Parliament of Australia
Department of Parliamentary Services

PARLIAMENTARY LIBRARY
INFORMATION ANALYSIS ADVICE

BACKGROUND NOTE 6 June 2013

Emissions trading schemes around the world

Anita Talberg, Science, Technology, Environment and Resources Section
Kai Swoboda, Economics Section

Executive summary

- Greenhouse gas emissions trading schemes (ETSs) are operational in several countries. The trade in carbon permits or credits within and between ETSs is growing. However, the economic value of this trade has decreased over the last few years largely due to suppressed economic activity levels.
- Australia's ETS is legislated to adopt a market price and to link to the European ETS in 2015. Some analysts expect the price of Australian carbon permits and credits to converge with those in the European scheme, which have been decreasing in value for the last few years due to oversupply.
- At the national level legislated ETSs exist in the European Union, Switzerland, New Zealand, Australia, South Korea, and Kazakhstan. Some subnational schemes are legislated in the US, Canada, and Japan. The Kyoto Protocol also provides for emissions trading across nations.
- Several new schemes are being proposed. China is the most notable with a network of seven pilot schemes planned to begin operation in 2013 (although most of these provincial schemes are unlikely to meet this deadline).

Contents

Acronyms

Acronym	Meaning
AAU	Assigned Amount Unit
AU	Australian Unit
BOCM	Bilateral Offset Credit Mechanism
CARB	California Air Resources Board
CCA	California Carbon Allowance
CDM	Clean Development Mechanism
CEF	Clean Energy Future
CER	Certified Emissions Reduction
CO_2	Carbon dioxide
CO_2e	Carbon dioxide equivalent
EC	European Commission
EITE	Emissions Intensive and Trade Exposed
ERU	Emission Reduction Units
ETS	Emissions Trading Scheme
EU	European Union
EUA	European Union Allowance
JI	Joint Implementation
MCI	Monthly Calculation Index (Kazakhstan)
Mt	Megatonnes
NZ	New Zealand
NZU	New Zealand Unit
RGGI	Regional Greenhouse Gas Initiative
US	United States
WCI	Western Climate Initiative

Introduction

Australia's ETS, known as the Carbon Pricing Mechanism (CPM), came into force on 1 July 2012 as part of the Clean Energy Future package. As the Minister for Climate Change and Energy Efficiency Greg Combet has stated frequently, Australia is not the only country to have legislated an ETS.[1] In 2010 the Parliamentary Library provided a listing of all ETSs in operation around the world in its Greenhouse gas emissions: still trading after all these years publication.[2] Since then, there has been some progress globally and a number of changes. On 2 May 2012, (for example) the South Korean National Assembly passed legislation for its own type of ETS.

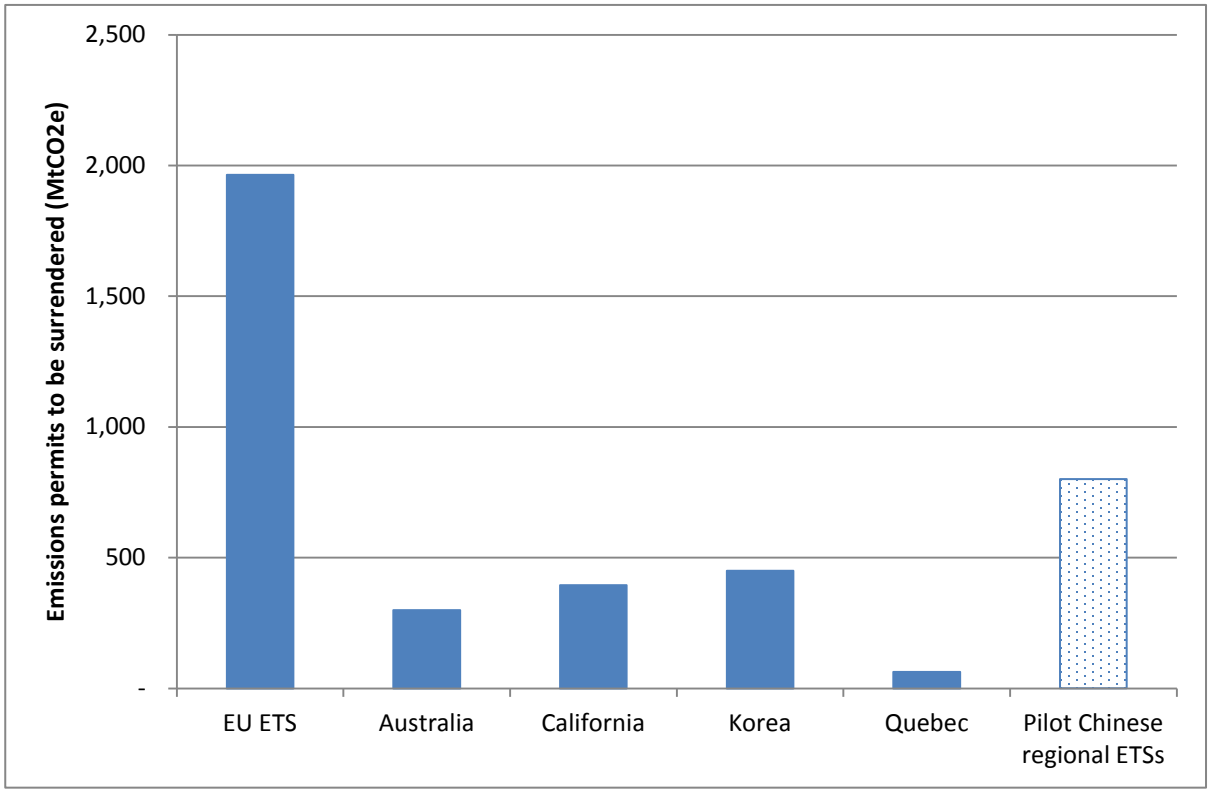
This paper provides an overview of international carbon trading in mandatory schemes and presents the current status on legislated multinational, national and regional ETSs around the globe as at the end of April 2013. New proposals relating to existing schemes and emerging schemes in overseas jurisdictions are made on an ongoing basis, so readers should take account of any new developments when assessing future situations. The paper includes two appendices, a map and a table which summarise and consolidate the information on ETSs for easy reference.

Part 1: International carbon markets

The key mandatory ETSs currently planned or in operation exist in the European Union (EU), South Korea, California, Quebec and Australia.[3] These are detailed in the second part of this paper. Together these five schemes will require companies to surrender emissions permits equivalent to around 3200 megatonnes (Mt) of CO_2e in 2015 (Figure 1).[4] Participants in the EU ETS account for around 60 per cent of emissions in these ETS systems.[5] The inclusion of seven pilot Chinese regional ETSs would add another 800 Mt of emissions covered by mandatory ETSs in 2015.[6]

1. G Combet, 'Dirty tactics on carbon pricing', *The Age*, 11 March 2011, accessed 15 March 2013; G Combet (Minister for Climate Change and Energy Efficiency), '*Australia and EU committed to low carbon future*', media release, 5 September 2011, accessed 15 March 2013; and G Combet, 'Carbon price is the best way forward', *The Australian*, 26 February 2011, accessed 15 March 2013.
2. L Nielson, '*Greenhouse gas emissions: still trading after all these years*', Background Note, Parliamentary Library, Canberra, 12 November 2010, accessed 19 March 2013.
3. Emissions covered by the New Zealand ETS are excluded from the analysis in Part 1 because of the relatively small volume of emissions covered by the scheme and the operation of rules that provide for a 50 per cent discount on the surrender of permits. The pilot Chinese regional schemes are also excluded as they are still in the draft stage.
4. The term CO_2e stands for carbon dioxide equivalent: the amount of carbon dioxide (CO_2) and/or non–CO_2 greenhouse gases that equal the global warming potential of an equivalent amount of CO_2 over a given timeframe, usually 100 years.
5. The size of the cap for each ETS may not yet be finalised. For example, the cap for the Australian ETS in 2015 will be determined by regulation, or, in the absence of regulation, by a default cap that is 38Mt less than actual emissions by liable entities in 2012–13 (*Clean Energy Act 2012*, sections 14 and 17). The estimates for each scheme presented in Figure 1 may differ from other available estimates depending on when they were made and the assumptions used.
6. H Chai, 'Will 2013 mark the dawn of Chinese ETS?', *Point Carbon Analysis*, 13 March 2013. The 800 Mt estimated to be covered by the pilot Chinese regional ETSs will be affected by how indirect emissions are treated in the program (H Chai, 'Direct and indirect emissions in Chinese ETS: a tale of double-counting', *Point Carbon Analysis*, 2 May 2013).

Figure 1: Estimated total liability for participants under selected existing emissions trading schemes, 2015 ($MtCO_2e$)



Sources: European Commission (EC), 'Allowances and caps', EC website, accessed 19 March 2013; C Jones and J Simjanovic, 'Korea's carbon emissions cap estimated at 450 Mt in 2015', *PointCarbon*, 14 May 2012, accessed 19 March 2013; Centre for Climate and Energy Solutions, *California cap-and-trade program summary table*, November 2012, p. 2, accessed 19 March 2013; Barclays, 'Carbon focus: all over the world', *Quarterly Carbon Standard*, 23 January 2013, accessed 21 March 2013; International Emissions Trading Association (IETA), 'Summary of Québec's regulation respecting a cap-and-trade system for greenhouse gas emission allowance', IETA website, p., 3, accessed 19 March 2013; H Chai, 'Will 2013 mark the dawn of China ETS?', *PointCarbon*, 13 March 2013.

Entities covered by a 'cap-and-trade' ETS must surrender enough permits or credits to cover their estimated emissions output.[7] These emissions units can be acquired in a number of ways: via free allocations from regulators, by purchasing them at auction or by accessing secondary markets. In secondary markets, participants can either purchase units directly or purchase financial instruments that are then exchanged for units at a later point in time. As such, the price for a given type of permit or credit varies depending on whether it is traded via an exchange or over-the-counter and whether trade involve actual units or is based on financial contracts with a specified delivery date.[8]

7. The terms 'permits' or 'credits' are sometimes used interchangeably. In general, a 'permit' is created under an ETS and gives the holder the right to pollute up to a certain level, whereas a 'credit' (also known as an offset) derives from the reduction in emissions created by certain eligible projects.
8. There are a number of financial exchanges that support trade in both permits and financial instruments, typically futures contracts. Where permits are traded, a 'spot' price is established. Typically financial instruments have a specified delivery date and there may be different prices established for instruments with different delivery dates.

Sovereign governments control the types of emissions units that are acceptable within the ETS that they oversee. For example, the EU ETS trades primarily in European Union Allowances (EUAs), the Californian scheme in California Carbon Allowances, the New Zealand scheme in New Zealand Units and the Australian scheme in Australian Units. However, some schemes allow the use of foreign emissions units. Liable entities participating in the EU ETS can use a few different emissions unit types defined under the Kyoto Protocol, although the use of units 'imported' from activities outside the EU is subject to quantitative and qualitative limits.

The Kyoto Protocol has several different types of emissions units for use or exhange. These arise mainly from the three different flexibility mechanisms but also from specific carbon abatement project types, such as forestry. The first mechanism is emissions trading, where countries that exceed emissions reduction targets can sell excess greenhouse gas emission permits to those countries with a deficit. Assigned Amount Units (AAUs) are the permits that would arise from this. The second mechanism is the Clean Development Mechanism (CDM), which allows industrialised countries to purchase carbon credits from approved emissions reduction projects that take place in developing countries. These credits are Certified Emissions Reductions (CERs) and are the most common type of traded unit in the Kyoto Protocol. The third mechanism is known as Joint Implementation (JI) and is similar to the CDM but occurs in and between developed countries that are parties to the Kyoto Protocol. There are unit types for JIs and also other types for specific project types, such as forestry.

Linkage between ETSs is created when two systems allow the use of a common permit or credit. For example, if two schemes accept CERs they become linked, albeit indirectly. Schemes can also become directly linked when the use of permits established for one specific ETS is allowed to be used within another ETS. To date a number of schemes have been linked (Table 1). In August 2012 the Australian Government and European Commission announced the intention to link ETSs from 2015. Initially a one-way link will allow EUAs into the Australian scheme. After 2018 Australian Units will be allowed in the EU ETS. South Korea has explicitly banned the use of Kyoto Protocol units until 2021 and California has confirmed it will link its ETS with that of Quebec in the medium term.[9]

Trade may also occur directly between parties or be facilitated by exchanges without being transferred on the exchange (so-called 'over-the-counter' (OTC) transactions).

9. S Reklev, 'S. Korea launches taskforce to hammer out CO2 market rules', *Point Carbon*, 22 February 2013 and L Doan, 'California Governor Clears Way for Carbon Market Link to Quebec', *Bloomberg*, 9 April 2013, accessed 1 May 2013.

Table 1: Use of different permits across ETSs (current and planned)

Permit type	EU ETS	Australia	South Korea	California	Quebec
CER	Subject to quantitative and qualitative limits	From July 2015 subject to quantitative and qualitative limits	Will not be accepted before 2021	No	No
EUA	Yes	From July 2015 subject to quantitative limits	No	No	No
AU	Proposed from 2018	Yes	No	No	No
CCA	No	No	No	Yes	Planned from August 2013

Note: EUA = EU Allowance, CER = Certified Emissions Reduction, AU = Australian Unit, CCA = California Carbon Allowance.
Sources: A Talberg, *'Phasing in changes to EU emissions trading'*, Library Briefing, Library of the European Parliament, 14 December 2011, accessed 19 March 2013; Australian Government, 'Linking and Australian liable entities', Clean Energy Future (CEF) website, accessed 19 March 2013; S Reklev,'S. Korea launches taskforce to hammer out CO_2 market rules', *Point Carbon*, 22 February 2013; R Carroll, 'California moves closer to CO_2 market link with Quebec', *Point Carbon*, 8 January 2013.

The trading of emissions units and financial instruments on secondary markets to satisfy carbon liabilities is a well-established practice in the EU ETS, which has been in operation since 2005, but in other markets carbon trading is less developed. Carbon market consultancy group Point Carbon estimates that the value of trade in emissions permits across ETSs was around $A78 billion in 2012.[10] This represents a significant decline in value since 2010. At the same time, however, the actual volume of permits traded increased from 7035 Mt in 2010 to 10 717 Mt in 2012 (Table 2).

10. Point Carbon, 'Carbon market monitor: A review of 2012', 7 February 2013. Australian dollar value estimated by the Parliamentary Library based on average exchange rate data for each year as published by the Reserve Bank of Australia.

Table 2: Trade in emissions permits, 2010 to 2012

Permit type	Volume (Mt CO_2e)			Value ($A million)		
	2010	2011	2012	2010	2011	2012
EUA	5,172	6,057	7,478	103,688	102,741	67,854
CER	1,508	2,012	2,408	25,934	23,926	7,604
ERU	59	101	574	731	962	1,126
AAU	63	69	119	663	545	187
North America	189	100	130	526	297	715
New Zealand	8	10	8	130	142	37
Australia	-	-	0.3	0	0	7
Other	35	25	-	297	157	0
Total	7,035	8,373	10,717	131,968	128,772	77,531

Note: EUA = EU Allowance, CER = Certified Emissions Reduction, AAU = Assigned Amount Unit, ERU = Emission Reduction Units.

Source: Point Carbon, 'Carbon market monitor: A review of 2012', 7 February 2013. Australian dollar value estimated by the Parliamentary Library based on average exchange rate data for each year as published by the Reserve Bank of Australia

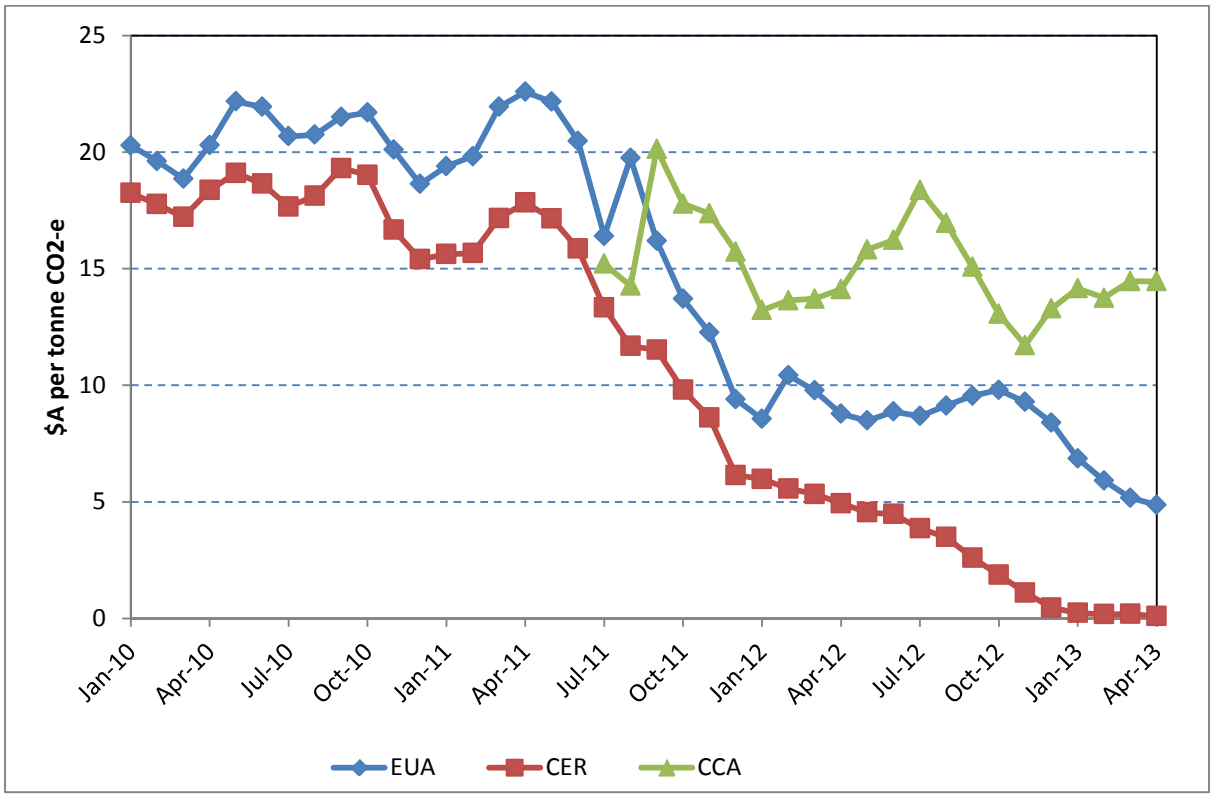
Recent carbon price trends

Australia has a legislated fixed carbon price of $A23 per tonne of CO_2e for 2012-13. This appears high compared to other ETSs, particularly the EU ETS where spot prices for EUAs declined from an average of around €13 ($A20.30) in January 2010 to around €3.90 ($A4.90) by the end of April 2013.[11] Although the Californian scheme does not require liable entities to surrender permits for the first year of the scheme until November 2014, futures contracts and an auction held in late 2012 have established a carbon price of around $US14.50 ($A14) for the early part of 2013.[12]

Prices for emissions units—which are derived in the market—are subject to a range of demand and supply factors. The price of emissions units in the EU ETS has steadily declined (Figure 2) following the drop in economic activity brought about by the global financial crisis and in the face of increased availability of emissions units from foreign sources.

11. Point Carbon, 'Point Carbon EUA OTC assessment', accessed 18 March 2013. Australian dollar value estimated by the Parliamentary Library based on average exchange rate data for each year as published by the Reserve Bank of Australia.
12. This price is only marginally above the $US10 floor price (2013 indexed annually thereafter by 5 per cent plus inflation) that underpins the California ETS.

Figure 2: Carbon prices for EU ETS and California ETS, selected permit types, January 2010 to April 2013 ($A)



Note: Prices are spot prices as compiled by Point Carbon based on exchange-traded and OTC transactions. EUA = European Union Allowance, CER = Certified Emissions Reduction, AU = Australian Unit, CCA = California Carbon Allowance.
Sources: Point Carbon, sCER OTC price assessment, CCA OTC assessment, and EUA OTC assessment, accessed 30 April 2013. Australian dollar value estimated by the Parliamentary Library based on average exchange rate data for each year as published by the Reserve Bank of Australia.

Some of the broader economic, financial and environmental issues that have affected EU ETS carbon prices over the first two phases of the EU ETS price include:

- levels of industrial production
- differentials in energy prices
- increased deployment of renewables
- permit stockpiling (affecting the quantity trading in the market)
- weather (affecting renewable output and demand for heating and cooling) and

- the supply of permits associated with the EU target, and alternative sources.[13]

The current low price in the EU ETS is largely attributed to an oversupply of permits relative to declining economic activity levels. Emission targets for Phase 2 (coinciding with the 2007–12 Kyoto Protocol commitment period) had assumed a higher rate of economic growth.[14] In addition to the oversupply of EUAs, the issuing of CERs has increased in recent years. This is because a backlog of projects requiring validation has been cleared, further contributing to an oversupply in CERs that have no major market outside of the EU ETS.[15]

EUA and CER prices are also likely to be affected by the considerable uncertainty surrounding future market arrangements in the EU ETS. In response to the low emissions unit prices, EU Member States are currently revisiting the EU ETS and considering a series of proposals aimed at bolstering the scheme. However, uncertainty results from a lack of consensus regarding these proposals. In the short-term, proposals include withdrawing 900 million permits from the years 2013-2015 until 2019-2020.[16] A further sharp decline in EUA prices in April 2013 was largely in response to European Member countries voting to reject this proposal.[17] In the longer term, proposals relate to structural changes including increasing the EU reduction target from 20 per cent to 30 per cent by 2020, expanding coverage to other sectors and further limiting access to international credits.[18]

Australian carbon price expectations

Projections of future Australian carbon prices reflect a number of uncertain political and economic variables. The Australian ETS does not have the support of the Federal Opposition, which has indicated that it will repeal the scheme if elected at the September 2013 election.[19] Without bipartisan support for the Australian ETS, any consideration of future carbon prices in Australia needs to be cognisant of the following factors beyond micro issues such as the interaction of policy instruments:

13. A Maydybura and B Andrew, 'A study of the determinants of emissions unit allowance price in the European Union emissions trading scheme', *Australasian Accounting Business and Finance Journal*, vol. 5, issue 4, 2011, pp. 123–142, accessed 18 March 2013; J Chevallier, 'Carbon price drivers: An updated literature review', April 2011, accessed 19 March 2013; K Van den Bergh, E Delarue and W D'haeseleer, 'Impact of Renewables Deployment on the CO2 Price and the CO2 Emissions in the European Electricity Sector', *Robert Schuman Centre for Advanced Studies, EUI Working paper*, no. 2012/66, 2012, accessed 18 March 2013.
14. International Emissions Trading Association (IETA), 'Briefing on the EU's emissions trading scheme', 13 April 2012, IETA website, accessed 18 March 2013; European Commission (EC), *Report from the Commission to the European Parliament and the Council: The state of the European carbon market in 2012*, 14 November 2012, pp. 7–11, accessed 18 March 2013.
15. World Bank, *State and trends in the global carbon market 2012*, Washington DC, May 2012, accessed 20 March 2013; p. 55 and N Chestney, 'U.N. carbon price forecasts to 2020 cut further: Reuters poll', *Reuters*, 2 October 2012, accessed 19 March 2013.
16. EC, 'Structural reform of the European carbon market', EC website, accessed 18 March 2013.
17. P Clark and J Chaffin, 'Europe's carbon market left in disarray', *Financial Times*, 16 April 2013, accessed 30 April 2013.
18. EC, *Report from the Commission to the European Parliament and the Council: The state of the European carbon market in 2012*, op. cit.
19. Liberal Party of Australia, ' Our Plan to Abolish the Carbon Tax.: The Coalition's Plan to Abolish the Carbon Tax', Coalition policy document, 29 June 2012, accessed 30 April 2013.

- the potential for a change of government in Australia
- the ease with which a new government will be able to dismantle the Australian ETS framework and
- price expectations within the EU ETS (because of the link to the EU scheme).

In mid-2012 the Centre for Climate Economics and Policy at the Australian National University undertook a survey of expectations from industry participants and other carbon price 'experts'. According to the results of this survey, 79 per cent of the 76 respondents expect that there will be a carbon price in Australia in 2020 and 81 per cent expect an Australian carbon price in 2025. However, 38 per cent expect the current carbon pricing legislation to be repealed by the end of 2015 and 40 per cent expect repeal by 2016. Of those who think the carbon price will be repealed, one-half expect that a carbon price will be reinstated by 2020.[20]

Forecasts of prices are issued regularly by market analysts to take account of the most recent expectations on possible changes to ETSs and other factors. Australian liable entities can substitute foreign carbon units for up to 50 per cent of their liability. Therefore the Australian carbon price from 2015 onwards will be influenced by prices established within the EU ETS, with some analysts expecting that the price of Australian carbon units is likely to converge with that of the EU ETS.[21]

Price forecasts can be volatile and can change significantly in a short period of time. A survey of EU ETS market analysts in early March 2013 estimated that EUA prices would be around €5.60 in 2013 and to average €9.60 over phase 3 of the EU ETS (2012–2020).[22] One month later, following the European Parliament's initial rejection of a temporary withdrawal of permits, analysts had revised their forecast for EUA prices to be down to €4.80 in 2013 and to average €7.60 over phase 3 of the EU ETS.[23]

Australia carbon price forecasts can also change significantly, reflecting changes in expectations over the EU ETS and other factors. For example, research firm Reputex was reported in late November 2012 as expecting Australian carbon permits to average $A16 in the years leading up to 2020 but by the end of April 2013 Reputex had reported an expected Australian permit price average of $A2.70 over the period 2015–2020.[24] Since these forecasts, the Government has revised its own projections

20. F Jotzo, 'The CCEP Australia Carbon Pricing Survey 2012: Policy uncertainty reigns but carbon price likely to stay', *CCEP Working Paper 1206*, 5 July 2012, accessed 18 March 2013.
21. PricewaterhouseCoopers, 'Appreciating Value', Issue 13, February 2013, accessed 19 March 2013; T Jordan, 'Why aren't Australian firms more engaged in the global carbon market?', *Carbon trading magazine*, vol. 1, issue 6, July/August 2012, p. 14, accessed 19 March 2013; S Chapman, 'Comment: 2013 outlook for Australian carbon markets', *Climate Bridge*, 1 February 2013, accessed 20 March 2013.
22. N Chestney, 'REUTERS POLL-Analysts cut EU, UN carbon forecasts again', *Point Carbon*, 3 March 2013.
23. N Chestney, 'REUTERS POLL-Analysts cut carbon price forecasts to 2020', *Point Carbon*, 25 April 2013.
24. Reputex, 'Price of renewable energy credits to soar', 4 December 2012, accessed 20 March 2013; N Perry, 'Business says end carbon tax, bring in ETS', *Herald Sun*, 18 April 2013, accessed 30 April 2013.

of domestic prices as part of its budget estimates, with a price of $A12.10 expected for 2015–16 rising to $18.60 in 2016–17.[25]

Part 2: Legislated mandatory emissions trading schemes

Kyoto Protocol

Under the Kyoto Protocol to the United Nations Framework Convention on Climate Change a number of developed countries pledged to reduce their greenhouse gas emissions to meet national targets. To do so, these developed countries could, in the first place, reduce their own emissions, but could also opt to participate in the Kyoto Protocol flexibility mechanisms described in Part 1.

The first commitment period of the Kyoto Protocol started in 2007 and ended in December 2012. Only a handful of countries have signed on to a second commitment period: the 27 Member States of the EU plus Norway, Croatia, Switzerland, Iceland, Liechtenstein, Belarus, Ukraine, Kazakhstan and Australia.[26] Canada, Japan, Russia and New Zealand were parties to the first commitment period but have not signed on a second time. The second commitment period will be an eight-year term ending in 2020. This coincides with phase 3 of the EU ETS (see below) but delays the opportunity to forge a broader, more inclusive agreement. There are also ongoing discussions on some of the finer details of how to transition from the first to the second commitment period. Australia and New Zealand originally stated that they would continue to participate in the decision-making process, but also indicated that they would reserve a decision regarding joining a second commitment period until all the details are known.[27] Australia has since decided to join, most likely to better align with the EU in order to link ETSs.[28]

EU ETS

The EU ETS is the longest standing scheme today. In 2013, the EU ETS entered its third phase, which ends in 2020. Phase 1 began in 2005 with a short two-year trial period. This was intended as a 'learning by doing' stage. A five-year second phase followed but it was criticised as being environmentally ineffective mainly due to an over-allocation of permits.[29] New legislation was

25. Australian Government, *Budget strategy and outlook: budget paper no. 1: 2013–14*, Commonwealth of Australia, Canberra, pp. 2–48, accessed 5 June 2013.
26. 'Information by Parties included in Annex I listed in annex 1 to decision 1/CMP.7 on their quantified emission limitation or reduction objectives for the second commitment period under the Kyoto Protocol' and Addenda, United Nations Framework Convention on Climate Change (UNFCCC), Ad Hoc Working Group on Further Commitments for Annex I Parties under the Kyoto Protocol Seventeenth session, Bonn, 15–24 May and Doha, 27 November 2012, FCCC/KP/AWG/2012/MISC.1, FCCC/KP/AWG/2012/MISC.1/Add.1, FCCC/KP/AWG/2012/MISC.1/Add.2, accessed 15 March 2013.
27. UNFCCC, FCCC/KP/AWG/2012/MISC.1
28. G Combet (Minister for Climate Change and Energy Efficiency), *'Australia and European Commission agree on pathway towards fully linking emissions trading systems'*, media release, 28 August 2012, accessed 20 March 2013.
29. A Talberg, *Phasing in changes to EU emissions trading*, Library Briefing, Library of the European Parliament, 14 December 2011, accessed 3 May 2013.

passed in 2009 to improve and expand the ETS and extend it beyond 2013.[30] The main changes were:

- Increased coverage of greenhouse gases and activities: phase 2 covered about 40 per cent of emissions, whereas phase 3 will cover about 43 per cent
- The establishment of an EU-wide emissions cap to replace national allocation plans that existed under the first two phases
- The creation of a single and central registry known as the EU Transaction Log to replace the national registries of phases 1 and 2 (some of which have been subject to lax security practices)
- A stronger tendency towards auctioning of permits, with more than 50 per cent being sold, as opposed to less than 5 per cent in previous phases
- A common auctioning platform for the sale of permits (although Germany, the United Kingdom and Poland have opted to establish their own auctioning platforms)
- The distribution of auction revenues such that 88 per cent is returned to Member States in proportion with their respective emissions; 10 per cent to Member States with low per capita income and good potential for growth; and 2 per cent to those Member States that had achieved a 20 per cent emissions reduction on their Kyoto Protocol base by 2005
- The introduction of benchmarking as a means of determining the proportion of free permits to installations
- The end of free permits to the power sector of most Member States (exceptions apply to some of the poorer EU countries) and
- An expanded list of restrictions on the use of credits from the CDM.[31]

The EU's commitment is to reduce greenhouse gas emissions by 20 per cent on 1990 levels by 2020. This is the same as reducing emissions by 14 per cent on 2005 levels in that time. The EU ETS covers 12 000 installations, responsible for just over 40 per cent of all EU greenhouse gas emissions. It has been designed to reduce emissions in covered sectors by 21 per cent on 2005 levels by 2020. Under an 'Effort Sharing Decision' policy, sectors not covered by the EU ETS are required to reduce emissions by 10 per cent on 2005 levels by 2020 through various measures.[32] Such measures are decided at the country-level in some cases (for example, taxation or advertising campaigns) and the EU-level in others (for example labelling systems or new standards).[33]

30. Ibid.
31. Ibid.
32. EC, 'Effort Sharing Decision', EC Climate Action website, accessed 20 March 2013.
33. EC, 'Questions and Answers on the Effort Sharing Decision (October 2012)', accessed 20 March 2013.

In 2011, emissions from installations included in the EU ETS showed a decline. According to Climate Action Commissioner Connie Hedegaard, 'ETS emissions decreased by more than 2% in 2011 despite an expanding economy recovery'.[34]

Unfortunately, this has amplified the unresolved problem of surplus allowances first caused by an over-allocation of permits and an unexpected downturn in activity levels and permit demand in the EU. Prices for EUAs dropped to a record low in 2012.[35] As a result, the European Commission (EC) announced that it 'is now reviewing the time profile of phase 3 auctions with a view to reducing the number of allowances for auction in the early years of phase 3'.[36] There has since been ongoing debate in this regard (such as the vote over backloading described in Part1), and permit prices continue to fall.[37]

Australia's Carbon Price Mechanism

The Clean Energy Future package is Australia's way of meeting a commitment to reduce greenhouse gas emissions by at least 5 per cent on 2000 levels by 2020, and potentially by 15 or 25 per cent if credible action is mobilised on a global scale. According to Government estimates, the 5 per cent target will require abatement of at least 159Mt of CO_2e in 2020.[38]

The Carbon Price Mechanism (CPM) is the key element of the Clean Energy Future package. The CPM requires that any facility that emits above an annual threshold must surrender emission permits to the government. The threshold is 25 000 tonnes of CO_2e. In 2012 the scheme imposed obligations to surrender permits on 377 liable entities[39], accounting for about 60 per cent of Australia's greenhouse gas emissions. The CPM allows agriculture and landfill activities to generate emission reduction 'credits' and sell them to scheme participants via the Carbon Farming Initiative (CFI). The only one of its kind globally, the CFI is a framework within which farmers and landholders can undertake, monitor, and receive financial benefits for greenhouse gas emissions projects.

The CPM establishes a price on carbon in two phases. In the first phase, which runs from 2012 to 2015, a fixed price of $A23 per tonne of CO_2e emissions (rising 2.5 per cent annually in real terms) applies. From 2015 onwards the fixed price for permits moves to a floating price under a cap-and-trade system. As described previously, a unilateral link with the EU ETS from 2015 means that EUAs

34. EC, *'Emissions trading: annual compliance round-up shows declining emissions in 2011'*, press release, 15 May 2012, accessed 20 March 2013.
35. B Garside, 'EUAs plunge to record low after lower-than-expected emission data', *Point Carbon,* 2 April 2012.
36. EC, 'Emissions trading: annual compliance round-up shows declining emissions in 2011', op. cit.
37. N Chestney, 'EU carbon market hit fresh low after backloading vote', *Reuters*, 24 January 2013, accessed 20 March 2013.
38. Australian Government, 'Securing a clean energy future: the Australian Government's climate change plan', Commonwealth of Australia, Canberra, 2011, p. 14, accessed 20 March 2013.
39. Clean Energy Regulator (CER), 'LEPID for 2012-13 financial year', CER website, accessed 3 May 2013

will be accepted into the Australian scheme. Australian permits can be sold into the EU ETS only once a full bilateral link has been agreed (this is expected to have taken place by 2018).[40]

Starting in 2012, activities deemed emissions-intensive and trade-exposed (EITE) receive free permits up to 94.5 per cent or 66 per cent of the industry average baseline, based on whether they are considered highly or moderately emission-intensive. This production-based allocation declines at a rate of 1.3 per cent annually. Except for those credits provided for free, all other carbon units will be auctioned by the government. After 2015, up to 50 per cent of a participant's liability can be met by importing either the EUAs or CERs—with a sublimit of 12.5 per cent imposed on the import of CERs.[41] These residual restrictions will be fully lifted from 1 July 2018.

New Zealand ETS

The New Zealand (NZ) ETS began in 2008 as a scheme covering only the forestry sector. In July 2010, it was amended and expanded to cover also stationary energy, fishing, industrial processes and the liquid fossil fuels sectors.

Participants are required to surrender emission permits (NZUs) to cover their greenhouse gas emissions liability. Most participants receive free allocations of NZUs and these can be traded amongst participants. Unlimited NZUs can also be purchased from the forestry sector and from the flexibility mechanisms of the Kyoto Protocol.[42] The NZ Government had planned for its ETS to cover all sectors of the economy (including agriculture, NZ's biggest source of emissions) by 2015. The expansion was expected to be rolled out gradually. However, the government has said that 'now is not the right time, in an uncertain economic environment, to put more costs on households and businesses'.[43] To ease the burden, from 1 July 2010, 'transition measures' have been in place. During this time:

- Participants are able to purchase carbon units from the Government at a fixed price of $NZ25 and
- Participants from the energy, industrial and liquid fossil fuel sectors need only surrender one credit for every two tonnes of emissions produced

These measures effectively cap the price of NZUs and halve the coverage of the scheme to just 25 per cent of national emissions. The end date for transition measures was initially set at 31 December 2012; however this is being reassessed.

40. G Combet (Minister for Climate Change and Energy Efficiency), *'Australia and European Commission agree on pathway towards fully linking emissions trading systems'*, op. cit.
41. Ibid.
42. Ministry for the Environment, 'Questions and answers about the emissions trading scheme', Climate change information New Zealand website, accessed 20 March 2013.
43. Ministry for the Environment, '2012 Amendments to the New Zealand Emissions Trading Scheme (NZ ETS): Questions and answers', Climate change information New Zealand website, accessed 26 April 2013.

The scheme was reviewed by a Government-appointed panel in 2011. The panel made a series of recommendations on phasing out the transition measures and how to manage the entry of new sectors into the ETS.[44] As a result of the review and a stakeholder consultation process, the NZ Government resolved, amongst other things, to extend the transition measures beyond 2012 and defer the inclusion of some agricultural emissions until after 2015.[45]

One aspect of the NZ ETS that remains unaltered is the lack of restrictions on the quantity of Kyoto Protocol CERs accepted into the scheme.[46] Some qualitative limits have been applied, but until at least 2016 an unlimited number of CERs can be used within the NZ scheme.[47] However, by refusing to join the second commitment period of the Kyoto Protocol, the NZ government has excluded itself from trading in any non-NZ CERs created after 2012. [48] On the passage of Australia's ETS legislation (see above), the NZ Prime Minister announced the intention to develop linkages between the schemes, although there have been no developments on this.[49] The price of NZUs has been in steady decline, and is now below $NZ2. This reflects the low level of emission constraint represented by current and foreseeable arrangements.

Swiss ETS

Swiss companies with installed energy capacities above 20MW or greenhouse gas emissions above 25 000 tonnes per year are required to participate in the Swiss ETS. Medium-sized firms can choose between paying a carbon tax and participating in the ETS.[50] Both the carbon tax and the voluntary ETS were introduced in 2008. The ETS became mandatory for large firms on 28 February 2013.[51]

Large companies are allocated free credits up to a benchmark (EU ETS benchmarks are used). Medium-sized companies that receive exemption from the tax are allocated free credits up to their level of emissions from the preceding year. All other credits are sold by auction. Credits can be traded among participating companies and up to 8 per cent of the cap can be met from the purchase of permits from CDM and/or JI projects. For a large company, a penalty of CHF125 (about $A125) applies for each tonne of greenhouse gases beyond the number of credits surrendered.[52] If a medium-sized company is found to be in non-compliance of the ETS, the carbon tax is applied retrospectively.

---

44. Emissions Trading Scheme Review Panel, '*Doing New Zealand's Fair Share. Emissions Trading Scheme Review 2011: Final Report*', Ministry for the Environment, Wellington, 2011, accessed 20 March 2013.
45. Ministry for the Environment, 'Legislative changes to the New Zealand Emissions Trading Scheme (NZ ETS)', Climate change information New Zealand website, accessed 20 March 2013.
46. S Reklev, 'NZ parliament adopts ETS rule changes', *Point Carbon,* 8 November 2012; only permits from certain types of projects are restricted.
47. S Reklev, 'NZ govt announces further curbs on U.N. CO2 offset use', *Point Carbon,* 17 December 2012 and S Reklev, 'NZ govt proposes carbon offset curbs from 2016', *Point Carbon,* 4 March 2013.
48. TVNZ, ' NZ barred from Kyoto deals', *tvnz.co.nz*, 22 February 2013, accessed 21 March 2013.
49. S Reklev, 'NZ PM vows to keep CO2 price cap, link to Australia ETS', *Point Carbon,* 9 November 2011.
50. Federal Office of the Environment (FOEN), 'Swiss emissions trading scheme', FOEN website, accessed 20 March 2013.
51. FOEN, 'Participating in the ETS and deadlines', FOEN website, accessed 20 March 2013.
52. *Loi fédérale sur la réduction des émissions de CO2* (Loi sur le CO2)* (Switzerland)

Less than 400 companies have obligations under the Swiss ETS and market activity is low. On 5 November 2010, the EC proposed to start negotiations to link the EU and Swiss ETS. As such, Switzerland has aligned the design of its revised post-2012 ETS with that of the EU ETS phase 3. Initially, the linking of the two systems was to come into effect in 2013 but because of a slow reform process involving parliamentary approval this timeframe does not seem feasible. Switzerland is now hoping to be ready for linkage by 2015.[53]

South Korean ETS

In November 2012 South Korea's cabinet approved and adopted rules for a mandatory ETS after legislation received bipartisan support in the country's unicameral National Assembly.[54] The finer details of the scheme will be decided before June 2014 by an inter-ministerial task force.[55]

In 2009, the Korean Government announced its intention to reduce national emissions by 30 per cent on business-as-usual projected levels by 2020.[56] This is the same as reducing emissions by 4 per cent by 2020, based on 2005 levels. The ETS is not expected to deliver the full reduction, but will assist. The actual cap is not known at this stage.

The planned start date of the ETS is 1 January 2015. The proposed scheme is expected to cover at least 60 per cent of national greenhouse gas emissions from all industries and buildings and include more than 450 participants (maybe as many as 600). Three initial phases have been outlined: 2015–2017, 2018–2020, and 2021–2026.

Participation is mandatory if an entity's annual emissions exceed 25 000 tonnes of CO_2e. No specific assistance for exposed industries has been announced but all carbon credits will be provided for free until 2018, after which 3 per cent will be auctioned. The level of free allocations is likely to decrease gradually from 97 per cent in 2018 to below 90 per cent by 2021. Banking and borrowing will be allowed (possible limitations on this have not been outlined). Credits from the Kyoto Protocol's mechanisms or any other international schemes will not be accepted until 2020. From 2021, international permits will be permitted up to 10 per cent of a participant's emissions (as long as this does not exceed the volume of domestic credits). Non-compliance would be penalised with a fee of around $A85 for each tonne over a company's cap that is not matched with a valid permit.

In 2010, in the lead up to a full ETS, the South Korean government established a precursor scheme, which is expected to become redundant under the new ETS in 2015. Under this precursor scheme, known as the Greenhouse Gas and Energy Target Management System, companies with emissions above the 25 000 tonne threshold are required to monitor, report on, and limit their annual

53. M Kruppa, 'EU-Swiss carbon market link delayed to 2015', *Point Carbon,* 30 October 2012.
54. S Reklev, 'S. Korea cabinet approves emissions trading rules', *Point Carbon,* 13 November 2012.
55. S Reklev, S. Korea launches taskforce to hammer out CO2 market rules, *Point Carbon,* 22 February 2013.
56. S Kang, 'South Korea to Cut Greenhouse Emissions 30% by 2020 (Update2)', *Bloomberg*, 17 November 2009, accessed 20 March 2013.

emissions to below set caps.[57] There are no credits or tradable permits. Those companies that exceed their annual cap are penalised with a one-off fee of around $A8 500.

Kazakhstan ETS

The Republic of Kazakhstan mandated a national ETS on 1 January 2013. The scheme covers plants in the manufacturing, energy, mining, metallurgy, chemicals, agriculture and transport industries which emit more than 20 000 tons of CO_2 per year. This scheme covers 178 participants and about 80 per cent of national emissions.[58] The first year is considered a pilot stage, rolling into full implementation and compliance in 2014. [59] During the second phase, which ends in 2020, a penalty will apply for emissions above the threshold. The penalty is set at 10 "Monthly Calculation Index" (MCI) per ton of emissions above the threshold; 10 MCI is currently worth about $A112.[60] The MCI is increased annually by the government.

Regional schemes

Regional Greenhouse Gas Initiative (RGGI)–United States

The RGGI commenced operations in 2009 as the first mandatory CO_2 cap-and-trade program in the US. It brings together nine states (Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New York, Rhode Island, and Vermont) that are committed to reducing carbon dioxide emissions from the power sector by 10 per cent before 2018, based on 2009 levels. There were originally 10 participating states but New Jersey withdrew from the agreement in 2011.[61]

The RGGI sets a cap on emissions of carbon dioxide from power plants in participating states, and allows affected firms to trade emission allowances. Emitters continuously monitor and report their emissions, and penalties for non-compliance are enforced according to each participating state's rules. Member states have agreed to each set aside at least 25 per cent of their emission allowances for public benefit purposes, such as promoting renewable energy and energy efficiency or mitigating possible increases in consumer energy prices. [62] In practice, apparently 80 per cent of auction revenues are so spent.[63] The RGGI also allows the use of offset projects for compliance, but these projects must meet strict standards to ensure the offset's quality. The number of offsets accepted by

57. A Talberg, 'Korea passes ETS but details are hazy', FlagPost weblog, 3 May 2012, accessed 28 May 2013.
58. West Kazakhstan Today, Kazakhstan launches the start of emission trading system from 2013', 17 November 2012, accessed 20 March 2013.
59. G Korniyenko, 'Allocation for Kazakhstan's carbon market: modest expectations for the pilot phase', *Point Carbon*, 10 August 2012.
60. Gratanet, 'Overview of Law "On Amendments and Additions to Certain Legislative Acts of the Republic of Kazakhstan Relating to Environmental Issues"', GRATA Law Firm, accessed 20 March 2013.
61. State of New Jersey, 'Notice of withdrawal of Agreement to the RGGI Memorandum of Understanding', 29 November 2011, accessed 20 March 2013.
62. Regional Greenhouse Gas Initiative Inc. (RGGI), 'RGGI benefits', RGGI website, accessed 20 March 2013.
63. RGGI, 'Fact Sheet: RGGI CO_2 Allowance Auctions', RGGI website, accessed 20 March 2013.

the scheme is limited to 3.3 per cent of an individual participant's liability, to ensure that significant emissions reductions occur.[64]

According to a November 2012 report from the RGGI administration, investments from the proceeds of the scheme:

> …will offset the need for more than 27 million MWh of electricity generation, and avoid the release of 12 million short tons of CO_2 pollution into the atmosphere over their lifetime, the equivalent of taking 2 million cars off the road for one year.[65]

However, for the scheme to generate ongoing abatement incentives, the cap had to be reduced. The cap was set at 165 million short tons (about 150 million tonnes) for 2014 yet only 91 million tons were emitted in 2012 (about 82 million tonnes). On 7 February 2013, the RGGI states announced that, alongside a series of other changes, the cap would be reduced by 45 per cent to 91 million tons. According to the press release:

> Improvements include:
>
> • A reduction of the 2014 regional CO_2 budget, "RGGI cap", from 165 million to 91 million tons – a reduction of 45 per cent. The cap would decline 2.5 per cent each year from 2015 to 2020.
>
> • Additional adjustments to the RGGI cap from 2014-2020. This will account for the private bank of allowances held by market participants before the new cap is implemented in 2014. From 2014-2020 compliance with the applicable cap will be achieved by use of "new" auctioned allowances and "old" allowances from the private bank.
>
> • Cost containment reserve (CCR) of allowances that creates a fixed additional supply of allowances that are only available for sale if CO_2 allowance prices exceed certain price levels ($4 in 2014, $6 in 2015, $8 in 2016, and $10 in 2017, rising by 2.5 per cent, to account for inflation, each year thereafter.)
>
> • Updates to the RGGI offsets program, including a new forestry protocol.
>
> • Not reoffering unsold 2012 and 2013 CO_2 allowances.
>
> • Requiring regulated entities to acquire and hold allowances equal to at least 50 per cent of their emissions in each of the first 2 years of the 3 year compliance period, in addition to demonstrating full compliance at the end of each 3 year compliance period.
>
> • Commitment to identifying and evaluating potential tracking tools for emissions associated with electricity imported into the RGGI region, leading to a workable, practicable, and legal mechanism to address such emissions.[66]

64. RGGI, 'CO_2 Offsets', RGGI website, accessed 20 March 2013.
65. RGGI, '*Regional Investment of RGGI CO_2 Allowance Proceeds, 2011*', November 2012, p. 3, accessed 20 March 2013.
66. RGGI, '*RGGI States Propose Lowering Regional CO2 Emissions Cap 45%, Implementing a More Flexible Cost-Control Mechanism*', press release, 7 February 2013, accessed 20 March 2013.

Western Climate Initiative (WCI)-United States and Canada

In February 2007, the Governors of five states (Arizona, California, New Mexico, Oregon, and Washington) signed an 'agreement directing their respective states to develop a regional target for reducing greenhouse gas emissions, participate in a multi-state registry to track and manage greenhouse gas emissions in the region, and develop a market-based program to reach the target.'[67] This was the beginning of the WCI.

After 2007, two more US states and four Canadian provinces joined the WCI, and at one stage a total of 11 US Canadian jurisdictions were involved. Today, only five of these are still WCI partners—California, British Columbia, Manitoba, Ontario and Quebec—and of those only California and Quebec have passed relevant legislation. Both schemes started in 2012 a trial or transitionary phase, with compliance only from the official start date of 1 January 2013. The next to follow suit may be Ontario, which released a discussion paper on 21 January 2013 soliciting ideas for an emissions reduction program. [68]

Californian cap-and-trade scheme—United States

The Californian Global Warming Solutions Act of 2006 (A.B. 32) requires the state of California to reduce its greenhouse gas emissions to 1990 levels by 2020.[69] To comply with this, the California Air Resources Board (CARB) has established an ETS.[70] The Californian cap-and-trade scheme has a 2013 emissions cap set at 2 per cent below 2012 levels. The cap then reduces by 2 per cent again for 2014, and 3 per cent every year after that until 2020.[71]

The scheme includes the 360 Californian businesses (600 facilities) with emissions above 25 000 tonnes of CO_2e per year. When it began in January 2013 the scheme included only electric utilities and large industrial facilities. From Phase 2, which starts in 2015, distributors of transportation, natural gas and other fuels will be added. The scheme will then cover around 85 per cent of California's total greenhouse gas emissions. Initially, 90 per cent of permits have been distributed freely, with the rest being auctioned quarterly. The first auction took place on 14 November 2012. This auction included a $US10 floor price. If at any stage in 2013 the market price of permits reaches $US40 (rising 5 per cent each year thereafter), CARB will allow more permits onto the market.[72] However, as an alternative to buying these credits from CARB, participants can purchase certified offset credits to cover 8 per cent of their total obligation.[73]

---

67. Western Climate Initiative (WCI), 'History', WCI website, accessed 20 March 2013.
68. Government of Ontario, 'Greenhouse Gas Emissions Reductions in Ontario: A Discussion Paper', Ontario's Environmental Registry website, accessed 20 March 2013.
69. California Environmental Protection Agency (CEPA), 'Assembly Bill 32: Global Warming Solutions Act', Air Resources Board (ARB) website, accessed 20 March 2013.
70. R Carroll, 'Auction to kick-start California carbon market', *Point Carbon*, 8 November 2012.
71. R Carroll, 'FACTBOX – The nuts and bolts of California's CO2 cap-and-trade program', *Point Carbon,* 14 November 2012.
72. R Carroll, 'FACTBOX – The nuts and bolts of California's CO2 cap-and-trade program', op. cit.
73. ARB, 'Overview of ARB Emissions Trading Program', CEPA, revised 20 October 2011, accessed 20 March 2013.

The Californian cap-and-trade scheme is planned to link with the Quebec system. Despite a series of technical and legislative hurdles, regulators expect a link by August 2013.[74] There have also been discussions between Australian and Californian representatives with a view to linking those schemes; however there may be impediments to this.[75]

> Experts cite the absence of an auction reserve price in Australia's carbon market as one of the obstacles to linking with California, where permits will have a floor price of $10.71/t at quarterly auctions this year [2013].[76]

Quebec's cap-and-trade system—Canada

Quebec's 2013–2020 Climate Change Action Plan, which was released in June 2012, includes an emissions reduction target of 20 per cent by 2020 on 1990 levels.[77] The centre-left Parti Québecois, which won minority government in the September 2012 Quebec general election, pledged to raise the emissions target to 25 per cent.[78] However, no such change has been made to the legislation.[79]

To achieve its emissions reduction goal, the Quebec government has enacted regulations for an ETS. As with the Californian scheme, it began in 2013 and applies to those operators in the industrial and electricity sector emitting in excess of 25 000 tonnes of CO_2e per year—in this case around 75 participants. This covers about a quarter of Quebec's total emissions.[80] In 2015, the fuels sector will be added.[81] Quebec expects to link its scheme with the Californian ETS by August 2013 and trade in California Carbon Allowances.[82]

Alberta-Based Greenhouse Gas Reduction Program and Offset Credit System–Canada

The Province of Alberta passed its Specified Gas Emitters Regulation in 2007 establishing an emissions intensity trading scheme that applies to facilities emitting more than 100 000 tonnes of CO_2e per year (regardless of their production rate), including power stations. Emissions intensity is

74. R Carroll, 'California moves closer to CO2 market link with Quebec', *Point Carbon*, 8 January 2013.
75. G Combet (Minister for Climate Change and Energy Efficiency), '*Australia and California to work together on carbon markets and emissions trading links*', media release, 30 September 2012, accessed 20 March 2013.
76. R Carroll, 'California downplays possibility of Australia CO2 market link', *Point Carbon*, 17 January 2013.
77. Ministère du Développement durable, 'The Premier announces the 2013-2020 climate change action plan', press release, 3 June 2012, accessed 20 March 2013.
78. Parti Québécois, 'Agir honnêtement', Parti Québécois website, accessed 20 March 2013.
79. Gouvernement du Québec, 'GAZETTE OFFICIELLE DU QUÉBEC, December 19, 2012, Vol. 144, No. 51', accessed 20 March 2013.
80. Coverage was calculated from data at these two sources: Environment Canada, 'Greenhouse Gas Emissions Data', Environment Canada website, accessed 20 March 2013 and Environment Canada, 'Programme de déclaration des émissions de gaz à effet de serre', Environment Canada website, accessed 20 March 2013.
81. Gouvernement du Québec, The Québec Cap and Trade System for Greenhouse Gas Emissions Allowances , Ministère du Développement durable, de l'Environnement, de la Faune et des Parcs (MDDEP) website, accessed 20 March 2013.
82. Carbon Offset Research & Education (CORE), 'Alberta-Based Greenhouse Gas Reduction Program and Offset Credit System' CORE website, Stockholm Environment Institute and Greenhouse Gas Management Institute, accessed 26 April 2013.

the quantum of emissions per unit of production. Relevant facilities must reduce their emissions intensity to 88 per cent of the baseline for existing facilities. If they are not able to do so, they may:

- purchase Emissions Performance Credits from those companies that have exceeded their target, or
- purchase offset credits from the Alberta-based Offset credit system, established to give the option for participants 'to purchase offset credits from other sectors that have voluntarily reduced their emissions in Alberta.'[83]
- pay, for each tonne over the target, $C15 into a government fund for commercialising new technologies, known as the Climate Change and Emissions Management Fund. According to a recent announcement, the fund is being used to support six new projects that will reduce greenhouse gas emissions by 183 000 tonnes in 10 years.[84]

The $C15 payment acts as a price ceiling on the energy intensity scheme and its offset program. In 2010, the average price for offsets stayed between $C8 and $C12.[85] In May 2012, the Alberta Government stated that it was considering increasing the fund payment amount and revisiting the targets.[86]

Japan's regional schemes

Two Japanese regions have operational mandatory ETSs in place: Tokyo and Saitama. Similar schemes, although likely voluntary, are being or have been considered for the Osaka-Kansai Prefecture and the Chiba Prefecture.[87]

Tokyo cap-and-trade scheme

The Tokyo metropolitan cap-and-trade scheme was launched in April 2010. The mandatory scheme covers those companies that use fuels, heat and electricity in excess of 1500 kilolitres of crude oil equivalent per year. This includes about 1400 buildings and industrial facilities from industrial, commercial, residential and transport sectors in the Tokyo Metropolitan area, responsible for about 20 per cent of the city's emissions The caps will represent a six per cent reduction in greenhouse gas emissions between 2010 and 2014 and a 17 per cent reduction from 2015 to 2019 (as compared to the average emissions over the previous three years). Until 2014 the scheme deals only with CO_2, but from 2015 all six Kyoto Protocol gases are included.

---

83. Government of Alberta, 'Greenhouse Gas Reduction Program', Government of Alberta website, accessed 20 March 2013.
84. V Volcovici, 'Alberta spends $45 mln from CO_2 program on clean tech', *Point Carbon,* 13 July 2012.
85. Ibid.
86. V Volcovici, 'Alberta mulls changes to CO2 rules', *Point Carbon,* 15 May 2012.
87. H Masaki, Third Japanese region launches CO2 trading scheme, *Point Carbon, 21* October 2011 and A Kachi, D Taenzler and W Sterk, '*Prospects for CDM in Post 2012 Carbon Markets'*, On behalf of the German Ministry for the Environment, the German Environment Agency, the German Emissions Trading Authority, German Emissions Trading Authority at the Federal Environment Agency, September 2012, accessed 20 March 2013.

All permits are given out free at the beginning of each phase, and a reserve is kept for new entrants into the market. The scheme does not allow linking to schemes outside of Japan (the Tokyo and Saitama schemes themselves are linked).[88] Participants are not required to relinquish permits until the end of the compliance period.[89] A report published by the Tokyo Metropolitan Government shows that Tokyo's 2010 emissions were reduced by 13 per cent compared to the base year (which is an average of three consecutive fiscal years selected between 2002 and 2007).[90]

Saitama cap-and-trade program

One year after the Tokyo scheme was launched the region of Saitama, Japan's fifth most populous prefecture, unveiled its own ETS. The scheme uses the same compliance periods, emissions baseline and threshold for inclusion as the Tokyo ETS. The resulting ETS covers about 600 installations. The reduction target is 7 per cent of emissions by 2014, differentiated whether for office buildings (6 per cent) or other commercial facilities (8 per cent).[91]

Part 3: Proposed emissions trading schemes

A number of countries or regions are said to be, or have been, contemplating their own forms of national mandatory or voluntary ETSs. Both China and Japan are among these. In 2010, the World Bank established the Partnership for Market Readiness (PMR), a 'grant-based, global partnership of developed and developing countries that provides funding and technical assistance for the collective innovation and piloting of market-based instruments for GHG emissions reduction'. [92] The PMR 'also provides a platform for technical discussions of such instruments to spur innovation and support implementation.'[93] Already Brazil, Chile, China, Columbia, Costa Rica, India, Indonesia, Jordan, Mexico, Morocco, Peru, South Africa, Thailand, Ukraine, Turkey and Vietnam have received PMR grants or advice.[94]

Within Brazil, the cities of Rio de Janeiro and Sao Paulo are said to be developing their own state carbon markets with plans to link. [95] Taiwan is said to be exploring a carbon offset scheme,[96] and

88. H Masaki, 'Two big Japanese regions link ETS pact', *Point Carbon*, 17 September 2010.
89. Bureau of the Environment, *Tokyo Cap-and-Trade Program: Japan's first mandatory emissions trading scheme*, Tokyo Metropolitan Government, March 2010, accessed 20 March 2013.
90. Bureau of the Environment, *'The Tokyo Cap-and-Trade Program Results of the First Fiscal Year of Operation (Provisional Results)'*, Tokyo Metropolitan Government, 21 May 2012, accessed 20 March 2013.
91. H Masaki, 'Second Japanese region poised for ETS launch', *Point Carbon*, 15 March 2011.
92. World Bank, 'About the PMR', Partnership for Market Readiness (PMR) website, accessed 20 March 2013.
93. Ibid.
94. World Bank, 'Participants', PMR website, accessed 20 March 2013.
95. C Jones, 'Rio State and Thomson Reuters Point Carbon to launch Brazil's first emissions trading scheme', *Point Carbon,* 11 June 2012 and Climate Markets and Investment Association, '*Country Fact Sheet: Brazil'*, August 2012, accessed 20 March 2013.
96. N Chestney, 'Factbox: Carbon trading schemes around the world', *Reuters*, 26 September 2012.

Dubai has announced its intention to develop an ETS.[97] Russia is also said to be exploring ETS options but very little English-language information has been made public regarding this.[98]

China's emissions intensity scheme

A draft Climate Change Law was released by the Chinese Academy of Social Sciences (CASS) in March 2012. As an institution of the State Council, the CASS is an important part of the Chinese government system. The CASS draft proposal, which outlines a cap-and-trade scheme based around an emissions intensity target, is likely to provide the basis upon which final legislation is founded. Under the proposal, key emitters must comply with caps (or quotas) set by local governments. These quotas would reflect sector-specific emissions intensity benchmarks. A financial penalty of 30 000 to 200 000 RMB ($A5 000 to $A30 000) would apply as a flat rate for non-compliance. Although the scheme seems designed as a carbon trading instrument, the draft does not rule out the idea of a carbon tax and may involve implementation of both a tax and an ETS in different ways.[99] Final legislation is not anticipated before 2016.

In the meantime, China's 12th Five Year Plan (2011-2014) establishes pilot ETSs in seven provinces and cities: Beijing, Shanghai, Tianjin, Shenzhen, Chongqing, Guangdong and Hubei. Each region is charged with designing its own scheme with a planned start date of 2013 (although some may not be ready in time). These pilot schemes are expected to provide invaluable information and testing grounds for a national ETS.[100]

At the moment, all seven pilot schemes are in the design and planning stages. The provinces are coming close to finalisation but little information has been released publicly.[101] It appears that only Shanghai, Guangdong and Shenzhen will have their schemes ready for operation by the end of the year, as planned.[102] The biggest immediate challenge in designing these pilot schemes is overcoming the lack of credible and useful emissions data. Without historical greenhouse gas emissions data, the tasks of setting a reasonable regional cap and verifying facility level emission needs are difficult.[103]

There is a possibility that by establishing schemes in only a handful of provinces, industry in those areas will be tempted to relocate to unaffected provinces. However, this may prove beneficial to China as it may lead to a redistribution of economic activity across the country.[104] The extent to which this occurs will be affected by the carbon price generated in each of these provinces and its

97. Government of Dubai, '*Dubai Supreme Council of Energy and Dubai Carbon Centre of Excellence sign MoU to develop strategy to reduce Emirate's greenhouse gas emissions*', press release, 26 February 2012.
98. M Kruppa, 'Russia to specify 2020 CO2 target, mulls carbon market for former USSR', *Point Carbon*, 2 August 2012.
99. H Chai, 'China's draft climate change law: setting a path toward emission reductions', *Point Carbon*, 9 May 2012.
100. G Yu and R Elsworth, '*Turning the Tanker*', Sandbag, April 2012, accessed 20 March 2013.
101. K Chen, FACTBOX: China's pilot emissions trading schemes, *Point Carbon*, 20 August 2012.
102. H Chai, 'Will 2013 mark the dawn of Chinese ETS?', op. cit.
103. G Han, M Olsson, K Hallding and D Lunsford, '*China's Carbon Emission Trading An Overview of Current Development*', FORES Study 2012:1, p. 42, accessed 20 March 2013.
104. G Yu et al., op.cit.

impact of overall production costs relative to other locations. The cost of relocation and the likelihood and timing of a national carbon price are also relevant to business decisions in this regard.

A national Japanese ETS?

A voluntary national ETS has been available to Japanese industry since 2005.[105] The Japanese Government has also made attempts to adopt a mandatory ETS but none has succeeded. A change in Japanese leadership (after 54 years) came about from the 2009 election. In its campaign the incoming Democratic Party of Japan (DPJ) detailed a new path for Japan: 'to reduce the political influence of the large Japanese corporations and to establish an ambitious climate policy that would reduce greenhouse gas emissions in 2020 by 25 per cent compared to 1990 levels.'[106] Under DPJ Prime Minister Hatoyama the *Basic Law on Global Warming Countermeasures*, which called for the establishment of a national emissions trading scheme, passed the Japanese Parliament in May 2010.[107] However, in mid-2010 the Prime Minister resigned, the DPJ lost its already narrow majority in the Upper House, and the climate change legislation lapsed. In the following months, the DPJ reaffirmed its commitment to implementing an ETS releasing a draft scheme outline with a planned start date of April 2013.[108] However the government was not able to harness enough industry or political support for the scheme and it was postponed indefinitely.[109]

The events at Fukushima in March 2011 marked the world's worst nuclear disaster since Chernobyl[110] and changed Japan's climate policy. Following the incident at the nuclear power plant, a government commission was established to consider whether Japan could still meet its emissions reduction targets.[111] The Japanese Ministry of Environment's Global Environmental Bureau stated on 23 July 2012 that

> The March 2011 Fukushima nuclear power reactor accident led to increased fossil fuel demand that may cause Japan's greenhouse gas emissions in fiscal 2011-2012 to rise as much as 6.6 per cent over the Kyoto Protocol benchmark year of 1990.[112]

105. H Chiba, 'Cap-and-Trade: does it fit Japan?', *The Japan Journal*, April 2009, accessed 20 March 2013.
106. Point Carbon, Carbon Market Analyst, 9 July 2010.
107. Department of Climate Change and Energy Efficiency, 'Status of global mitigation action', 10 November 2010, accessed 20 March 2013.
108. H Masaki, 'Japanese ministry unveils final draft of ETS', *Point Carbon*, 16 November 2010 and Domestic Emissions Trading Subcommittee, '*Key Features of Domestic Emissions Trading Scheme in Japan (Interim Report)*', Global Environment Committee, Central Environment Council, December 2010, accessed 20 March 2013.
109. S Reklev, 'Japan postpones carbon trading plans', *Point Carbon*, 28 December 2010 and H Masaki, 'Japan's government tries again on climate bill', *Point Carbon*, 20 October 2010.
110. CA Huh, SC Hsu and CY Lin, 'Fukushima-derived fission nuclides monitored around Taiwan: Free tropospheric versus boundary layer transport', *Earth and Planetary Science Letter*, vol. 319–20, 15 February 2012, pp. 9–14.
111. T Aritake, 'Japan Debates Greenhouse Gas Strategy for Future Less Reliant on Nuclear Power', *BNA Bloomberg*, 1 September 2011.
112. T Aritake, 'Japan Likely to Overshoot Kyoto Target Because of Increased Fossil Fuel Demand', *BNA Bloomberg*, 23 July 2012.

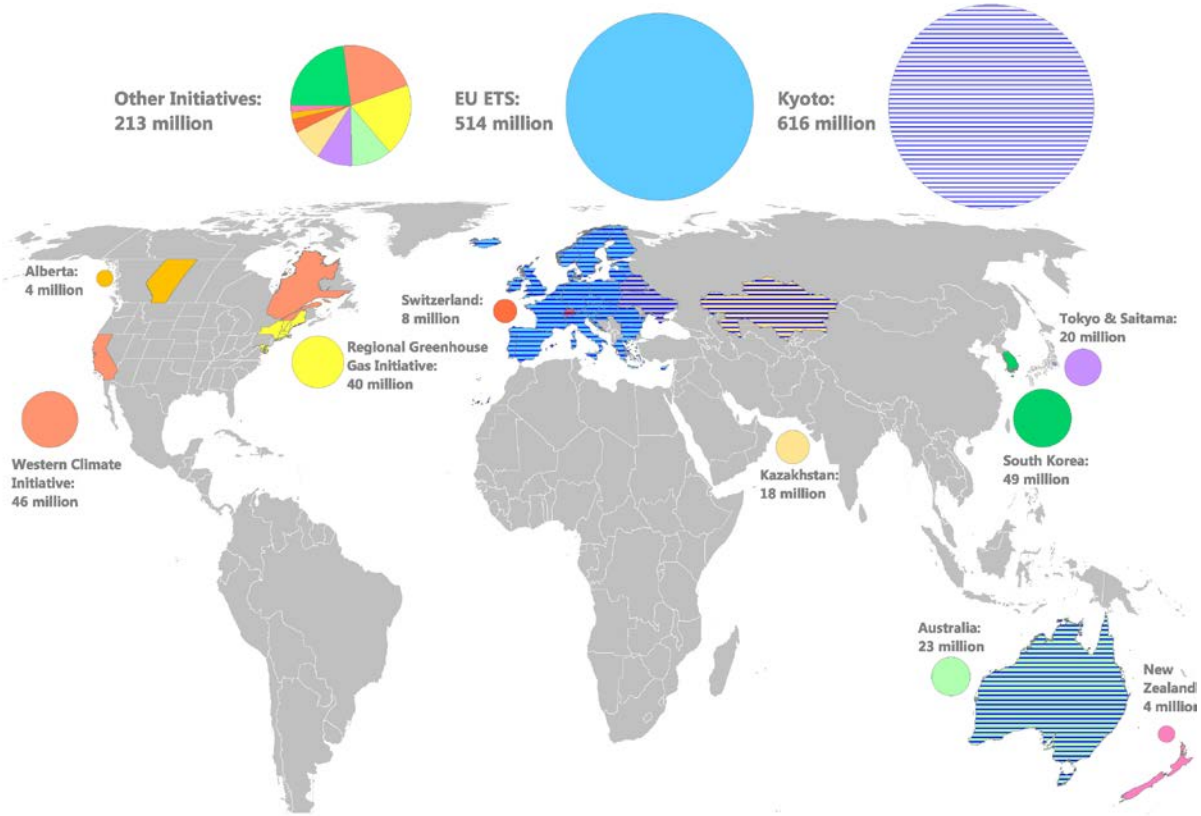
In the December 2012 election the DPJ lost government to the Liberal Democratic Party. The incoming government has indicated that before November 2013 Japan's emissions reduction target will be revised downwards to a less ambitious goal.[113]

Japan's bilateral offset credit mechanism

Despite abandoning the Kyoto Protocol process, Japan is establishing a bilateral offset scheme that appears to be modelled on the CDM. The Japanese bilateral offset credit mechanism (BOCM) relies on a series of bilateral agreements between Japan and developing countries, whereby Japanese investors can fund and retain the resultant carbon credits from emissions reduction projects in partner countries.[114] To date, Japan has signed bilateral agreements with Mongolia and Bangladesh[115] and hopes to partner with Indonesia and Vietnam as well soon.[116]

113. C Watanabe, 'Japan to Announce Greenhouse Gas Reduction Targets by November', *Bloomberg*, 25 January 2013, accessed 20 March 2013.
114. Ministry of the Environment of Japan (MOEJ), '*The Joint Crediting Mechanism / Bilateral Offset Credit Mechanism (JCM/BOCM)*', MOEJ website, accessed 26 April 2013.
115. MOEJ, '*Japan and Bangladesh signed the bilateral document to start BOCM*', MOEJ website, accessed 26 April 2013; and MOEJ, '*Japan and Mongolia signed the first bilateral document to start JCM'*, MOEJ website, accessed 26 April 2013.
116. C Watanabe, Japan Signs First Bilateral Emissions Offset Pact With Mongolia, *Bloomberg*, 8 January 2013.

Appendix 1: Map showing countries with an ETS and their populations



Source: Map generated by the Parliamentary Library; sources for population data: CIA World Factbook and census data for US, Canada and Japan.

Appendix 2: Table of ETSs

Name	Region	Start date	Target or cap	Per cent of emissions covered	Industries covered	Assistance to exposed industries	Penalty for non-compliance	Permit price
Kyoto Protocol (second commitment period)	The 27 EU States + Norway, Croatia, Switzerland, Iceland, Liechtenstein, Belarus, Ukraine, Kazakhstan, Australia	1 January 2013-31 December 2020 (The first commitment period ran from 2008 to end-2012)	13% -18% below 1990 levels by 2020	Not known	Energy, industrial processes, solvents and other product use, agriculture, waste and land-use, land-use change and forestry	None	The country must make up the difference in the next commitment period, plus 30%. Trading rights are revoked in the interim.	The main currency is an Assigned Amount Unit (AAU); however other permit types exist and can be traded. Certified Emission Reductions (CERs) are permits traded in the CDM. CERs are trading at less than €0.08 ($A0.10, April 2013)
EU ETS	•Phase 1: 25 EU States	•Phase 1: 2005-2007	•Trial phase with modest abatement aims	•Phase 1: 40%	•Phase 1: power generators and energy-intensive industry (only CO_2)	•Phase 1: 95% of permits for free	•Phase 1: €40 per tonne	
	•Phase 2: 27 EU States	•Phase 2: 2008-2012	•Phase 2: 8 % below 1990 levels by 2008 to 2012	•Phase 2: 40%	•Phase 2: power stations & other combustion plants, oil refineries, coke ovens, iron & steel plants & factories making cement, glass, lime, bricks, ceramics, pulp, paper & board (mainly CO_2 but some N_2O optional) •2012: add aviation	•Phase 2: 90% of permits for free	•Phase 2: €100 per tonne	
	•Phase 3: 27 EU States + Norway, Iceland, Liechtenstein	•Phase 3: 2013-2020	•Phase 3: National target is 20% below 1990 levels by 2020. ETS target is 21% on 2005 levels by 2020.	•Phase 3: 43%	•Phase 3: add petrochemicals, ammonia & aluminium + N_2O emissions from production of nitric, adipic & glyocalic acid production & PFCs from aluminium sector + emissions from CCS.	•Phase 3: less than 50% for free; none for the power sector; industry get free permits up to 80% of benchmark; heavy emitters get free permits	•Phase 3: €100 rising annually in line with the annual rate of inflation in the Eurozone	About €3.9 ($A4.90, April 2013)

Name	Region	Start date	Target or cap	Per cent of emissions covered	Industries covered	Assistance to exposed industries	Penalty for non-compliance	Permit price
						up to 100% of benchmark		
Carbon Pricing Mechanism	Australia	2012	National target: 5% below 2000 levels by 2020	About 60%	Electricity generation, mining, industrial processes, fugitive emissions, non-legacy waste and construction	66% of permits for free to moderately emissions intensive activities and 94.5% for highly emissions intensive activities.	Twice the price of a permit (currently $A46)	Starting at a fixed $A23 for 2012–13
NZ ETS	New Zealand	•2008: forestry •2010: liquid fossil fuels, stationary energy & industrial processes	National target: 10% to 20% below 2000 levels by 2020.	About 50%	•2008: forestry •2010: liquid fossil fuels, stationary energy & industrial processes	All permits free to EITE, some free to forestry	$NZ30 per permit (where each permit covers two tonnes of emissions)	About $NZ2 ($A1.60, April 2013)
Swiss ETS	Switzerland	2008	National target: 20% below 1990 levels by 2020.	N/A	Same as EU ETS.	None to the power sector; Free permits to EITE based on benchmarks of industry-wide emissions intensity and an adjustment factor based on relocation risk of different industries.	•Large companies: CHF125 •Medium companies: carbon tax applies	Not known.
South Korean ETS	Korea	2015	National target: 4% below 2005 levels by 2020	Around 60%	All industry, buildings & power generation	100% of permits for free, decreasing gradually from 2018.	Three times the permit market price for each tonne (capped at KRW100,000 which is about $A89)	N/A
Kazakhstan ETS	Kazakhstan	2013	National target:15% below 1990 levels by 2018	Around 80%	Manufacturing, mining, metallurgy, chemicals, agriculture and transport	Not known	From 2014, penalty is 10 MCI (which is currently about $A112)	Not known
Regional Greenhouse Gas Initiative (RGGI)	Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New York,	2009	10% on 2009 levels by 2020	About 25%	Power generation	None	Three times the permit shortfall.	About $US2.55 ($A2.50 April 2013)

Name	Region	Start date	Target or cap	Per cent of emissions covered	Industries covered	Assistance to exposed industries	Penalty for non-compliance	Permit price
	Rhode Island, Vermont							
Western Climate Initiative (WCI)	California, British Columbia, Manitoba, Ontario, Quebec	2013	15% below 2005 levels by 2020	About 88%	•2013: Power & industry •2015: add fuels	Still to be determined	Three times the permit shortfall.	N/A
WCI—Californian cap-and-trade	California (US)	•2013 for electric utilities & large industrial facilities •2015 for distributors of transportation, natural gas & other fuels	1990 levels by 2020	About 35% 2013–15 About 85% from 2015	Power generation, manufacturing, mining.	Free permits for 90% of average emissions, based on a benchmark. Amount of free permits decreases annually	Four times the permit shortfall, or $US25,000 fine per missing allowance per 45 days.	Around $US14.50 ($A14.10 April 2013) There is an auction floor price of $US10.71.
WCI—Quebec cap-and-trade	Quebec	•2013 for electric utilities & large industrial facilities •2015 for distributors of transportation, natural gas	20% on 1990 levels by 2020.	25-30%, moving to 75-80% in 2015.	Power generation, and industry, expanding to energy distributors in 2015	Free allocation of 80% or 100% depending on the type of emissions.	Three times the permit shortfall.	N/A There is an auction floor price of $C10.50 (plus inflation) increasing by 5% annually. There is also an allowance reserve to cap price at $C40 to $C50.
Alberta-Based Greenhouse Gas Reduction Program and Offset Credit System	Alberta (Canada)	2007	12% annual reduction in emissions intensity of liable entities	About 50%	Power generation and industry, expanding to energy distributors in 2015	N/A	$C200 per tonne in excess of intensity limit.	Between $C8 and $C12 in 2010
Tokyo cap-and-trade	Tokyo (Japan)	2010	•6% below base-year levels by 2014 •17% below base-year levels by 2019 *	About 40% of commercial and industrial sector emissions (about 20% of total Tokyo emissions)	Buildings and industrial facilities from industrial, commercial, residential and transport sectors	All permits are allocated free	1.3 times the shortfall, and a fine of up to ¥500,000.	Around $US100 ($A95.50 Dec 2012)
Saitama cap-and-trade	Saitama (Japan)	2011	7% below base-year levels by 2014	Not known	Buildings and industrial facilities from industrial, commercial, residential and transport sectors	All permits are allocated free	None	Not known

Source: compiled by the Parliamentary Library.