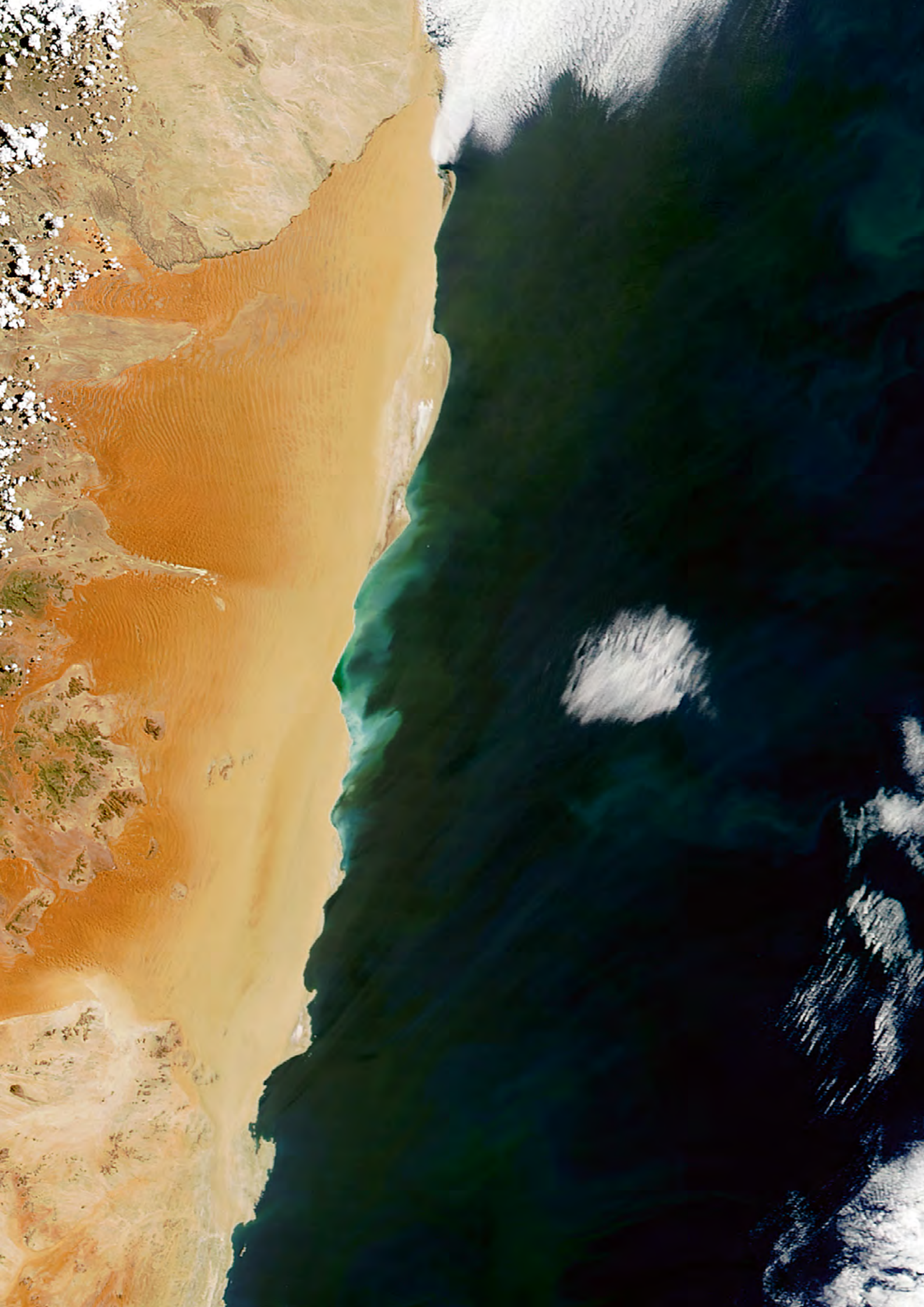
The ICAP ETS map depicts ETS for GHG in force, scheduled or under consideration around the world. 19 ETS are in force to date, including this year's launch of systems in China and Ontario, with Nova Scotia to follow in 2018. Many governments are also considering the role an ETS can play in their climate change policy mix, including Mexico, Brazil, Turkey, Ukraine and Washington State.

A regularly updated, interactive version of the ICAP ETS map with detailed information on all systems is available at:

www.icapcarbonaction.com

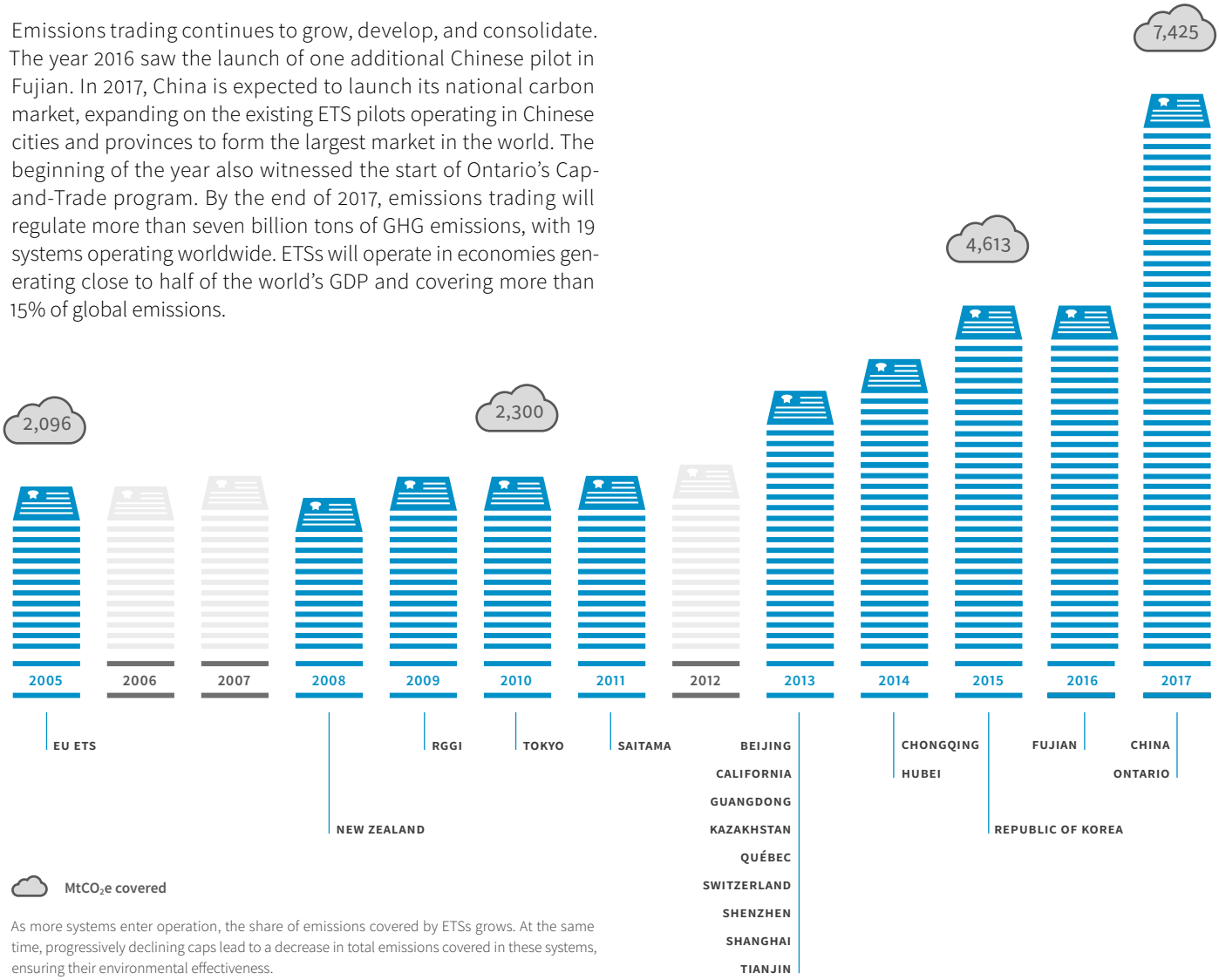
- ETS in force
- ETS scheduled
- ETS considered





At a Glance
Global Trends in Emissions Trading

Emissions trading continues to grow, develop, and consolidate. The year 2016 saw the launch of one additional Chinese pilot in Fujian. In 2017, China is expected to launch its national carbon market, expanding on the existing ETS pilots operating in Chinese cities and provinces to form the largest market in the world. The beginning of the year also witnessed the start of Ontario's Cap-and-Trade program. By the end of 2017, emissions trading will regulate more than seven billion tons of GHG emissions, with 19 systems operating worldwide. ETSs will operate in economies generating close to half of the world's GDP and covering more than 15% of global emissions.

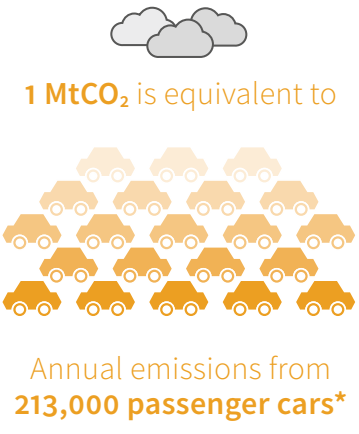


As more systems enter operation, the share of emissions covered by ETSs grows. At the same time, progressively declining caps lead to a decrease in total emissions covered in these systems, ensuring their environmental effectiveness.

As the number of systems grow and markets start to mature, opportunities for linking systems also increase. The EU and Switzerland have finalized linking negotiations and the newly launched Ontario program is discussing a future link with the joint program of California and Québec. The rise of China's carbon market also sends an encouraging signal for existing and future ETSs in Asia.

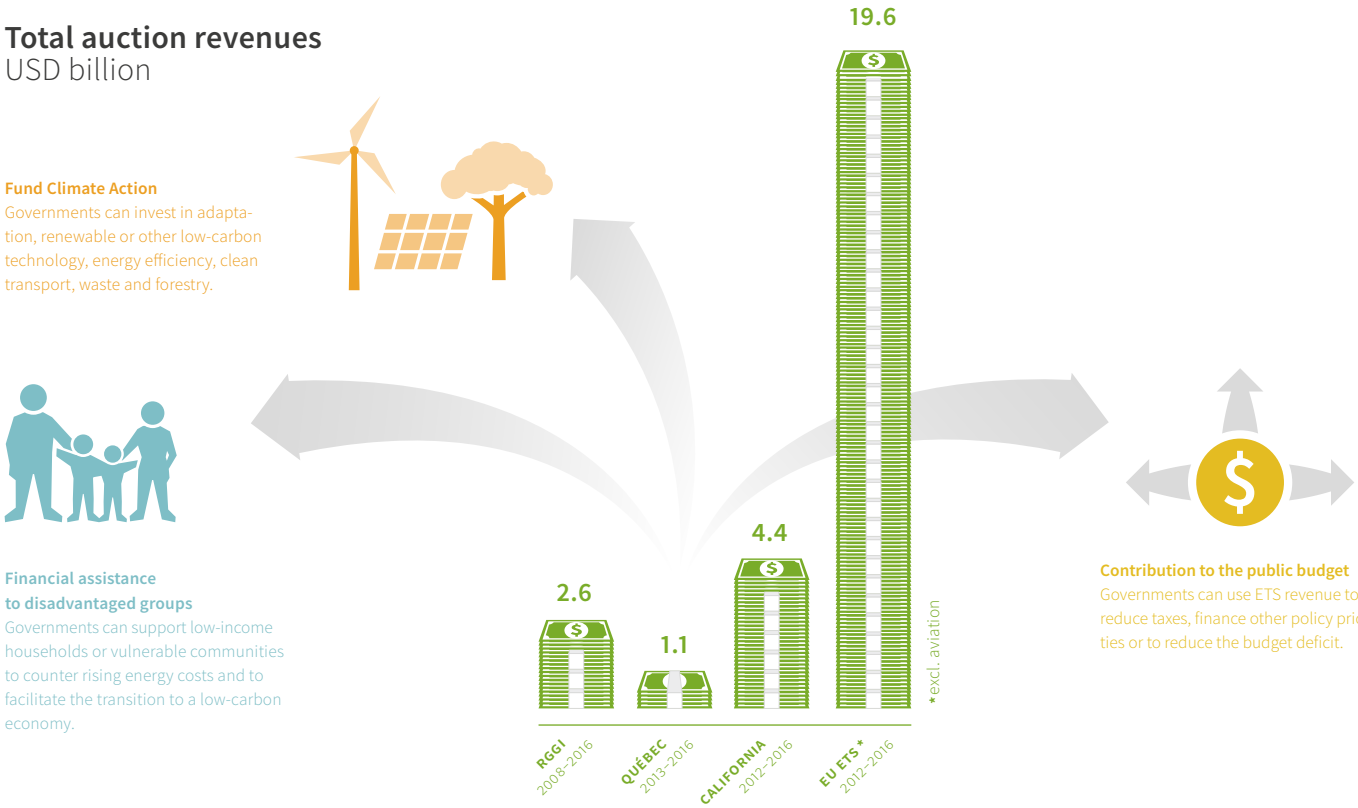
The Paris Agreement, through article 6, also heralds a new era in international climate action by encouraging countries to collaborate by transferring mitigation units through linked carbon markets.

Putting ETS cap sizes into perspective



* calculated using a typical passenger vehicle using 2014 data from the U.S. Environment Protection Agency, Office of Transportation and Air Quality. ~ 10,000

Total auction revenues
USD billion



Auctioning allowances can generate public revenue that can be used in different ways depending on the priorities of the jurisdiction. Systems have, among other things, funded additional climate change programs, generated more renewable energy, and helped disadvantaged groups. The amount of revenue depends on the size of the jurisdiction, the ETS coverage, the number of auctioned permits and the carbon price. By the end of 2016, systems worldwide have raised close to USD 30 billion.

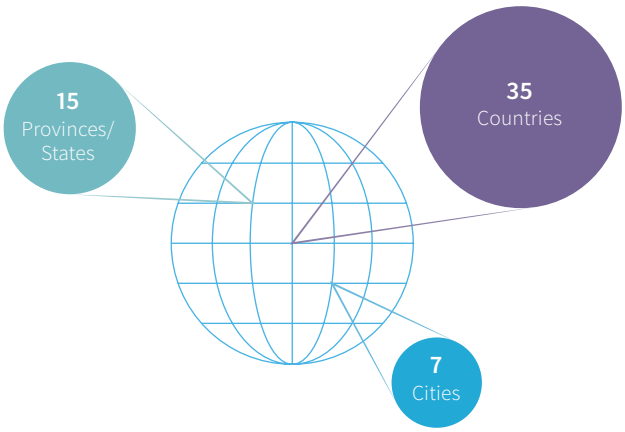
Sector coverage

	INDUSTRY	POWER	BUILDINGS	TRANSPORT	WASTE	AVIATION	FORESTRY
ASIA PACIFIC							
Beijing	●	●	●	●			
China	●	●				●	
Chongqing	●	●					
Fujian	●	●				●	
Guangdong	●	●				●	
Hubei	●	●					
New Zealand	●	●	● *	● *	●	● *	●
Republic of Korea	●	●	●	●	●	●	
Saitama	●		●				
Shanghai	●	●	●			●	
Shenzhen	●	●	●	●			
Tianjin	●	●					
Tokyo	●		●				
EUROPE & CENTRAL ASIA							
EU ETS	●	●				●	
Switzerland	●						
NORTH AMERICA							
California	●	●	● *	● *			
Ontario	●	●	● *	● *			
Québec	●	●	● *	● *			
RGGI		●					

* Sectors represent upstream coverage

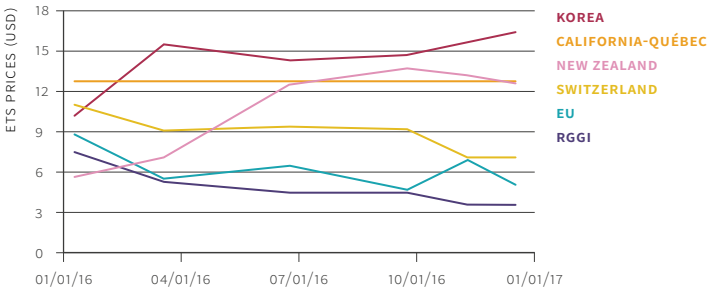
As the graphics on this double page illustrate, an ETS has considerable design flexibility. Although most systems cover the power and industry sector, ETS can be designed to fit a wide range of economic profiles. Prices also differ across systems, from USD 2 to over USD 15. This reflects the different abatement costs, market conditions and design elements of each system.

Different kinds of jurisdictions **implement an ETS**



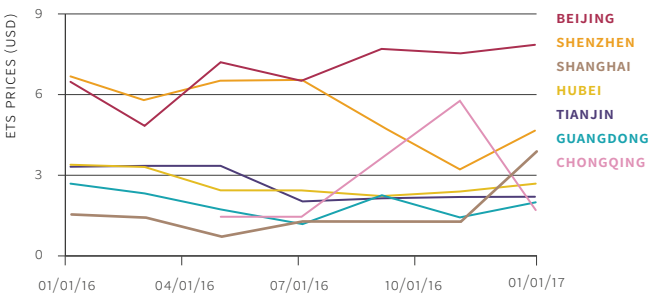
ETS prices (USD)

Established ETSs

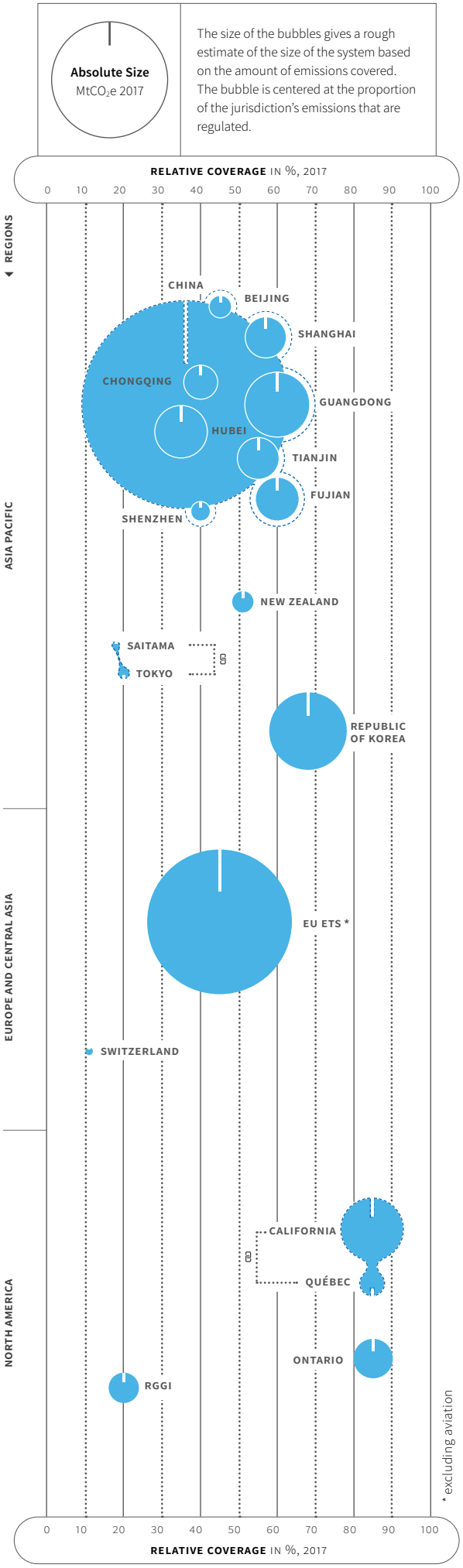


Prices for California-Québec, the EU, RGGI and Switzerland are the clearing prices from auction, whereas prices in New Zealand and Korea are the secondary market prices.

Chinese ETS Pilots



Prices in the Chinese pilots represent secondary market prices. For Chongqing, regular trading only started in August, one trade at CNY 10 (USD 1.45) on 17 March 2016.



Diving into the Details

Planned and Operating Emissions Trading Systems Around the World

Europe and Central Asia

More than a decade after its launch, the EU ETS is now undergoing revisions in preparation for its fourth phase. In parallel, technical negotiations on a link with the Swiss ETS have recently been concluded. Meanwhile, neighboring countries like Ukraine are also taking steps towards Cap-and-Trade, while Turkey sees their first year of mandatory emissions reporting.

ETS in force
ETS scheduled
ETS considered

The European Union Emissions Trading System (EU ETS) in force

28 EU MEMBER STATES, ICELAND, LIECHTENSTEIN AND NORWAY

EMISSIONS COVERAGE ($MtCO_2e$, 2017)	LIABLE ENTITIES
1,939 (excl. aviation)	11,000 +

GAS COVERAGE	ALLOCATION	OFFSETS & CREDITS
SEVERAL GASES	AUCTIONING & FREE ALLOCATION	INTERNATIONAL OFFSETS

The European Union Emissions Trading System (EU ETS) is the world's first and, until implementation of the Chinese national ETS, remains the largest GHG trading system. The EU ETS represents the central pillar of the European Union's (EU) climate change policy.

In 2016, the focus has been on the European Commission's proposed amendments for revision of the EU ETS for its fourth phase (2021–2030). The proposed amendments aim to align the cap with the EU's 2030 target to reduce GHG emissions by at least 40% domestically by 2030, provide for better targeted free allocation rules and to further support low-carbon innovation and energy sector modernization.

The proposal is still under discussion in the European Parliament and the Council.

In 2015, a Decision to create a Market Stability Reserve (MSR) was adopted, a structural measure addressing the large accumulated allowance surplus, which depressed the allowance price in recent years. The MSR, which will start operating in January 2019, aims at neutralizing the negative impacts of the existing allowance surplus and improving the system's resilience to future shocks. Allowances will be added to the reserve if the total number of allowances in circulation is higher than 833 million allowances. As part of the decision, the 900 million back-loaded allowances, which were withdrawn from auctions from 2014–2016, and for the time being an unknown amount of unallocated allowances, will be placed directly into the reserve.

BACKGROUND INFORMATION

OVERALL EU GHG EMISSIONS (EXCL. LULUCF) 4,336.1 $MtCO_2e$ (2014)

OVERALL EU GHG EMISSIONS BY SECTOR $MtCO_2e$

- INDUSTRIAL PROCESSES (402.6)
- SOLVENT & OTHER PRODUCT USE (4.3)
- AGRICULTURE (440.9)
- ENERGY (3,342.4)
- WASTE (145.8)

OVERALL EU GHG REDUCTION TARGETS BY 2020: 20% below 1990 GHG levels. **BY 2030:** At least 40% below 1990 GHG levels. **BY 2050:** EU leaders have committed to reducing emissions by 80–95% below 1990 GHG levels.

ETS SIZE

CAP PHASES ONE AND TWO (2005–2012): Decentralized cap-setting, the EU cap resulted from the aggregation of the National Allocation Plans of each Member State. **PHASE THREE (2013–2020):** Single EU-wide cap for stationary sources: 2,084 $MtCO_2e$ in 2013, which will be annually reduced by a constant linear reduction factor (currently 1.74% of the midpoint of the cap in phase 2 or around 38.3 million tons). AVIATION SECTOR CAP: 210 $MtCO_2e$/year for 2013–2020 (not decreasing). However, following the temporary derogation of obligations related to flights to and from third countries until the end of 2016, the issuance of allowances has been adjusted accordingly. **PHASE FOUR (2021–2030):** According to the European Commission's proposal for the revision of the EU ETS (see above), the annual linear reduction factor to reduce the cap on the maximum permitted emissions is proposed to be changed from 1.74% to 2.2% (48 million tons) from 2021. The linear reduction factor does not have a sunset clause and as such the cap will continue to decline beyond 2030.

EMISSIONS COVERAGE

GHG COVERED CO_2, N_2O, PFCs

SECTORS & THRESHOLDS PHASE ONE (2005–2007): Power stations and other combustion installations with >20MW thermal rated input (except hazardous or municipal waste installations), industry (various thresholds) including oil refineries, coke ovens, iron and steel plants and production of cement, glass, lime, bricks, ceramics, pulp, paper and board. **PHASE TWO (2008–2012):** In addition to Phase one sectors, aviation was introduced in 2012 (>10,000 tCO_2/year for commercial aviation; >1,000 tCO_2/year for non-commercial aviation since 2013) (see below). **PHASE THREE (2013–2020):** In addition to Phase two sectors, CCS installations, production of petrochemicals, ammonia, non-ferrous and ferrous metals, gypsum, aluminum, nitric, adipic and glyoxylic acid (various thresholds) were included—see Annex I of the EU ETS Directive.

INTERNATIONAL AVIATION: Emissions from international aviation have been included in the EU ETS since 2012. In November 2012, the EU temporarily suspended enforcement of the EU ETS requirements for extra-EU flights operating from or to non-European countries (so-called 'stop the clock'), while continuing to apply the legislation to flights within and between countries in the European Economic Area (EEA). Exemptions for operators with low emissions have also been introduced. The EU will decide on how to regulate extra-EU aviation emissions within the EU ETS after 2016 based on a report from the European Commission regarding the Carbon Offsetting and Reduction Scheme (CORSIA) of the International Civil Aviation Organization (ICAO), passed at the 39th Assembly Session in October 2016.

POINT OF REGULATION Downstream

NUMBER OF ENTITIES More than 11,000 power plants and manufacturing installations. Aircraft operators are covered for all flights. However, a temporary exemption applies to flights between the EEA and a third country.

PHASES AND ALLOCATION

TRADING PERIODS **PHASE ONE:** Three years (2005–2007) **PHASE TWO:** Five years (2008–2012) **PHASE THREE:** Eight years (2013–2020) **PHASE FOUR:** Ten years (2021–2030)

ALLOCATION **PHASE ONE (2005–2007):** Nearly 100% free allocation through grandfathering. Some Member States used auctioning and some used benchmarking. **PHASE TWO (2008–2012):** Similar to Phase one with some benchmarking for free allocation and some auctioning in eight EU Member States (about 3% of total allowances). **PHASE THREE (2013–2020):** In 2013, about 40% of total allowances are auctioned, with different allocation rules for the electricity, manufacturing and aviation sectors. **ELECTRICITY SECTOR:** 100% auctioning with optional derogation for the modernization of the electricity sector in certain Member States. In line with the 2030 framework for climate and energy, Member States with a GDP per capita in 2013 below 60% of the EU average may continue to make use of this optional free allocation in Phase four. **MANUFACTURING SECTOR:** Free allocation is based on benchmarks. Sub-sectors deemed at risk of carbon leakage will receive free allocations at 100% of the pre-determined benchmarks. Sub-sectors deemed not at risk of carbon leakage will have free allocation phased out gradually from 80% of the benchmarks in 2013 to 30% by 2020. **AVIATION SECTOR:** In 2012, 85% of allowances were allocated for free based on benchmarks. For Phase three (2012–2020): 15% of allowances are auctioned and 82% allocated for free based on benchmarks. The remaining 3% constitutes A special reserve for new entrants and fast growing airlines. **BACK-LOADING:** Taken as a short term measure to address a growing surplus in the EU ETS, it was agreed to postpone the auctioning of 900 million allowances until 2019–2020. Auction volumes were reduced by 400 million allowances in 2014, 300 million in 2015, and by 200 million in 2016. In line with the decision to create an MSR, the back-loaded allowances will not be auctioned but be placed directly in the MSR. **NEW ENTRANTS RESERVE:** 5% of the total allowances are set aside to assist new installations coming into the EU ETS or covered installations whose capacity has significantly increased since their free allocation was determined. **PHASE FOUR (2021–2030):** On 15 July 2015, the European Commission proposed amendments to the EU ETS directive to enhance cost-effective emissions reductions and low-carbon investments. A central component of the proposed amendments refers to the continuation of transitory measures to address the risk of carbon leakage and a revision of the free allocation of allowances. According to the European Commission, the limited and declining number of allowances requires that the current system of free allocation be revised in order to distribute allowances in the most effective and efficient way. To this end, changes are proposed to:

- Benchmark values, which will be updated to reflect technological progress in the different sectors.
- Production data to better take into account production increases or decreases and to adjust the amount of free allocation accordingly. This should also make the EU ETS more flexible.
- Make carbon leakage rules more targeted. The number of sectors receiving 100% of the benchmark-based free allocation will be reduced.

In addition, the European Commission proposed to transfer 250 million unused allowances from 2013–2020 to establish a reserve for new and growing installations. Amendments to the Commission's proposal are currently discussed within the European Parliament and in the Council.

COMPLIANCE PERIOD From 1 January until 30 April the following year (16 months)

FLEXIBILITY

BANKING AND BORROWING Unlimited banking is allowed since 2008. Borrowing is not allowed.

OFFSETS AND CREDITS **PHASE ONE (2005–2007):** Unlimited use of Clean Development Mechanism (CDM) and Joint Implementation (JI) credits. **PHASES TWO (2008–2012) AND THREE (2013–2020): QUALITATIVE LIMIT:** Most categories of CDM/JI credits are allowed (restrictions vary across different EU Member States), no credits from the land use, land-use change and forestry (LULUCF) and nuclear power sectors. Strict requirements apply for large hydro projects exceeding 20 MW. Since the start of Phase three (1 January 2013), additional restrictions apply for CDM: newly generated (post-2012) international credits may only come from projects in Least Developed Countries (LDCs). Projects from industrial gas credits (projects involving the destruction of HFC-23 and N_2O) are excluded regardless of the host country. Credits issued for emission reductions that occurred in the first commitment period of the Kyoto Protocol are no longer accepted as of 31 March 2015. **QUANTITATIVE LIMIT:** In Phase two (2008–2012), operators were allowed to use JI and CDM credits up to a certain percentage limit determined in the respective country's National Allocation Plans. Unused entitlements were transferred to Phase three (2013–2020). The total use of credits for Phase two and three may amount up to 50% of the overall reduction under the EU ETS in that period (approximately 1.6 billion tons CO_2e). **PHASE FOUR (2021–2030):** Currently no international offsets are envisaged.

COMPLIANCE

MRV **REPORTING FREQUENCY:** Annual self-reporting based on harmonized electronic templates prepared by the European Commission. **VERIFICATION:** Verification by independent accredited verifiers is required before 31 March each year. **FRAMEWORK:** For Phase three onwards, European Commission Regulations have been published for monitoring and reporting, and for verification and accreditation of verifiers. A monitoring plan is required for every installation and aircraft operator (approved by competent authority).

ENFORCEMENT Entities must pay an 'excess emissions penalty' of EUR 100/tCO_2 emitted for which no allowance has been surrendered in due time. The name of the non-compliant operator is also published. Different penalties exist at the national level for other forms of non-compliances.

OTHER INFORMATION

INSTITUTIONS INVOLVED The European Commission and the relevant authorities of the 28 Member States, Iceland, Liechtenstein and Norway.

LINKAGE WITH OTHER SYSTEMS The European Commission has concluded negotiations with Switzerland on linking the EU ETS with the Swiss ETS. However, the link will only become operational once the agreement has been signed and entered into force.

Swiss Emissions Trading System (Swiss ETS)

in force

EMISSIONS COVERAGE ($MtCO_2e$, 2017)	LIABLE ENTITIES
5.2	55

GAS COVERAGE	ALLOCATION	OFFSETS & CREDITS
SEVERAL GASES	AUCTIONING & FREE ALLOCATION	INTERNATIONAL OFFSETS

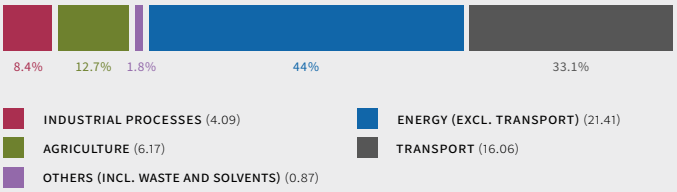
The Swiss ETS started in 2008 with a five-year voluntary phase as an alternative option to the CO_2 levy on fossil fuels. Revised regulations entered into force on 1 January 2013. The scheme subsequently became mandatory for large, energy-intensive entities, while medium-sized entities may join voluntarily. It now covers about 10% of the country's total GHG emissions. In the 2013–2020 mandatory phase, participants in the ETS are exempt from the CO_2 levy.

In January 2016, Switzerland and the EU concluded negotiations on linking their ETSs. Through the bilateral agreement, the two systems will mutually recognize each other's emissions allowances. Once the link is operational, prices should converge resulting in a level playing field for Swiss and EU based industry. While many elements of the Swiss ETS were designed to match provisions in the EU ETS (e.g. allocation benchmarks), the linked Swiss ETS will now also cover aviation as a result of the negotiations. Switzerland has identified lower cost emission reductions, enhanced liquidity, clearer price formation and price stability as expected benefits from the link.

BACKGROUND INFORMATION

OVERALL GHG EMISSIONS (EXCL. LULUCF) 48.61 $MtCO_2e$ (2014)

OVERALL GHG EMISSIONS BY SECTOR $MtCO_2e$

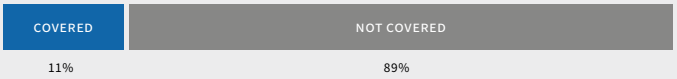


OVERALL GHG REDUCTION TARGET **BY 2020:** At least 20% reduction from 1990 GHG levels (unconditional, domestic target). **BY 2025:** 35% reduction from 1990 GHG levels (NDC of Switzerland). **BY 2030:** 50% reduction from 1990 GHG levels (NDC of Switzerland).

ETS SIZE

CAP **VOLUNTARY PHASE (2008–2012):** Each participant received its own entity-specific reduction target. **MANDATORY PHASE (2013–2020):** Overall cap of 5.63 $MtCO_2e$ (2013), to be reduced annually by a constant linear reduction factor (currently 1.74%), to 4.9 $MtCO_2e$ in 2020.

EMISSIONS COVERAGE



GHG COVERED CO_2, N_2O, CH_4, HFCs, NF_3, SF_6 and theoretically PFCs (In principle all these gases are covered in accordance with the CO_2 Ordinance. In practice, monitoring is only required for CO_2, NO_2 and PFCs.)

SECTORS & THRESHOLDS **MANDATORY PARTICIPATION:** Industries listed under Annex 6 of the revised CO_2 Ordinance (25 sub-sectors) must participate in the Swiss ETS. **INCLUSION THRESHOLDS:** Industries in Annex 6 generally have a total rated thermal input of >20MW. **POSSIBLE VOLUNTARY OPT-IN:** Industries **A)** listed under Annex 7 of the revised CO_2 Ordinance (20 sub-sectors) and **B)** with a total rated thermal input of >10MW. One-time binding notification must be given before 1 June 2013 for industries currently above the threshold. Industries that may become eligible for participation in the future must then register within six months after they have reached the threshold. **POSSIBLE OPT-OUT:** Industries with a total rated thermal input of >20MW, but yearly emissions <25,000 tCO_2e/year in each of the past three years. Should their future emissions rise above the threshold during at least one year, they must start participating in the ETS the following year and cannot opt out anymore for the remainder of the compliance period.

POINT OF REGULATION Downstream

NUMBER OF LIABLE ENTITIES 55 (2015)

In the Swiss ETS, liable entities are defined at the installation level.

PHASES AND ALLOCATION

TRADING PERIODS **VOLUNTARY PHASE:** 2008–2012 **MANDATORY PHASE:** 2013–2020

ALLOCATION **VOLUNTARY PHASE (2008–2012):** Each participant was granted free allocation of allowances covering emissions up to their own entity-specific emissions target. **MANDATORY PHASE (2013–2020):** Free allocation is based on industry benchmarks using a similar methodology to the EU ETS. Free allocation for sectors not exposed to the risk of carbon leakage will be phased out gradually: in 2013, 80% free allocation and in 2020 this will be reduced to 30% free allocation.

An overarching correction factor is applied given the benchmarked allocation exceeds the overall emissions cap.

Allowances that are not allocated for free are auctioned. Auctions take place two or three times a year, depending on available auction volumes.

5% of the allowances are set aside in the New Entrants Reserve (NER).

COMPLIANCE PERIOD One year from (31 December). Covered entities have until April 30 of the following year to surrender allowances.

FLEXIBILITY

BANKING AND BORROWING Banking within compliance periods is allowed. Banking from one compliance period to the next is also allowed without limit. Valid certificates (CERs, ERUs) from the 2008–2012 commitment period may be carried over and surrendered until 30 April 2015. Valid certificates from the 2008–2012 commitment period that have not been requested to be carried over within the deadline will be canceled.

OFFSETS AND CREDITS **QUALITATIVE LIMIT:** Exclusion criteria are listed in Annex 2 of the revised CO_2 Ordinance. Most categories of credits from CDM projects in LDCs are allowed. Credits from CDM and JI projects from other countries are eligible only if registered and implemented before 31 December 2012. **QUANTITATIVE LIMIT:** Industries that already participated in the voluntary phase (2008–2012): For 2013–2020, the maximum amount of offsets allowed into the scheme equals 11% of five times the average emissions allowances allocated in the voluntary phase (2008–2012) minus offset credits used in that same time period.

Industries entering the Swiss ETS in the mandatory phase and newly covered emission sources (2013–2020): 4.5% of their actual emissions in 2013–2020.

In exceptional cases, companies may submit a request to the Federal Office of the Environment to increase this limit. They must prove that they would otherwise not be able to comply with their liability without major economic impairment and commit to acquire as many European allowances as the additional international ones. This provision is limited until 31 December 2018.

COMPLIANCE

MRV Monitoring plans are required for every installation (approved by a competent authority) no later than three months after the registration deadline. **REPORTING FREQUENCY:** Annual monitoring report, based on self-reported information (by 31 March). **VERIFICATION:** The Federal Office for the Environment may order third party verification of the monitoring reports.

ENFORCEMENT The penalty for failing to surrender sufficient allowances is set at 125 CHF/tCO_2 (103.89 EUR/tCO_2). In addition to the fine, entities must surrender the missing allowances and/or international credits in the following year.

OTHER INFORMATION

INSTITUTIONS INVOLVED The Federal Office of the Environment

LINKS WITH OTHER SYSTEMS Switzerland has concluded negotiations with the European Commission on linking the Swiss ETS to the EU ETS. An agreement has been initialed in January 2016. For the agreement to enter into force, it must be signed and ratified by both sides. The timetable for this is open.

Kazakhstan Emissions Trading System (KAZ ETS)

scheduled

EMISSIONS COVERAGE ($MtCO_2e$, 2017)	LIABLE ENTITIES
153.7	140

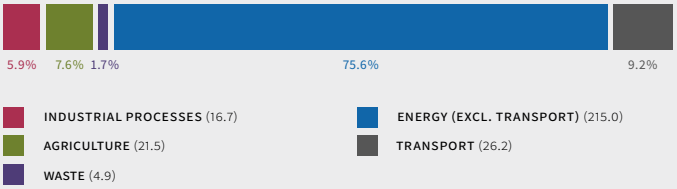
GAS COVERAGE	ALLOCATION	OFFSETS & CREDITS
CO_2 ONLY	FREE ALLOCATION	DOMESTIC OFFSETS

Kazakhstan launched an ETS in January 2013. The groundwork for the development of an ETS was laid out in 2011 through amendments and additions to Kazakhstan's environmental legislation. The system is temporarily suspended until 2018. Corresponding amendments to the Environmental Code were passed and came into force on 22 April. The amendments aim to improve the monitoring, reporting and verification (MRV) system, as well as the overall greenhouse gas emissions regulation and KAZ ETS operation. The KAZ ETS will restart in 2018 with new allocation methods and trading procedures for all market participants. Soft MRV obligations apply until 2018.

BACKGROUND INFORMATION

OVERALL GHG EMISSIONS (EXCL. LULUCF): 284.3 $MtCO_2e$ (2012)

OVERALL GHG EMISSIONS BY SECTOR $MtCO_2e$



OVERALL GHG REDUCTION TARGET **BY 2020:** 5% reduction from 1990 GHG levels. **BY 2030:** 15–25% reduction from 1990 GHG levels (NDC of Kazakhstan).

ETS SIZE

CAP **PHASE I (2013):** 147 $MtCO_2$ (plus a reserve of 20.6 $MtCO_2$). This equals a stabilization of the capped entities' emissions at 2010 levels. **PHASE II (2014–2015):** 2014: 154.8 $MtCO_2$; 2015: 152.7 $MtCO_2$. This represents reduction targets of 0% and 1.5% respectively, compared to the average CO_2 emissions of capped entities in 2011–2012. **PHASE III (2016–2020):** 746.5 $MtCO_2$ (plus a reserve of 21.9 $MtCO_2$).

EMISSIONS COVERAGE

GHG COVERED CO_2

SECTORS & THRESHOLDS Energy sector (including oil and gas,) mining and chemical industry (>20,000tCO_2/year). **INCLUSION THRESHOLDS:** For Phase I (2013) and Phase II (2014–2015), thresholds are based on 2010 and 2012 emission levels. For Phase III, 2014 emission levels are used.

POINT OF REGULATION Downstream

NUMBER OF LIABLE ENTITIES **PHASE III (2016–2020):** 140 companies

PHASES AND ALLOCATION

TRADING PERIODS **PHASE ONE (PILOT PHASE):** 2013, **PHASE TWO:** 2014–2015, **PHASE THREE:** 2016–2020

ALLOCATION **PHASE ONE (2013):** 100% free allocation based on emissions data from 2010. **PHASE TWO (2014–2015):** Free allocation (0% and 1.5% below 2011/2012 average emissions). **PHASE THREE (2016–2020):** Free allocation based on grandfathering.

COMPLIANCE PERIOD One year

FLEXIBILITY

BANKING AND BORROWING Banking is provided for by the legislation.

OFFSETS AND CREDITS **QUALITATIVE LIMIT:** The system allows domestic offsets. International credits may be allowed in the future.

PRICE MANAGEMENT PROVISIONS Current legislation does not contain any carbon price control measures.

COMPLIANCE

MRV Reporting is required for businesses or financial facilities above the 20,000 tCO_2/year threshold. Aside from CO_2, reporting is also required for CH_4, N_2O and PFCs emissions. **REPORTING FREQUENCY:** Annually, with reporting due on 1 April. **VERIFICATION:** Emission data reports and their underlying data require accredited third-party verification. **OTHER:** Installations below the compliance threshold must submit non-verified inventory reports.

ENFORCEMENT In 2013, penalties for non-compliance were waived. The current non-compliance penalty is approximately EUR 30/tCO_2.

OTHER INFORMATION

INSTITUTIONS INVOLVED Ministry of Energy; JSC Zhasyl Damu

Russian Federation

under consideration

Russia is currently exploring policy options to meet its GHG emissions reduction target of at least 25% below 1990 levels by 2020 and 25–30% below 1990 levels by 2030.

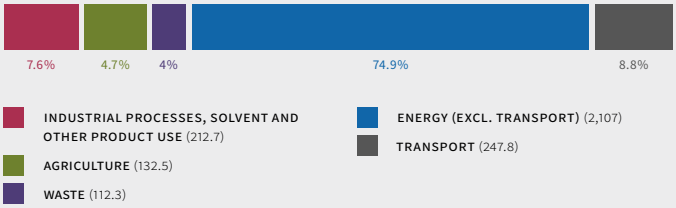
In 2014, the Russian government adopted a plan for the development and implementation of emissions reductions activities. The plan includes the development and introduction of an MRV system at the company level, assessment of emissions reduction potentials, and the development of a concept and action plan to reach the emissions reduction targets by 2020 and 2030, which could potentially include emissions trading.

Building on this, Russia has started to build the legal basis to enable GHG monitoring at the company level. In 2015, the Government adopted the Concept on MRV. Methodological guidelines for GHG emissions assessment on a corporate and regional level were also adopted by the Ministry of Natural Resources and Ecology. The draft amendment of the Law on Environmental Protection was also published and made available for public comment. The revised Law will be submitted to the Parliament for consideration. It would create a legal basis for the government to list the types of GHG that will be regulated in the future and set rules for MRV of GHG emissions on a company level.

BACKGROUND INFORMATION

OVERALL GHG EMISSIONS (EXCL. LULUCF): 2,812 $MtCO_2e$ (2014)

OVERALL GHG EMISSIONS BY SECTOR $MtCO_2e$



GHG REDUCTION TARGET BY 2020: At least 25% reduction from 1990 GHG levels. **BY 2030:** 70–75% reduction from 1990 GHG levels (INDC Submission).

Turkey

under consideration

In April 2012, Turkey adopted a new regulatory framework for a comprehensive, mandatory MRV system. Monitoring started in 2015 and reporting (of 2015 emissions) will begin in 2017.

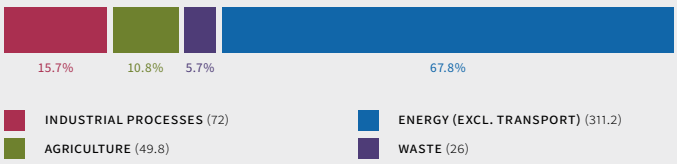
As an implementing country under the PMR, Turkey received funding in May 2013 to enhance the implementation of the MRV regulation through pilot studies in the energy, cement and refinery sectors, and to explore options for market-based instruments. This includes a series of analytical reports on using emissions trading and other market-based instruments for the MRV sectors. A synthesis report outlining carbon market policy options for Turkey will be submitted to the Climate Change and Air Management Coordination Board by March 2017.

Turkey is also a candidate to EU accession and thereby aims to complete the environmental obligations of the EU accession (including the EU ETS directive).

BACKGROUND INFORMATION

OVERALL GHG EMISSIONS (EXCL. LULUCF): 459.1 $MtCO_2e$ (2013)

OVERALL GHG EMISSIONS BY SECTOR $MtCO_2e$



GHG REDUCTION TARGET Turkey is not listed in Annex B of the Kyoto Protocol and has no mandatory GHG reduction target under the UNFCCC. **BY 2030:** Up to 21% reduction from the BAU scenario (INDC Submission).

COMPLIANCE

MRV The Turkish MRV legislation establishes an installation-level system for CO_2 emissions for roughly 1,000 entities. Sector coverage includes the energy sector (combustion fuels >20MW) and industry sectors (coke production, metals, cement, glass, ceramic products, insulation materials, paper and pulp, chemicals over specified threshold sizes/production levels).

Entities had until October 2014 to submit their first monitoring plans and will submit verified emissions reports for 2015 and 2016 to the Ministry of Environment and Urbanization by 30 April 2017. Verifiers will be accredited by the Turkish Accreditation Organization by 2019. During 2016–2018, the Ministry of Environment and Urbanization will provide training, examination and licensing services.

ENFORCEMENT Entities that fail to comply with the Turkish MRV regulation are subject to the generic data reporting requirements and related sanctions under the Turkish Environmental Law No. 2872.

OTHER INFORMATION

INSTITUTIONS INVOLVED Ministry of Environment and Urbanization and further ministries.

Ukraine

scheduled

Ukraine plans to establish a national ETS in line with its obligations under the Ukraine-EU Association Agreement, signed and ratified by the country on September 16, 2014. Climate change-related issues addressed in Article 365 (c) Title V and Annex XXX to the Agreement fall under the provisional application. Therefore, the country has to prepare for ETS implementation, e.g.:

- Adopt national legislation and designate competent authority/ies;
- Establish a system for identifying relevant installations and for identifying greenhouse gases (Annexes I and II);
- Develop a national allocation plan to distribute allowances to installations (art. 9);
- Establish a system for issuing greenhouse gas emission permits and issuance of allowances to be traded domestically among installations in Ukraine (art. 4 and 11–13);
- Establish monitoring, reporting, verification and enforcement systems and public consultations procedures (art. 9, 14–17, 19 and 21).

As a first step, an MRV system would be developed and put into practice to provide for a solid basis for the upcoming market-based mechanism.

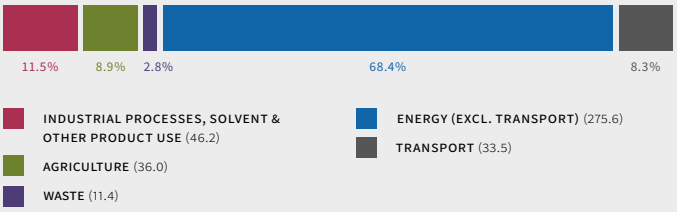
Separate legislation would be prepared and submitted to the Parliament to establish the MRV system, and going further, transpose the relevant EU Directives, regulate GHG emissions and establish the ETS.

Ukraine is working on its MRV plans and the plans for further ETS development under the Ukraine-EU Association Agreement with the assistance of the PMR, the European Bank for Reconstruction and Development (EBRD), the United States Agency for International Development (USAID), the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) and other institutions.

BACKGROUND INFORMATION

OVERALL GHG EMISSIONS (EXCL. LULUCF): 402.7 $MtCO_2e$ (2012)

OVERALL GHG EMISSIONS BY SECTOR $MtCO_2e$



OVERALL GHG REDUCTION TARGET BY 2020: Voluntary target of 20% reduction from 1990 GHG levels (Copenhagen Accord). **BY 2030:** GHG emissions will not exceed 60% of 1990 GHG levels (NDC). **BY 2050:** Voluntary target of 50% reduction from 1990 GHG levels.

OTHER INFORMATION

INSTITUTIONS INVOLVED Ministry of Ecology and Natural Resources; Cabinet of Ministers of Ukraine

North America

Following the announcement of the Pan-Canadian Carbon Pricing Framework, there is fresh momentum for carbon markets in North America. Not only did Ontario launch an ETS this year but it also plans on linking up with the Californian and Québec Cap-and-Trade program. Many other Canadian provinces and territories are also exploring ETS as a possible compliance option, with Nova Scotia launching its ETS in 2018. In the US, California and RGGI are reviewing their respective Cap-and-Trade programs to ensure it continues to deliver increasingly ambitious reduction targets.

Regional Greenhouse Gas Initiative (RGGI)

in force

CONNECTICUT, DELAWARE, MAINE, MARYLAND, MASSACHUSETTS, NEW HAMPSHIRE, NEW YORK, RHODE ISLAND, VERMONT

EMISSIONS COVERAGE ($MtCO_2e$, 2015)	LIABLE ENTITIES
89.1	164

GAS COVERAGE	ALLOCATION	OFFSETS & CREDITS
CO_2 ONLY	AUCTIONING	DOMESTIC OFFSETS

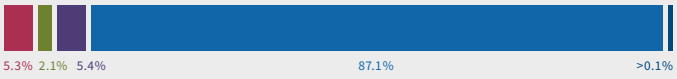
RGGI is the first mandatory GHG ETS in the United States. As foreseen by the original Memorandum of Understanding between the participating states, a RGGI program review was conducted in 2012. Based on the program review, each of the states updated their regulations so that a tighter cap and other program changes went into force on 1 January 2014.

RGGI is currently undergoing a second program review.

BACKGROUND INFORMATION

OVERALL GHG EMISSIONS (EXCL. LULUCF): 446.0 $MtCO_2e$ (2012)

OVERALL GHG EMISSIONS BY SECTOR $MtCO_2e$



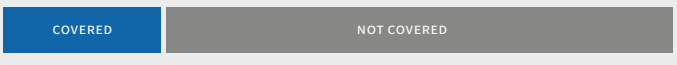
- INDUSTRIAL PROCESSES (23.8)
- AGRICULTURE (9.4)
- WASTE (24.2)
- ENERGY (388.5)
- BUNKER FUELS (0.1)

OVERALL GHG REDUCTION TARGET BY 2020: RGGI states have committed to a regional target of a more than 50% reduction of CO_2 emissions from electricity generation from 2005 GHG levels.

ETS SIZE

CAP The original cap was stabilized at 149.7 Mt (165 million short tons) CO_2 (2009–2014) with a 2.5% annual reduction factor from 2015 through 2018, totaling 10%. However, by 2012, RGGI had experienced more than a 40% reduction in emissions from the original cap. Because of these reduced emissions, the states lowered the cap to 91 million short tons in 2014 as part of the 2012 program review. The revised regulations extend the 2.5% annual reduction factor through 2020, with a 2020 cap of approximately 78 million short tons.

EMISSIONS COVERAGE



GHG COVERED CO_2

SECTORS & THRESHOLDS Fossil Fuel Electric Generating Units. **INCLUSION THRESHOLDS:** Equal to or greater than 25MW.

POINT OF REGULATION Downstream (at installation level)

NUMBER OF LIABLE ENTITIES 164 entities (as of October 2016)

* RGGI introduced an interim control period with the 2014 revisions. An affected source must cover 50% of its emissions with allowances in each of the first two years of a control period. The affected source must cover 100% of the remaining emissions at the end of the three-year control period.

PHASES AND ALLOCATION

ALLOCATION The vast majority of CO_2 allowances issued by each RGGI state are distributed through quarterly, regional CO_2 allowance auctions using a "single-round, sealed-bid uniform-price" format. Auctions are open to all parties with financial security, with a maximum bid of 25% of auctioned allowances per quarterly auction.

TRADING/COMPLIANCE PERIOD RGGI's trading period is referred to as a control period. **FIRST CONTROL PERIOD:** 2009–2011 **SECOND CONTROL PERIOD:** 2012–2014 **THIRD CONTROL PERIOD:** 2015–2017* **FOURTH CONTROL PERIOD:** 2018–2020*

FLEXIBILITY

BANKING AND BORROWING Banking is allowed without restrictions. An annual reduction in the number of allowances offered by states at auction accounts for the large surplus of banked allowances currently in the market. Borrowing is not allowed.

OFFSETS AND CREDITS **QUANTITATIVE LIMIT:** 3.3% of an entity's liability may be covered with offsets. **QUALITATIVE LIMIT:** Offset allowances from five offset types located in RGGI states are allowed: **(1)** Landfill methane capture and destruction; **(2)** Reduction in SF_6 emissions; **(3)** Sequestration of carbon due to reforestation, improved forest management, or avoided conversion; **(4)** Reduction or avoidance of CO_2 emissions from natural gas, oil, or propane end-use combustion due to end-use energy efficiency; and **(5)** Avoided methane emissions from agricultural manure management operations.

COMPLIANCE

MRV FRAMEWORK: Emissions data for emitters are recorded in the United States Environmental Protection Agency's (US EPA) Clean Air Markets Division database in accordance with state CO_2 Budget Trading Program regulations and US EPA regulations. Provisions are based on the US EPA monitoring provisions. Data are then automatically transferred to the electronic platform of the RGGI CO_2 Allowance Tracking System, which is publicly available

ENFORCEMENT Penalties for non-compliance are set by each state; in case of excess emissions, compliance allowances for three times the amount of excess emissions have to be surrendered in future periods.

OTHER INFORMATION

INSTITUTIONS INVOLVED Each RGGI State has its own statutory and/or regulatory authority. In addition, RGGI's development and implementation is supported by RGGI Inc., a non-profit cooperative.

Western Climate Initiative

CALIFORNIA, QUÉBEC, MANITOBA, ONTARIO

The WCI is an initiative of American state and Canadian provincial governments that aims to develop a joint strategy to reduce greenhouse gas emissions via a regional Cap-and-Trade program. Currently, British Columbia, California, Manitoba, Ontario, and Québec are members of the initiative. California and Québec independently established Cap-and-Trade systems, their first compliance periods started on 1 January 2013. One year later, on 1 January 2014, California and Québec linked their systems creating the first international Cap-and-Trade system consisting of sub-national jurisdictions. In 2017, Ontario launched its Cap-and-Trade system and aims to link with the California-Québec carbon market. British Columbia and Manitoba are not officially considering an ETS.

California Cap-and-Trade Program

in force

* Sectors represent upstream coverage

EMISSIONS COVERAGE ($MtCO_2e$, 2017)	LIABLE ENTITIES
370.4	450

GAS COVERAGE	ALLOCATION	OFFSETS & CREDITS
SEVERAL GASES	AUCTIONING & FREE ALLOCATION	DOMESTIC OFFSETS

Initiated in 2012, the California Cap-and-Trade Program began its compliance obligation on 1 January 2013. California has been part of the Western Climate Initiative (WCI) since 2007 and formally linked its system with Québec's on 1 January 2014.

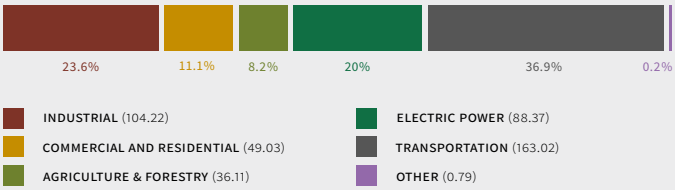
The Cap-and-Trade program covers sources responsible for approximately 85% of California's GHG emissions.

In 2016, California passed legislation to reduce emissions by 40% compared to 1990 levels by 2030. The California Air Resources Board is currently working on post-2020 caps to help achieve the State's climate goals.

BACKGROUND INFORMATION

OVERALL GHG EMISSIONS (EXCL. LULUCF): 441.5 $MtCO_2e$ (2014)

OVERALL GHG EMISSIONS BY SECTOR $MtCO_2e$



GHG REDUCTION TARGETS **BY 2020:** Return to 1990 GHG levels. **BY 2030:** 40% reduction from 1990 GHG levels. **BY 2050:** 80% reduction from 1990 GHG levels.

ETS SIZE

CAP The caps are listed below in $MtCO_2e$ allowances.

FIRST COMPLIANCE PERIOD (2013–2014): 2013: 162.8; 2014: 159.7.

SECOND COMPLIANCE PERIOD (2015–2017): 2015: 394.5; 2016: 382.4; 2017: 370.4.

THIRD COMPLIANCE PERIOD (2018–2020): 2018: 358.3; 2019: 346.3; 2020: 334.2.

EMISSIONS COVERAGE

GHG COVERED CO_2, CH_4 and N_2O

SECTORS & THRESHOLDS **FIRST COMPLIANCE PERIOD (2013–2014):** Covered sectors include those which have one or more of the following processes or operations: Large industrial facilities (including cement production, glass production, hydrogen production, iron and steel production, lead production, lime manufacturing, nitric acid production, petroleum and natural gas systems, petroleum refining, pulp and paper manufacturing, including cogeneration facilities co-owned/operated at any of these facilities), electricity generation, electricity imports, other stationary combustion, and CO_2 suppliers. **SECOND COMPLIANCE PERIOD (2015–2017) AND BEYOND:** In addition to the sectors listed above, suppliers of natural gas, suppliers of reformulated blendstock for oxygenate blending (RBOB) and distillate fuel oil, suppliers of liquid petroleum gas in California and suppliers of liquefied natural gas. **INCLUSION THRESHOLDS:** Facilities ≥25,000 tCO_2e (metric) per data year.

POINT OF REGULATION Mixed

NUMBER OF LIABLE ENTITIES Approximately 450 entities (2015–2017)

PHASES AND ALLOCATION

TRADING PERIODS California's trading period is referred to as a "compliance period" (see "compliance period" below).

Allowances are allocated and auctioned with calendar year vintages. Some allowances from future vintages are offered for sale at each auction and may be traded but not used for compliance until the compliance date for the vintage year.

ALLOCATION Allowances are distributed either via auction or free allocation.

Electrical distribution utilities and natural gas suppliers: receive allowances on behalf of their ratepayers. Investor-owned electrical utilities must consign the allowances they receive to state-run auctions. Publicly owned electrical utilities may either deposit allowances into a compliance account or consign the allowances to auction. Natural gas suppliers must consign an increasing percentage of allowances to auction each year (25% of allowances in 2015, 30% in 2016, and so on); the remainder of allowances must be placed into the natural gas supplier's compliance account. All natural gas and electrical utilities must use the allowance value for ratepayer benefit and for emissions reductions.

INDUSTRIAL FACILITIES: Receive free allowances for transition assistance and to prevent leakage. Starting in 2018, transition assistance declines. The amount of free allocation is determined by leakage risk (measured through emissions intensity and trade exposure) and sector-specific benchmarks. Each entity's allocation reduces each year in proportion to the cap. The majority of industrial allocation is based on production benchmarks and is updated annually based on verified production data. There is no cap on the total amount of industrial allocation.

OTHER ALLOCATION: Other categories of transition assistance are provided for public wholesale water entities, legacy contract generators, universities, and public service facilities.

The remainder of allowances is auctioned. This was about 6% of current-vintage allowances in the first compliance period, and increases in subsequent compliance periods.

COMPLIANCE PERIOD Three calendar years (after first compliance period of two years). Allowances for emissions of the whole compliance period must be surrendered by 1 November (or the first business day thereafter) of the year following the last year of a compliance period.

NOTE: California's trading period is referred to as 'compliance period', though a portion (30%) of allowances must be submitted for each year's emissions depending on the year of the trading/compliance period.

FIRST COMPLIANCE PERIOD: 2013–2014 **SECOND COMPLIANCE PERIOD:** 2015–2017
THIRD COMPLIANCE PERIOD: 2018–2020

FLEXIBILITY

BANKING AND BORROWING Banking is allowed but the emitter is subject to a general holding limit. Borrowing of future vintage allowances is not allowed.

OFFSETS AND CREDITS **QUANTITATIVE LIMIT:** Up to 8% of each entity's compliance obligation. **QUALITATIVE LIMIT:** Currently six domestic offset types are accepted as compliance units originating from projects carried out according to six 'protocols': **(1)** U.S. forest projects; **(2)** Urban forest projects; **(3)** Livestock projects (methane management); **(4)** Ozone depleting substances projects; **(5)** Mine methane capture (MMC) projects; **(6)** Rice cultivation projects

PRICE MANAGEMENT PROVISIONS **AUCTION RESERVE PRICE:** USD 13.57 in 2017 (EUR 12.78) per allowance. The auction reserve price increases annually by 5% plus inflation, as measured by the Consumer Price Index.

An Allowance Price Containment Reserve will be allocated allowances from various budgets (1% from budget years 2013–2014; 4% from budget years 2015–2017; and 7% from budget years 2018–2020).

The reserve sale administrator can sell accumulated allowances on a regular basis in three equal price tiers. For 2017, these prices are USD 50.69, 57.04, and 63.37 (EUR 48.61, 54.70 and 60.77). Tier prices increase by 5% plus inflation (as measured by the Consumer Price Index).

If the allowances in the reserve are all sold, allowances from future years are transferred to the reserve and made available for sale.

COMPLIANCE

MRV **REPORTING FREQUENCY:** Once a year **VERIFICATION:** Emission data reports and their underlying data require independent third-party verification annually for all entities covered by the program (generally defined as entities with emissions that equal or exceed 25,000 tCO_2e (metric) per year). **OTHER:** Reporting is required for most operators at or above 10,000 tCO_2e (metric) per year. Operators must implement internal audits, quality assurance and control systems for the reporting program and the data reported.

ENFORCEMENT Penalties may be assessed pursuant to Health and Safety Code section 38580 (misdemeanor, fines, and possibly imprisonment).

There are separate and substantial penalties for mis- or non-reporting under the Mandatory GHG Reporting Regulation.

Under the Cap-and-Trade Regulation, if an entity fails to surrender a sufficient number of compliance instruments to meet its compliance obligation, there is a separate violation of this article for each required compliance instrument that has not been surrendered, or otherwise obtained by the Executive Officer. A separate violation accrues every 45 days after the end of the Untimely Surrender Period for each required compliance instrument that has not been surrendered.

Adjustment to Compliance Obligation: Outside of enforcement, there is also an automatic adjustment to the compliance obligation due equal to the number of allowances short for that compliance surrender deadline multiplied by four. A quarter of that amount is retired and the remaining amount is auctioned by the state.

OTHER INFORMATION

INSTITUTIONS INVOLVED California Air Resources Board (CARB)

LINKS WITH OTHER SYSTEMS California linked with Québec's ETS on 1 January 2014. Current amendments propose to link the California program with Ontario's emerging ETS beginning in 2018.

Washington

under consideration

In 2008, the State of Washington adopted GHG reduction targets for 2020, 2035 and 2050.

In September 2016, the Washington Department of Ecology published the Clean Air Rule to reduce emissions from industrial sources, petroleum fuel producers and importers, as well as natural gas distributors responsible for more than 100,000 metric tons of GHG per year, starting in 2017.

Under the proposed rule, regulated businesses would be able to comply by reducing their own emissions, buying or trading credits with other regulated parties, funding projects that reduce emissions or acquiring emissions reductions from external carbon markets.

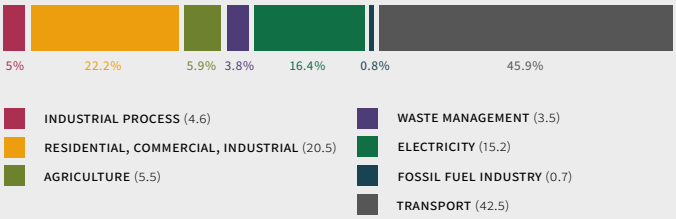
Covered facilities must reduce emissions by 1.7% annually.

On 8 November, Washington State voters rejected Initiative 732, which would impose a USD 15/tCO_2e tax (EUR 14.01) on all fossil fuels consumed in the state starting in 2017. The tax would have increased to USD 25/tCO_2e (EUR 23.35) in 2018, rising annually by 3.5% plus inflation for each following year.

BACKGROUND INFORMATION

OVERALL GHG EMISSIONS (EXCL. LULUCF) 92.5 $MtCO_2e$ (2012)
(million metric tons)

OVERALL GHG EMISSIONS BY SECTOR $MtCO_2e$ (2012)



GHG REDUCTION TARGETS BY 2020: Reduce emissions to 1990 GHG levels. **BY 2035:** 25% reduction from 1990 GHG levels. **BY 2050:** 50% reduction from 1990 GHG levels or 70% reduction from the state's expected emissions for that year.

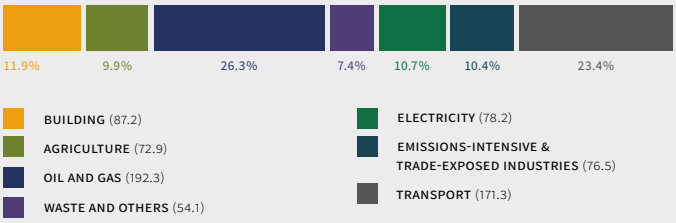
Canada

In October 2016, the Government of Canada announced a plan for a national price on carbon. The carbon price will start at CAD 10 per ton (EUR 6.80) in 2018, rising by CAD 10 annually to reach CAD 50 (EUR 34) per ton in 2022. Provinces and territories will have the option to either put a direct price on carbon or implement a Cap-and-Trade system. If they decide on Cap-and-Trade, their system must meet two conditions: a 2030 emissions reduction target equal to or greater than Canada's national target of 30% below 2005 levels by 2030; and annual caps set to decline until 2022 or further, which deliver projected emissions reductions at least equivalent to the direct carbon price. All carbon pricing revenues generated will remain in the province/territory of origin. The federal government will impose a carbon pricing system on any jurisdiction that does not meet the benchmark. Canada's overall approach to carbon pricing will be reviewed by early 2022 to confirm the path forward. An interim report will be completed in 2020, including approaches and best practices to address competitiveness issues.

BACKGROUND INFORMATION

OVERALL GHG EMISSIONS (EXCL. LULUCF) 732.5 $MtCO_2e$ (2014)

OVERALL GHG EMISSIONS BY SECTOR $MtCO_2e$



GHG REDUCTION TARGETS BY 2020: 17% below 2005 levels **BY 2030:** 30% below 2005 levels

Québec Cap-and-Trade System

in force

* Sectors represent upstream coverage

EMISSIONS COVERAGE ($MtCO_2e$, 2017)	LIABLE ENTITIES
61.1	132

GAS COVERAGE	ALLOCATION	OFFSETS & CREDITS
SEVERAL GASES	AUCTIONING & FREE ALLOCATION	DOMESTIC OFFSETS

Québec's Cap-and-Trade system for GHG emissions was introduced in 2012 with a transition year in which emitters could prepare and familiarize themselves with the program without mandatory compliance. The program's enforceable compliance obligation began on 1 January 2013.

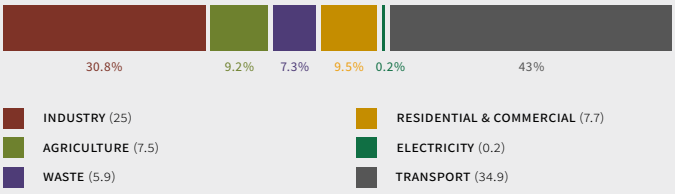
The first compliance period ended on 31 December 2014. On 2 November 2015, all covered entities in the first compliance period had to surrender sufficient allowances to cover their 2013 and 2014 GHG emissions. All of Québec's covered entities complied with this requirement. The second compliance period began on 1 January 2015 and will end on 31 December 2017. Future compliance periods will be three years long.

Québec has been a member of the Western Climate Initiative (WCI) since 2008 and formally linked its system with that of California on 1 January 2014.

BACKGROUND INFORMATION

OVERALL GHG EMISSIONS (EXCL. LULUCF) 81.2 $MtCO_2e$ (2013)

OVERALL GHG EMISSIONS BY SECTOR $MtCO_2e$

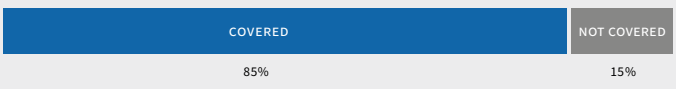


GHG REDUCTION TARGETS **BY 2020:** 20% reduction from 1990 GHG levels. **BY 2030:** 37.5% reduction from 1990 GHG levels. **BY 2050:** 80–95% reduction from 1990 GHG levels.

ETS SIZE

CAP The following caps are given in millions of allowances: **FIRST COMPLIANCE PERIOD (2013–2014):** 23.20 each year **SECOND COMPLIANCE PERIOD (2015–2017):** 2015: 65.30; 2016: 63.19; 2017: 61.08 **THIRD COMPLIANCE PERIOD (2018–2020):** 2018: 58.96; 2019: 56.85; 2020: 54.74

EMISSIONS COVERAGE



GHG COVERED CO_2, CH_4, N_2O, SF_6, HFC, PFC, NO_3 and other fluorinated GHGs

SECTORS & THRESHOLDS **FIRST COMPLIANCE PERIOD (2013–2014):** Electricity, Industry (>25,000 tCO_2e/year). **SECOND COMPLIANCE PERIOD (2015–2017)** and **THIRD COMPLIANCE PERIOD (2018–2020):** Sectors of first compliance period alongside the distribution and importation of fuels used for consumption in the transport and building sectors, as well as in small and medium-sized businesses. **INCLUSION THRESHOLDS:** >25,000 tCO_2e/year. As of 2016, fuel distributors that have distributed 200L or more of fuel (in 2015) are also subject to inclusion even if the combustion of their fuel has resulted in the emission of less than 25,000 tCO_2e

POINT OF REGULATION Mixed

NUMBER OF LIABLE ENTITIES 132 (2017)

PHASES AND ALLOCATION

TRADING PERIODS In Québec's Cap-and-Trade system, a trading period is referred to as a "compliance period" (see below). Allowances are allocated and auctioned with calendar vintage years.

ALLOCATION **AUCTIONS:** Generally, electricity and fuel distributors have to buy 100% of their allowances at auction (or on the market). Allowances are auctioned quarterly.

As of November 2016, Québec had held a total of thirteen auctions, nine jointly with California.

All auction revenues go to the Québec Green Fund and are dedicated to the fight against climate change through Québec's 2013–2020 Climate Action Plan. Unsold allowances in past auctions are removed and will gradually be released for sale at auction after two consecutive auctions are held in which the sale price is higher than the minimum price.

FREE ALLOCATION: Sectors subject to international competition receive a portion of free allowances. These include: Aluminum, lime, cement, chemical and petrochemicals, metallurgy, mining and pelletizing, pulp and paper, petroleum refining, and others (manufacturers of glass food containers, electrodes, gypsum products, and some agro-food products).

FIRST COMPLIANCE PERIOD (2013–2014): Free allocation based on historical levels, production level and intensity target of GHG emissions attributable to the activity, with 100% allocation for process emissions, 80% for combustion emissions and 100% for emissions from other sources.

SECOND COMPLIANCE PERIOD (2015–17): Free allocation diminishes by approximately 1–2% on a yearly basis.

75% of free allowances issued on 14 January of each year (year x) (except in 2013 when they were issued on 1 May). The remaining 25% are to be issued in September of the following year (year x+1) after the Minister's verification of emission reports (for year x). Free allocation is based on real output.

No free allocation for fuel distributors.

COMPLIANCE PERIOD **FIRST COMPLIANCE PERIOD:** 1 January 2013–31 December 2014. **SUBSEQUENT COMPLIANCE PERIODS:** Three calendar years as of 1 January

2015 (2015–2017, 2018–2020, and so forth), although rules pertaining to the free allocation of allowances are only set by regulation until 2020.
Allowances must be surrendered by 1 November following the end of the compliance period.

FLEXIBILITY

BANKING AND BORROWING Banking is allowed but the emitter is subject to a general holding limit. Borrowing is not allowed.
OFFSETS AND CREDITS **QUANTITATIVE LIMIT:** Up to 8% of each entity's compliance obligation. **QUALITATIVE LIMIT:** Currently four domestic (non-Kyoto) offset types are accepted as compliance units originating from projects carried out according to five "protocols" in Québec: **(1)** CH_4 destruction as part of projects to cover manure storage facilities; **(2)** Capture of gas from specified landfill sites; **(3)** Destruction of certain ozone depleting substances contained in insulating foam and of certain refrigerant gases recovered from domestic appliances in Canada; **(4)** Capture and destruction of CH_4 from a CH_4 drainage system at an active underground or surface coal mine, except a mountaintop removal mine; **(5)** Capture and destruction of CH_4 from the ventilation system of an active underground coal mine.
Additional offset types may be approved by the authority.
Offsets issued by jurisdictions linked with Québec are recognized for compliance.
The Minister may require the promoter to replace any offset credit issued to the buyer for a project, in the event that: **(1)** Due to omissions, inaccuracies or false information in the documents provided by the promoter, the GHG emissions reductions for which the offset credits were issued were not eligible; **(2)** Offset credits were applied for under another program for the same reductions as those covered by the application for credits under this regulation.
In the instance that credit recovery is not possible; an equivalent number of credits will be retired from the Minister's environmental integrity account. The Minister takes 3% of issued offset credits as a contingency reserve to fill that account.
PRICE MANAGEMENT PROVISIONS Minimum auction (reserve) price for joint auction with California in 2017: the higher of CAD 13.56 or USD 13.57 (EUR 12.78); increasing annually by 5% and inflation until 2020.
Reserve emission units held in the Allowance Price Containment Reserve account may be sold at ca. CAD 66.79, 75.16, 83.5/tCO_2e (EUR 47.76, 53.75, 59.71) in 2017 (these numbers are inferred from Californian prices, no prices for Québec are published thus far). Only covered entities in Québec are eligible to purchase allowances from the Reserve, as long as they do not have valid compliance instruments for the current period in their general account. Reserve prices increase annually by 5% and inflation.

COMPLIANCE

MRV **REPORTING FREQUENCY:** Reporting frequency: Once a year. Report to be submitted by 1 June of each year.
VERIFICATION: Emitters participating in ETS (higher threshold than those with regulatory reporting requirement) must send a verification report carried out by an organization accredited to ISO 14065.
FRAMEWORK: Regulation on the mandatory reporting of certain emissions of contaminants into the atmosphere is outlined in the Environment Quality Act.
ENFORCEMENT For non-compliance, entities can be fined CAD 3,000–500,000 (EUR 2,145–357,564) and spend up to 18 months in jail in the case of a natural person, and CAD 10,000–3,000,000 (EUR 7,151–214,538) in the case of a legal person.
Fines are doubled in the case of a second offense. In addition, the Minister of Sustainable Development, the Environment and the Fight against Climate Change may suspend the allocation to any emitter in case of non-compliance.
A covered entity that fails to cover its real and verified GHG emissions with enough allowances on 1 November following the end of a compliance period, must remit each missing allowance and will have to remit three additional allowances for each allowance it failed to remit to the Minister.
The emitter responsible for that entity would also be committing an infraction, subject to financial penalties, for each compliance instrument not surrendered as part of the compliance obligation.

OTHER INFORMATION

INSTITUTIONS INVOLVED Ministère du Développement durable, de l'Environnement et de la Lutte contre les changements climatiques (Ministry of Sustainable Development, the Environment and the Fight Against Climate Change); Direction générale de la Réglementation carbone et des données d'émission, Carbon Market Directorate
LINKS WITH OTHER SYSTEMS On 1 January 2014, Québec linked with California. Together with California, Québec is reviewing Ontario's ETS provisions for future linking.

Ontario Cap-and-Trade Program

in force

* Sectors represent upstream coverage

EMISSIONS COVERAGE ($MtCO_2e$, 2017)	LIABLE ENTITIES
142	unknown

GAS COVERAGE	ALLOCATION	OFFSETS & CREDITS
SEVERAL GASES	FREE ALLOCATION	DOMESTIC OFFSETS

On 18 May 2016, Ontario passed legislation introducing a Cap-and-Trade program with a first compliance period of 2017–2020. The program covers facilities generating more than 25,000 tons of GHG, as well as natural gas distributors, fuel suppliers and electricity importers.

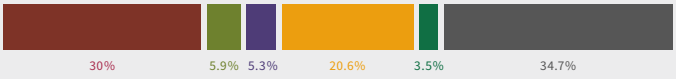
Ontario has been a member of the Western Climate Initiative (WCI) since 2008. The WCI is an initiative of American State and Canadian Provincial governments that aim to develop a joint strategy to reduce GHG emissions through a regional Cap-and-Trade program.

Ontario intends to link its program with the Californian and Québec carbon market in 2018.

BACKGROUND INFORMATION

OVERALL GHG EMISSIONS (EXCL. LULUCF) 170.2 $MtCO_2e$ (2014)

OVERALL GHG EMISSIONS BY SECTOR $MtCO_2e$ (2012)



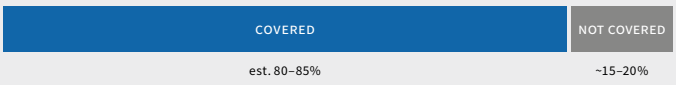
- INDUSTRY (51)
- AGRICULTURE (10)
- WASTE (9)
- BUILDINGS (35)
- ELECTRICITY GENERATION (EXCL. IMPORTS) (6)
- TRANSPORT (59)

GHG REDUCTION TARGETS **BY 2020:** 15% reduction from 1990 GHG levels. **BY 2030:** 37% reduction from 1990 GHG levels. **BY 2050:** 80% reduction from 1990 GHG levels.

ETS SIZE

CAP **FIRST COMPLIANCE PERIOD (2017–2020): 2017:** 142 $MtCO_2e$, set to decline by 4.17% per year until 2020. **2018:** 136 $MtCO_2e$ **2019:** 131 $MtCO_2e$ **2020:** 125m $MtCO_2e$

EMISSIONS COVERAGE



GHG COVERED All major greenhouse gases such as CO_2, CH_4, SF_6, N_2O, NF_3 and other fluorinated GHGs.

SECTORS & THRESHOLDS **PHASE I (2017–2020):** Industrial and large commercial operators including manufacturing, base metal processing, steel, pulp and paper, food processing and facilities, with annual emissions > 25,000 tCO_2e. Electricity: Domestic electricity generation based on fuel combustion covered at the fuel distribution level, while the compliance obligation for electricity imports rests with the importer.

Transportation fuel distributors (including propane and fuel oil) for those entities that first place more than 200L of fuel annually into the Ontario market. Natural gas distributors with annual emissions greater than 25,000 tCO_2e and operating at the point where the gas is moved from the pipeline into the distribution network for Ontario consumers. **INSTITUTIONS:** Entities with annual emissions > 25,000 tCO_2e.

Facilities emitting between 10,000–25,000 tCO_2e per year may voluntarily opt in.

POINT OF REGULATION Mixed

NUMBER OF LIABLE ENTITIES unknown

PHASES AND ALLOCATION

TRADING PERIODS Not applicable; details for post-2020 period not determined yet.

ALLOCATION Electricity sector (electricity generators, or those involved in electricity importation and transmission), petroleum producers and suppliers and natural gas distributors: Electricity and fuel distributors have to buy 100% of their allowances at auctions or on the secondary market. Allowances are auctioned quarterly. Other sectors (Industry, institutions as defined above (Sectors)): Emitters outside the electricity, natural gas and fuel sectors can apply to receive free allowances in Phase I.

COMPLIANCE PERIOD **FIRST COMPLIANCE PERIOD:** 2017–2020 **SUBSEQUENT COMPLIANCE PERIODS:** Three calendar years.

Allowances must be surrendered by 1 November (or the first business day thereafter) following the end of the compliance period.

FLEXIBILITY

BANKING AND BORROWING Banking is allowed but the emitter will be subject to a general holding limit.

OFFSETS AND CREDITS **PHASE I (2017–2020):** In the first phase, offset credits and early reduction credits will be available for use. Early reduction credits are offered to facilities who have taken early mitigation action in the four years preceding approval of the final Cap-and-Trade regulation. The regulations do not currently provide details on the creation and distribution of Early Reduction Credits, but Ontario has indicated intent to amend the regulation to do so.

Ontario is in the process of finalizing offset protocols in conjunction with Québec. The protocols will be consistent with offset project criteria developed together with Québec, California and other Western Climate Initiative members in 2010. The following project protocols will be prioritized for development: Ozone Depleting Substances, Landfill Gas Capture and Coal Mine Methane Destruction. This will be followed by additional protocols, mostly for forestry and agriculture. **QUANTITATIVE LIMITS:** Offset credits can be used to meet up to 8% of an entity's compliance obligation.

PRICE MANAGEMENT PROVISIONS **RESERVE PRICE AT AUCTION:** The minimum price at Ontario auctions will be the higher of the annual action reserve prices in either Québec or California (USD 13.57 (CA) or 13.56 (QC) in 2017 adjusted to CAD based on the exchange rate on the day prior to the auction. The reserve price increases annually by 5% plus inflation, as measured by the Consumer Price Index). **COST CONTAINMENT RESERVE:** Ontario also has a strategic allowance reserve for Ontario entities. Allowances released from this reserve can only be used for compliance. Ontario's prices are closely aligned with Québec's.

Failure to surrender allowances also renders the entity liable to a minimum fine of CAD 25,000/day (EUR 16,971/day) until the remaining allowances are surrendered (with a maximum fine of CAD 6 million [EUR 4.07 million]). Subsequent offences attract higher fines.
Individuals (persons) are liable for at least CAD 5,000/day (EUR 3,394) with a maximum fine of CAD 4 million (EUR 2.72 million) and imprisonment for up to five years. Subsequent offences attract higher fines.
Penalties apply for other violations.

COMPLIANCE

MRV **REPORTING FREQUENCY:** Annually
Facilities and natural gas distributors emitting more than 10,000t CO_2e, fuel suppliers that sell more than 200L of fuel annually, and electricity importers must report their emissions. **VERIFICATION:** Third party verification is required for capped emitters.
ENFORCEMENT If an entity fails to surrender sufficient allowances to cover their emissions, they must surrender four times the number of missing allowances (three times the shortfall plus the original shortfall, i.e., four times the number of the shortfall).

OTHER INFORMATION

INSTITUTIONS INVOLVED Ministry of Environment and Climate Change; Western Climate Initiative
LINKS WITH OTHER SYSTEMS Ontario intends to link its system with California and Québec in 2018.

Nova Scotia

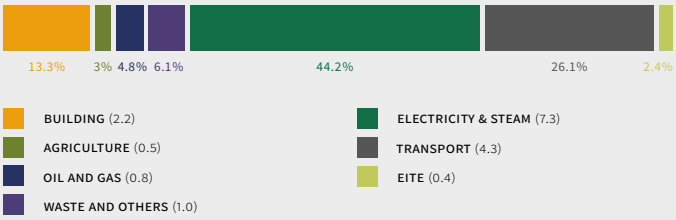
scheduled

On 21 November 2016, Nova Scotia Premier Stephen McNeil announced the implementation of a Cap-and-Trade program in 2018, in line with Canada's federal carbon pricing policy.

According to the Premier's announcement, Nova Scotia's Cap-and-Trade program will be focused on the power, transport and building sectors. While details for the system will be developed in 2017, the province did announce that it will not be linked to other jurisdictions and allowances under the cap will be issued for free. The potential to use offsets for compliance will also be examined. Nova Scotia will also adopt an emissions target that meets or even exceeds Canada's 2030 target of reducing emissions 30% compared to 2005 levels.

BACKGROUND INFORMATION

OVERALL GHG EMISSIONS (EXCL. LULUCF) 16.6 $MtCO_2e$ (2014)
OVERALL GHG EMISSIONS BY SECTOR $MtCO_2e$ (2012)



GHG REDUCTION TARGETS **BY 2020:** At least 10% reduction from 1990 GHG levels. **BY 2050:** Goal to achieve up to 80% reduction below current GHG levels.

Latin America and the Caribbean

Many jurisdictions in Latin America are considering carbon pricing. Mexico has been particularly active, running an ETS simulation alongside a carbon tax as part of its plans to establish a national carbon market by 2018. Additionally, Brazil is also exploring the possibility of a Cap-and-Trade program.

ETS in force
ETS scheduled
ETS considered

Brazil

under consideration

Brazil's National Climate Change Policy (PNMC), which was enacted in December 2009, aims to promote the development of a Brazilian market for emissions reductions.

As part of its activities under the PMR, the Brazilian government is considering the implementation of market instruments to meet Brazil's voluntary GHG reduction commitment and reduce overall mitigation costs. Brazil is currently assessing different carbon pricing instruments including an ETS and a carbon tax. The Ministry of Finance is developing design options and conducting comprehensive economic and regulatory impact assessments for both instruments. Depending on the impact assessment, the work stream is expected to culminate in a White Paper with design recommendations for a carbon pricing instrument for Brazil. In addition, the Ministry of Finance has launched a strategy to strengthen the understanding of carbon pricing instruments among stakeholders through engagement, communication, and consultation.

Since 2013, a group of leading companies have been participating in a voluntary ETS simulation. The initiative offers a platform to gain experience and develop proposals for a wide-ranging and robust approach towards the cap-and-trade market in Brazil with the purpose of promoting the reduction of national GHG emissions at the lowest possible cost. In 2015, 23 companies from diverse sectors of the Brazilian economy took part in this exercise.

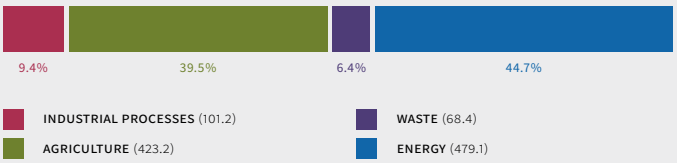
The allocation process and trading is managed by the Rio de Janeiro Green Stock Exchange (BVRio) and the ETS design is coordinated by the Centro de Estudos em Sustentabilidade da Fundação Getúlio Vargas (GVCes/FGV).

Brazilian states are also actively engaging in climate policy. In 2012, both Rio de Janeiro and São Paulo had considered the implementation of a state-wide ETS.

BACKGROUND INFORMATION

OVERALL GHG EMISSIONS (EXCL. LULUCF) 1,071.9 $MtCO_2e$ (2014)

OVERALL GHG EMISSIONS BY SECTOR $MtCO_2e$



GHG REDUCTION TARGETS **BY 2020:** Voluntary commitment to reduce GHG emissions by 36.1–38.9% compared to BAU projections. **BY 2025:** 37% reduction from 2005 GHG levels (NDC of Brazil). **BY 2030:** Indicative contribution of 43% reduction from 2005 GHG levels (NDC of Brazil).

OTHER INFORMATION

INSTITUTIONS INVOLVED Ministry of Environment; Ministry of Finance (General Coordination of Environment and Climate Change)

Chile

under consideration

Under the PMR, Chile received funding to develop a roadmap for the design and eventual implementation of an ETS for GHG mitigation in the energy sector in March 2013. However, it subsequently shifted policy priorities towards the implementation of a carbon tax. The roadmap includes necessary institutional arrangements, regulatory options, economic impacts and technical requirements for an MRV framework to track GHG emissions that would fit both a carbon tax and an ETS.

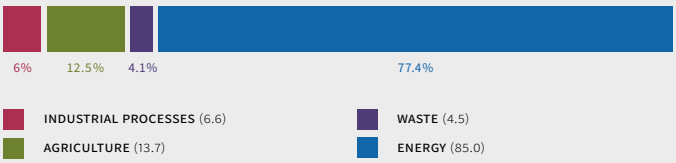
In September 2014, as part of a broader fiscal reform, Chile approved the implementation of a carbon tax for thermal power generators with a thermal input equal to or above 50 MW (exempting biomass power plants). From 2018, emitters will have to pay USD 5 (EUR 4) for related CO_2 emissions, as well as a tax on local pollutants (SO_2, NOx and particulate matter). A tax for particulate matter and NOx has been operating since 2015 as a one-time payment for the purchase of new vehicles based on the purchase price, combustible consumption, and NOx emissions/km. In the longer run, Chile is considering deepening the tax or transitioning to an ETS.

Chile also has a track record of voluntary carbon market activities. Established in 2009, the Santiago Climate Exchange provides a local platform for trading voluntary GHG reductions. In addition, the Chilean government established a "Platform for the Generation and Trading of Carbon Credits from the Forestry Sector in Chile" in January 2013. The platform works in cooperation with Verified Carbon Standards, a major GHG program in the global voluntary carbon market.

BACKGROUND INFORMATION

OVERALL GHG EMISSIONS (EXCL. LULUCF) 109.8 $MtCO_2e$ (2013)

OVERALL GHG EMISSIONS BY SECTOR $MtCO_2e$



GHG REDUCTION TARGETS BY 2020: Under the UNFCCC and conditional to external support, Chile has pledged to reduce projected BAU emissions by 20% (as projected from 2007). **BY 2030:** 30% reduction of emissions intensity compared to 2007, in terms of CO_2/unit of GDP. Conditional to international funding, 35–45% reduction of emissions intensity compared to 2007, in terms of CO_2/unit of GDP (INDC Submission).

OTHER INFORMATION

INSTITUTIONS INVOLVED Ministry of Energy; Ministry of the Environment; Ministry of Finance; Inter-Ministerial Committee on Climate Change

Mexico

under consideration

The General Climate Change Law of April 2012 provides the basic framework for the establishment of a voluntary ETS in Mexico. Subsequently, in June 2013, the government released its National Strategy on Climate Change, outlining the country's transition to a low-carbon economy. In April 2014, the Special Climate Change Program (2014–2018) was released.

In 2014, Mexico introduced a USD 3.50 (EUR 3.19) carbon tax on fossil fuel sales and imports (natural gas exempted). Firms may use offset credits from domestic projects to fulfill their tax liability; exact details of this are pending official regulation. In parallel, several legislative attempts to introduce an ETS for the electricity sector have been made.

In October 2014, a mandatory reporting system (the National Emissions Register) for both direct and indirect GHG emissions for facilities with annual emissions above 25,000 tCO_2e was established. Emitters in the energy, industrial, transport, agricultural, waste, commercial, and services sectors are required to report the six GHGs identified by the UNFCCC and black carbon. The National Emissions Register also includes the voluntary registration of mitigation or reduction certificates obtained from projects and activities carried out in Mexico.

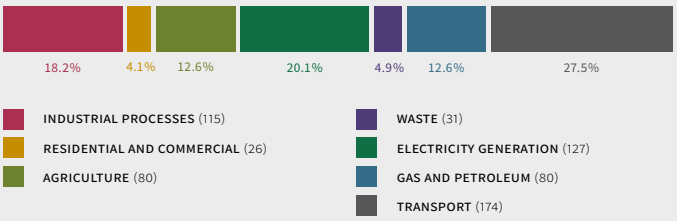
In October 2015, Mexico signed an MOU with Québec that includes cooperation on ETS. Later, in August 2016, Mexico, Québec, and Ontario issued a joint declaration on carbon markets collaboration.

In August 2016, the Ministry of Environment and Natural Resources (SEMARNAT), the Mexican stock exchange (Grupo BMV), and MÉXICO$_2$ (the voluntary carbon platform at the BMV) signed a cooperation agreement to implement a voluntary pilot ETS for 60 major entities in the power generation, manufacturing, and transport sector. The simulation aims to make stakeholders familiar with the concept of emissions trading and to improve corporate readiness. Together with the development of a registry for national emissions, the pilot ETS is consistent with Mexico's objective to implement a national carbon market by 2018.

BACKGROUND INFORMATION

OVERALL GHG EMISSIONS (EXCL. LULUCF) 633 $MtCO_2e$ (2013)

OVERALL GHG EMISSIONS BY SECTOR $MtCO_2e$



GHG REDUCTION TARGETS BY 2030: 22% reduction compared to BAU scenario and 36% conditional reduction, subject to a global mitigation agreement (NDC of Mexico). **BY 2050:** 50% reduction from 2000 GHG levels (Climate Change Law aspirational goal).

OTHER INFORMATION

INSTITUTIONS INVOLVED Ministry of Environment and Natural Resources (SERMANAT); Ministry of Energy (SENER); Ministry of Finance (SHCP)

Asia-Pacific

Asia is rapidly establishing itself as a new ETS hub, with the launch of the largest ETS expected this year in China. In the Pacific, following the transition of the New Zealand ETS to a domestic-only system, the government is undergoing a wider review of the ETS.

Japan

under consideration

In December 2010, the Ministerial Committee on Climate Change stipulated government directions for the future development of the three main policies against global warming. The government decided to reconsider an ETS, taking into consideration the burden on domestic industry and associated impacts on employment; the ongoing development of ETS overseas; an evaluation of existing, major climate change policy measures (such as voluntary actions implemented by the industry sector); and progress towards the establishment of a fair and effective international framework where all major emitters participate.

In February 2016, an Expert Panel advising the Ministry of Environment Japan on long-term climate action proposed carbon pricing as an effective measure for achieving Japan's 2050 emissions reduction target, provided it has a sufficient impact on people's and companies' activities.

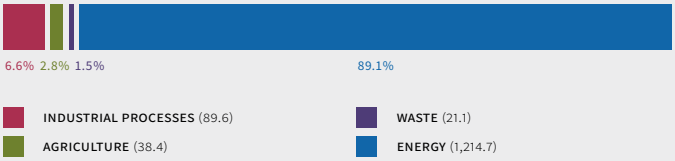
Japanese companies can familiarize themselves with a voluntary Cap-and-Trade scheme: The Advanced Technologies Promotion Subsidy Scheme with Emission Reduction Targets (ASSET).

In parallel, Japan is implementing the Joint Crediting Mechanism (JCM) for the post-2012 era.

BACKGROUND INFORMATION

OVERALL GHG EMISSIONS (EXCL. LULUCF) 1,364 $MtCO_2e$ (FY2014)

OVERALL GHG EMISSIONS BY SECTOR $MtCO_2e$



GHG REDUCTION TARGETS BY 2020: 3.8% or more reduction from FY2005 GHG levels. **BY FY2030:** 26% reduction from FY2013 GHG levels. In addition, the amount of GHG emissions reductions and removals by the JCM is estimated to be 50–100 million tCO_2 (NDC of Japan). **BY FY2050:** 80% reduction (base year not stipulated).

Tokyo Cap-and-Trade Program

in force

EMISSIONS COVERAGE ($MtCO_2e$, 2015)	LIABLE ENTITIES
13.5 (2014)	1,300

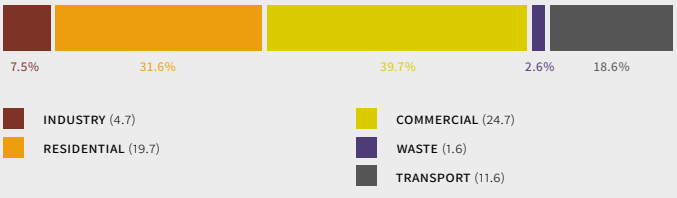
GAS COVERAGE	ALLOCATION	OFFSETS & CREDITS
CO_2 ONLY	FREE ALLOCATION	DOMESTIC

The Tokyo Metropolitan Government Cap-and-Trade Program (TMG ETS), launched in April 2010, is Japan's first mandatory ETS. Under the TMG ETS, large offices and factories are required to reduce emissions by 6–8% in the first period (FY2010–2014). Now in its second period, the target has increased to 15–17%. In FY2014, emissions by covered entities reduced by 25% compared to base-year emissions. This amounts to a 14 million ton reduction in the first compliance period.

BACKGROUND INFORMATION

OVERALL GHG EMISSIONS (EXCL. LULUCF) 67.3 $MtCO_2e$ (2014)*

OVERALL GHG EMISSIONS BY SECTOR $MtCO_2e$

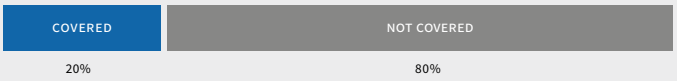


GHG REDUCTION TARGETS BY 2020: 25% reduction from 2000 GHG levels. **BY 2030:** 30% reduction from 2000 GHG levels.

* The overall emissions figure for Tokyo is higher than the total of the emissions by sector because the former includes all GHGs in Tokyo, whereas the emissions by sector only measures CO_2 emissions.

ETS SIZE

CAP The absolute cap is set at the facility level that aggregates to a Tokyo-wide cap. This is calculated according to the following formula:
Sum of base year emissions of covered facilities × compliance factor × number of years of a compliance period (five years).
COMPLIANCE FACTOR FIRST PERIOD (FY2010–FY2014): 8% or 6% reduction below base-year emissions. **SECOND PERIOD (FY2015–FY2019):** 17% or 15% reduction below base-year emissions.
The higher compliance factors (8% and 17%) apply to office buildings, and district and cooling plant facilities (excluding facilities which use a large amount of district heating and cooling).
The lower compliance factors (6% and 15%) apply among others to office buildings, facilities which are heavy users of district and cooling plants, and factories. Highly energy efficient facilities that have already made significant progress with regards to climate change measures are subject to half or three-quarters of the compliance factor.
EMISSIONS COVERAGE



GHG COVERED CO_2
SECTORS & THRESHOLDS Commercial and Industrial Sectors.
INCLUSION THRESHOLDS: Facilities that consume energy more than 1,500kL of crude oil equivalent or more per year
POINT OF REGULATION Downstream
NUMBER OF LIABLE ENTITIES Approximately 1,300 facilities

PHASES AND ALLOCATION

TRADING PERIOD FIRST PERIOD: 1 April 2011 to 30 September 2016 (compliance period and adjustment year) **SECOND PERIOD:** 1 April 2015 to 30 September 2021 (compliance period and adjustment year)
ALLOCATION Grandfathering based on historical emissions calculated according to the following formula: base year emissions × (1-compliance factor) × compliance period (5 years).
Base-year emissions for the first compliance period are based on the average emissions of three consecutive years between FY2002–FY2007.
Allocation to new entrants is based on past emissions or on emissions intensity standards: emissions activity (floor area) × emission intensity standard.
COMPLIANCE PERIOD Five years. **FIRST PERIOD:** FY2010–FY2014 **SECOND PERIOD:** FY2015–FY2019 Fiscal year runs from 1 April to 31 March.

FLEXIBILITY

BANKING AND BORROWING Banking is allowed between two compliance periods (e.g. banking from first to second compliance period is allowed. Banking from first to third is not). Borrowing is not allowed.
OFFSETS AND CREDITS Currently credits from four offset types are allowed in the TMG ETS. **SMALL AND MID-SIZE FACILITY CREDITS:** Total amount of emission reductions achieved by implementing emission reduction measures from non-covered small- and medium-sized facilities in Tokyo since FY2010. Issuance of credits from FY2011. Small and Mid-size Facility Credits can be used for compliance without limit. **OUTSIDE TOKYO CREDITS:** Emission reductions achieved from large facilities outside of the Tokyo area. Large facilities: Energy consumption of 1,500 kL of crude oil equivalent or more in a base-year, and with base-year emissions of 150,000t or less. Credits are only issued for the reduction amount that exceeds the compliance factor of 8%. Issuance of credits from FY2015. Outside Tokyo Credits can be used for compliance for up to one-third of facilities' reduction obligations.
RENEWABLE ENERGY CREDITS: Credits from solar (heat, electricity), wind, geothermal, or hydro (under 1,000 kW) electricity production are counted at 1.5 times the value of regular credits. Credits from biomass (biomass rate of 95% or more, black liquor is excluded) are converted with the factor 1. Types of Credits: Environmental Value Equivalent, Renewable Energy Certificates and New Energy Electricity, generated under the Renewable Portfolio Standard Law. Renewable Energy Credits can be used for compliance without a limit.
SAITAMA CREDITS (VIA LINKING): TWO TYPES: (1) Excess Credits of the Saitama Scheme: Emission reductions from facilities with base-year emissions of 150,000 tons or less. Issuance of credits from FY2015. **(2)** Small and mid-size Facility Credits issued by Saitama Prefecture. Issuance of credits from FY2012. Saitama Credits can be used for compliance without a limit.
All offsets have to be verified by verification agencies.
PRICE MANAGEMENT PROVISIONS In general, TMG does not control carbon prices. However, the supply of credits available for trading may be increased in case of excessive price evolution.

COMPLIANCE

MRV REPORTING FREQUENCY: Participants are required to annually submit (fiscal year) their emission reduction plans and emissions reports. Seven GHG gases have to be monitored and reported: CO_2 (non-energy related), CH_4, N_2O, PFCs, HFCs, SF_6 and NF_3. **VERIFICATION:** These reports also require third-party verification. **FRAMEWORK:** These are based on "TMG Monitoring/Reporting Guidelines" and "TMG Verification Guidelines". **OTHER:** CO_2 emission factors are fixed during the five year compliance period.
Verified reduction amounts can be used for compliance, but cannot be traded with other facilities except energy-related CO_2. Verification is required only when it is used for compliance.
ENFORCEMENT In case of non-compliance, the following measures may be taken in two stages: **FIRST STAGE:** The Governor orders the facility to reduce emissions by the amount of the reduction shortfall multiplied by 1.3. **SECOND STAGE:** Any facility that fails to carry out the order will be publicly named and subject to penalties (up to JPY 500,000 [EUR 4,113]) and surcharges (1.3 times the shortfall).

OTHER INFORMATION

INSTITUTIONS INVOLVED TMG Bureau of Environment
LINKS WITH OTHER SYSTEMS Linking with the Saitama Prefecture started in April 2011 when the Saitama ETS was launched. Credits from excess emission reductions and Small- and Mid-size Facility Credits (offsets) are officially eligible for trade between the two jurisdictions. During the first compliance period, 14 credit transfers took place between the Saitama Prefecture and Tokyo (8 cases from Tokyo to Saitama, 6 cases from Saitama to Tokyo).

Target Setting Emissions Trading System in Saitama

in force

EMISSIONS COVERAGE ($MtCO_2e$, 2015)	LIABLE ENTITIES
6.9 (2014)	568

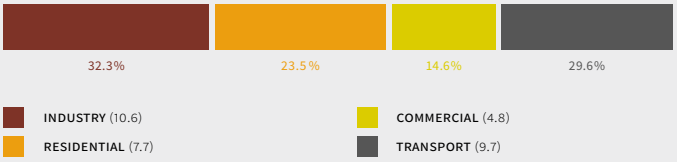
GAS COVERAGE	ALLOCATION	OFFSETS & CREDITS
CO_2 ONLY	FREE ALLOCATION	DOMESTIC

Saitama's ETS was established in April 2011 as part of the Saitama Prefecture Global Warming Strategy Promotion Ordinance. Saitama's ETS is bilaterally linked to that of Tokyo. In FY2014, the Saitama ETS had achieved a 24% reduction below base-year emissions.

BACKGROUND INFORMATION

OVERALL GHG EMISSIONS (EXCL. LULUCF) 38.5 $MtCO_2e$ (FY2014) (demand side)*

OVERALL GHG EMISSIONS BY SECTOR $MtCO_2e$



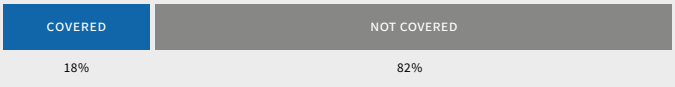
GHG REDUCTION TARGETS BY 2020: 21% reduction from 2005 GHG levels (demand side).

ETS SIZE

CAP An absolute cap is set at the facility level, which aggregates to a Saitama-wide cap. This is calculated according to the following formula:
Sum of base year emissions of covered facilities × compliance factor (8%/6%) × number of years of a compliance period. (First Period: four years, Second Period: five years).

COMPLIANCE FACTOR FIRST PERIOD (FY2011–FY2014): 8% or 6% reduction below base-year emissions. **SECOND PERIOD (FY2015–FY2019):** 15% or 13% reduction below base-year emissions.

EMISSIONS COVERAGE



GHG COVERED CO_2

SECTORS & THRESHOLDS Commercial and industrial sectors.

INCLUSION THRESHOLDS: Facilities that consume energy more than 1,500kL of crude oil equivalent or more per year.

POINT OF REGULATION Downstream

NUMBER OF LIABLE ENTITIES 568 facilities (as of 31 March 2015)

* The overall emissions figure for Saitama is higher than the total of the emissions by sector because the former includes all GHGs in Saitama, whereas the emissions by sector only measures CO_2 emissions.

PHASES AND ALLOCATION

TRADING PERIODS FIRST PERIOD: 1 April 2012 to 30 September 2016 (compliance period and adjustment year). **SECOND PERIOD:** 1 April 2015 to 30 September 2021 (compliance period and adjustment year).

ALLOCATION Grandfathering based on historical emissions is calculated according to the following formula: Base year emissions × (1-compliance factor) × compliance period.
Base year emissions for the first compliance period are based on the average emissions of three consecutive fiscal years between 2002 and 2007.
Allocation to new entrants is based on past emissions or on emissions intensity standards: Emissions activity (floor area) × emission intensity standard.

COMPLIANCE PERIOD Four or Five years. **FIRST PERIOD:** FY2011–FY2014 **SECOND PERIOD:** FY2015–FY2019 The fiscal year runs from 1 April to 31 March.

FLEXIBILITY

BANKING AND BORROWING Banking is allowed between two consecutive compliance periods (e.g. banking from first to second compliance period is allowed. Banking from first to third is not). Borrowing is not allowed.

OFFSETS AND CREDITS Currently credits from five offset types are allowed in the Saitama scheme. **SMALL AND MID-SIZE FACILITY CREDITS:** Total amount of emission reductions achieved by implementing emission reduction measures from non-covered small and medium sized facilities in Saitama since FY2011. Issuance of credits from FY2012. Small and Mid-size Facility Credits can be used for compliance without limit. **OUTSIDE SAITAMA CREDITS:** Emission reductions achieved from large facilities outside the Saitama Prefecture. Large facilities: Energy consumption of 1,500kL of crude oil equivalent or more in a base-year, and with base-year emissions of 150,000 tonnes or less. Credits only issued for the reduction amount that exceeds the compliance factor of 8%. Issuance of credits from FY2015. Outside Saitama Credits can be used for compliance for up to one-third, in the case of offices, or to half, in the case of factories, for the facilities' reduction targets. **RENEWABLE ENERGY CREDITS:** Credits from solar (heat, electricity), wind, geothermal, or hydro (under 1,000kW) electricity production are counted at 1.5 times the value of regular credits. Credits from biomass (biomass rate of 95% or more, black liquor is excluded) and hydro power (1,000kW to 10,000kW) are converted with the factor 1. Types of Credits: Environmental Value Equivalent, Renewable Energy Certificates, New Energy Electricity generated under the Renewable Portfolio Standard Law. Renewable Energy Credits can be used for compliance without limit. **FOREST ABSORPTION CREDITS:** Credits from forests inside the Saitama Prefecture are counted at 1.5 times the value of regular credits. Others are converted with the factor 1. Forest absorption Credits can be used for compliance without limit. **TOKYO CREDITS (VIA LINKING): TWO TYPES: (1)** Excess Credits from TMG ETS: Emission reductions from facilities with base-year emissions of 150,000t or less. Issuance of credits from

FY2015. **(2)** Small and mid-size Facility Credits issued by TMG ETS: Issuance of credits from FY2012. Tokyo Credits can be used for compliance without a limit. All offsets have to be verified by verification agencies.

PRICE MANAGEMENT PROVISIONS In general, the Saitama Prefectural Government does not control carbon prices. However, the supply of credits available for trading may be increased in case of excessive price evolution.

COMPLIANCE

MRV REPORTING FREQUENCY: Annual reporting. All seven GHGs have to be monitored and reported: CO_2 (non-energy related), CH_4, N_2O, PFCs, HFCs, SF_6 and NF_3.
VERIFICATION: Verification is required only when it is used for compliance.
FRAMEWORK: Participants are required to report their verified emissions based on the Saitama Prefectural Government Monitoring/Reporting Guidelines and the Saitama Prefectural Government Verification Guidelines. **OTHER:** Verified reduction amounts can be used for compliance, but cannot be traded with other facilities except for energy-related CO_2.

ENFORCEMENT None.

OTHER INFORMATION

INSTITUTIONS INVOLVED Saitama Prefectural Government

LINKS WITH OTHER SYSTEMS Linking with Tokyo started in April 2011. Credits from excess emission reductions and Small- and Mid-size Facility Credits (offsets) are officially eligible for trade between the two jurisdictions. During the first compliance period, 14 credit transfers took place between the Saitama Prefecture and Tokyo (8 cases from Tokyo to Saitama, 6 cases from Saitama to Tokyo).

New Zealand Emissions Trading Scheme (NZ ETS) in force

* Sectors represent upstream coverage

EMISSIONS COVERAGE ($MtCO_2e$, 2015)	LIABLE ENTITIES
41.4 (2014)	2,364

GAS COVERAGE	ALLOCATION	OFFSETS & CREDITS
SEVERAL GASES	AUCTIONING & FREE ALLOCATION	INTERNATIONAL UNTIL MAY 2015 & DOMESTIC

The NZ ETS was launched in 2008 and has since evolved to cover all sectors of the economy, including forestry as a source of both emissions and units, and agriculture, which currently has reporting without surrender obligations.

The first statutory review was completed in 2011 and the NZ ETS was amended in 2012. A second review of the NZ ETS began in 2015, and is currently underway in two stages.

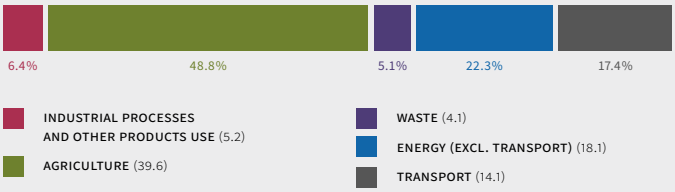
Based on stage one consultation, the decision was taken to phase out the 'one-for-two' transitional measure from the beginning of 2017, effectively increasing surrender obligations over the next three years. The ongoing second stage of the review covers issues relating to unit supply, such as auctioning, price stability measures, and forestry sector accounting. Further policy decisions are expected in mid-2017.

The NZ ETS was originally designed to be fully linked to international carbon markets under the UNFCCC. However, the use of Kyoto Protocol credits was restricted as of 1 June 2015, effectively making the NZ ETS a domestic-only system. As indicated by New Zealand's NDC, reestablishing a link to high-integrity international carbon markets is a priority under the Paris Agreement.

BACKGROUND INFORMATION

OVERALL GHG EMISSIONS (EXCL. LULUCF) 81.1 $MtCO_2e$ (2014)

OVERALL GHG EMISSIONS BY SECTOR $MtCO_2e$



GHG REDUCTION TARGETS **BY 2020:** 5% reduction from 1990 GHG levels (unconditional target). **BY 2030:** 30% reduction from 2005 GHG levels (equivalent to 11% reduction from 1990 GHG levels) (NDC of New Zealand). **BY 2050:** 50% reduction from 1990 GHG levels.

ETS SIZE

CAP The NZ ETS was originally designed to operate without a fixed cap, in order to accommodate carbon sequestration from forestry activities and to enable the full use of international carbon markets. However, as allowance supply is now restricted to domestic units (NZUs), the NZ ETS is effectively moving closer to a fixed cap. NZUs are issued either as free allocation to Emissions Intensive Trade Exposed (EITE) activities or for domestic removal activities (i.e. forestry). This means that as long as NZU prices remain below the fixed price offer level (NZD 25/NZU) (EUR 17/NZU), the annual cap is equivalent to the quantity of free allowances and removal units issued (see Allocation).

The NZ ETS legislation includes provisions to introduce auctioning of New Zealand Units (NZUs) within an overall cap on non-forestry sectors.

EMISSIONS COVERAGE

COVERED	NOT COVERED
51%	49%

Coverage with surrender obligations. Emissions coverage with reporting obligations: ~98%

GHG COVERED CO_2, CH_4, N_2O, SF_6, HFCs and PFCs

SECTORS & THRESHOLDS Sectors were gradually phased-in over time. **2008:** Forestry (mandatory: deforesting pre-1990 forest land, voluntary: post-1989 forest land). **2010:** Stationary energy (various thresholds), industrial processing (various thresholds) and liquid fossil fuels (various thresholds). **2013:** Waste (except for small and remote landfills) and synthetic GHGs (various thresholds). Synthetic GHGs not in the NZ ETS are subject to an equivalent levy. Biological emissions from agriculture must be reported, but face no surrender obligations.

POINT OF REGULATION The point of obligation is generally placed upstream. Some large businesses that purchase directly from mandatory NZ ETS participants can choose to opt into the NZ ETS rather than have the costs passed down from their suppliers.

NUMBER OF LIABLE ENTITIES 2,364 entities registered, of which 2,295 have surrender obligations (as of June 2015): 159 entities with mandatory reporting and surrender obligations. 2,136 entities with voluntary reporting and surrender obligations; mostly for forestry activities. 69 entities with mandatory reporting without surrender obligations; mostly for agricultural activities.

PHASES AND ALLOCATION

TRADING PERIODS For most sectors the NZ ETS has year-on-year allocations and surrender obligations.

For post-1989 forestry participants, annual reporting of emissions and removals is optional, with five-year mandatory reporting periods. As a result, unit entitlement transfers and surrender obligations for these participants correspond to when they choose to report their emissions.

ALLOCATION **INDUSTRIAL SECTOR:** Intensity-based allocation for 26 eligible activities: 90% free allocation for for highly EITE activities (1,600 tCO_2e/NZD 1 million of revenue [EUR 652,740]); 60% free allocation for moderately emissions-intensive and trade exposed activities (800 tCO_2e/NZD 1 million of revenue [EUR 652,740]).

POST-1989 FORESTRY SECTOR AND OTHER REMOVAL ACTIVITIES: See 'offsets and credits'. In the year to June 2016, 4.6 million NZUs were allocated to industrial participants, and 8.5 million NZUs were granted for removal activities, compared to a total of 20.4 million certificates surrendered in this period.

FORESTRY AND FISHERIES SECTORS: Owners of pre-1990 forest land received a one-off free allocation of NZUs to partially compensate for the impact of the introduction of the NZ ETS on land use flexibility. Fishing quota owners were also compensated for rising fuel costs with a one-off free allocation.

In 2012, the NZ ETS legislation was amended to allow the introduction of auctioning of NZUs within an overall cap on non-forestry sectors. However, no decision to implement auctioning has been taken.

COMPLIANCE PERIOD One year for most sectors.

Participants registered for post-1989 forestry have mandatory five year compliance periods; however they may choose to report emissions and removals more frequently.

FLEXIBILITY

BANKING AND BORROWING Banking is allowed except for those units that were purchased under the fixed price option (see 'price management provisions'). Borrowing is not allowed.

OFFSETS AND CREDITS QUALITATIVE LIMIT: As of 1 June 2015, international units are not eligible for surrender in the NZ ETS.

NZUs are granted to participants that voluntarily register in the scheme for removal activities. Forestry Removal Activities: participants are entitled to receive one NZU per ton of removals for registered post-1989 forest land. If the forest is harvested or deforested, units must be surrendered to account for the emissions, and if the participant chooses to deregister from the scheme, NZUs equivalent to the number received must be returned. **OTHER REMOVAL ACTIVITIES:** Participants are currently entitled to receive one NZU per two tons of removals. This is set to increase over the next three years in line with the phase-out of the one-for-two surrender obligation measure (see Price Management Provisions).

In the year to June 2016, 8.5 million NZUs were transferred to participants for removal activities (forestry removal activities—7.1 million, and other removal activities—1.4 million).

Since January 2013, pre-1990 forest landowners have the option to offset deforestation on their land by planting an equivalent new forest elsewhere in New Zealand (under given conditions).

PRICE MANAGEMENT PROVISIONS Transitional measures were implemented in 2009 to help firms adjust to a carbon price signal. These include: **(A)** One-for-two surrender obligation for non-forestry sectors (one allowance may be surrendered for every two tons of emissions); and **(B)** a NZD 25 (EUR 16.32) fixed price option, which effectively acts as a price ceiling. These measures are the focus of phase one of the current ETS review and the government has confirmed that the one-for-two measure is to be phased out over the next three years. The one-for-two measure, effectively a 50% surrender obligation, has been increased to 67% from 1 January 2017, and will increase to 83% from 1 January 2018 and to full surrender obligations from 1 January 2019.

COMPLIANCE

MRV REPORTING FREQUENCY: Most sectors are required to report annually. **VERIFICATION:** Self-reporting supplemented by audits (methodology is consistent with NZ income tax auditing procedures). Third party verification is only required when participants apply for the use of a unique emissions factor. **OTHER:** Post-1989 forestry participants are required to report emissions at the end of each five year 'mandatory emissions reporting period', with the option to report annually as well.

ENFORCEMENT An entity that fails to surrender emission units when required to, will have to surrender units and pay a penalty of NZD 30 (EUR 19.58) for each unit. Entities can be fined up to NZD 24,000 (EUR 15,67) for failure to collect emissions data or other required information, calculate emissions and/or removals, keep records, register as a participant, submit an emissions return when required, or notify the administering agency or provide information when required to do so.

Entities can also be fined up to NZD 50,000 (EUR 32,64) for knowingly altering, falsifying or providing incomplete or misleading information about any obligations under the scheme, including emissions return. This penalty and/or imprisonment of up to five years also apply to entities that deliberately lie about obligations under the NZ ETS to gain financial benefit or avoid financial loss.

OTHER INFORMATION

INSTITUTIONS INVOLVED Ministry for the Environment; The Environmental Protection Authority and Ministry for Primary Industries.

Korean Emissions Trading System (KETS)

in force

EMISSIONS COVERAGE ($MtCO_2e$, 2017)	LIABLE ENTITIES
551	525

GAS COVERAGE	ALLOCATION	OFFSETS & CREDITS
SEVERAL GASES	FREE ALLOCATION	DOMESTIC OFFSETS

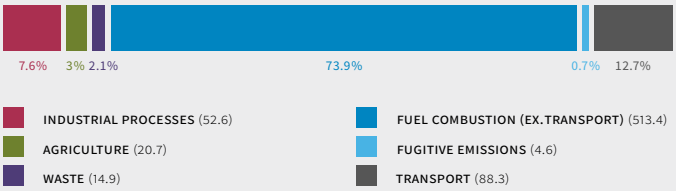
On 1 January 2015, the Republic of Korea launched its national ETS (KETS), the first nation-wide Cap-and-Trade program in operation in East Asia. The ETS covers approximately 525 of the country's largest emitters, which account for around 68% of national GHG emissions. The KETS covers direct emissions of six Kyoto gases, as well as indirect emissions from electricity consumption. The KETS will play an essential role in meeting Korea's 2030 NDC target of 37% below BAU emissions.

In the first two years of operation trade under the KETS has been limited. In 2016, efforts have been made to increase the supply of allowances in the Korean market to ease the pressure on market participants. Firstly, the share of allowances companies can borrow for compliance was doubled (from 10% to 20%). Secondly, an additional 900,000 allowances were offered from the Allowance Reserve at a floor price of around EUR 12. Finally, 2.3 million Korean Offset Credits were also added to the market.

BACKGROUND INFORMATION

OVERALL GHG EMISSIONS (EXCL. LULUCF) 694.5 $MtCO_2e$ (2013)

OVERALL GHG EMISSIONS BY SECTOR $MtCO_2e$



GHG REDUCTION TARGETS **BY 2020:** 30% below BAU. **BY 2030:** 37% below BAU (536 $MtCO_2e$). This represents a 22% reduction below 2012 GHG levels.

ETS SIZE

CAP **PHASE ONE (2015–2017):** 1,687 $MtCO_2e$, including a reserve of 89 million tCO_2e for market stabilization measures, early action and new entrants.
2015: 573 $MtCO_2e$, 2016: 562 $MtCO_2e$, 2017: 551 $MtCO_2e$
Caps for phase two and three have not yet been announced.

EMISSIONS COVERAGE

GHG COVERED CO_2, CH_4, N_2O, PFCs, HFCs, SF_6

SECTORS & THRESHOLDS **PHASE ONE (2015–2017):** 23 sub-sectors from steel, cement, petro-chemistry, refinery, power, buildings, waste and aviation sectors.
INCLUSION THRESHOLDS: Company >125,000 tCO_2/year, facility >25,000 tCO_2/year
POINT OF REGULATION Downstream
NUMBER OF LIABLE ENTITIES 525 business entities including 5 domestic airlines.

PHASES AND ALLOCATION

TRADING PERIODS **PHASE ONE:** Three years (2015–2017) **PHASE TWO:** Three years (2018–2020) **PHASE THREE:** Five years (2021–2025)
ALLOCATION **PHASE ONE (2015–2017):** 100% free allocation, no auctioning.
Most sectors will receive free allowances based on the average GHG emissions of the base year (2011–2013). Three sectors (grey clinker, oil refinery, aviation) will be allocated free allowances following benchmarks based on previous activity data from the base year (2011–2013).
During Phase one about 5% of total allowances are retained in a reserve for market stabilization measures (14 $MtCO_2e$), early action (41 $MtCO_2e$), and other purposes including new entrants (33 $MtCO_2e$). In addition, any unallocated allowances and withdrawn allowances will be transferred to the reserve.
PHASE TWO (2018–2020): 97% free allowances, 3% auctioned.
PHASE THREE (2021–2025): Less than 90% free allowances, more than 10% auctioned. Energy-intensive and trade-exposed (EITE) sectors will receive 100% of their allowances for free in all phases. EITE sectors are defined along the following criteria: **(1)** additional production cost of >5% and trade intensity of >10%; or **(2)** additional production cost of >30%; or **(3)** trade intensity of >30%.
COMPLIANCE PERIOD One year

FLEXIBILITY

BANKING AND BORROWING Banking is allowed without any restrictions. Borrowing is allowed only within a single trading phase (maximum of 10% of entity's obligation in 2015. Increased to 20% in 2016 and 2017), but not across phases.
OFFSETS AND CREDITS **PHASE ONE (2015–2017)** and **PHASE TWO (2018–2020):**
QUALITATIVE LIMIT: Only domestic credits from external reduction activities implemented by non-ETS entities—that meet international standards—may be used for compliance. Domestic CDM credits (CERs) are allowed in the scheme. Eligible activities include those eligible under the CDM and Carbon Capture and Storage (CCS). However, only activities implemented after 14 April 2010 are eligible. **QUANTITATIVE LIMIT:** Up to 10% of each entity's compliance obligation.
PHASE THREE (2021–2025): Up to 10% of each entity's compliance obligation with a maximum of 5% coming from international offsets.
PRICE MANAGEMENT PROVISIONS The Allocation Committee may decide to implement market stabilization measures in the following cases: **(1)** The market allowance price of six consecutive months is at least three times higher than

the average price of the two previous years. **(2)** The market allowance price of the last month is at least twice the average price of two previous years and the average trading volume of the last month is at least twice the volume of the same month of the two previous years. **(3)** The average market allowance price of a given month is smaller than 40% of the average price of the two previous years. In 2015 and 2016, the price threshold is KRW 10,000 (EUR 7).

The stabilization measures may include: **(1)** Additional allocation from the reserve (up to 25%) **(2)** Establishment of an allowance retention limit: minimum (70%) or maximum (150%) of the allowance of the compliance year. **(3)** An increase or decrease of the borrowing limit (currently up to 20%). **(4)** An increase or decrease of the offsets limit (currently up to 10%). **(5)** Temporary establishment of a price ceiling or price floor.

In 2016, the Allocation Committee increased the borrowing limit from 10% to 20%. Furthermore, an additional nine million allowances were made available from auction at a reserve price of 16,200 KRW (EUR 12). Less than a third of allowances were sold.

COMPLIANCE

MRV REPORTING FREQUENCY: Annual reporting of emissions must be submitted within three months from the end of a given compliance year (by the end of March). **VERIFICATION:** Emissions must be verified by a third-party verifier. **OTHER:** Emissions reports are reviewed and certified by the Certification Committee of the Ministry of Environment within five months from the end of a given compliance year (by the end of May).

If the liable entity fails to report emissions correctly, the report will be disqualified.

ENFORCEMENT The penalty shall not exceed three times the average market price of allowances of the given compliance year or KRW 100,000/ton (EUR 70).

OTHER INFORMATION

INSTITUTIONS INVOLVED In 2016, responsibility for the KETS moved from the Ministry of Environment to the Ministry of Strategy and Finance.

China Emissions Trading System

scheduled

2016 marked a significant year of intensive preparation work on the path towards the launch of China's national ETS by 2017, a goal set in the previous year by China's highest political level. This timeline has been reaffirmed by China's NDC under the Paris Agreement, which entered into force on 4 November 2016, and the '13th Five-Year Work Plan for Greenhouse Gas Emission Control' released on 27 October 2016. The Work Plan outlines China's climate and energy related measures and targets between 2016 and 2020, with binding provincial level targets.

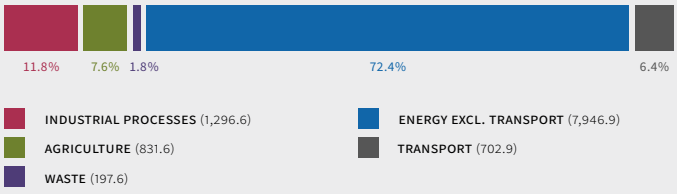
Overseen by the National Development and Reform Commission (NDRC), the national system would expand on the existing ETS pilots that are already operating in Chinese cities and provinces.

Between 2013–2015, the NDRC developed interim administrative ETS measures, as well as sector-specific monitoring and reporting guidelines. Building on this, current work is focused on developing the National ETS Legislation, as well as rules around emissions reporting, verification entities, allocation and offsetting. These regulations are under consultation and are expected to come into force in the first half of 2017. The allowance allocation is also expected to be completed by then.

BACKGROUND INFORMATION

OVERALL GHG EMISSIONS (EXCL. LULUCF) 10,976 $MtCO_2e$ (2012)

OVERALL GHG EMISSIONS BY SECTOR $MtCO_2e$



GHG REDUCTION TARGETS BY 2020: 40–45% reductions in carbon intensity compared to 2005 levels (voluntary commitment under the Copenhagen Accord of 2009). **FURTHER DETAILED TARGET FOR 2016–2020:** Reduction in carbon emissions per unit GDP by 18% compared to 2015 level (13th Five-year plan). **BY 2030:** Peak CO_2 emissions around 2030, with best efforts to peak earlier. China has also committed to lowering CO_2 emissions per unit of GDP by 60–65% from 2005 levels and increasing the share of non-fossil fuels in primary energy consumption to around 20% (NDC of China).

ETS SIZE

CAP PHASE ONE (2017–2019): 3000–5000 $MtCO_2e$/year, (projection only)

GHG COVERED CO_2

SECTORS & THRESHOLDS The National ETS will cover eight sectors: petrochemicals, chemicals, building materials, iron and steel, non-ferrous metals, paper making, power (including power generation and grid) and aviation, which are further divided into subsectors. **INCLUSION THRESHOLDS:** Entities with an annual energy consumption of more than 10,000 tons of standard coal equivalent (emissions of ~26,000 tCO_2) in any year over 2013–2015 were asked to report their historical emissions and expect to be enrolled into the National ETS (see 13th Five Year Plan (FYP)).

POINT OF REGULATION Mixed: Both direct emissions from the power sector and indirect emissions from electricity (and heat) consumption are included in the scheme. Electricity prices are regulated in China, and therefore a scheme based on direct emissions alone would not induce a pass-through of carbon costs via the electricity price, and would not incentivize demand-side management of electricity. The system therefore covers emissions from the power sector upstream and other sectors downstream.

NUMBER OF LIABLE ENTITIES Expected to be at least 7,000

PHASES AND ALLOCATION

TRADING PERIODS **PHASE ONE:** Three years (2017–2019)

ALLOCATION **PHASE ONE (2017–2019):** Expected to be free allocation in the beginning based on either benchmarking or historical emissions intensity. NDRC expresses a willingness to introduce and gradually increase the share of auctioning, but there are no details as yet on the starting date and share of auctioning.

COMPLIANCE PERIOD One year

FLEXIBILITY

OFFSETS AND CREDITS **PHASE ONE (2017–2019):** Using CCER (China Certified Emission Reduction) credits.

In 2012, the NDRC issued the 'Interim Measures for the Management of Voluntary GHG Emission Reduction Transactions'. These measures include guidelines for the issuance of domestically-produced offsets, known as CCERs. CCERs are expected to be used in the national ETS. The revised Interim Regulation and upcoming regulation on administrative measures for the offset scheme will impose quantitative and qualitative limits on the use of CCERs.

COMPLIANCE

MRV **REPORTING FREQUENCY:** Annual **VERIFICATION:** The NDRC is currently drafting regulation for third-party verification for the national ETS. Before this is finalized, local DRCs are asked to select suitable institutions and personnel to carry out the verification tasks according to suggested requirements by the NDRC. **FRAMEWORK:** From 2013–2015, the NDRC has released a series of MRV guidelines covering a total of 24 sectors. In 2015, the NDRC further provided supplementary data sheets on GHG MR for the 8 ETS covered sectors as well as 'Reference Guidance on Third-party Verification of China ETS' and 'Reference Qualification on Third-party Verification Body and Verifiers of China ETS'. To support the NDRC drafting of the national allocation plan in 2016, local DRCs collected emissions reports from entities in their regions for 2013–2015 in accordance with the MRV sector guidelines. Companies were also required to report production and other industry-specific data that may be used for benchmark allocation. The reports had to be verified by third-party verifiers. Both the emissions and verification reports had to be checked by local DRCs and were sent to the NDRC before the end of June 2016.

OTHER INFORMATION

INSTITUTIONS INVOLVED NDRC, provincial/autonomous regional/municipal Development and Reform Commissions (DRCs), and Civil Aviation Administration of China (CAAC)

Overall, NDRC is in charge of policy design and rule making while the local DRCs and CAAC are in charge of policy and rule implementation.

Market oversight is to be at the central level. Nine exchanges have been approved by NDRC to act as official trading platforms for the national ETS, which are the seven in the original pilot regions and two in Sichuan province and Fujian province.

Beijing (Pilot) Emissions Trading System

in force

EMISSIONS COVERAGE ($MtCO_2e$, 2016)	LIABLE ENTITIES
46 (existing facilities only)	947

GAS COVERAGE	ALLOCATION	OFFSETS & CREDITS
CO_2 ONLY	FREE ALLOCATION	DOMESTIC

The Beijing pilot ETS was launched on 28 November 2013 and has finished three compliance years so far. It covers about 45% of the city's total emissions, including both direct and indirect emissions from electricity providers, the heating sector, cement, petrochemicals, other industrial enterprises, manufacturers, the service sector and public transport.

To test interregional cooperation, several cement companies from Hebei province and Inner Mongolia were included in the pilot system in 2015 and 2016.

BACKGROUND INFORMATION

OVERALL GHG EMISSIONS (EXCL. LULUCF) 188.1 $MtCO_2e$ (2012)

GHG REDUCTION TARGETS BY 2020 (13th Five Year Plan): 20.5% reduction in carbon intensity compared to 2015 levels.

ETS SIZE

CAP 46 $MtCO_2e$ (2016, existing facilities only)

EMISSIONS COVERAGE

GHG COVERED CO_2

SECTORS & THRESHOLDS Industrial and non-industrial companies and entities, including electricity providers, heating sector, cement, petrochemicals, other industrial enterprises, manufacturers, service sector, and public transport. **INCLUSION THRESHOLDS:** 5,000t CO_2/year, considering both direct and indirect emissions. **MANDATORY REPORTING:** 2,000 tons of standard coal equivalent energy consumption/year.

POINT OF REGULATION Mixed: Both direct emissions from the power sector and indirect emissions from electricity (and heat) consumption are included in the scheme. Electricity prices are regulated in China, and therefore a scheme based on direct emissions alone would not induce a pass-through of carbon costs via the electricity price, and would not incentivize demand-side management of electricity. The system therefore covers emissions from the power sector upstream and other sectors downstream.

NUMBER OF LIABLE ENTITIES 947 (2016, Beijing), 26 (Inner Mongolia), 6 (Hebei)

MANDATORY REPORTING: 582 (2016, Beijing)

* Initially, the seven Chinese pilot ETS were scheduled to end after three compliance years and be replaced by the national ETS in 2016. However, as the national ETS will start in the second half of 2017, the pilots will continue operating until then and probably also beyond.

PHASES AND ALLOCATION

TRADING PERIODS Four years (2013–2016)*

ALLOCATION Mainly free allocation through grandfathering based on emissions or emissions intensity in the years 2009–2012 (stationary sources) or 2011–2014 (mobile sources). Benchmarking for new entrants and entities with expanded capacity.

COMPLIANCE PERIOD One year (15 June)

FLEXIBILITY

BANKING AND BORROWING Banking is allowed during the pilot phase. Borrowing is not allowed.

OFFSETS AND CREDITS QUANTITATIVE LIMIT: Domestic project-based carbon offset credits—China Certified Emission Reduction (CCER) credits—are allowed. The use of CCER credits is limited to 5% of the annual allocation. **QUALITATIVE LIMIT:** Out of the 5% annual allocation limit, at least 50% must come from projects within the jurisdiction of the city of Beijing. Credits from hydropower, HFC, PFC, N_2O and SF_6 projects are not eligible and all reductions have to be achieved after the beginning of 2013.

Verified carbon emission reductions from energy saving projects and forest carbon sink projects from within the city of Beijing are also allowed.

PRICE MANAGEMENT PROVISIONS The Beijing Development and Reform Commission (DRC) can auction extra allowances if the weighted average price exceeds CNY 150 (EUR 20.30) for ten consecutive days, and buy back allowances from the market if the price is below CNY 20 (EUR 2.70).

COMPLIANCE

MRV REPORTING FREQUENCY: Annual reporting of CO_2 emissions. **VERIFICATION:** Third-party verification is required. **FRAMEWORK:** The Beijing DRC has released guidelines for monitoring and reporting for the following seven sectors: heat production and supply, thermal power generation, cement, petrochemicals, transport, other industrial enterprises, and the service sector. **OTHER:** In addition to the ETS participants, all legal entities with energy consumption of more than 2,000 tons of standard coal equivalent have to report their emissions. Verification is not required.

ENFORCEMENT Penalties for failing to submit emissions or verification reports on time can result in fines up to CNY 50,000 (EUR 7,343). Furthermore, companies failing to surrender enough allowances to match their emissions are fined three to five times the average market price over the past six months for each missing allowance.

OTHER INFORMATION

INSTITUTIONS INVOLVED Beijing DRC (Competent authority); China Beijing Environment Exchange (Trading platform)

Chongqing (Pilot) Emissions Trading Scheme

in force

EMISSIONS COVERAGE ($MtCO_2e$, 2016)	LIABLE ENTITIES
100.4	230

GAS COVERAGE	ALLOCATION	OFFSETS & CREDITS
SEVERAL GASES	FREE ALLOCATION	DOMESTIC

Chongqing was the last of the original Chinese pilots to start its pilot ETS on 19 June 2014. The system covers enterprises from seven sectors: power, electrolytic aluminum, ferroalloys, calcium carbide, cement, caustic soda, and iron and steel. The 230 enterprises covered by the system account for around 40% of the city's total emissions.

BACKGROUND INFORMATION

OVERALL GHG EMISSIONS (EXCL. LULUCF) 250 $MtCO_2e$ (2014)

GHG REDUCTION TARGETS BY 2020 (13th Five Year Plan): 19.5% reduction in carbon intensity compared to 2015 levels.

ETS SIZE

CAP 100.4 (2016)

EMISSIONS COVERAGE

COVERED	NOT COVERED
40%	60%

GHG COVERED CO_2, CH_4, N_2O, HFCs, PFCs, SF_6

SECTORS & THRESHOLDS Power, electrolytic aluminum, ferroalloys, calcium carbide, cement, caustic soda, and iron and steel.

INCLUSION THRESHOLD: 20,000t CO_2e/year.

POINT OF REGULATION Mixed: Both direct emissions from the power sector and indirect emissions from electricity (and heat) consumption are included in the scheme. Electricity prices are regulated in China, and therefore a scheme based on direct emissions alone would not induce a pass-through of carbon costs via the electricity price, and would not incentivize demand-side management of electricity. The system therefore covers emissions from the power sector upstream and other sectors downstream.

NUMBER OF LIABLE ENTITIES 230 (2015)

PHASES AND ALLOCATION

TRADING PERIODS Four years (2013–2016)*

ALLOCATION Free allocation through grandfathering based on historic emissions (highest number in period 2008–2012). If the sum of allocation for all enterprises exceeds the cap, a reduction factor is applied. Ex-post adjustments based on production data are also possible.

COMPLIANCE PERIOD Due to the late start of the Chongqing pilot, compliance for 2013 and 2014 were combined in one phase. A one year compliance period is in place since 2015 (20 June).

FLEXIBILITY

BANKING AND BORROWING Banking is allowed during the pilot phase. Borrowing is not allowed.

OFFSETS AND CREDITS QUANTITATIVE LIMIT: Domestic project-based carbon offset credits—China Certified Emission Reductions (CCERs)—are allowed with a maximum amount of 8% of the compliance obligation. **QUALITATIVE LIMIT:** Reductions have to be achieved after 2010 with the exception of carbon sink projects. Credits from hydro projects are not allowed.

PRICE MANAGEMENT PROVISIONS In case of market fluctuations, the Chongqing Carbon Emissions Exchange can take price stabilization measures. Compliance entities must not sell more than 50% of their free allocation.

COMPLIANCE

MRV REPORTING FREQUENCY: Annual reporting of GHG emissions.

VERIFICATION: Third-party verification is required. **FRAMEWORK:** The Chongqing Development and Reform Commission (DRC) released a guiding document for monitoring and reporting that includes methods for different emissions sources: combustion, industrial processes and electricity consumption.

ENFORCEMENT According to the 'Interim Administrative Measures for the Chongqing ETS' published in May 2014, there are no financial penalties for non-compliance. The punishments may include media reporting and public exposure of the non-compliance; disqualification from the energy saving and climate subsidies and associated awards for three years; and a record entered on the State Owned Enterprise (SOE) performance assessment system.

OTHER INFORMATION

INSTITUTIONS INVOLVED Chongqing DRC (Competent authority); Chongqing Carbon Emissions Trading Center (Trading platform)

* Initially, the seven Chinese pilot ETS were scheduled to end after three compliance years and be replaced by the national ETS in 2016. However, as the national ETS will start in the second half of 2017, the pilots will continue operating until then and probably also beyond.

Fujian (Pilot) Emissions Trading Scheme

in force

EMISSIONS COVERAGE ($MtCO_2e$, 2016)	LIABLE ENTITIES
200 $MtCO_2e$ (unofficial estimation)	277

GAS COVERAGE	ALLOCATION	OFFSETS & CREDITS
CO_2 ONLY	AUCTIONING & FREE ALLOCATION	DOMESTIC

On 30 September 2016, the Fujian Province government released the Interim Measures for the Management of Emissions Trading in Fujian Province and the Implementation Plan of Emissions Trading Market in Fujian Province, to introduce a one-year pilot ETS. The aim is to allow local firms to gain some experience before they are brought into the national Cap-and-Trade program in the second half of next year. This makes Fujian the eighth carbon market pilot in China besides the seven existing regional pilots already operating since 2013. The mandate for the pilot ETS came from the National Ecological Civilization Pilot Area (Fujian) Implementation Plan endorsed by the State Council on 22 August. Given the prominence of the forestry sector in Fujian, its ETS pilot has a special focus on carbon sinks.

At the beginning of December 2016, further regulatory rules and guidelines were released regarding GHG emissions reporting, carbon offset projects, market stability management, administration of the third-party verifiers and allowance allocation. This was followed by the first auction for vintage 2016 allowances on 15 December 2016 with a volume of 50,000 allowances.

In addition, the Haixia Equity Exchange in Fujian was approved in July 2016 by the National Development and Reform Commission to be one of the nine dedicated trading platforms for trading China's domestic project-based carbon offset credits.

BACKGROUND INFORMATION

GHG REDUCTION TARGETS BY 2020 (13th Five Year Plan): 19.5% reduction in carbon intensity compared to 2015 levels.

ETS SIZE

CAP Around 200 $MtCO_2e$ (unofficial estimation). Because allocation is based on actual production data, the 2016 cap will be determined after the verification in April 2017.

EMISSIONS COVERAGE More than 60% (unofficial estimate)

GHG COVERED CO_2

SECTORS & THRESHOLDS Electricity, petrochemical, chemical, building materials, iron and steel, nonferrous metals, paper, aviation, and ceramics. **INCLUSION THRESHOLDS:** Energy consumption of 10,000 tons of coal equivalent (tce)/year for any year between 2013–2015.

POINT OF REGULATION Mixed: Both direct emissions from the power sector and indirect emissions from electricity (and heat) consumption are included in the scheme. Electricity prices are regulated in China, and therefore a scheme based on direct emissions alone would not induce a pass-through of carbon costs via the electricity price, and would not incentivize demand-side management of electricity. The system therefore covers emissions from the power sector upstream and other sectors downstream.

NUMBER OF LIABLE ENTITIES 277 (2016)

PHASES AND ALLOCATION

TRADING PERIODS One year (2016) before the national carbon market is launched in 2017. The pilot may expend its coverage to smaller emitters who would continue trading in and beyond 2017.*

ALLOCATION Mainly free allocation on annual basis, with a view to introducing auctioning over time as appropriate. 10% of the total cap will be reserved for capacity extension and market intervention (when necessary). Free allowances to be allocated to new entrants.

In order to increase market liquidity and facilitate carbon price discovery among market participants, on December 15, 2016, Fujian DRC organized the first auction. 50,000 allowances from the government reserve were auctioned.

COMPLIANCE PERIOD One year (30 June)

FLEXIBILITY

BANKING AND BORROWING Banking is allowed during the pilot phase. Borrowing is not allowed.

OFFSETS AND CREDITS **QUANTITATIVE LIMIT:** Domestic project-based carbon offset credits—China Certified Emission Reduction (CCER) and Fujian Forestry Certified Emission Reduction (FFCER)—are allowed. The use of CCER credits is limited to 5% of the annual compliance obligation and to increase to 10% for companies that use FFCER credits. **QUALITATIVE LIMIT:** Eligible offsets will be restricted to those generated in Fujian province, from CO_2 or CH_4 projects. Hydro power related credits are not eligible. FFCERs projects need to start implementation after 16 February 2005 and the project developers need to have independent legal personality.

* Similar to the other seven Chinese pilots, the Fujian pilot will operate until the start of the national ETS in the second half of 2017 and probably also beyond. The pilot may then extend its coverage to smaller emitters, who will not be covered under the national scheme.

PRICE MANAGEMENT PROVISIONS According to the (trial) Implementation Rules of Emissions Trading Market Management in Fujian Province, in case of market fluctuations (i.e., if the cumulative increase or decrease of allowance prices for ten consecutive trading days reach a certain percentage), severe imbalances between supply and demand, or liquidity issues, the Fujian Economic and Information Center under the guidance of the Fujian Development and Reform Commission (DRC)—in consultation with an advisory committee—can buy or sell allowances in order to stabilize the market. More specifically, when the price is too high, the Center may sell allowances from government reserves via auction through Haixia Equity Exchange; and when the price is too low, the Center may buy allowances back using special funds from the government.

COMPLIANCE

MRV REPORTING FREQUENCY: Annual reporting of CO_2 emissions before the end of February and submission of the end of April. **VERIFICATION:** Third-party verification is required. **FRAMEWORK:** The Fujian DRC and Fujian Statistical Bureau have jointly released a guiding document on monitoring and reporting that includes a monitoring plan template, using national measuring and reporting guidelines. In addition, the Fujian DRC and Fujian Quality and Technical Supervision Bureau also jointly released a measure for the administration of third-party verifiers, which specifies criteria for the verifiers and their staff.

ENFORCEMENT Penalties for failing to submit an emissions or verification report on time, providing fake information, or disturbing the verification process range from CNY 10,000 to CNY 30,000 (EUR 1,347 to EUR 4,042). Companies failing to surrender enough allowances to match their emissions are fined one to three times the average market price of the past 12 months, with the maximum limit of CNY 30,000 (EUR 4,042). Twice the amount of the missing allowances can be withdrawn from the account of the company or deducted from next year's allocation. Penalties for the misconduct of trading entities and their staff, such as not publishing relevant trading info or leaking commercial secrets, could range from CNY 10,000 to CNY 30,000 (EUR 1,347 to EUR 4,042).

OTHER INFORMATION

INSTITUTIONS INVOLVED Fujian DRC (Competent authority, hosting the Provincial ETS Coordination Group Office); Fujian Provincial Forestry Department (FFCER projects management); Fujian Haixia Equity Exchange (Trading platform); Fujian Economic and Information Center (Registry, market management, MRV administration)

Guangdong (Pilot) Emissions Trading Scheme

in force

EMISSIONS COVERAGE ($MtCO_2e$, 2016)	LIABLE ENTITIES
422 (excl. white cement)	280

GAS COVERAGE	ALLOCATION	OFFSETS & CREDITS
CO_2 ONLY	AUCTIONING & FREE ALLOCATION	DOMESTIC

On 19 December 2013, Guangdong was the fourth Chinese region, after Shenzhen, Shanghai and Beijing, to start its pilot ETS.

Guangdong is the largest of the Chinese ETS pilots. Covered sectors account for more than half of the province's emissions. The third compliance period was completed on 20 June 2016 (with 100% compliance rate) for 2015 vintage.

In 2016, Guangdong expanded its scope for the first time since implementation. As well as introducing three new sectors (aviation, paper and white cement), allocation methods were also further adjusted.

Guangdong ETS has one of the most active markets among the Chinese pilots. Guangdong and Shenzhen are the only two markets open to foreign investors. In November 2016, Guangdong further increased the maximum position of institutional and individual investors from 3 to 8 million allowances. Guangdong also allows unincorporated organizations such as funds and trusts to trade in its carbon market.

BACKGROUND INFORMATION

OVERALL GHG EMISSIONS (EXCL. LULUCF) 610.5 $MtCO_2e$ (2012)

GHG REDUCTION TARGETS BY 2020 (13th Five Year Plan): 20.5% reduction in carbon intensity compared to 2015 levels.

ETS SIZE

CAP TOTAL (2016): 422 $MtCO_2e$ (excl. white cement) **EXISTING SECTORS:** 386 $MtCO_2e$ (2016), of which 365 $MtCO_2e$ is allocated to compliance entities and the remaining 21 $MtCO_2e$ is reserved (for new entrants and market stability). Compared to 2015, the cap was reduced by 22 $MtCO_2e$ in 2016 (with a 5 $MtCO_2e$ reduction for compliance entities). **NEW SECTORS:** 12 $MtCO_2e$ (2016) for aviation, of which 11.45 $MtCO_2e$ is for compliance entities; 24 $MtCO_2e$ (2016) for paper, of which 22.7 $MtCO_2e$ is for compliance entities; unknown for the white cement sector.

EMISSIONS COVERAGE

GHG COVERED CO_2

SECTORS & THRESHOLDS Four existing compliance sectors: power, iron and steel, cement, and petrochemicals. Three new compliance sectors added in 2016: aviation, paper and white cement. Reporting sectors: ceramics, textiles, non-ferrous metals, and chemicals. **INCLUSION THRESHOLDS:** 20,000 tCO_2/year or energy consumption 10,000 tons coal equivalent (tce)/year

POINT OF REGULATION Mixed: Both direct emissions from the power sector and indirect emissions from electricity (and heat) consumption are included in the scheme. Electricity prices are regulated in China, and therefore a scheme based on direct emissions alone would not induce a pass-through of carbon costs via the electricity price, and would not incentivize demand-side management of electricity. The system therefore covers emissions from the power sector upstream and other sectors downstream.

NUMBER OF LIABLE ENTITIES TOTAL (2016): 280 (excl. white cement) **EXISTING SECTORS (2016):** 218; 189 compliance entities and 29 new entrants **NEW SECTORS (2016):** 62; Aviation 4; Paper 58; White cement unknown.

PHASES AND ALLOCATION

TRADING PERIODS Four years (2013–2016)*

ALLOCATION Mainly free allocation through grandfathering based on 2013–2015 emissions for 2016 vintage allocation. Annual emissions reduction factor of 0.99 is applied to sectors using grandfathering. Benchmarking is applied for coal or gas fired electricity generators (including heating, combined heat and power), aviation, certain cement, white cement, paper and iron and steel industrial processes and relevant new entrants. For those using benchmarking, pre-issuance of allowance is based on 2015 production, and the final number will be updated based on 2016 production.

New entrants need to first buy enough allowances on the market and formally transfer into compliance entities; afterwards they receive new allowances.

In 2016, the proportion of free allocation (95% for the power sector and 97% for remaining sectors) remained the same as in 2015. The allowance auction plan was also the same as for the 2015 compliance year. A total of 2 million allowances were auctioned in four quarters, i.e. September, December, March and June. During the first compliance year participation in auctions was mandatory for entities to be eligible to receive or trade their freely allocated allowances.

COMPLIANCE PERIOD One year (20 June)

FLEXIBILITY

BANKING AND BORROWING Banking is allowed during the pilot phase. Borrowing is not allowed.

OFFSETS AND CREDITS QUALITATIVE LIMITS: Domestic project-based carbon offset credits—China Certified Emission Reduction (CCER)—are allowed. The

* Initially, the seven Chinese pilot ETS were scheduled to end after three compliance years andbe replaced by the national ETS in 2016. However, as the national ETS will start in the second half of 2017, the pilots will continue operating until then and probably also beyond.

use of CCER credits is limited to 10% of the actual emissions of the compliance entities. **QUANTITATIVE LIMITS:** Of the annual compliance obligation met by offsets, at least half must be from CO_2 or CH_4 reduction projects. At least 70% of CCERs have to come from within Guangdong. Pre-CDM credits are not eligible, as are credits from hydropower or most fossil fuel projects. CCERs from the other pilot markets or regions that already have launched carbon markets are not allowed.

PRICE MANAGEMENT PROVISIONS Guangdong has an auction floor price. Initially in 2013, it was set at CNY 60 (EUR 8.81), and then lowered to CNY 25 (EUR 3.67) and increased in steps of CNY 5 (EUR 0.73) with each quarterly auction, up to CNY 40 (EUR 5.87) at the end of the second compliance period. In the third compliance period, the floor price was set at 80% of the weighted average price for allowances over the previous three months.

Since 2016, a so-called policy reserve price effectively served as a price floor. During the first auction for vintage 2016 allowances, half a million allowances were on offer and cleared above the policy reserve price of 9.37 CNY/ton (EUR 1.35) with a settlement price of 9.88 CNY/ton (EUR 1.42).

COMPLIANCE

MRV REPORTING FREQUENCY: Annual reporting of CO_2 emissions. **VERIFICATION:** Third-party verification is required. **FRAMEWORK:** The Guangdong Development and Reform Commission (DRC) has released guidelines for monitoring and reporting for the compliance and reporting sectors.

ENFORCEMENT Penalties for failing to submit emissions or verification reports on time range from CNY 10,000 (EUR 1,347) to CNY 50,000 (EUR 6,544). Furthermore, companies failing to surrender enough allowances to match their emissions will have twice the amount of allowances deducted from their allocation for the following year and be fined CNY 50,000 (EUR 6,544).

OTHER INFORMATION

INSTITUTIONS INVOLVED Guangdong DRC (Competent authority); China Emissions Exchange Guangzhou (Trading platform)

Hubei (Pilot) Emissions Trading System

in force

EMISSIONS COVERAGE ($MtCO_2e$, 2016)	LIABLE ENTITIES
253	236

GAS COVERAGE	ALLOCATION	OFFSETS & CREDITS
CO_2 ONLY	FREE ALLOCATION	DOMESTIC OFFSETS

On 2 April 2014, Hubei was the sixth pilot ETS in China to start trading. The system initially covered 138 of the most carbon-intensive companies in the province, accounting for approximately 35% of the province's total carbon emissions. Until now, Hubei has been the most active market among the pilot ETSs in terms of trading.

On 3 January 2017, the Hubei Development and Reform Commission (Hubei DRC) issued its allowance allocation plan for 2016 vintage compliance. The inclusion threshold has been lowered for some sectors and allocation methods have been adjusted using historical carbon intensity rather than grandfathering and stricter benchmarks for several sectors.

In addition, companies covered by both the Hubei ETS and the upcoming national ETS will be pre-allocated with a certain amount (equivalent to 10% of their 2016 initial allocation) of National Emissions Allowances, which can only be used for forwards trading rather than 2016 compliance.

BACKGROUND INFORMATION

OVERALL GHG EMISSIONS (EXCL. LULUCF) 463.1 $MtCO_2e$ (2012)

OVERALL GHG EMISSIONS BY SECTOR $MtCO_2e$

GHG REDUCTION TARGETS BY 2020 (13th Five Year Plan): 19.5% reduction in carbon intensity compared to 2015 levels.

ETS SIZE

CAP 253 $MtCO_2e$ (2016)

EMISSIONS COVERAGE

COVERED	NOT COVERED
35%	65%

HUBEI (PILOT) EMISSIONS TRADING SYSTEM

GHG COVERED CO_2

SECTORS & THRESHOLDS Power and heat supply, iron and steel, non-ferrous metals, petrochemicals, chemicals, chemical fiber, cement, glass and other building materials, pulp and paper, ceramics, automobile and general equipment manufacturing, food, beverage and medicine producers.

INCLUSION THRESHOLD: Annual energy consumption more than 10,000 tons coal equivalent (tce) in any year between 2013 and 2015 for the power, steel, non-ferrous, chemicals, petrochemicals, building materials and pulp and paper sectors and 60,000 tce for the rest of the sectors.

POINT OF REGULATION Mixed: Both direct emissions from the power sector and indirect emissions from electricity (and heat) consumption are included in the scheme. Electricity prices are regulated in China, and therefore a scheme based on direct emissions alone would not induce a pass-through of carbon costs via the electricity price, and would not incentivize demand-side management of electricity. The system therefore covers emissions from the power sector upstream and other sectors downstream.

NUMBER OF LIABLE ENTITIES 236 (2016)

PHASES AND ALLOCATION

TRADING PERIODS Four years (2013–2016)*

ALLOCATION Free allocation of 2016 vintage allowances through benchmarks for power, heat, co-generation and cement (except the entities using outsourced clinker); historical carbon intensity method for glass and other building material, and ceramics sectors; grandfathering based on 2013–2015 historic emissions for all other sectors. Ex-post allocation adjustments are possible, especially for those sectors that use benchmarks and historical intensity (first receive half of the total allowance based on 2015 production data and then using 2016 actual production data to update allocation). The total cap also includes a reserve for new entrants.

COMPLIANCE PERIOD Due to the late start, compliance for 2013 and 2014 were combined in one phase. A one-year compliance period is in place since 2015 (30 May).

FLEXIBILITY

BANKING AND BORROWING Banking is allowed during the pilot phase, but only for allowances that were traded at least once. Borrowing is not allowed.

OFFSETS AND CREDITS **QUANTITATIVE LIMIT:** Domestic project-based carbon offset credits—China Certified Emission Reduction (CCER)—is limited to 10% of the annual allocation. **QUALITATIVE LIMIT:** CCERs must come from rural biogas or forestry projects in the province of Hubei or from provinces and regions that have signed agreements with Hubei and that were generated after 1 January 2015.

PRICE MANAGEMENT PROVISIONS 8% of the total cap is kept as government reserve for price management. In case of market fluctuations, severe imbalances between supply and demand or liquidity issues, the Hubei Development and Reform Commission (DRC)—in consultation with an advisory committee consisting of government institutions and other stakeholders—can buy or sell allowances in order to stabilize the market.

Specifically, if the allowance price reaches a low or high point six times during a 20-day time span, the Hubei DRC shall take action.

Furthermore, the exchange limits day-to-day price fluctuations to –1% and +10% respectively.

COMPLIANCE

MRV **REPORTING FREQUENCY:** Annual reporting of CO_2 emissions. **VERIFICATION:** Third-party verification is required. **FRAMEWORK:** The Hubei DRC has released a guiding document on monitoring and reporting that includes sector-specific guidance for the following sectors: power, glass, aluminum, calcium carbide, pulp and paper, automobile manufacturing, iron and steel, ferroalloys, ammonia, cement, and petroleum processing.

ENFORCEMENT Penalties for failing to submit an emissions or verification report on time range from CNY 10,000 (EUR 1,347) to CNY 30,000 (EUR 4,040). Trade participants that manipulate the market face up to CNY 150,000 (EUR 20,306) in fines. Furthermore, companies that fail to surrender enough allowances to match their emissions will be deducted twice the amount of allowances from next year's allocation and are fined one to three times the average market price for every allowance, with a maximum limit of CNY 150,000 (EUR 20,306).

OTHER INFORMATION

INSTITUTIONS INVOLVED Hubei DRC (Competent authority); China Hubei Emission Exchange (Trading platform)

* Initially, the seven Chinese pilot ETS were scheduled to end after three compliance years and be replaced by the national ETS in 2016. However, as the national ETS will start in the second half of 2017, the pilots will continue operating until then and probably also beyond.

Shanghai (Pilot) Emissions Trading System

in force

EMISSIONS COVERAGE ($MtCO_2e$, 2016)	LIABLE ENTITIES
155	368

GAS COVERAGE	ALLOCATION	OFFSETS & CREDITS
CO_2 ONLY	AUCTIONING & FREE ALLOCATION	DOMESTIC

Shanghai was the second Chinese region, after Shenzhen, to start its pilot ETS on 26 November 2013. The pilot covers more than half of the city's emissions, including power, industrial and non-industrial sectors like building, aviation and shipping. Shanghai completed its third compliance period in June 2016 for the 2015 vintage, achieving full compliance for three years in a row. In 2016 Shanghai further expanded its ETS coverage.

Shanghai is one of the most active markets among the pilots, with regards to the cumulative trade volume and transaction amount.

On 12 January 2017, Shanghai Environmental and Energy Exchange and Shanghai Clearing House (SHCH) jointly launched Over-the-Counter Shanghai Emission Allowance Forward (SHEAF) with Central Counterparty (CCP) clearing, as an innovative financial product that serves a similar purpose to carbon financial derivatives.

BACKGROUND INFORMATION

OVERALL GHG EMISSIONS (EXCL. LULUCF) 297.7 $MtCO_2e$ (2012)

GHG REDUCTION TARGETS BY 2020 (13th Five Year Plan): 20.5% reduction in carbon intensity compared to 2015.

ETS SIZE

CAP 155 $MtCO_2e$ (2016)

EMISSIONS COVERAGE

COVERED	NOT COVERED
57%	43%

GHG COVERED CO_2

SECTORS & THRESHOLDS The following sectors are covered: airports, aviation, chemical fiber, chemicals, commercial, power and heat, water suppliers, commercial, hotels, financial, iron and steel, petrochemicals, ports, shipping, non-ferrous metals, building materials, paper, railways, rubber, and textiles. **INCLUSION THRESHOLDS:** For power and industry: 20,000t CO_2/year or 10,000 tons coal equivalent (tce)/year; and those already participated in 2013–2015 phase with 10,000 CO_2/year or 5,000 tce/year. For transport: 10,000t CO_2/year or 5,000 tce/year (aviation and ports), 100,000t CO_2/year or 50,000 tce/year (shipping), considering both direct and indirect emissions. For buildings: 10,000 CO_2/year or 5,000 tce/year.

POINT OF REGULATION Mixed: Both direct emissions from the power sector and indirect emissions from electricity (and heat) consumption are included in the scheme. Electricity prices are regulated in China, and therefore a scheme based on direct emissions alone would not induce a pass-through of carbon costs via the electricity price, and would not incentivize demand-side management of electricity. The system therefore covers emissions from the power sector upstream and other sectors downstream.

NUMBER OF LIABLE ENTITIES 368 (2016)

PHASES AND ALLOCATION

TRADING PERIODS Three years (2013–2015 formal, 2016–2018 indicative)*

ALLOCATION Free allocation based on sector-specific benchmarks (power, heat, car glass manufacturers), historic emissions intensity (industry, aviation, ports, shipping, and water suppliers, generally based on 2013–2015 data) or historic emissions (buildings and commercial sector, generally based on 2013–2015 data). Ex-post allocation adjustments, e.g., on the basis of production data, are possible. A smaller share of the annual cap will be auctioned.

COMPLIANCE PERIOD One year (30 June)

FLEXIBILITY

BANKING AND BORROWING Within the pilot phase, banking is allowed across compliance periods. For banked allowances from the first trading period (2013–2015), only one third can be used per year between 2016 and 2018 for compliance entities; fully bankable for institutional investors without limit (except for OTC deals after 9 May 2016 with one third of the SHEA to be exchanged per year between 2016 and 2018). Borrowing is not allowed.

OFFSETS AND CREDITS QUANTITATIVE LIMIT: Domestic project-based carbon offset credits—China Certified Emission Reduction (CCER)—are allowed. The use of CCER credits is limited to 1% of the annual allocation. **QUALITATIVE LIMIT:** Credits for reductions that were realized before January 2013 cannot be used for compliance. Credits from hydro projects are not allowed.

PRICE MANAGEMENT PROVISIONS If prices vary more than 10% in one day, the Shanghai Environment and Energy Exchange can take price stabilization measures, temporarily suspend trading or impose holding limits.

* Initially, the seven Chinese pilot ETS were scheduled to end after three compliance years and be replaced by the national ETS in 2016. However, as the national ETS will start in the second half of 2017, the pilots will continue operating until then and probably also beyond. Shanghai has indicated a second 3-year phase to run until 2018 with the announcement of the transition plan for the Shanghai Emissions Allowances (2013–2015) to be banked to Phase II 2016–2018.

COMPLIANCE

MRV REPORTING FREQUENCY: Annual reporting of CO_2 emissions. **VERIFICATION:** Third-party verification is required. Framework: The Shanghai Development and Reform Commission (DRC) has released guidelines for monitoring and reporting for the following ten sectors: Iron and steel, electricity and heat, chemicals, non-ferrous metals, non-metallic mineral products, textiles and paper, aviation, shipping, large buildings (hotels, commercial and financial) and transport stations.

ENFORCEMENT Penalties for failing to submit emission report or verification report on time or providing fraudulent information range from CNY 10,000 (EUR 1,309) to CNY 50,000 (EUR 6,544).

Between CNY 50,000 (EUR 6,544)—CNY 100,000 (EUR 13,088) can be imposed for non-compliance, besides surrendering the adequate amount of allowances. On top of the financial sanctions, further sanctions may be imposed, e.g., entry into the credit record of the company, publication on the internet, cancelation of ability to access special funds for energy conservation and emissions reduction measures.

OTHER INFORMATION

INSTITUTIONS INVOLVED Shanghai DRC (Competent authority); Shanghai Environment and Energy Exchange (Trading platform)

Shenzhen (Pilot) Emissions Trading Scheme

in force

EMISSIONS COVERAGE ($MtCO_2e$, 2015)	LIABLE ENTITIES
31.45 (excl. buildings)	824

GAS COVERAGE	ALLOCATION	OFFSETS & CREDITS
CO_2 ONLY	AUCTIONING & FREE ALLOCATION	DOMESTIC

Shenzhen was the first of the Chinese pilot ETSs to start operation on 18 June 2013. In June 2016, Shenzhen finished its third compliance period (with a 99.8% compliance rate). On 18 September 2016, the Shenzhen Development and Reform Commission (DRC) released its working plan for the 2016 vintage compliance year, including a list of new companies and the 2016 vintage allocation plan. The Shenzhen ETS covers a total of 824 entities, including 246 new entrants. These new entrants come from industry sectors, as well as the public transport and port sectors.

BACKGROUND INFORMATION

OVERALL GHG EMISSIONS (EXCL. LULUCF) 83.45 $MtCO_2e$ (2010)

GHG REDUCTION TARGETS BY 2020 (13th Five Year Plan): 45% reduction in carbon intensity compared to 2005, to reach 0.81 tCO_2/CNY 10,000. Shenzhen has also pledged to peak its GHG emissions by 2022, as one of the first group of cities in China to endorse such peak year target.

ETS SIZE

CAP 31.45 $MtCO_2e$ (excluding buildings, 2015)

EMISSIONS COVERAGE

GHG COVERED CO_2

SECTORS & THRESHOLDS Power, water, gas, manufacturing sectors, buildings, port and subway sectors, public buses and other non-transport sectors.

INCLUSION THRESHOLDS: 3,000t CO_2e/year for enterprises; 20,000m^2 for public buildings and 10,000m^2 for government buildings.

POINT OF REGULATION Mixed: Both direct emissions from the power sector and indirect emissions from electricity (and heat) consumption are included in the scheme. Electricity prices are regulated in China, and therefore a scheme based on direct emissions alone would not induce a pass-through of carbon costs via the electricity price, and would not incentivize demand-side management of electricity. The system therefore covers emissions from the power sector upstream and other sectors downstream.

NUMBER OF LIABLE ENTITIES 824

PHASES AND ALLOCATION

TRADING PERIODS Four years (2013–2016)*

ALLOCATION Allowances are largely distributed for free. Benchmarking is applied to the water, power and gas sectors based on sectoral historical carbon intensity; while grandfathering based on the entity's historical carbon intensity is applied to port and subway sectors, public buses and other non-transport sectors. For those using benchmarking and historical carbon intensity, the final number of allowances will be updated based on 2016 output.

The Interim Measure for the Administration of Carbon Emission Trading of Shenzhen indicated that at least 3% of allowances are ought to be auctioned. As of November 2016, only one auction has taken place (June 2014).

COMPLIANCE PERIOD One year (June 30)

FLEXIBILITY

BANKING AND BORROWING Banking is allowed during the pilot phase. Borrowing is not allowed. Different from other pilots, Shenzhen releases its annual allowances before the compliance date of the previous vintage year, but does not allow them to be used for previous vintage compliance.

OFFSETS AND CREDITS QUANTITATIVE LIMIT: Domestic project-based carbon offset credits—China Certified Emission Reduction (CCER)—allowed. The use of CCER credits is limited to 10% of the annual compliance obligation.

QUALITATIVE LIMIT: Credits from hydro projects are not eligible and there are further geographic restrictions for the use of certain CCERs.

PRICE MANAGEMENT PROVISIONS In case of market fluctuations, the Shenzhen Development and Reform Commission (DRC) can sell extra allowances from a reserve at a fixed price. Such allowances can only be used for compliance and cannot be traded. The DRC can also buy back up to 10% of the total allocation

.

COMPLIANCE

MRV REPORTING FREQUENCY: Annual reporting of CO_2 emissions with a tier approach taking into account the size of the company. **VERIFICATION:** Third-party verification is required.

ENFORCEMENT Institutes providing fake information can be fined for the difference between reported and actual emissions at the price three times of the average of the past six months. Penalties for disturbing the market order can cost up to CNY 100,000 (EUR 13,088). Companies failing to surrender enough allowances to match their emissions are fined three times the average market price of the past six months. The missing allowances can be withdrawn from the account of the company or deducted from next year's allocation.

OTHER INFORMATION

INSTITUTIONS INVOLVED Shenzhen DRC (Competent authority); China Emissions Exchange Shenzhen (Trading platform)

* Initially, the seven Chinese pilot ETS were scheduled to end after three compliance years and be replaced by the national ETS in 2016. However, as the national ETS will start in the second half of 2017, the pilots will continue operating until then and probably also beyond.

Tianjin (Pilot) Emissions Trading System

in force

EMISSIONS COVERAGE ($MtCO_2e$, 2015)	LIABLE ENTITIES
160–170	109

GAS COVERAGE	ALLOCATION	OFFSETS & CREDITS
CO_2 ONLY	FREE ALLOCATION	DOMESTIC

The Tianjin pilot ETS started operation on 26 December 2013 and has finished three compliance years thus far. The system covers enterprises from five sectors: heat and electricity production, iron and steel, petrochemicals, chemicals, as well as oil and gas exploration. These industries account for 50–60% of the city's total emissions.

BACKGROUND INFORMATION

OVERALL GHG EMISSIONS (EXCL. LULUCF) 215 $MtCO_2e$ (2012)

GHG REDUCTION TARGETS BY 2020 (13th Five Year Plan): 20.5% reduction in carbon intensity compared to 2015 levels.

ETS SIZE

CAP 160–170 $MtCO_2$

EMISSIONS COVERAGE

GHG COVERED CO_2

SECTORS & THRESHOLDS Heat and electricity production, iron and steel, petrochemicals, chemicals, exploration of oil and gas. **INCLUSION THRESHOLD:** 20,000t CO_2/year considering both direct and indirect emissions.

POINT OF REGULATION Mixed: Both direct emissions from the power sector and indirect emissions from electricity (and heat) consumption are included in the scheme. Electricity prices are regulated in China, and therefore a scheme based on direct emissions alone would not induce a pass-through of carbon costs via the electricity price, and would not incentivize demand-side management of electricity. The system therefore covers emissions from the power sector upstream and other sectors downstream.

NUMBER OF LIABLE ENTITIES 109 (2015)

PHASES AND ALLOCATION

TRADING PERIODS Four years (2013–2016)*

ALLOCATION Mainly free allocation through grandfathering based on 2009–2012 emissions or emissions intensity. Benchmarking for new entrants and expanded capacity.

COMPLIANCE PERIOD One year (31 May) according to the Interim Measure for the Administration of Carbon Emission Trading of Tianjin; in practice 30 June 2016 for 2015 vintage, 10 July 2015 for 2014 vintage, and 25 July 2014 for 2013 vintage.

FLEXIBILITY

BANKING AND BORROWING Banking is allowed during the pilot phase. Borrowing is not allowed.

OFFSETS AND CREDITS QUANTITATIVE LIMIT: Domestic project-based carbon offset credits—China Certified Emission Reduction (CCER)—are allowed. The use of CCER credits is limited to 10% of the annual compliance obligation. **QUALITATIVE LIMIT:** Credits have to stem from CO_2 reduction projects, excluding hydro and have to be realized after 2013.

PRICE MANAGEMENT PROVISIONS In case of market fluctuations, the Tianjin Development and Reform Commission (DRC) can buy or sell allowances in order to stabilize the market.

COMPLIANCE

MRV REPORTING FREQUENCY: Annual reporting of CO_2 emissions. **VERIFICATION:** Third-party verification is required.

ENFORCEMENT In case of non-compliance, companies are disqualified for preferential financial support and policies for three years. There are no financial penalties for non-compliance.

OTHER INFORMATION

INSTITUTIONS INVOLVED Tianjin DRC (Competent authority); Tianjin Climate Exchange (Trading platform)

* Initially, the seven Chinese pilot ETS were scheduled to end after three compliance years and be replaced by the national ETS in 2016. However, as the national ETS will start in the second half of 2017, the pilots will continue operating until then and probably also beyond.

Taiwan

under consideration

On 1 July 2015, Taiwan enacted the Greenhouse Gas Reduction and Management Act, which sets a 50% emissions reduction target for 2050 compared to 2005 GHG levels. The Act charges the Taiwanese Environmental Protection Administration (TEPA) with the development of appropriate climate change policies to reach this target.

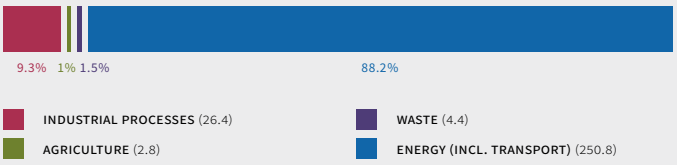
An ETS is mentioned as a key option in the law, although no precise timeline is given for its implementation. The Act also outlines options for ETS design elements including: allocation, provisions for offsets, and the considerations that must be taken into account when setting the cap.

TEPA initiated an inter-ministerial consultation process on Taiwan's climate strategy, including the potential ETS in November 2016. In addition, preparations are focusing on mandatory reporting for entities from certain sectors with annual emissions above 25,000 tCO_2e. Reporting has been ongoing since 2013. Taiwan is also encouraging voluntary emissions reduction efforts.

BACKGROUND INFORMATION

OVERALL GHG EMISSIONS (EXCL. AFOLU) 284.5 $MtCO_2e$ (2013)

OVERALL GHG EMISSIONS BY SECTOR $MtCO_2e$



GHG REDUCTION TARGETS **BY 2030:** 50% below BAU **BY 2050:** 50% below 2005 GHG levels.

COMPLIANCE

MRV **REPORTING FREQUENCY:** Annual reporting of GHGs (CO_2, CH_4, N_2O, SF_6, NF_3, PFCs and HFCs) for entities from certain sectors with annual emissions greater than 25,000 tCO_2e. **VERIFICATION:** Third-party verification is required.
FRAMEWORK: As of 2004, Taiwan introduced voluntary GHG reporting under the Air Pollution Control Act. This became mandatory in 2013 and is continued under the Greenhouse Gas Reduction and Management Act.

OTHER INFORMATION

INSTITUTIONS INVOLVED TEPA

Thailand

under consideration

The 11th National Economic and Development Plan (2012–2016) of Thailand calls for several measures related to the development of a domestic carbon market. The National Climate Change Master Plan (2015–2050) also refers to carbon markets as a potential mechanism to reduce GHG emissions in the private sector. The importance of carbon markets has also been emphasized in Thailand's NDC.

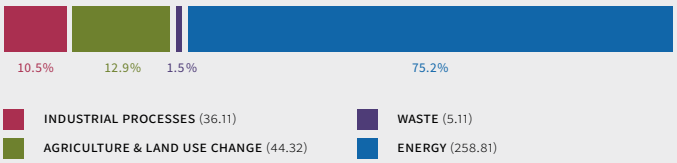
From 2013–2016, the Thailand Greenhouse Gas Management Organization (Public Organization) (TGO) developed an MRV system for the Thailand Voluntary ETS (Thailand V-ETS). In 2013, MRV general guidelines for the Thailand V-ETS were finalized. In October 2014, the Thailand V-ETS started its pilot phase, which will last until September 2017, in order to test the MRV system, develop sector-specific MRV guidelines, as well as to set a cap and allocate allowances for covered factories during the pilot phase.

TGO is also developing a Low Carbon City (LCC) Program as part of the World Bank's PMR to help Thai provinces, cities, and municipalities build a GHG inventory along with an MRV system for city-wide emissions and set reduction targets. The TGO will translate these mitigation actions into emissions reduction certificates ("Certificates") under the Thailand Voluntary Emission Reduction Program.

BACKGROUND INFORMATION

OVERALL GHG EMISSIONS (EXCL. AFOLU) 344.35 $MtCO_2e$ (2013)

OVERALL GHG EMISSIONS BY SECTOR $MtCO_2e$ (2013)



INDUSTRIAL PROCESSES (36.11)
AGRICULTURE & LAND USE CHANGE (44.32)
WASTE (5.11)
ENERGY (258.81)

GHG REDUCTION TARGETS BY 2020: In its Nationally Appropriate Mitigation Action (2014), Thailand committed to a voluntary 7% emissions reduction compared to BAU in the energy and transport sectors. The reduction target can be up to 20% with international support. **BY 2030:** 20% reduction compared to BAU with a 25% reduction contingent on adequate and enhanced access to technology development and transfer, financial resources and capacity building support through a balanced and ambitious global agreement under the UNFCCC (Thailand's NDC).

Vietnam

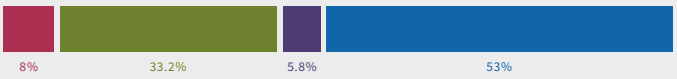
under consideration

Vietnam's Green Growth Strategy (2012) pursues the objective of a low-carbon economy and invokes the introduction of market-based instruments. Several measures lay the groundwork for implementing National Appropriate Mitigation Actions (NAMAs) in the waste, steel, cement, chemical fertilizer, wind power and biogas sectors. As part of its activities under the PMR, Vietnam is focusing on the steel and waste sectors. The planned MRV system and crediting NAMA will provide the experiences for the implementation of a sector-based Cap-and-Trade program in the steel sector, which could start in 2020.

BACKGROUND INFORMATION

OVERALL GHG EMISSIONS (EXCL. LULUCF) 266 $MtCO_2e$ (2010)

OVERALL GHG EMISSIONS BY SECTOR $MtCO_2e$ (2010)



INDUSTRIAL PROCESSES (21.2)
AGRICULTURE (88.3)
WASTE (15.4)
ENERGY (141.1)

GHG REDUCTION TARGETS BY 2030: 8% below BAU and 25% conditional on international support (NDC of Vietnam) including 20% reduction in 2010 GHG (intensity) levels and 30% conditional on international support.

OTHER INFORMATION

INSTITUTIONS INVOLVED Ministry of Natural Resources and Environment of Viet Nam

About ICAP

Introducing the International Carbon Action Partnership

Ten years ago, ICAP was founded as an international government forum to bring together policymakers from all levels of government that have, or are interested in introducing, an emissions trading system (ETS). It provides a unique platform for governments to discuss the latest research and practical experiences with emissions trading. Since its formation, ICAP has established itself as an ETS knowledge hub and its membership has grown to include 31 members and four observers.

Objectives

- Share best practices and learn from each other's experience of ETSs
- Help policymakers recognize ETS design compatibility issues and opportunities for the establishment of an ETS at an early stage
- Facilitate the future linking of trading programs
- Highlight the key role of Cap-and-Trade as an effective climate policy response
- Build and strengthen partnerships amongst governments

ICAP Training Courses at a Glance

16 courses since 2009 on ETS design and implementation
Over 403 participants from 44 countries
214 speakers from 29 countries

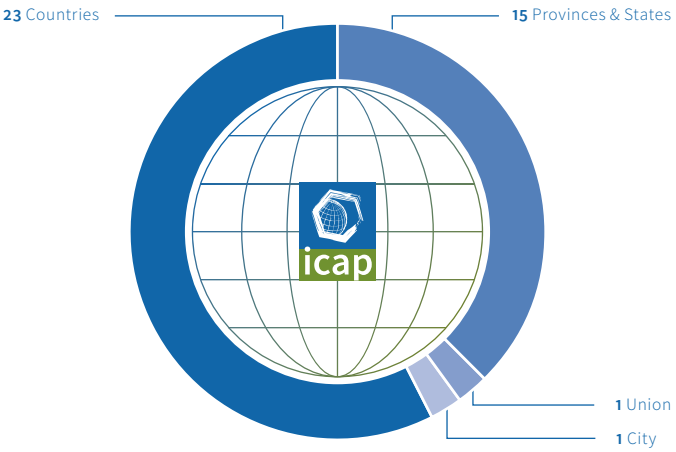
ICAP Knowledge Products

Quarterly newsletter in six languages
The interactive ICAP ETS Map
ICAP/PMR ETS Handbook in six languages
ICAP annual report "Emissions Trading Worldwide: Status Report"
A range of publications on ETS

Members (as of February 2017)
Arizona, Australia, British Columbia, California, Denmark, the European Commission, France, Germany, Greece, Ireland, Italy, Maine, Manitoba, Maryland, Massachusetts, Netherlands, New Jersey, New Mexico, New York, New Zealand, Norway, Ontario, Oregon, Portugal, Québec, Spain, Switzerland, the Tokyo Metropolitan Government, Vermont, the United Kingdom and the state of Washington.

Observers
Japan, Kazakhstan, the Republic of Korea and Ukraine

One of the strengths of ICAP is its broad and diverse membership



www.icapcarbonaction.com

A Decade of ICAP

2007–2017

Since its founding in 2007, ICAP has helped raise awareness on the different roles emissions trading can play in mitigating climate change and transitioning to a new model of sustainable development. It has also played a key role in spreading knowledge and enhancing the capacity of jurisdictions to build a robust ETS. Through the technical dialogue, ICAP continues to facilitate discussion among ETS practitioners on the latest issues in policy design, such as linking and a long-term carbon pricing signal. In 2009, ICAP held the first ETS summer school to offer an introduction to emissions trading for developing and emerging economies. Six years later, the first ETS Masterclass took place in London.

This year marks the fourth edition of the ICAP Status Report, which offers an annual snapshot of the state of emissions trading worldwide. 2017 will also see the release of the ICAP Guide to Linking. This builds on the recently launched ICAP/PMR Emissions Trading Handbook, a ten-step process to guide policymakers on how to design and operate their own ETS. It offers an amalgamation of the latest ETS research and lessons learned from more than a decade of practical experience with emissions trading from different systems around the world. As systems continue to evolve and expand in the future, ICAP remains committed to strengthening and broadening the ETS community.

ICAP Timeline

2007

29 October 2007
Foundation of ICAP

2008

January 2008
First ICAP Meeting

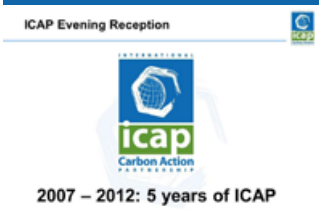
2009

July–August 2009
First ICAP Summer School

December 2012
Interactive ICAP ETS Map

2012

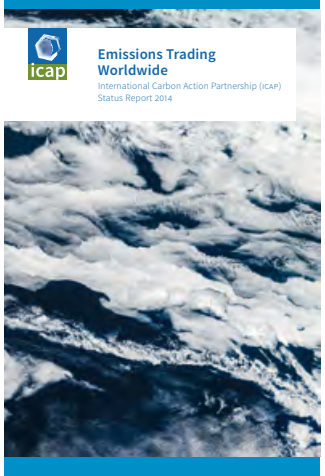
September 2012
ICAP 5 Year Anniversary Evening Reception in New York

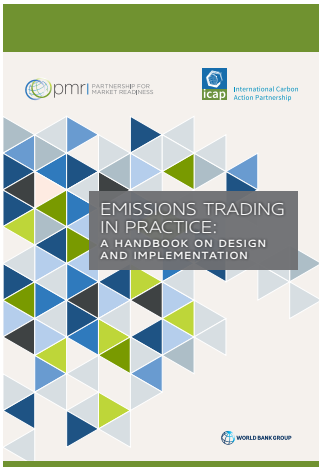


September 2014
ICAP-IETA High-Level Carbon Pricing Dialogue in New York

2014

February 2014
First ICAP Status Report





March 2016
ICAP-PMR ETS Handbook

2016

2017
ICAP Guide on Linking

2017

List of Acronyms

ADEME	The French Environment and Energy Management Agency
AFOLU	Agriculture, Forestry and other Land Use
ASSET	Advanced Technologies Promotion Subsidies Scheme with Emissions Reduction Targets
BAU	Business as Usual
BVRio	Rio de Janeiro Green Stock Exchange
CAAC	Civil Aviation Administration of China
CAD	Canadian Dollar
CARB	California Air Resources Board
CCER	China Certified Emission Reductions
CCP	Central Counterparty
CCR	Cost Containment Reserve
CCS	Carbon Capture and Storage
CDM	Clean Development Mechanism
CER	Certified Emission Reductions
CH4	Methane
CHF	Swiss Franc
CNY	Chinese Yuan Renminbi
CO_2	Carbon Dioxide
CORSIA	Carbon Offsetting and Reduction Scheme
CSRC	China Security Regulatory Commission
DRC	Development and Reform Commission
EBRD	European Bank for Reconstruction and Development
EEA	European Economic Area
EITE	Energy-Intensive and Trade-Exposed
ENVI	Committee on Environment, Public Health and Food Safety
ETS	Emissions Trading System or Emissions Trading Scheme
EU	European Union
EUR	Euro
FFCER	Fujian Forestry Certified Emission Reduction
FY	Fiscal Year
FYP	Five Year Plan
GHG	Greenhouse Gas
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
Grupo BMV	Mexican Stock Exchange
GVCes	Centro de Estudos em Sustentabilidade da Fundação Getúlio Vargas
HFCs	Hydrofluorocarbon
HFC-23	Fluoroform
ICAO	International Civil Aviation Organization
ICAP	International Carbon Action Partnership
INDC	Intended Nationally Determined Contribution
ISO	International Organization for Standardization
ITMO	Internationally Transferred Mitigation Outcomes
JCM	Joint Crediting Mechanism
JI	Joint Implementation
KAU	Korean Allowance Units
KAZ ETS	Kazakhstan Emission Trading Scheme
KAU2015	Korean Allowance Units of the 2015 Vintage
KCU	Korean Credit Units
KCU2015	Korean Credit Units of the 2015 Vintage
KETS	Korean Emissions Trading Scheme
KL	Kiloliter
KOC	Korean Offset Credits
KRW	South Korean Won
KRX	Korea Exchange
KW	Kilowatt
LAO	Legislative Affairs Office of the State Council
LCC	Low Carbon City
LDCs	Least Developed Countries
LULUCF	Land Use, Land-Use Change and Forestry
MIT	Massachusetts Institute of Technology
MMC	Mine Methane Capture
MoU	Memorandum of Understanding
MRV	Monitoring, Reporting and Verification
MSR	Market Stability Reserve
M	Million
$MtCO_2e$	Million Metric Tons of Carbon Dioxide Equivalent
MW	Megawatt
N_2O	Nitrous Oxide
NAMA	Nationally Appropriate Mitigation Actions
NDC	Nationally Determined Contribution
NDRC	National Development Reform Commission
NER	New Entrants Reserve
NF_3	Nitrogen Trifluoride
NZ	New Zealand
NZD	New Zealand Dollar
NZUs	New Zealand Units
PNMC	Brazil National Climate Change Policy
PFCs	Perfluorocarbon
PMR	Partnership for Market Readiness
QC	Québec
RBOB	Reformulated Blendstock for Oxygenate Blending
RENE	Mexico National Emissions Register
RGGI	Regional Greenhouse Gas Initiative
RTE	French Transmission System Operator
SEMARNAT	Ministry of Environment and Natural Resources of Mexico
SENER	Ministry of Energy of Mexico
SF_6	Sulfur Fluoride
SHEAF	Shanghai Emission Allowance Forward
SHCH	Shanghai Clearing House
SHCP	Ministry of Finance of Mexico
SOE	State Owned Enterprise
tce	Ton of Coal Equivalent
tCO_2	Ton of Carbon Dioxide
tCO_2e	Ton of Carbon Dioxide Equivalent
TEPA	Taiwan Environmental Protection Administration
TGO	Thailand Greenhouse Gas Management Organization
TMG	Tokyo Metropolitan Government
TMS	Target Management Scheme
T-VER	Thailand Voluntary Emission Reduction Program
UNFCCC	United Nations Framework Convention on Climate Change
USAID	United States Agency for International Development
USD	US Dollar
US EPA	US Environment Protection Agency
V-ETS	Thailand Voluntary Emission Trading Scheme
WCI	Western Climate Initiative

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Photos

Los Glaciares National Park, Argentina (cover) ©USGS/ESA

Bloom in the Barents Sea, Norway, August 2007 (page 6) ©NASA

Hydrogen Sulfide Emissions off of Africa, Namibia, February 2012 (page 22) ©NASA

Icebergs of western Greenland, July 2005 (page 26) ©NASA

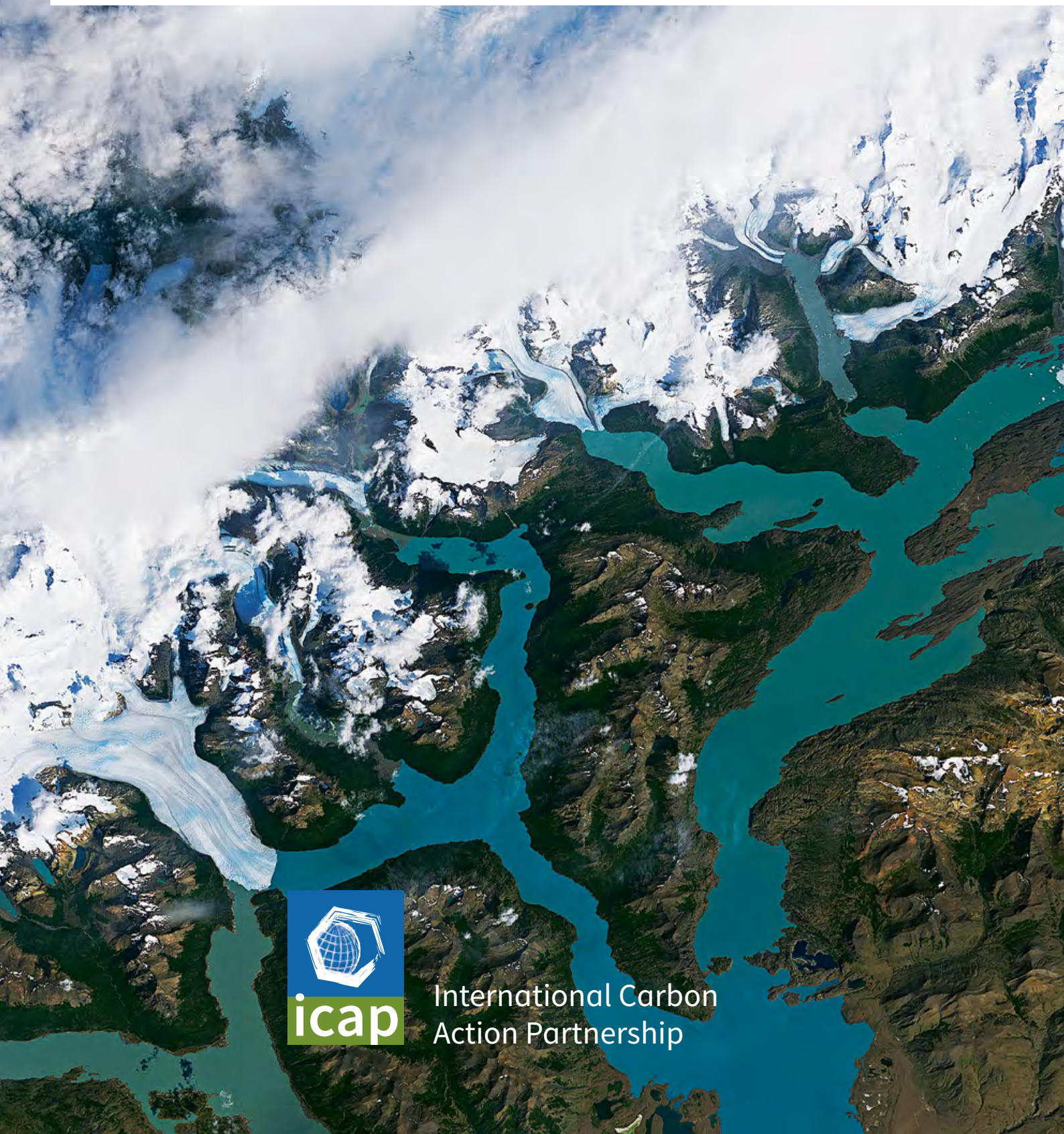
Kalimantan, Borneo, Indonesia, July 2000 (page 70) ©NASA

Notes on Sources

The report draws on a range of sources, including official ETS information from governments and public authorities, data submitted to the UNFCCC, or where available, other official reporting and information provided by ICAP members or contributing authors. Information on emitting sectors is based on self-reporting by the respective jurisdictions; therefore categories are not necessarily consistent across jurisdictions.

Infographics have been calculated including Kazakhstan's ETS until its suspension in 2016. Where information on emissions caps was not available, cap estimates based on the relative coverage of a jurisdiction's overall GHG emissions were used. However, the total emissions coverage of ETSs does not include the Chinese pilots, as most of their emissions are covered under the Chinese national ETS. Emissions coverage under the national Chinese ETS is estimated at 4,000 $MtCO_2e$, based on recent written statements by the NDRC officials estimating the future market at 3,000–5,000 $MtCO_2e$. Emissions coverage under the Tianjin ETS pilot is estimated at 165 $MtCO_2e$, the average of the 160–170 $MtCO_2e$ estimate listed in the factsheet. Among the Chinese pilot schemes, official information is scarce and not always publicly available. No official data on the relative emissions coverage of Fujian was available at the time of writing. It is assumed to be the same as the Guangdong ETS, which covers the same sectors, is comparable in size and is located next to Fujian. The 1 $MtCO_2$ equivalence graphic uses 2014 data on the typical passenger vehicle from the U.S. Environment Protection Agency. Figures for the revenues graphic are from the European Commission, ICAP Status Report, Québec Ministry of Sustainable Development, Environment and the Fight against Climate Change, California Air Resources Board, RGGI, European Energy Exchange and the Intercontinental Exchange. US dollars were converted at the annual average exchange rates published by the Bank of Canada and https://www.oanda.com. For the Québec Cap-and-Trade Program, joint auctions involve currency conversion for part of the proceeds. The rate and transaction fees on the date of conversion can affect the amount deposited to the Green Fund. As a result, the product of the number of permits sold and the settlement price may slightly differ from the actual amount deposited. For the California Cap-and-Trade Program, the estimated percentage of auctioned permits and total auction revenue account for state-owned permits only. The estimated percentage of auctioned permits for the California and Québec Cap-and-Trade systems are calculated based on the vintage year, not by the year when permits were or would be actually auctioned. For the ETS prices graphs, the following sources were used: California Air Resources Board, Tanjiaoyi News Service, European Energy Exchange, Carbon News New Zealand, the Swiss Emissions Trading Register, and RGGI Inc. Sinocarbon Innovation & Investment Co Ltd also provided additional pricing data for the Chinese pilots.

In over a decade of operation, emissions trading systems (ETS) for greenhouse gas emissions have developed and spread worldwide, emerging as a trusted policy instrument for climate change mitigation. While existing systems have been consolidating and improving, emerging economies are rapidly building a new generation of ETS. In 2017, there are 19 different systems in force, and many new systems under development and consideration. The ICAP Status Report 2017 provides an overview of the diversity of ETS worldwide, with detailed factsheets on the policy settings of each system combined with in-depth articles from policymakers and carbon market experts.



icap

International Carbon Action Partnership