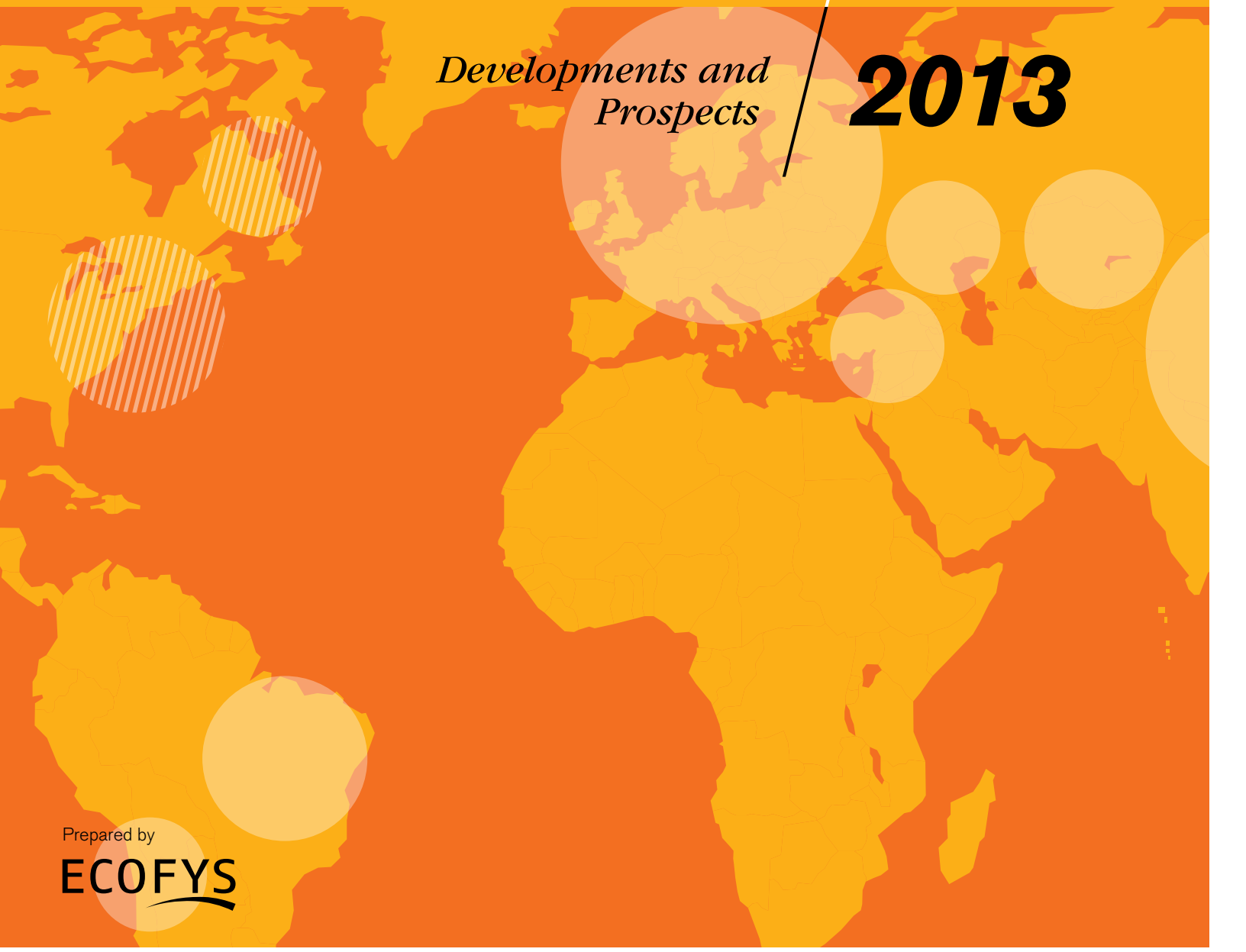
Carbon Finance
AT THE WORLD BANK

Mapping Carbon Pricing Initiatives

Washington DC
May 2013

Developments and Prospects

2013



Prepared by
ECOFYS

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This report replaces the *State and Trends of the Carbon Market* series. Unlike in previous years, the report does not provide a quantitative, transaction-based analysis of the international carbon market as current market conditions invalidate any attempt and interest to undertake such analysis. The development of national and sub-national carbon pricing initiatives in an increasing number of countries calls for a different focus. Thus, this report maps existing and emerging carbon pricing initiatives around the world, hence its new title.

LIST OF ABBREVIATIONS AND ACRONYMS

	°C	Degrees Celsius
A	**AAU**	Assigned Amount Unit
	ACCU	Australian Carbon Credit Unit
	ACR	American Carbon Registry
	ADB	Asian Development Bank
	ARB	Air Resources Board
	ANREU	Australian National Registry of Emissions Units
B	**BOCM**	Bilateral Offset Credit Mechanism
C	**CAR**	Climate Action Reserve
	CCER	Chinese Certified Emissions Reduction
	CCR	Cost Containment Reserve
	CCS	Carbon Capture and Storage
	CDM	Clean Development Mechanism
	CER	Certified Emission Reduction
	CFI	Carbon Farming Initiative
	CH_4	Methane
	CMP	Conference of the Parties serving as the Meeting of the Parties to the Kyoto Protocol
	CO_2	Carbon Dioxide
	CO_2e	Carbon Dioxide Equivalent
	COP	Conference of the Parties
	CP1	First Commitment Period under the Kyoto Protocol
	CP2	Second Commitment Period under the Kyoto Protocol
	CPM	Carbon Pricing Mechanism

D	**DNA**	Designated National Authority
	DOE	Designated Operational Entity
	DRC	Development and Reform Commission
E	**EB**	Executive Board
	ERPA	Emission Reductions Purchase Agreement
	ERU	Emission Reduction Unit
	ETS	Emissions Trading Scheme
	EU	European Union
	EUA	European Union Allowance
	EU ETS	European Union Emissions Trading System
F	**FCPF**	Forest Carbon Partnership Facility
	FVA	Framework for Various Approaches
G	**GCF**	Green Climate Fund
	GHG	Greenhouse Gas
	GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit (German Technical Cooperation Organization)
	$GtCO_2e$	Gigaton of Carbon Dioxide Equivalent
H	**HFC**	Hydrofluorocarbon
	HFC-23	Trifluoromethane hydrofluorocarbon 23
I	**ICAO**	International Civil Aviation Organization
	ICAP	International Carbon Action Partnership
	ICE	IntercontinentalExchange
	IEA	International Energy Agency
	IET	International Emissions Trading
	IETA	International Emissions Trading Association
	IGES	Institute for Global Environmental Strategies
	IPCC	Intergovernmental Panel on Climate Change
J	**J-CDM**	Japan Domestic Credit Scheme
	JCM	Joint Crediting Mechanism
	JCOS	Japan Carbon Offset Scheme
	JI	Joint Implementation
	JISC	Joint Implementation Supervisory Committee
	JNR	Jurisdictional and Nested REDD+
	J-VER	Japan Verified Emission Reduction Scheme
	JVETS	Japan Voluntary Emissions Trading Scheme
K	**KAZ ETS**	Kazakhstan's Emissions Trading Scheme

L	**LAC**	Latin America and the Caribbean
	LDC	Least Developed Country
	LULUCF	Land Use, Land-Use Change and Forestry
M	**MOEJ**	Ministry of Environment Japan
	MOTCC	Mineral Oil Tax: Carbon Charge
	MRP	Market Readiness Proposal
	MRV	Measurement, Reporting and Verification
	MW	Megawatt
	$MtCO_2e$	Megaton of Carbon Dioxide Equivalent
	Mt	Megaton
N	**N_2O**	Nitrous Oxide
	NAM	National Association of Manufacturers
	NAMA	Nationally Appropriate Mitigation Action
	NDRC	China's National Development and Reform Commission
	NGCT	Natural Gas Carbon Tax
	NGER	National Greenhouse and Energy Reporting
	NIM	National Implementation Measure
	NMM	New Market-based Mechanism
	NZ ETS	New Zealand Emissions Trading Scheme
	NZ EUR	New Zealand Emission Unit Register
O	**OECD**	Organization for Economic Co-operation and Development
	OPR	Offset Project Registry
P	**PFC**	Perfluorocarbon
	PMR	Partnership for Market Readiness
	PoA	Program of Activities
R	**REDD**	Reducing Emissions from Deforestation and Forest Degradation
	REDD+	Extends REDD by including sustainable forest management, conservation of forests, and enhancement of carbon sinks
	RGGI	Regional Greenhouse Gas Initiative
	RMU	Removal Unit
S	**SBI**	Subsidiary Body for Implementation
	sCER	Secondary Certified Emission Reduction
	SF_6	Sulfur hexafluoride
T	**tCO_2**	Ton of Carbon Dioxide
	tCO_2e	Ton of Carbon Dioxide Equivalent
	TMS	Target Management System

U	**UK**	United Kingdom
	UN	United Nations
	UNDP	United Nations Development Programme
	UNEP	United Nations Environment Programme
	UNFCCC	United Nations Framework Convention on Climate Change
	US	United States
	US EPA	United States Environmental Protection Agency
V	**VCS**	Verified Carbon Standard
W	**WB**	World Bank
	WBI	World Bank Institute
	WCI	Western Climate Initiative
Y	**y**	Year
	y/y	Year-on-year

CONTENTS

Executive summary

The uncertainty surrounding the future of existing carbon markets in recent years has prevented valuable resources from being channeled to low-carbon investments, particularly from the private sector. Following the economic downturn in 2008–2009 and slow economic recovery in major economies, industrial output plummeted and the demand for carbon assets used for compliance also fell. With limited support, prices reached historic lows. At the same time, several national and sub-national carbon pricing initiatives are emerging. It is not surprising that several of these new carbon pricing initiatives also include design features intended to prevent similar developments in the future. These emerging initiatives are being tailored to national circumstances and include a range of novel design features, including mechanisms to stabilize the carbon price.

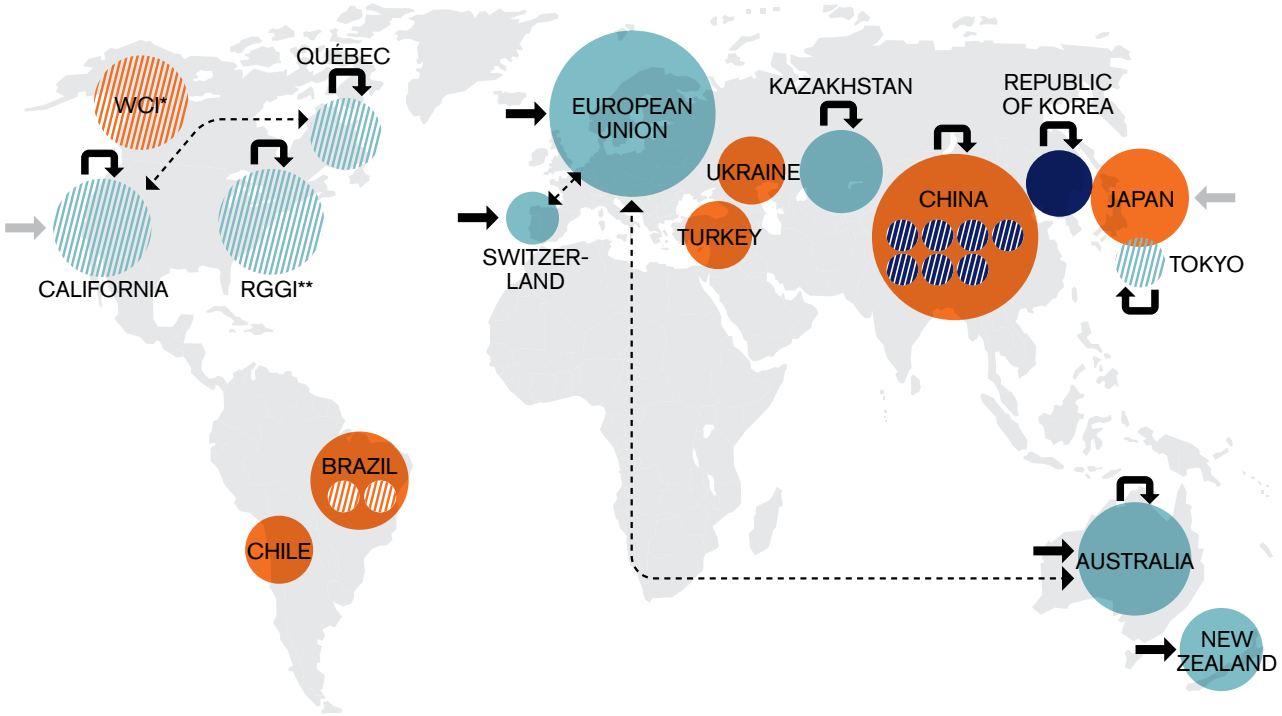
Prices in the major existing carbon markets are at a historic low. Carbon markets have endured challenging years since the global economic crisis of 2008–2009. The subsequent economic downturn led to a significant reduction in industrial activity in some major economies in the years immediately following the economic crisis, as well as falls in greenhouse gas (GHG) emissions in participating economies. Under conditions of lower growth the demand for carbon assets from compliance buyers fell. The imbalance created by reduced demand and an unchanged supply (put in place in a more favorable economic environment) in the main carbon markets has led to a surplus of allowances and credits in the market, causing carbon prices to plummet since mid-2011. Kyoto offsets are currently being traded at a few Euro (€) cents,[1] while EU Allowance (EUA) prices fell from about €30 in mid-2008 to lows of below €4 in early 2013, substantially less than what is needed for a transition to a sustainable, low-carbon world.

The prospect of a coordinated international approach to carbon pricing will remain uncertain for several years. Decisions taken at COP 18 in Doha in 2012 ensured that the existing carbon mechanisms under the Kyoto Protocol would continue. However, mainly European countries made carbon pledges, and these were restricted to levels already known. Outside the Kyoto Protocol, no decisions are expected on new international emissions reduction targets or new carbon market mechanisms before 2015, making implementation impossible before 2020. This leaves a considerable period of time with limited guidance on carbon pricing at the international level.

1 The EU ETS compliance installations have historically represented the largest source of demand for international offsets in the market.

Regional, national and sub-national carbon pricing initiatives are proliferating. Despite weak international carbon markets, both developed and developing countries are mainstreaming carbon pricing initiatives in national climate change and development strategies.[2] Several regional emissions trading schemes and carbon taxes are already in place, while new carbon pricing mechanisms are under development, in some cases including new national offset standards (see Figure 1). Yet other countries are hosting pilot projects under new market mechanisms and for domestic trading schemes. This underlying endorsement of carbon pricing alongside other policy instruments to reduce GHG emissions cannot be left unnoticed.

Figure 1: Map of existing, emerging, and potential emissions trading schemes



* WCI – Western Climate Initiative. Participating jurisdictions are British Columbia, California, Manitoba, Ontario and Québec
** RGGI – Regional Greenhouse Gas Initiative
*** Schemes under consideration are at different stages in the process. See Section 3 for more details.

Note 1: The size of the circles is not representative of the size of the schemes.
Note 2: Mexico's Congress passed a General Law on Climate Change, which provides the federal government with the authority to create programs, policies, and actions to mitigate emissions, including an ETS.
Note 3: Costa Rica is working on the design of a domestic carbon market that would contribute to meeting the country's carbon neutrality goal

2 For the purpose of this report "carbon pricing" includes carbon market mechanisms and GHG / carbon taxes. Policies that put a price on GHG emissions indirectly, e.g., efficiency standards or support policies for renewable energy, are outside of the scope of this report.

» Today, jurisdictions with carbon pricing mechanisms implemented and scheduled emit roughly 10 $GtCO_2e/y$, equivalent to 21% of the 50 $GtCO_2e$ emitted globally. If China, Brazil, Chile, and the other emerging economies eyeing these mechanisms are included, carbon pricing mechanisms could reach countries emitting 24 $GtCO_2e$ per year, or almost half of the total global emissions.

*Implemented and scheduled emissions trading schemes and carbon taxes put a carbon price on at least 3.3 $GtCO_2e/y$, or 7% of global emissions. «**

Carbon pricing needs to be flexible and aligned with national priorities in order to work. The recent implementation of a variety of carbon pricing schemes around the world illustrates, that to be successful, such initiatives have to be in line with national priorities and, in particular, national economic priorities. New schemes benefit from the lessons learned under earlier schemes. Most carbon pricing mechanisms in place or being planned involve a staged approach, allowing for the gradual introduction of a scheme with consecutive compliance periods or using piloting approaches. In addition, many emissions trading schemes include the distribution of free permits, which are then reduced over time. These approaches make the acceptance of schemes by compliance entities and stakeholders easier. Schemes that allow learning can also adjust themselves better to changes in the economy and national priorities.

New approaches are emerging to ensure ambition and price stabilization. Several schemes are exploring ways of raising the level of mitigation ambition over time in a predictable way. The Kyoto Protocol fixes the new targets as a "floor of ambition" and sets a date for countries to increase their ambition. Schemes are introduced through pilots or in phases to then apply the lessons learned (including those on supply and demand balance) to the full scheme. Price stabilization mechanisms can be used to prevent prices from falling too low, such as through a price floor, or to prevent prices from becoming too high, using a cost containment reserve or other mechanisms. Provisions on borrowing and banking allowances between commitment periods were introduced as instruments to stabilize prices in the first cap-and-trade schemes, but these proved to be insufficient. Australia's Carbon Pricing Mechanism (CPM)

* Source for national GHG emissions: JRC/PBL, EDGAR version 4.2 FT2010. Joint Research Centre of the European Commission/PBL Netherlands Environmental Assessment Agency, 2012, available at: http://edgar.jrc.ec.europa.eu/index.php. Rounded to two significant digits.

includes a rolling target-setting approach that can adjust to new economic and environmental considerations. The United Kingdom (UK) carbon price floor is intended to supplement currently low prices in the EU Emissions Trading System (EU ETS), in order to stimulate investment in low-carbon infrastructure and help the country meet its long-term target to reduce GHG emissions of 80% by 2050. The Regional Greenhouse Gas Initiative in the United States (RGGI), Québec's cap-and-trade system, and California's cap-and-trade program include cost containment reserves to safeguard market players against too high prices. Several schemes allow the use of offsets as price stabilization mechanisms.

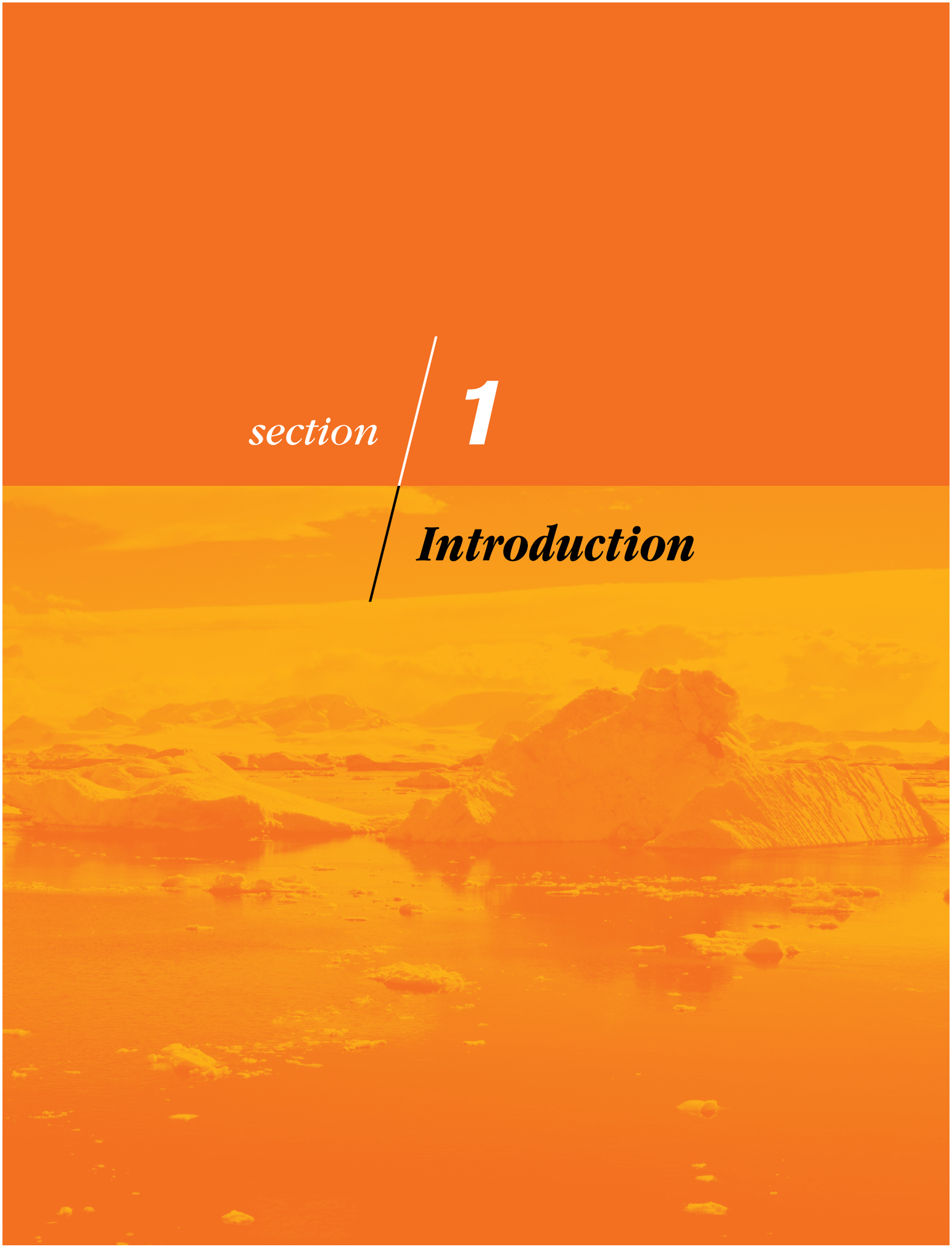
National and regional trading schemes are starting to link up. This report highlights concrete commitments to direct linking made since 2012, such as the EU–Australia link, the EU–Swiss link and the California–Québec link. In addition, many other jurisdictions say they are committed to communicating on and coordinating their detailed design approach to carbon pricing, especially in relation to monitoring and reporting. Linking needs to be carefully timed to allow new carbon pricing schemes to become well established. Unilateral links, which only allow credits from one scheme to be used in another (but not the other way around), can act as a stepping stone towards bilateral links. Unilateral links can also be considered less bold and less risky than bilateral links. While the bilateral link, as in the case of the EU ETS and Australia's CPM, represents a step towards establishing a global carbon market, this link will also compel the schemes to walk in step, making it more difficult to alter either in the future. This challenge, a result of the tight relationship formed through linking, could stimulate the development of more subtle approaches, perhaps creating networks of schemes. This could allow for diversity and national circumstances to be fully accounted for.

The demand for domestic offsets and the role of bilateral offset schemes coincides with falling demand for CERs and ERUs. The overall demand for international offsets has fallen sharply due to the significant decline in demand from the EU ETS. This has led secondary Certified Emission Reduction (CER) and Emission Reduction Unit (ERU) prices to fall to rock-bottom levels.[3] In addition, several jurisdictions, for example Japan and California, are favoring the development of new bilateral offset schemes rather than continuing to rely on international offsets. Furthermore, an increased focus on domestic offset projects is evident in many schemes, for instance in Australia and China. These domestic offset schemes can also secure domestic investment and help reduce emissions in hard-to-reach sectors. Domestic offsets also play a role in other carbon pricing schemes, for instance, Costa Rica's carbon neutrality goal and South Africa's carbon tax.

Climate change requires urgent action at scale. Concerted action to mitigate climate change is as urgent as ever. Global GHG emissions continue to rise, and the window to avert dangerous climate change is closing fast. The international community has agreed to limit the increase in average global temperature to 2 degrees Celsius (°C) above pre-industrial levels. The current level of action puts us on a pathway towards a 3.5–4°C warmer world by the end of this century. Such a scenario would have a devastating impact on the climate and would threaten our current economic model with unprecedented and unpredictable impacts on human life and ecosystems in the long term.[4] The main challenge for the international community will be to find a balance between the emerging plethora of carbon pricing schemes, which allow progress on carbon pricing initiatives at the national level, and global incentives to reduce emissions, which would allow the world to remain below a 2°C limit. Activities at a larger scale are needed for a truly transformational carbon market – one that can emerge from fragmented initiatives. The challenge then will be to develop these initiatives through linking, potentially reshaping the global carbon map.

3 See Figure 4.

4 Although no nation will be immune to the impacts of climate change, the distribution of impacts is likely to be inherently unequal and tilted against many of the world's poorest regions, which are less prepared to cope and adapt. This will threaten to revert decades of hard earned progress in social development by the international community.



section **1**

Introduction

1 Introduction

»I got it wrong on climate change – it's far, far worse.«

These words from Nicholas Stern, author of the 2006 review on climate change that bears his name, also bear witness to the challenge of global climate change.[5]

That climate change is happening is no longer in doubt. But new records set in 2012 confirm a worsening situation. These include the lowest summer ice coverage in the Arctic[6] and highest temperatures in Australia since records began.[7] Current global emissions of greenhouse gases (GHGs) could put us on a pathway towards a world that is 3.5 to 4 degrees Celsius (°C) warmer by the end of the century.[8] An increase in temperature of 4°C would threaten our current economic model with unprecedented and unpredictable impacts on human life and ecosystems into the long-term future.[9]

At the 15th Conference of the Parties (COP) to the United Nations Framework Convention on Climate Change (UNFCCC) in 2009, Parties recognized in the Copenhagen Accord "the scientific view that the increase in global temperature should be below 2°C."[10] For a "likely" chance of being on track, GHG emissions need to be around 44 gigatons of carbon dioxide equivalent ($GtCO_2e$) in 2020. Given current government action, these emissions could reach 52 to 57 $GtCO_2e$ in 2020, leaving a gap of 8 to 13 $GtCO_2e$.[11]

5 Source: Stewart, H., and Elliott, L., Nicholas Stern: *"I got it wrong on climate change – it's far, far worse"*, The Observer, 26 January 2013.
6 Source: National Snow and Ice Data Center, *Arctic Sea Ice News & Analysis*, accessed 1 May 2013, http://nsidc.org/arcticseaicenews/.
7 Source: Australian Bureau of Meteorology, *Climate change and variability*, accessed 1 May 2013, http://www.bom.gov.au/climate/change/index.shtml#tabs=climate-change-tracker&tracker=time-series.
8 Source: *Climate Action Tracker*, accessed on 20 March 2013, www.climateactiontracker.org.
9 Source: Potsdam Institute for Climate Impact Research and Climate Analytics, *Turn down the heat – why a 4°C warmer world must be avoided*, World Bank, November 2012.
10 Source: UNFCCC, *Draft decision -/CP.15, Proposal by the President, Copenhagen Accord*,18 December 2009.
11 Source: United Nations Environment Programme (UNEP), *Emissions Gap Report 2012*, November 2012.

Finance is key to realizing emission reductions needed to bridge this emissions gap. The role for the private sector and how this interplays with the public sector are crucial questions. Global climate finance reached around US$364 billion in 2011, with the private sector as the main source, contributing between US$217 and 243 billion, mostly from corporations and renewable energy project developers. Public sector investment totaled between US$16 and 23 billion globally, and from public and private intermediaries between US$110 and 220 billion.[12] Most public sector investment acted as a catalyst for private investment by creating an incentive framework that helped to lower investment costs and risks, and enabling private flows. Private initiatives will be essential to raise resources at scale and to seek out least-cost options for climate mitigation and adaptation activities.

In that respect, the market for project-based emission reductions has been an important catalyst for low-carbon investment in developing countries. By complementing and leveraging other resources, carbon markets catalyzed the shift of much larger amounts of (essentially private) financial and investment flows toward climate-smart development.

For the purpose of this report, carbon pricing includes initiatives that give a direct price to GHG emissions, that is, carbon market mechanisms (e.g., emissions trading schemes, offsets and new market mechanisms) as well as non-market initiatives (e.g., results-based financing) and carbon taxes. Such initiatives are being implemented not only at the international level but also increasingly at the regional, national, sub-national levels. A variety of policies implemented by governments indirectly price carbon and reduce GHG emissions, such as energy efficiency standards, energy efficiency certificate trading, fuel taxation, removal of fossil fuel subsidies, and support for renewable energy. These policies are, however, outside of the scope of this report.

12 Source: Buchner, B., Falconer, A., Hervé-Mignucci, M., Trabacchi, C., *The Landscape of Climate Finance 2012*, Climate Policy Initiative, December 2012.

At the international level, decisions on new internationally agreed emission reductions targets and new mechanisms are not expected before 2015, making implementation impossible before 2020. The new mechanisms are likely to encompass carbon market mechanisms, such as the new market-based mechanism defined by the UNFCCC at the Durban COP, as well as non-market approaches. Until this agreement is in place, however, uncertainty will prevail. The continuing effects of the economic crisis combined with a lack of ambition in reduction targets will continue impacting the mechanisms of the Kyoto Protocol and will limit the allocation of private capital to climate change mitigation. The state of play of existing international carbon pricing mechanisms and new initiatives under the international framework are reviewed in Section 2.

Despite weak international carbon markets, countries are increasingly embarking on carbon pricing initiatives at the regional, national, and sub-national levels. This is partly driven by international negotiations, and partly by increasing recognition of the urgency of required action and the associated economic and development implications both in the form of threats and opportunities. As the international community works on effective and practical solutions to mitigate GHG emissions on a large scale, it is imperative that it makes full use of accumulated experience, knowledge and capacity. Existing, emerging, and potential regional, national and sub-national carbon pricing mechanisms are discussed in Section 3.

Various carbon pricing mechanisms are different but share common considerations, analyzed in Section 4. This section presents themes including setting the appropriate ambition level, using offsets and taking concrete moves towards linking schemes together.

section **2**

International carbon pricing approaches

2 International carbon pricing approaches

2.1 STATUS OF INTERNATIONAL CLIMATE NEGOTIATIONS AFTER DOHA

The 18th COP to the UNFCCC took place in Doha, Qatar, in November–December 2012. COP 18 resulted in the Doha Climate Gateway, which prepares the pathway for negotiations on a global agreement on climate change by 2015. Outcomes from the Doha COP include a timetable and milestones for the Durban Platform, which foresees the adoption of an international agreement in 2015 to be implemented in 2020.

The Doha conference moreover ended uncertainty about a second commitment period for the Kyoto Protocol (CP2) by translating the 2011 decision to have a second commitment period into legal text in the form of an amendment to the Kyoto Protocol. CP2 will last from 2013 to 2020 and thus allows a continuation of legally binding targets after 2012. In order to enter into force, the amendment requires ratification by three-quarters of the participating Parties.[13] Parties have agreed to either apply it provisionally or implement it as of January 1, 2013.[14] The decision on CP2 also provides a basis for the three market-based mechanisms of the Kyoto Protocol (Clean Development Mechanism, CDM; Joint Implementation, JI; and International Emissions Trading, IET) to continue.

Australia, Belarus, Croatia, the European Union (EU-27),[15] Kazakhstan, Liechtenstein, Monaco, Norway, Switzerland and Ukraine have submitted emissions reduction targets under CP2 of the Kyoto Protocol. New Zealand remains a Party to the Kyoto Protocol. It will be taking a quantified economy-wide emission reduction target under the UNFCCC in the period 2013 to 2020. The Russian Federation and Japan have decided not to participate in CP2. Canada, meanwhile, withdrew from the Protocol in December 2011.

It was acknowledged in the decisions that reduction targets under CP2 of the Kyoto Protocol are less stringent than those suggested by the Intergovernmental Panel on Climate Change (IPCC) to limit global temperature increase to 2°C. Hence, countries need to revisit their target levels in 2014 in order to increase ambition.[16]

13 According to Article 20 and 21 of the Kyoto Protocol.
14 Source: UNFCCC, *Decision 1/CMP.8 II. paras 5 and 6*, 28 February 2013.
15 The CP2 targets of Iceland and Croatia's under the Kyoto Protocol are based on the understanding that they will fulfill it jointly with the European Union and its member states. Croatia's accession to the European Union shall not affect its participation in such a joint fulfillment agreement.
16 This is additional to the Ad Hoc Working Group on the Durban Platform for Enhanced Action workstream on raising ambition levels in the pre-2020 period.

Many countries that do not have targets under the Kyoto Protocol have submitted non-binding emissions reduction targets or action for 2020, amongst them all major emitters. It is unclear, however, whether these targets create demand for international allowances through new carbon market mechanisms. The United States (US) for example announced that it will achieve its federal level target without international allowances, although individual states may allow the use of these allowances.

In total, these emission reduction proposals of all countries for 2020 remain insufficient to put global emissions on a path consistent with limiting global temperature increase to 2°C.[17] Therefore, the Ad Hoc Working Group on the Durban Platform for Enhanced Action has initiated a workstream to increase the ambition *before* 2020.

The Doha Climate Gateway further includes a range of other elements that, among others, consolidate the architecture for implementation of a future, global climate agreement, thus indicating continued confidence in the UNFCCC as the forum to tackle climate change.

The Doha agenda also included further mechanisms covering carbon markets and direct financing, which will play a role in the discussion on a post-2020 climate agreement. These include the New Market-based Mechanism (NMM), the Framework for Various Approaches (FVA), Reducing Emissions from Deforestation, Forest Degradation and sustainable forest management (REDD+), as well as Nationally Appropriate Mitigation Actions (NAMAs). Results-based financing is a new term that is used under various previous concepts and has been included as an approach for the implementation of the Green Climate Fund (GCF).[18] Beyond the UNFCCC, the voluntary carbon market represents a small, but relevant part of implemented carbon pricing mechanisms and cannot be omitted when mapping international carbon pricing mechanisms. These approaches are discussed in detail in the following sections.

2.2 MECHANISMS UNDER THE KYOTO PROTOCOL

2.2.1 Supply and demand outlook for international credits (2013–2020)

Analysts predict the overall demand for international credits for 2013–2020 to be around 1,600 $MtCO_2e$ (see Table 1). The EU ETS and Effort Sharing Decision are the main sources of demand, with an estimated demand of less than 1,400 $MtCO_2e$. The potential demand from other schemes, summarized in Table 1 is about 250 $MtCO_2e$.

Estimates of supply of Certified Emission Reductions (CERs) and Emission Reduction Units (ERUs) (other potential international credits not included) are higher than 1,900 $MtCO_2e$ for 2013–2020 as shown in Table 2. This is still considerably lower than what was estimated last year (around 2,700 $MtCO_2e$)[19] despite an increasing number of projects in the pipeline. The forecast was reviewed to reflect the market conditions, with projects stopping issuance due to low prices. These estimates are uncertain since it will take time to see the full effect of price decrease on supply and there is a large potential for resurgence in supply if the issue of demand is addressed.

Both supply and demand figures for international credits are influenced by developments at the national, regional, and sub-national levels (e.g., development of new schemes that accept CERs and ERUs, new market-based approaches under the UNFCCC, and new bilateral agreements) and at the international level (e.g., outcome of international negotiations). It can nevertheless be concluded that in the current situation the supply of CERs and ERUs is likely to outweigh the global demand for international credits for 2013–2020.

17 Source: UNEP, *UNEP Emissions Gap Report 2012*, November 2012.
18 Source: UNFCCC, *Decision 3/CP.17, paras 51 and 55*, 15 March 2012.
19 Source: estimates from Thomson Reuters Point Carbon in Table 13 of Kossoy, A. and Guigon, P., *State and trends of the carbon market 2012*, World Bank, May 2012.

Table 1: Potential demand for international credits (2013–2020)

Country or group of countries	Assumption	Potential demand 2013–2020 ($MtCO_2e$)
Australia	After linking with the EU ETS: 12.5% of Australia's compliance obligation allowed to be met through international credits	Around 90[20]
EU-27, Iceland, Liechtenstein, Norway and Switzerland	Demand for international credits between 2008 and 2020: around 2,400 $MtCO_2e$,[21] of which about 1,060 $MtCO_2e$ were used until 2012 for compliance.[22] Other credits were already secured – but not yet used – by EU ETS installations, or are in the hands of governments and intermediaries	Less than 1,400
Japan	Japan has declined to sign up for CP2 and will therefore not be allowed to buy secondary Kyoto credits. No estimates provided due to uncertainties around potential demand for offsets under the Joint Crediting Mechanism (JCM) / Bilateral Offset Credit Mechanism (BOCM) and for Kyoto credits from companies under Japanese voluntary scheme, and around the GHG reduction target that is currently under review	Low
New Zealand	Only demand for CP1 Kyoto credits. Range is calculated by the New Zealand government and depends on whether carry-over is allowed in 2015[23]	Around 70
North America	Only California, demand limited to Reducing Emissions from Deforestation and Forest Degradation (REDD) credits[24]	Around 80
Total		**Around 1,600**

Table 2: Potential supply of CERs and ERUs (2013–2020)

	Potential supply 2013–2020 ($MtCO_2e$)
CERs, EU ETS eligible	1,690
CERs, others	223
ERUs, EU ETS eligible	7
Total	**1,920**

Source: Thomson Reuters Point Carbon, *Carbon Market Monitor*, April 10, 2013.

20 Calculation provided by the World Bank.
21 Around 1,700 $MtCO_2e$ including aviation for the EU ETS and around 700 $MtCO_2e$ for the Effort Sharing Decision.
22 Source: Thomson Reuters Point Carbon, *Carbon Market Analyst,* 2 May 2013.
23 Source: Government of New Zealand, ***Consultation on domestic carry-over provisions***, February 2013, http://climatechange.govt.nz/consultation/ets/proposed-options-for-carry-over-units-ets-2013.pdf.
24 Own calculation according to the California Cap-and-Trade Regulations allowing 2% in REDD credits in the first and second compliance period, and 4% in the third compliance period.

2.2.2 The Clean Development Mechanism (CDM)

While the Doha decision on CP2 confirmed the existence of the CDM until 2020, it did not address the issue of low demand, thereby questioning the role of the CDM as a catalyst for private sector investment in climate change mitigation.

2012 at a glance The effects of the lack of demand are being felt throughout the CDM market. The price of primary CERs for most projects follows the price for secondary CERs (sCERs), which went down from €3.86 in January to €0.34 in December.[25] Without a major change in the supply/demand imbalance, no significant price recovery can be expected in the near future. This provides little incentive for project developers to originate new CDM project activities. In February 2013, 17 projects were submitted for validation compared with 256 at the same time last year, and in March 2013 this number was 18 compared with 278 in 2012.[26] Some analysts forecast an 80% year-on-year (y/y) reduction in the number of projects submitted for validation in 2013 compared with 2012.[27]

Low prices also affect the generation of CERs, as the current price does not cover the costs of verification and issuance of CERs for some existing CDM projects. In some cases monitoring activities are also slowing down (e.g., collection of emission reductions data is being stopped, the monitoring equipment not maintained) and, in extreme cases, projects solely relying on carbon credits to cover operational costs are being discontinued (e.g., abatement equipment removed). It is yet to be seen to which extent project developers will abandon their unfinished CDM projects, attempt to sell them in the voluntary or domestic markets, and/or convert CDM programs of activities (PoAs) into NMMs. Low prices increase the bargaining power of buyers, who are renegotiating emission reductions purchase agreements (ERPAs) of existing projects[28] and, in some cases, entering with sellers into contract disputes over the price agreed in the ERPAs.[29]

This reduction in origination and CER generation activities leads to the consolidation of the market, already observed in 2011. Most carbon project developers are limiting their CDM activities or turning to other financing structures for their clean energy investments, and Designated Operational Entities (DOEs) are engaging in new activities, such as broader auditing and sustainability report assurance.

Despite this lack of demand, 2012 saw a peak of activity in the registration of CDM projects and the issuance of CERs (see Table 3 and Figure 2). This did not reflect the demand side but was driven by the upcoming end of Phase II of the EU ETS and the start of Phase III, which sees the introduction of additional restrictions on the use of international credits. CERs from projects registered after December 31, 2012 will be eligible only if they are hosted by Least Developed Countries (LDCs) or countries with bilateral agreements with the EU.[30] As a consequence, in an attempt to secure compliance under Phase III of the EU ETS, submissions for registrations steadily increased throughout the year to reach a record in December, when 947[31] projects were registered or in the registration process. Now that the EU ETS eligibility deadline has passed and as a result of origination activities slowing down, a significant reduction in the number of registrations, estimated at around 60% y/y by some analysts, is expected in 2013.[32]

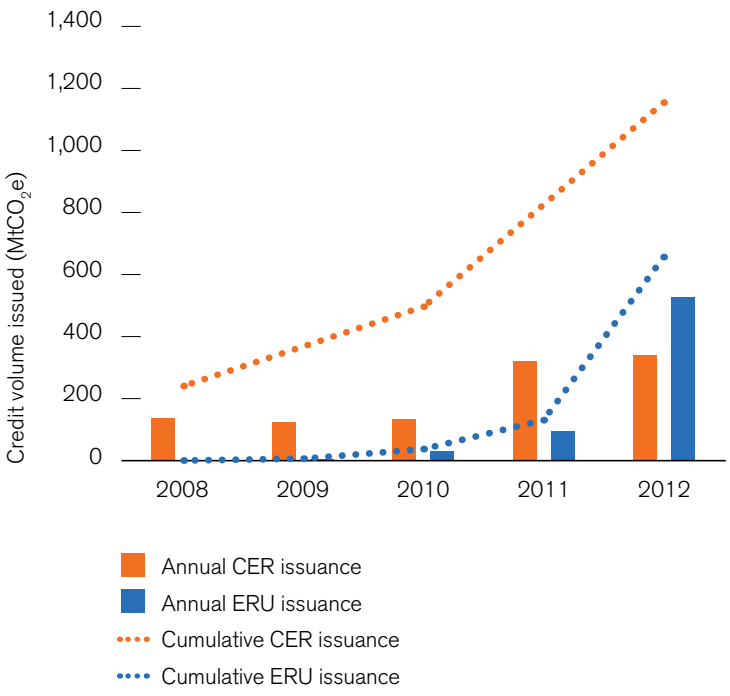
25 Source: IntercontinentalExchange (ICE), *Daily Future sCERs*, prices on 3 January 2012 and 17 December 2012.
26 Source: UNFCCC, *CDM insights*, Data as of 31 March 2013, 31 March 2013, http://cdm.unfccc.int/Statistics/Public/CDMinsights/index.html.
27 Source: Barclays, *Commodities Research, Quarterly Carbon Standard, Waiting room*, 23 January 2013.
28 For more details on ERPA renegotiations, please see section 4.2.1 of Kossoy, A. and Guigon, P., *State and trends of the carbon market 2012*, World Bank, May 2012.
29 Source: Thomson Reuters Point Carbon, *Point Carbon Analysis, Buyers step away from Chinese CDM contracts*, 7 February 2013.
30 No such agreement has been signed so far.
31 Source: UNFCCC, *CDM insights, Data as of 31 March 2013*, 31 March 2013, http://cdm.unfccc.int/Statistics/Public/CDMinsights/index.html.
32 Source: Barclays, *Commodities Research, Quarterly Carbon Standard, Waiting room*, 23 January 2013.

Table 3: CDM projects registered and CERs issued

	Registrations (number of projects)	Issuances ($MtCO_2e$)
Total[36]	6,663	1,271 $MtCO_2e$
In 2012	2,719[37]	339 $MtCO_2e$[38]

Sources: UNFCCC, UNEP Risoe, Institute for Global Environmental Strategies (IGES), Thomson Reuters Point Carbon

Figure 2: CERs and ERUs issuance (2008–2012)



Sources: UNFCCC, UNEP Risoe

Another restriction introduced in Phase III is the ban after April 2013 of CERs from projects involving the destruction of trifluoromethane hydrofluorocarbon 23 (HFC-23) and nitrous oxide (N_2O) emissions from adipic acid production. This drove the issuance of CERs in 2012, and in early September 2012 the number of total CERs issued passed 1,000 $MtCO_2e$. By the end of March 2013 this reached 1,270 $MtCO_2e$.[33] Total issuances in 2012 alone amounted to 339 $MtCO_2e$. CERs from HFC-23 projects and N_2O projects in adipic acid plants accounted for 41% of this volume, and renewable energy projects accounted for 33%.[34] After April 30, 2013, issuances are expected to decrease significantly and analysts forecast a y/y reduction of around 63% in CER issuance this year.[35]

On the secondary market, it is estimated that around 2,400 $MtCO_2e$ were traded in 2012.[39] Significant trading activity was observed until the compliance deadline of April 30, 2013 for Phase II of the EU ETS. Trading activity is forecast to steadily decrease to below 1,000 $MtCO_2e$/y by 2015 as estimated by some analysts.[40]

33 Source: UNFCCC, *CDM insights, Data as of 31 March 2013*, 31 March 2013, http://cdm.unfccc.int/Statistics/Public/CDMinsights/index.html.
34 Source: Barclays, *Commodities Research, Quarterly Carbon Standard, Waiting room*, 23 January 2013.
35 Source: Barclays, *Commodities Research, Quarterly Carbon Standard, Waiting room*, 23 January 2013.
36 As of 31 March 2013. Source: UNFCCC, *CDM Insights, Project activities as of 31 March 2013*, accessed on 13 April 2013.
37 As of 31 March 2013. Source: UNEP Risoe, *CDM/JI Pipeline Analysis and Database*, 1 April 2013. A backlog of requests for registration submitted in 2012 are still being processed by the UNFCCC Secretariat and will be registered retroactively. The exact number of projects registered in 2012 will become available when this pipeline is cleared.
38 Source: IGES, *IGES CDM Monitoring and Issuance Database*, 15 March 2013; Thomson Reuters Point Carbon, *Carbon Market Daily, CER issuance up 6 pct in 2012*, 31 December 2012.
39 Source: Thomson Reuters Point Carbon, *Carbon Market Analyst, Outlook: Global carbon markets 2013-2015*, 25 March 2013.
40 Source: Thomson Reuters Point Carbon, *Carbon Market Analyst, Outlook: Global carbon markets 2013-2015*, 25 March 2013.

Initiatives to safeguard the CDM The CDM Executive Board (EB) and the international community recognize the threat the CDM is under. They realize that this is affecting the ability of the mechanism to spur investment in low carbon technologies and they are aware of the risk of losing the experience and resources that have been built up around the CDM over the past several years.[41] Several activities aimed at strengthening the CDM and positioning it in the future climate regime were launched in 2012.

The UNFCCC Secretariat and the CDM EB have been continuing in 2012 efforts to promote regional distribution and develop CDM capacity in LDCs. For example they organized training and special facilities to support the CDM in LDCs, including two regional collaboration centers,[42] and they also launched an interest-free loan scheme to support the development of projects in underrepresented countries.[43]

At a more strategic level, the EB launched the CDM Policy Dialogue in October 2011. A panel of experts from civil society, policymakers and market participants was mandated to "review past CDM experience and help to ensure the readiness and positioning of the CDM to meet the challenges of the post-2012 period."[44] The panel's recommendations, published in September 2012, stipulate the need for rapid action on the supply but also the demand side to prevent the collapse of the CDM.[45]

With Doha marking the end of the first commitment period under the Kyoto Protocol (CP1), the review of the modalities and procedures of the CDM decided at the first meeting of the Parties to the Kyoto Protocol was launched.[46] The revised rules, planned to be approved at COP 19 in Warsaw at the end of 2013, aim to help ensure that the CDM will be more efficient and effective as and when demand returns.[47] In parallel, the CMP requested the EB to explore possibilities to further streamline the CDM project cycle, by, *inter alia*, reviewing the validation process of projects that are deemed to be automatically additional, simplifying the regulatory framework for PoAs, and further developing the regulatory framework relating to standardized baselines.[48]

» Without a major change in the supply/demand imbalance, no significant price recovery can be expected in the near future. This provides little incentive for project developers to originate new CDM project activities. «

Also in Doha, eligibility issues relating to CP2 were discussed. Proposals to allow the use of CERs by Parties without a CP2 target[49] were rejected and it was decided that only Parties with CP2 targets can transfer and acquire

41 Sources: UNFCCC, *FCCC/KP/CMP/2012/3 (Part I), Annual report of the Executive Board of the clean development mechanism to the Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol*, 25 October 2012; International Emissions Trading Association (IETA), *Subject: IETA Response To the Call For Input On recommendations for possible changes to the modalities and procedures of the CDM*, 25 March 2013.
42 Source: UNFCCC, *Press release, UNFCCC expands efforts to increase regional distribution of clean development mechanism projects*, 12 February 2013.
43 Source: UNFCCC, *Press release, New loan scheme launched to boost CDM projects in least developed countries*, 20 April 2012.
44 Source: UNFCCC, CDM Executive Board, ***EB64, Annex 1, Terms of reference for the policy dialogue on the Clean Development Mechanism***, October 2011.
45 Key recommendations on the demand side include the need for Parties to increase the level of mitigation ambition and the establishment of a fund to purchase CERs in the short to medium term. Key recommendations on the supply side include to develop sector-based crediting approaches, support wider use of standardized methods for additionality determination, strengthen sustainability benefits, expand coverage of underrepresented regions, create greater regulatory certainty and consistency of decision making, promote greater accountability, and create an appeals process. For more information, see CDM Policy Dialogue, *Climate Change, Carbon Markets and the CDM: A Call to Action. Report of the High-Level Panel on the CDM Policy Dialogue*, September 2012.
46 Source: UNFCCC, *Decision 3/CMP.1*, 30 March 2006.
47 Source: UNFCCC, *Highlights - 72nd meeting of the CDM Executive Board*, 8 March 2013, http://cdm.unfccc.int/CDMNews/issues/issues/I_TIKWZ21BNON7O3LX7M63A8IJCXGAAC/viewnewsitem.html.
48 Source: UNFCCC, *Decision 5/CMP.8*, 28 February 2013.
49 Sources: UNFCCC, *Draft decision -/CMP.8 Amendments to the Kyoto Protocol pursuant to its Article 3, paragraph 9*, AWG-KP Vice-Chair's Informal Consultations, 1 December 2012.

CERs.[50] Parties without a CP2 target can purchase and cancel CERs with the objective of accounting this purchase towards their emissions reduction pledge.[51]

Until the issue of the lack of demand for CERs is addressed, the CDM market will continue to slow down and uncertainty will remain around the role of the mechanism in the international climate policy landscape.

2.2.3 Joint Implementation (JI)

The EU introduced new rules on putting qualitative restrictions on the use of ERUs issued after December 31, 2012 in Phase III of the EU ETS, resulting in ERU issuance reaching a record high and exceeding the annual issuance of CERs for the first time (see Figure 2). Continuously low demand, growing supply and high uncertainty in the rules governing the eligibility of ERUs under the EU ETS have resulted in the ERU price dropping to €0.17 in December 2012 from €9.7 averaged in 2011.[52]

2012 at a glance As for the CDM additional qualitative rules restricting the use of ERUs were implemented in Phase III of the EU ETS. In addition, the EU is introducing new registry rules for the use of ERUs, which are expected to enter into force in May 2013.[53] The new rules, taking the form of an amendment of the Regulation which governs the registry infrastructure underpinning the EU ETS, aim to implement existing provisions in the EU's 2008 climate and energy package.[54] As per these new rules, to avoid double-counting, the issuance of ERUs is not permitted for projects hosted in member states directly or indirectly related to activities covered by the EU ETS Phase II after December 31, 2012[55] and projects related to activities newly covered by Phase III of the EU ETS after April 30, 2013. Furthermore, ERUs transferred to the EU ETS registry after May 1, 2013 by countries that have not committed to CP2 are only allowed to be held in the EU ETS registry if they represent emission reductions achieved before December 31, 2012, which is especially relevant for the Russian Federation. Such emission reductions have to be verified under JI Track 2. ERUs that cannot be held in the registry of the EU ETS cannot be used for compliance. The European Commission presented a draft amendment of the Regulation on December 13, 2012.[56] The European Commission's Climate Change Committee approved the proposal to update the Regulation on January 23, 2013. Provided that there are no objections within three months, the Commission will adopt and publish the amendment, after which it will enter into force.[57]

The prospect of these new rules led to a surge of ERU issuances in December as countries anticipated a possible change of ERU eligibility. The ERU issuance in 2012 amounted to 526 $MtCO_2e$, which is more than five times the issuance in 2011 (see Figure 2).[58] Most of the ERUs were issued by Ukraine and the Russian Federation at the end of the year, accounting for 492 $MtCO_2e$. Almost all ERUs were issued under JI Track 1, which is under the supervision of the host Party.

This distribution is also reflected in the number of projects in the JI pipeline. To date, of the 782 projects at different stages of development, two-thirds are hosted in the Russian Federation (203 projects) and Ukraine (317 projects). Moreover, in 2012, more than 90% of newly submitted projects were from the Russian Federation and Ukraine.[59]

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50 Source: UNFCCC, *Decision 1/CMP.8*, 28 February 2013.
51 Source: Sterk, W., *House Cleaning in Doha – UN Summit Delivers Second Life for Kyoto but no Deal to Revive the Carbon Market*, In: Wuppertal Institute, *The Long Road to 2015*, Carbon Mechanisms Review Issue 1/2013, January 2013.
52 IntercontinentalExchange (ICE), *Future December 2012 ERUs*, average of 2011 prices and price on 17 December 2012.
53 Source: European Commission, *Questions & answers on use of international credits in the third trading phase of the EU ETS*, February 2013, http://ec.europa.eu/clima/policies/ets/linking/faq_en.htm.
54 Source: European Commission, *Growing consensus in Climate Change Committee on main elements of forthcoming changes to EU ETS registry rules*, 13 December 20122013, http://ec.europa.eu/clima/news/articles/news_2012121301_en.htm.
55 During Phases I and II of the EU ETS, some ERUs were generated from ETS activities within ETS participating countries, with special rules in place to prevent double-counting. This situation occurred in Romania and Bulgaria who joined the EU and therefore the EU ETS when the scheme had already been established, and with JI projects already in the pipeline in participating sectors.
56 Source: European Commission, *Growing consensus in Climate Change Committee on main elements of forthcoming changes to EU ETS registry rules*, 13 December 2013, http://ec.europa.eu/clima/news/articles/news_2012121301_en.htm.
57 Source: European Commission, *New EU ETS registry rules approved by Climate Change Committee*, 23 January 2013, http://ec.europa.eu/clima/news/articles/news_2013012301_en.htm.
58 Source: UNFCCC, *ERUs issued*, 3 April 2013, http://ji.unfccc.int/statistics/2012/ERU_Issuance.pdf.
59 Source: UNEP Risoe, *JI Pipeline*, 1 April 2013.

Doha and JI reform The issuance of ERUs requires the cancellation of Assigned Amount Units (AAUs) in equal amount. In Doha, Parties decided[60] that countries cannot issue ERUs for CP2 until CP2 AAUs are issued. Countries that do not participate in CP2 can therefore not participate in JI. Parties at Doha decided that all CP2 units above the averaged 2008–2010 emissions are automatically cancelled. For the future, JI suppliers such as Belarus, Ukraine and Kazakhstan have so far submitted CP2 targets higher than allowed by the Doha decision,[61] which increases uncertainty whether they will participate in CP2, and therefore whether they will continue to be ERU suppliers.

Furthermore, the Doha decision means an interruption in ERU issuance. Transitional measures have been suggested by the Joint Implementation Supervisory Committee (JISC) to avoid such interruption but these were not adopted at Doha. Instead Parties requested the Subsidiary Body for Implementation (SBI) to consider expediting the continued issuance, transfer and acquisition of CP2 ERUs. Until such modalities are in place, ERUs cannot be issued for CP2.

In Doha, the Parties also agreed to investigate a comprehensive reform of JI, notably the merging of Tracks 1 and 2.[62] A proposal for a single track procedure includes a stronger role for verifiers accredited by the JISC and the host Party, with mandatory standards for accreditation set out by a new governing body.[63] The new governing body would have the mandate to also oversee the JI mechanism and ensure that rules are being properly applied. The Parties tasked the SBI to prepare recommendations, including revised JI guidelines, in relation to the future operation of JI for COP 19 in Warsaw in 2013.[64] Revisions should consider the implementation of the single unified track, an accreditation process closely aligned with CDM, an appeals process against decisions of the JISC, modalities for the demonstration of additionality, and requirements for host Parties with respect to approval of baselines and the setting of standardized baselines.

The revision of the JI guidelines provides an opportunity to find a clear role for JI in a future international climate regime. With JI activity focused mainly in the Russian Federation and Ukraine, the future of the mechanism needs a careful consideration of how to widen the scope of participation, whilst ensuring environmental integrity. Parties will also need to promptly address the issue of the gap in issuance of ERUs, which poses a genuine challenge to the continuation of the mechanism in its current form.

2.2.4 International Emissions Trading (IET)

The Doha decisions on surplus AAUs CP1 has an estimated AAU surplus of around 13,000 $MtCO_2e$ which, according to Kyoto rules, can be carried over to CP2.[65] With this surplus exceeding estimated demand, it would undermine mitigation actions in CP2. For this reason, ending the uncertainty about the AAU surplus was an important agenda item for the Doha conference.

While the decision taken in Doha does not limit the *carry-over* of AAUs into CP2, it does introduce some restrictions on the *use* of this surplus. Countries participating in CP2 can use their carried over CP1 AAUs to reach their *own* CP2 target and sell part of them, and AAUs from CP1 can only be used if they originate from countries having taken on targets in CP2.[66] Countries with a large surplus which are not participating in CP2, such as the Russian Federation, will be unable to sell their excess AAUs.[67] This has a significant impact, because the Russian Federation's estimated surplus is around 5,800 $MtCO_2e$.[68]

60 Source: UNFCCC, *Decision 1/CMP.8*, 28 February 2013.
61 Source: Wuppertal Institute, *The Long Road to 2015*, Carbon Mechanisms Review Issue 1/2013, January 2013.
62 Source: UNFCCC, *Decision 6/CMP.8*, 28 February 2013.
63 Source: UNFCCC JISC, *Roundtable consultations on draft JI guidelines*, 9 August 2012.
64 Source: UNFCCC, *Decision 6/CMP 8.*, 28 February 2013.
65 Source: Den Elzen et al., *The impact of surplus units from the first Kyoto period on achieving the reduction pledges of the Cancún Agreements*, Climatic Change, Volume 114, Issue 2, pp 401–408, September 2012, and Thomson Reuters Point Carbon, *Carry-over of AAUs from CP1 to CP2 – Future implications for the climate regime, A briefing by Point Carbon*, September 2012.
66 Source: UNFCCC, *Decision 1/CMP.8*, 28 February 2013.
67 Source: Kollmuss, A., *Doha decisions on the Kyoto surplus explained*, Carbon Market Watch, March 2013.
68 Source: Thomson Reuters Point Carbon, *Carry-over of AAUs from CP1 to CP2 – Future implications for the climate regime, A briefing by Point Carbon*, September 2012.

Moreover, AAUs carried over to CP2 may only be used for compliance if emissions exceed a country's emission reduction target and the purchase of such AAUs is limited to a maximum of 2% of the buyer's AAUs in CP2.[69] Furthermore, the AAU surplus of CP1 is effectively eliminated by a political declaration of the majority of participating countries and regions (the EU-27, Australia, Switzerland, Norway, Japan, Monaco and Liechtenstein) not to purchase AAUs from CP1 for compliance in CP2.[70, 71]

Doha also prevented new surpluses from building up in CP2 by effectively strengthening some of the proposed targets. In Doha, negotiators decided on a Kyoto amendment[72] specifying that any AAUs above the average of a country's 2008–2010 emissions will automatically be cancelled. Effectively, all countries that proposed target emissions levels in 2020 that are above the 2008–2010 average do now have a target at the 2008–2010 average. Countries affected by this are Belarus, Ukraine and Kazakhstan. Under these restrictions all three countries move from an expected surplus in CP2 to a position where they will all be a source of demand for credits, in the absence of further domestic mitigation activity. This decision sets a strong political signal with regard to the creation of surplus in target setting and could form a precedent for the negotiations on post-2020 targets.[73]

It is possible that Belarus, Kazakhstan and Ukraine will not ratify CP2 as a result of these decisions. Ukraine has a significant surplus from CP1, which it can use to satisfy some of its own demand for credits in CP2. It also can sell some of the CP1 surplus to other countries. If Ukraine withdraws from CP2, it will be unable to sell its CP1 surplus. In contrast, Belarus and Kazakhstan did not have a target in CP1 and therefore do not have a surplus from CP1. They would need to implement emissions reduction policies or purchase credits to achieve their 2020 targets.

One important issue was postponed to a later point, namely whether surplus units will be cancelled after 2020.

AAU trading in 2012 In 2012, the amount of AAUs traded doubled, thus reaching record levels, and is estimated to have been around 150 million AAUs.[74] The decline in AAU prices in 2012 continues a trend that began in 2011, coinciding with the price decrease of other carbon assets. In 2012, prices for AAUs dropped from €4 at the start of 2012 to only €0.5 by December 2012.[75]

Low AAU prices can be seen as one factor for high AAU transaction volumes. AAU prices have, however, been declining faster than those of CERs and ERUs, among others due to uncertainty surrounding the treatment of surplus AAUs in CP2 before Doha. The price spread between these assets has created an opportunity for credit buyers to swap some of their assets held for compliance in their portfolios by cheaper AAUs. This may be another factor for the increase in transactions in 2012.[76]

2.3 NEW APPROACHES TO MARKET INSTRUMENTS UNDER THE UNFCCC

The international climate community is discussing new market instruments in parallel with negotiations on a future global climate agreement. This is deemed necessary, as current market mechanisms under the UNFCCC apply only to the Kyoto Protocol and CP2 has limited participation from developed countries.

At COP 13 in Bali 2007, Parties agreed to increase national/international action to mitigate climate change with the objective to "enhance the cost-effectiveness of, and to promote mitigation actions, bearing in mind different circumstances of developed and developing

69 Source: UNFCCC, *Decision 1/CMP.8*, 28 February 2013.
70 In addition, internal EU legislation does not allow for AAUs from the first commitment period to be used in meeting the region's climate goals.
71 CP2 AAUs are not included in these trading restrictions.
72 Source: UNFCCC, *Decision 1/CMP.8*, 28 February 2013.
73 Source: Kollmuss, A., *Doha decisions on the Kyoto surplus explained*, Carbon Market Watch, March 2013.
74 Source: Thomson Reuters Point Carbon, *AAU trade hits record in 2012 as national scoop up cheap units*, 4 January 2013.
75 Ibid.
76 Ibid.

countries."[77] The subsequent Cancun conference decided on the establishment of one or more market-based mechanisms, which are to:

- Ensure voluntary participation.
- Be supported by the promotion of fair and equitable access for all Parties.
- Complement other means of support for NAMAs of developing country Parties.
- Stimulate mitigation across broad segments of the economy.
- Safeguard environmental integrity.
- Ensure a net decrease and/or avoidance of global GHG emissions.
- Assist developed country Parties to meet part of their mitigation targets.
- Ensure good governance, robust market functioning, and regulation.[78]

Following this mandate, two possible approaches evolved. The first one refers to an international market mechanism that is set up and governed centrally under the UNFCCC, known as NMM, while the second one is a proposal for a framework that would leave it up to the countries to define their own approaches and methodologies in a decentralized manner, known as FVA.

2.3.1 New Market-based Mechanism (NMM)

At COP 17 in Durban 2011, countries defined a NMM to be "operating under the guidance and authority of the COP." Furthermore, it was agreed that the NMM has to stimulate emission reductions across "broad segments of the economy" and go beyond pure offsetting by "ensuring a net decrease and/or avoidance of global GHG." For the NMM, the responsibility for the development of rules and modalities as well as for the governance of the mechanism would lie with the UNFCCC.

Two main variants have been proposed:

- **Crediting:** A crediting baseline/threshold is set for a broad segment of the economy of a host country. Credits are issued *ex post* if emissions are verified to be below the baseline and can be sold to recover, at least partly, the cost of mitigation activities. No penalty is applied if emissions are above the threshold.
- **Trading:** An emissions target is defined for a broad segment of the economy in a cap-and-trade approach and tradable emissions allowances are issued *ex ante*. Surplus allowances can be sold to recover, at least partly, the cost of mitigation activities. If emissions are higher than allowances issued, additional allowances can be bought on the international market.

The purpose of the NMM is to provide incentives for mitigation actions in developing countries that go beyond the scale of existing market-based mechanisms under the Kyoto Protocol. The Doha conference established a work program to define modalities and procedures of the NMM, which will have to consider elements such as:[79]

- The role of the COP.
- The voluntary participation of Parties in the mechanism.
- Standards that deliver real, permanent, additional, and verified mitigation outcomes; avoid double-counting of effort and achieve a net decrease and/or avoidance of GHG emissions.
- Requirements for the accurate measurement, reporting and verification of emission reductions, emission removals and/or avoided emissions.
- Means to stimulate mitigation across broad segments of the economy, which are defined by the participating Parties and may be on a sectoral and/or project-specific basis.
- Criteria that include the application of conservative methods for the establishment, approval and periodic adjustment of ambitious reference levels and for the periodic issuance of units based on mitigation below a crediting threshold or based on a trading cap.
- Criteria for the accurate and consistent recording and tracking of units.
- Supplementarity, that is, the use of credits from the NMM to supplement domestic mitigation actions in developed countries.

77 Source: UNFCCC, *Decision 1/CP.13, para 1*, 14 March 2008.
78 Source: UNFCCC, *Decision 1/CP.16, para 80*, 15 March 2011.
79 Source: UNFCCC, *Decision 1/CP.18, para 51*, 28 February 2013.

– A share of proceeds to cover administrative expenses and assist developing country Parties that are particularly vulnerable to the adverse effects of climate change to meet the costs of adaptation.
– The promotion of sustainable development.
– The facilitation of the effective participation of private and public entities.
– The facilitation of the prompt start of the mechanism.

In further developing the NMM, the UNFCCC will need to cover a range of issues that are of a political and technical nature. If and to what extent net emission reductions are actually achieved depends on baseline setting and accounting rules. For setting realistic baselines, consistent and reliable data are needed which is not always available in many countries.[80] Furthermore, emissions projections always depend on a number of assumptions, which have to be made transparent. Baseline setting and Measurement, Reporting, and Verification (MRV) under the NMM are likely to require a certain level of institutional capacity at the national level.[81] Due to this, piloting and testing different approaches on the ground is an important way to progress the development of the NMM.[82] This motivated the "prompt start" provision of the Doha text mentioned above. A prompt start can provide an opportunity for countries to build domestic knowledge and capacities, and at the same time support discussions within the UNFCCC on market-based mechanisms. This prompt start phase could build on a variety of feasibility studies and piloting activities that are already under way in different countries. The essence of such activities is learning-by-doing, gaining experience and building capacities on the ground in the absence of clear international definitions of the mechanism.

Against this background, a range of countries is already exploring and piloting different market-based mechanisms. Such readiness activities are relevant to the broader discussion on market-based instruments. One example is the NOAK-NEFCO Partnership Initiative, which is supporting readiness activities within the solid waste management sector in Peru, and the cement sector in Vietnam.[83] A variety of activities relevant for the NMM are also taking place within the Partnership for Market Readiness (PMR), with a range of countries proposing or implementing readiness activities around scaled-up crediting mechanisms and NAMAs (e.g., Mexico, Colombia, Vietnam, Indonesia, Jordan).[84] Another example is a pilot on a market-based mechanism for the cement sector in Tunisia funded by GIZ, the German technical cooperation organization.

The low demand for carbon credits is currently a barrier to the development of a new market-based mechanism. With the details of the NMM still being defined, potential overlaps with other market-based as well as non-market mechanisms need to be addressed as well. Overlaps may exist with existing mechanisms (e.g., CDM) but also with mechanisms under discussion or development (e.g., REDD+ and FVA).

The complementarity or potential overlap with NAMAs is another issue that needs further clarification.

NAMAs were first mentioned in the Bali Action Plan of 2007, where they were defined as "[…] nationally appropriate mitigation actions by developing country Parties in the context of sustainable development, supported and enabled by technology, financing and capacity building, in a measurable, reportable and verifiable manner."[85] Since then, NAMAs have become a firm element of the international climate policy architecture, and many developing countries have started to communicate, develop, and implement NAMAs.[86] While an official definition of NAMAs beyond the general statement mentioned in the Bali Action Plan does not exist, current country activities

80 Source: Kollmuss, A. and Fuessler, J, *New Climate Mitigation Market Mechanisms: Stocktaking after Doha*, Ministry of Infrastructure and the Environment (I&M) and Federal Office of the Environment (FOEN), 4 March 2013.
81 Based on the experience gained from the CDM, it is likely that building up international institutions and capacities will take time.
82 Source: Sterk, W. and Mersmann, F., *New Market Mechanisms: Prerequisites for Implementation*, JIKO Policy Paper 1/2012, Wuppertal institute for Climate, Environment and Energy, April 2012.
83 Nordic Group on Climate Change (NOAK) and the Nordic Environment Finance Corporation (NEFCO). For details, see: http://www.nefco.org/financing/nordic_partnership_initiative.
84 Details on activities for all PMR countries can be found on the PMR website: http://www.thepmr.org/.
85 Source: UNFCCC, *Decision 1/CP.13, para 1 (b) (II)*, 14 March 2008.
86 The Ecofys NAMA database is an informal platform (not a registry) collecting publicly available information on NAMAs and similar activities happening around the world: http://www.nama-database.org.

show a wide variety of NAMAs, ranging from projects to policies to sectoral strategies and programs. As agreed in Cancun, a registry for NAMAs and NAMA support is currently being set up by the UNFCCC Secretariat and is expected to become fully operational in 2013.[87]

Voluntary in nature, the UNFCCC NAMA registry is expected to be the central hub for information on NAMAs seeking support, on NAMAs seeking recognition, and on support available for NAMAs. To date six NAMAs have been submitted for support for preparation (from Mali, Ethiopia, Uruguay); seven NAMAs have been submitted for support for implementation (from Chile, Uruguay, Dominican Republic, Indonesia and Cook Islands); and three have been submitted for recognition (from Chile and Uruguay).

The Cancun Agreements recognize two kinds of NAMAs: those developed with domestic resources ("unilateral NAMAs") and those supported and enabled by technology, financing and capacity building ("supported NAMAs"). In their submissions to the UNFCCC on the NMM, some Parties also propose "credited NAMAs," which are financed through the generation and sale of carbon credits. The term credited NAMAs is not a term officially defined under the UNFCCC, and there are different opinions on the relation between the NMM and supported NAMAs. While some countries and observers see the NMM as an opportunity to stimulate and support NAMAs, others prefer to draw a clear line between credit-generating approaches and NAMAs that are supported by other means. These countries wish to discuss credit-generating approaches under the NMM discussion only, especially because of the risk of double-counting.[88]

Last but not least, although the roles of the different players in the NMM are not defined yet, it is widely acknowledged that private sector investments in low carbon technology will play a crucial role in achieving the needed emission reductions globally. The design of any new market mechanism will have to take this into account.

2.3.2 Framework for Various Approaches (FVA)

The FVA refers to a general framework at the UNFCCC level providing an umbrella for different national, regional, and multilateral approaches to emission reductions that are implemented in a decentralized manner. An FVA would allow individual countries to design, establish, and implement mechanisms based on their own standards and methodologies that are recognized within the UNFCCC. The negotiation text states that approaches under the FVA "must meet standards that deliver real, permanent, additional, and verified mitigation outcomes; avoid double-counting of effort; and achieve a net decrease and/or avoidance of greenhouse gas emissions."[89]

Two different models on how the FVA could work are being discussed. The first model would allow recognition of units issued by domestic schemes under the condition that they are approved by a UNFCCC body. A second model in contrast would not provide approval power to the UNFCCC but, rather, would see the UNFCCC play a role in providing a platform for exchange of information and providing a general set of common principles.[90]

COP 18 in 2012 clarified that any such framework will be developed under the authority and guidance of the COP and decided to work on such a framework. Nonetheless, a range of important issues remain to be clarified, including:[91]

- The purpose of the framework.
- The scope of approaches to be included.
- A set of criteria and procedures to ensure environmental integrity of approaches.
- Technical specifications to avoid double-counting through the accurate and consistent recording and tracking of mitigation outcomes.
- The institutional arrangements for the framework.

87 The UNFCCC webpage including NAMA submissions can be found at: http://unfccc.int/cooperation_support/nama/items/6945.php. The UNEP Risoe's NAMA Pipeline (www.namapipeline.org) provides an overview of NAMA submissions following the Copenhagen Accord.

88 Source: UNFCCC Secretariat, *Various approaches, including opportunities for using market, to enhance the cost-effectiveness of, and to promote, mitigation action, bearing in mind different circumstances of developed and developing countries, Technical paper, FCCC/TP/2012/4*, 24 August 2012.

89 Source: UNFCCC, *Decision 2/CP.17, para 79*, 15 March 2012.

90 Source: Kollmuss, A. and Fuessler, J, *New Climate Mitigation Market Mechanisms: Stocktaking after Doha*, Ministry of Infrastructure and the Environment (I&M) and Federal Office of the Environment (FOEN), 4 March 2013.

91 Source: UNFCCC, *Decision 1/CP.18 D. 1., para 46*, 28 February 2013.

It therefore remains unclear what the FVA will actually be. Its main characteristic will depend on decisions taken on the above-mentioned issues. Many of the issues and open questions mentioned under the NMM apply to the FVA as well. The background to the discussion on the FVA is a growing need to integrate the diverse regional, national, and sub-national emission reductions initiatives currently underway. An underlying question is to what extent should these domestic efforts be recognized internationally. Parties' diverse views on the issue reflect, to some extent, more profound questions on the role of the UNFCCC as well as what level of flexibility can be provided in order to create a well-functioning international carbon market, while still allowing bottom-up development.

Box 1: New UNFCCC market mechanisms[92]

Since 2010, the COP to the UNFCCC has been working on new scaled-up approaches to support ambitious mitigations actions leading to net emission reductions. The COP initiated two work programs dedicated to the FVA and the NMM. Despite differences in the envisioned governance structures for NMM and FVA, given the commonality of their main principles and technical elements, there are similar key areas that could drive the development of their criteria and procedures to become attractive tools for international cooperative mitigation actions at scale and with a high level of environmental integrity.

First, in the absence of clarity of the future architecture of the post-2020 agreement, establishing a common prompt start phase for market-based actions under both NMM and FVA could be a fast and practical way to provide minimum clarity to the Parties and stimulate the prompt start mitigation actions. It should be done by providing a prospect (though not certainty) for the resulting emission reductions to be internationally recognized and used for compliance purposes. This would allow experience to be gained early on and to ensure that domestic and international institutional capacity is maintained and further improved, in particular in terms of accounting, registry, tracking, and verification systems.

The international rules and provisions to guide the prompt start actions are key to clarifying the overarching principles of environmental integrity, achieving a net decrease and/or avoidance of GHG emissions, transparency and information sharing. It should, in particular, be ensured that baselines (reference levels) and crediting thresholds and/or trading caps are conservative and that no emission reductions can be earned for decreases in activity levels. The prompt start phase rules and provisions could also contain an evolving set of non-mandatory standards, based on the emerging good practices identified through an independent assessment. These standards could, for example, address technical elements of the mechanisms related to accounting, registry, tracking, and verification systems. These standards will also provide information for future participation requirements, governance structure and scope for harmonization of different approaches.

The prompt start phase should be inclusive in terms of participation requirements (e.g., countries with or without caps of national GHG emissions, at different levels of readiness in terms of GHG accounting and tracking systems). Eligible activities should cover broad segments of the economy while accommodating mitigation actions at different scales and scopes – starting with incentive schemes at the sub-sectoral, city-level, subnational, and national levels to domestic emissions trading schemes and economy-wide instruments such as carbon tax or reform of fuel pricing – to effectively complement and support domestic efforts. A combined use of financing sources under the new mechanisms should be supported to increase efficiency and help raise the ambition through an optimized leverage of domestic and international, public and private finance.

92 Text kindly provided by Alexandrina Platonova-Oquab.

2.4 VOLUNTARY CARBON MARKET[93]

The voluntary carbon market caters to the needs of those entities that voluntarily decide to reduce their carbon footprint using offsets. The regulatory vacuum in some countries and the anticipation of imminent legislation on GHG emissions also motivate some pre-compliance activity. In other countries, a voluntary market can be created as the first step towards further carbon pricing mechanisms. Voluntary offset standards help create certainty of the quality of reductions in the voluntary carbon market.

The international voluntary carbon market continues to be a tiny proportion of global emissions transaction volumes. It is less than 0.1% of all volumes transacted in 2011.[94] In 2012 the price paid by voluntary buyers of carbon offsets did not decline as steeply as the CER price. Voluntary market data source Forest Trends' Ecosystem Marketplace reports that demand for very low-priced credits from some types of "CDM like" projects remained a trend but was balanced by credit sales from development-oriented project types, including forestry and clean cookstoves, that reported above-average pricing. Overall, and as many market participants predicted, the market-wide average price for voluntary emission reductions fell slightly.

The volume of new voluntary offset purchases has also declined, following continued economic pressures in the EU, which is home to the most active buyers. Those that did transact new volumes in 2012 often took a portfolio approach to buying a mix of lower priced renewable energy offsets along with some more "charismatic" offsets – those with verifiable sustainable development or environmental benefits. The overall mix of project types from which offsets were contracted in 2012 is similarly divided between renewable energy projects, approximately half of overall market share, and all other project types.

Among these "other" types, projects in the forestry and land use category generated roughly another quarter of voluntary offsets transacted. Here, REDD projects held their ground in 2012, contracting the same volume as in 2011, approximately 7 $MtCO_2e$, as a number of projects overcame technical hurdles to verify and contract issued offsets. In previous years, REDD offset suppliers reported that buyers were holding out for issued tons, which became a reality for several projects in 2012.

The vast majority of REDD volumes were contracted from projects seeking dual certification under the Verified Carbon Standard (VCS) and the Climate, Community, and Biodiversity Standards. Last year, the VCS charted a new course for land use carbon markets, working alongside domestic governments to develop programs for certifying jurisdiction-wide certification mechanisms for REDD activities. The initiative on jurisdictional and nested REDD+ (JNR) was intended to anticipate the needs of REDD+ compliance markets and to ensure that REDD+ projects already in place could fit into broader schemes.[95] One JNR pilot program in Acre, Brazil is one of two regions (Chiapas in Mexico is the other) that has been tapped by California as a potential source of REDD credits for its state-wide carbon market.[96] In 2013, the Norwegian government committed to funding pilots of the JNR requirements in Brazil, Costa Rica, Peru, and the Democratic Republic of the Congo.[97]

Another carbon standard, the Gold Standard, also saw significant development in the category of clean household device distribution projects, including clean cookstoves and water purification systems. Offset suppliers surveyed by Forest Trends' Ecosystem Marketplace reported that prices for these credits fell slightly as new supply came online, but remained well above average. In this category, the voluntary market offered a small number

93 This section strongly benefited from the kind contributions from Forest Trends' Ecosystem Market Place. Assertions here are supported by data gathered by Forest Trends' Ecosystem Market Place and published in a similar timeframe to this report.
94 Source: Peters-Stanley M. and Hamilton K. E., *Developing Dimension: State of the Voluntary Carbon Markets 2012*, Ecosystem Marketplace & Bloomberg New Energy Finance, May 2012. Data on the size of the global carbon market obtained from the World Bank.
95 Source: Verified Carbon Standard, *Jurisdictional and Nested REDD*, accessed on 14 April 2013, http://v-c-s.org/JNRI.
96 Source: Thomson Reuters Point Carbon, *Group advises California on accepting REDD credits*, 28 January 2013.
97 Source: Verified Carbon Standard, *Media Release: Norway and VCS Team Up to Support Jurisdictional REDD+*, 4 April 2013.

of project developers an alternative to Kyoto markets to sell offsets – from Gold Standard and/or CDM projects – at above the CER spot price. Still, the volume of household device offsets that contracted voluntarily, approximately 5 $MtCO_2e$ according to preliminary survey results, was less than the volume Forest Trends' Ecosystem Marketplace tracked as sold to compliance buyers, at more than 7 $MtCO_2e$ in 2012.

The voluntary market has continued to innovate and pilot new approaches in 2012, including a focus on standardized approaches, methodologies that include broader sustainability considerations, and projects that have adaptation and resilience co-benefits. The VCS has approved five new methodologies (not standardized) since January 2012, at the time of writing this report.[98] The pipeline for the VCS review of standardized methodologies is just starting to fill. Several other new methodologies are in the pipeline, including four so-called "Blue Carbon projects" which relate to wetlands restoration and conservation, delivering carbon reductions in tandem.[99]

Voluntary market players are playing an increasing role in the compliance market. The Climate Action Reserve (CAR) and the American Carbon Registry (ACR) have both been approved as Offset Project Registries (OPR) for California's Cap-and-Trade Program.[100, 101] CAR produced the first four offset protocols adopted by California, and ACR has already received offset project listings in 2012 in preparation for this compliance offset market.[102]

Overall, the market saw several company names make or continue offsetting commitments in 2012, including Microsoft, Marks & Spencer, Walt Disney Company, General Motors' Chevrolet, Bain & Company, Coca Cola, the London Olympics, La Poste, Deutsche Post DHL, Virgin Atlantic, FedEx, and United Parcel Service.

In addition to the existing voluntary market and standards, there are several national voluntary initiatives. In Japan, two domestic voluntary crediting schemes have merged (see Section 3.2.3). In Indonesia, the Nusantara carbon regime will develop a national emission reductions certification scheme that can be part of a voluntary domestic market. This scheme will help maintain momentum in Indonesia on carbon pricing and has the potential to be refined when the international context is clarified. Such schemes are intended to mobilize project-based reductions in certain sectors to act as a building block of a national carbon pricing framework.[103] In Costa Rica, a voluntary carbon offset scheme is part of its commitment to carbon neutrality (see Section 3.3.3).

There may be increasing convergence and merging of the compliance and voluntary markets over time. The FVA proposal discussed under the UNFCCC may offer an opportunity for parity between different standards be they voluntary or compliance in origin (see Section 2.3.2).

2.5 OTHER RELEVANT APPROACHES

2.5.1 Result-based financing

Result-based financing is a concept according to which financial support is provided *ex post* based on verified achievement of pre-defined outcomes. It is in contrast to providing funding up-front for inputs. Result-based financing was first piloted in development cooperation. Within the UNFCCC, the concept has been central to the discussions on REDD+, while lately it also appears in the broader climate financing context.[104] Result-based

98 Two on energy efficiency (VM0018 and VM0020), one in transport (VM0019) and two in agriculture (VM0021 and VM0022).
99 Source: Ferretti, W., *Verified Carbon Standard*, April 2013.
100 Source: Climate Action Reserve, *Working with the Reserve*, accessed on 14 April 2013, http://www.climateactionreserve.org/how/california-compliance-projects/working-with-the-reserve/.
101 Source: ACR, *Media Release: American Carbon Registry Approved by California Air Resources Board as an Offset Project Registry for the California Cap-and-Trade Program*, December 2012.
102 Source: California Air Resources Board, *Offset Project Registries*, accessed on 14 April 2013, http://www.arb.ca.gov/cc/capandtrade/offsets/registries/registries.htm.
103 Source: Indonesia Council on Climate Change, *Nusantara Carbon Scheme: an initiative for carbon market development in Indonesia (presentation)*, 2012.
104 Source: Jung, M., Röser,F., and Khosla, S., *Annual Status Report on Nationally Appropriate Mitigation Actions 2012, Chapter 3.5 Learning from results-based finance for NAMA implementation?*, Ecofys, ECN, CCAP and GIZ, November 2012.

financing is an explicit criterion mentioned in the COP decision describing the cornerstones for the establishment of the GCF.[105]

The term is rather broad and can cover a range of tools and instruments. Moreover, result-based financing can be provided to governments for results achieved at the national level as well as to other entities (e.g., companies, communities) for the delivery of specific services.

Indicators to measure achievement of results can be qualitative (e.g., contribution to sustainable development) and also quantitative (e.g., emission reductions, kilowatt hours, hectares). Discussions on result-based climate finance are typically focused on the achievement of emission reductions.

»Result-based financing offers a potential for developing capacities and piloting, in combination with the prompt start for new market instruments under the UNFCCC.«

Result-based financing is designed to satisfy an increasing need, which is that funders need to justify the results that are achieved based on the funding they provide. It might therefore not only be able to help channel funding to where results (e.g., emission reductions) are achieved in the most cost-efficient and effective manner, but also scale up available funding by mobilizing private sector financing for mitigation activities in developing countries. In this regard, it can be used as a complementary approach to other climate financing approaches, as it is able to combine elements of traditional (*ex ante*) public sector funding and *ex post* market-based approaches like the CDM.[106] As many technical aspects are likely to overlap with market-based approaches (e.g., baseline setting, MRV), result-based financing offers a potential for developing capacities and piloting, in combination with the prompt start for new market instruments under the UNFCCC.

2.5.2 Reducing Emissions from Deforestation, Forest Degradation, and sustainable forest management (REDD+)

REDD+ became a major negotiating issue at the Bali COP of 2007, which created an opportunity to develop a formal mitigation mechanism linked to forests as part of a post-2012 climate change agreement (annual emissions arising from forest loss amount to about 3,000 $MtCO_2e$ globally).[107] Subsequent COP decisions embraced a three-phased approach for REDD+ implementation consisting of initial preparation and capacity building, followed by policy formulation and piloting, and eventual results-based payments. Experience to date, however, suggests that countries may well engage in a wide range of preparatory and piloting activities simultaneously, rather than rigidly follow these distinct phases.

Since 2007, progress on the REDD+ architecture has mainly focused on the definition of technical aspects e.g., design of reference levels as benchmarks against which the results of REDD+ would be measured or the implementation of and reporting on social and environmental safeguards. Key decisions are still outstanding after Doha, such as the sources for long-term finance for REDD+, as well as modalities and procedures for the MRV of emission reductions. In this context, both carbon markets

105 Source: UNFCCC, *Decision 3/CP.17, paras 51 and 55*, 15 March 2012.
106 Source: Gosh, a. et al., *Mobilizing the Private Sector -Quantity-Performance Instruments for Public Climate Funds*, Oxford Energy and Environment Brief, August 2012.
107 Source: Harris, N., S. Brown, S. C. Hagen, A. Baccini, R. Houghton, *Progress toward a consensus on carbon emission from tropical deforestation*, Winrock International & Woods Hole Research Center, November 2012.

and a fund-based approach continue to be discussed as two options for REDD+ finance under the UNFCCC. The technical details for implementation of REDD+ overlap with implementation details required for NAMAs, results-based financing, as well as the NMM.

After the initial REDD+ readiness preparation phase, countries may pilot payments for results generated through large emission reductions programs (the second phase in the UNFCCC framework). Since 2008, mechanisms for result-based payments have been promoted by multilateral institutions, such as the World Bank,[108] building developing countries' capacity to access future REDD+ financing.

The development of large emission reductions programs for REDD+ occurs in the absence of a compliance mechanism. Forest carbon represents a small fraction (less than 0.1%) of the compliance carbon market; REDD+ represents an even smaller fraction. Almost all REDD+ emission reductions are transacted in the voluntary carbon market.[109] REDD+ projects make up approximately 10% of the voluntary carbon market, but they are characterized by heterogeneity of demand, high price variability, and lack of transparency. Emission reductions transacted in the forest carbon market are generated by project-level activities, as opposed to REDD+ programs envisaged at the national or jurisdictional level [e.g., in the Forest Carbon Partnership Facility (FCPF) Carbon Fund].

The state of forest carbon markets today provides some, albeit limited, guidance on the pricing for future REDD+ results payments. The market-wide average of US$9.2/tCO$_2$e for forest carbon in 2011 (an aggregate based on a broad range of forest carbon projects) is skewed by pricing incentives or requirements of domestic-only markets and may not represent the price attainable in the international marketplace. In early 2013, offers on forward REDD+ credits ranged between US$7.0 and US$8.0/tCO$_2$e,[110] which vary considerably as a function of volume, level of advance payments, and quality (environmental and social co-benefits). The price for emission reductions in the voluntary market is largely driven by buyers' willingness to pay and sellers' willingness to accept payment. Outside the forest carbon market, there are a limited number of REDD+ result-based payment schemes at such scale as Norway's International Climate and Forest Initiative where a payment level of US$5/tCO$_2$e has been used for both the Brazil Amazon Fund and the Guyana REDD+ Investment Fund.[111]

The principal source of current funding for REDD+ is directed towards readiness activities and is coming from non-market sources, mainly bilateral and multilateral funding. Leveraging the private sector and markets is generally considered essential to generate the level of REDD+ funding to cover a larger share of REDD+ emission reductions and to increase overall cost-efficiency of mitigation. However, these preconditions are difficult to achieve given the current lack of demand for carbon credits at the international level. Proponents of a fund-based approach stress potential market risks that may arise from uncertain emission reductions potentials in REDD+ (and the associated price volatility)[112] and the need for sustained readiness capacity building in order for private actors to get involved once the market is well established and the climate policy framework has matured.

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108 The Forest Carbon Partnership Facility (FCPF) is a multilateral global initiative that was created to promote REDD+ capacity building and implementation. Since its inception in 2008, the facility has developed a collaborative partnership among countries, donors and observers that has provided a meaningful platform for exchanges on REDD+. An important contribution of the FCPF has been the development of an operational framework for readiness preparation activities consistent with the phased policy framework under the UNFCCC. The framework encompasses the development of national institutions, a REDD+ strategy, reference levels, forest monitoring systems and safeguards information systems. The Carbon Fund of the FCPF, operational since 2011, is a multi-lateral funding mechanism to pilot-test REDD+ results-based payments at scale. Activities to date have focused on the development of the procedural and legal aspects related to the development, submission and review of REDD countries' emission reductions programs and the development of a methodological and pricing framework for performance-based transactions. With a current capitalization of approximately $390 million, the Carbon Fund is set up to pay for emission reductions delivered by a few (indicatively five) large programs at a jurisdictional (e.g., provincial) or national scale (for illustration, a hypothetical price of US$5-10/tCO$_2$e could cover 15-2% of current emission from deforestation or 3,000 MtCO$_2$e).

109 Source: Peters-Stanley, M., K. Hamilton, D. Yin, *Leveraging the landscape, State of the forest carbon markets in 2012*, 2012.

110 Source: Thomson Reuters Point Carbon.

111 Source: Norwegian Government, *Technical note: Calculating 2012 performance based payments to Guyana based on interim performance indicators*, http://www.regjeringen.no/upload/MD/2012/Nyheter/Technical_note_payments.pdf.

112 Source: Raab, U., *Market mechanisms – from CDM towards a global carbon market*, FORES study, August 2012.

section **3**

Regional, national, and sub-national carbon pricing approaches

3 Regional, national, and sub-national carbon pricing approaches

There is a diversity of existing and emerging carbon pricing initiatives, including carbon taxes, emissions trading schemes and offsetting approaches. A review of regional, national, and sub-national approaches reveals that these initiatives are developing at a greater pace than ever before.

»A review of regional, national, and sub-national approaches reveals that these initiatives are developing at a greater pace than ever before.«

This section presents information on scope, allocation approaches, competitiveness considerations, use of offsets, price stabilization mechanisms, performance and effectiveness, MRV and registry, linking to other schemes, and what is happening in the coming year.[113]

3.1. REGIONAL, NATIONAL, AND SUB-NATIONAL EMISSIONS TRADING SCHEMES

Regional, national, and sub-national emissions trading schemes are implemented, scheduled, or under consideration in various parts of the world (see Figure 3).

3.1.1 European Union Emissions Trading System (EU ETS)

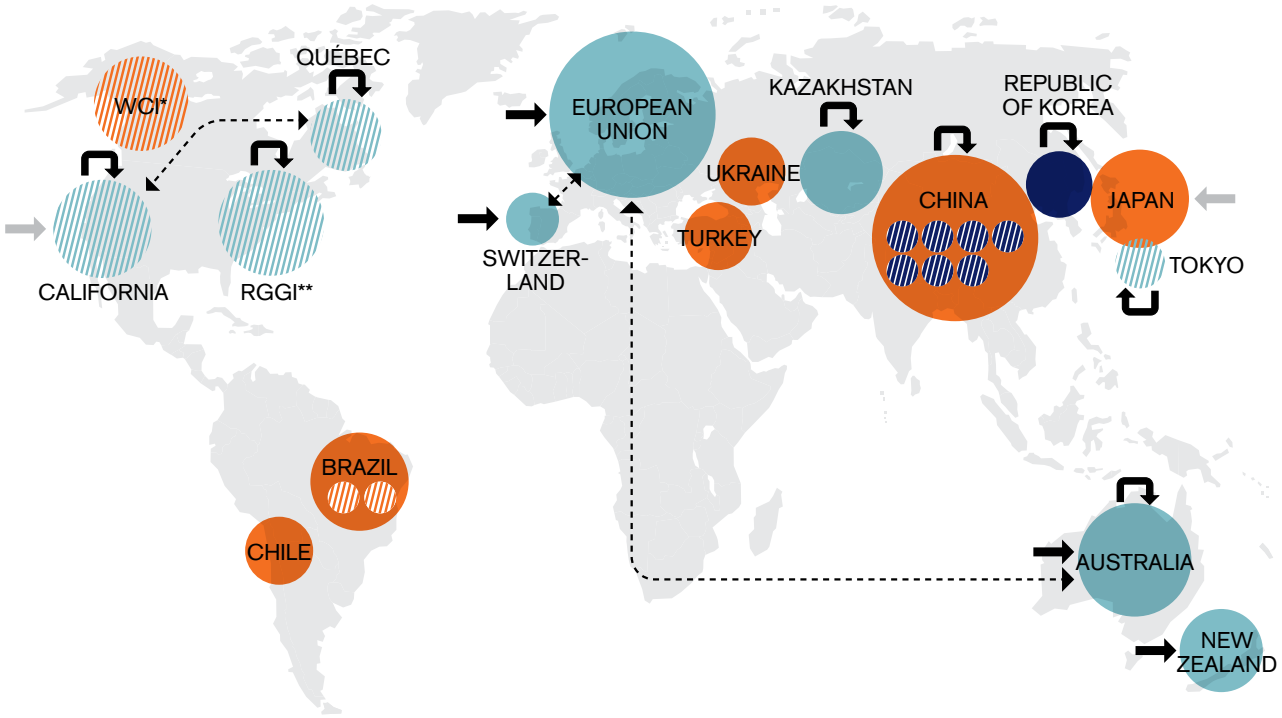
The EU ETS, a mandatory cap-and-trade scheme that started in 2005, is the EU's flagship climate policy instrument. In January 2013 Phase III of the scheme began, characterized by several major reforms agreed to in 2009 and outlined in the sections that follow.[114, 115] In addition, the EU is debating structural changes to the EU ETS in response to low prices in the system.

113 For some schemes, not all of this information is comprehensively available, and therefore more limited information is provided.
114 Source: European Commission, *ETS Directive (2009/29/EC)*, 25 June 2009.
115 For a more detailed description of Phase III of the EU ETS, see Kossoy,A. and Guigon,P., *State and trends of the carbon market 2012*, World Bank, May 2012, or the EU ETS factsheet from the European Commission, *The EU Emissions Trading System (EU ETS)*, January 2013.

Scope The EU ETS covers GHG emissions from power producers and a range of named industrial sectors including iron and steel, cement, as well as installations with thermal combustion input of over 20 megawatt (MW). In Phase III the scheme's scope has been extended by explicitly including new industrial sectors, such as aluminum, ammonia, bulk organic chemicals, carbon capture and storage (CCS); and by mandating the inclusion of two new GHGs from specific sources, NO_2 and perfluorocarbons (PFCs). The EU's newest member state, Croatia, will also be covered by the scheme from July 1, 2013.

The EU ETS covers around 45% of EU-wide GHG emissions including aviation. The overall EU-27 emissions were 4,409 $MtCO_2e$ in 2010.[116] The 2013 cap for stationary installations has been provisionally set at

Figure 3: Map of existing, emerging, and potential emissions trading schemes



* WCI – Western Climate Initiative. Participating jurisdictions are British Columbia, California, Manitoba, Ontario and Québec
** RGGI – Regional Greenhouse Gas Initiative
*** Schemes under consideration are at different stages in the process. See Section 3 for more details.

Note 1: The size of the circles is not representative of the size of the schemes.
Note 2: Mexico's Congress passed a General Law on Climate Change, which provides the federal government with the authority to create programs, policies, and actions to mitigate emissions, including an ETS.
Note 3: Costa Rica is working on the design of a domestic carbon market that would contribute to meeting the country's carbon neutrality goal

116 Source: UNFCCC Greenhouse Gas Inventory, *Detailed data by Party*, including LULUCF, accessed on 15 April 2013.

2,039 $MtCO_2e$ in 2013. The cap will be reduced annually by 1.74% of the average of allowances issued annually in 2008–2012 (corresponding to 37.4 $MtCO_2e$). This will lead to a 21% reduction of emissions from stationary installations in 2020 compared to 2005 levels. The cap reduction factor is planned to continue post-2020, but its value may be revised no later than 2025.[117] To stay in line with the EU 2050 Roadmap trajectory of reducing emissions by 80% to 95% in 2050,[118] preliminary studies indicate that the linear reduction factor needs to increase to 2.3% to 2.5%.[119]

As of 2012, aviation is included in the EU ETS. The inclusion of aviation increases the cap by a constant amount of 210 $MtCO_2e/y$ for 2013–2020. Only unidirectional trading is possible between the aviation sectors and the other sectors, allowing the aviation sector to purchase non-aviation EU Allowances (EUAs), but not the reverse. The inclusion of flights into and out of Europe has been deferred until after the International Civil Aviation Organization (ICAO) General Assembly in autumn 2013 ("stop the clock"). This is an invitation to the international community to develop an alternative and global solution to limit CO_2 emissions from aviation.[120]

Allocation approaches More than 40% of the issued allowances in 2013 will be distributed via auctions. Free allocation is based on EU-wide benchmarks, historical activity data, a carbon leakage exposure factor, and a reduction factor.

In the course of 2013, the European Commission will finalize the review of the preliminary allocations of free allowances set out in member state plans, the so-called National Implementation Measures (NIMs), and will subsequently calculate the cross-sectoral correction factor, which may be applicable if the sum of free allowances included in all NIMs exceeds the maximum amount available.[121] For aviation, 15% of allowances will be auctioned over the whole 2013–2020 period.

From the start of Phase III, auctioning will be the default allocation approach for the power sector. Some free allocation, nonetheless, remains in particular circumstances.[122]

Competitiveness considerations As of January 2013, sectors identified as eligible for carbon leakage compensation receive 100% of allowances up to the benchmark level; the other sectors receive 80% in 2013 down to 30% in 2020 with "a view to reaching no free allocation in 2027" according to the ETS Directive. Induced carbon costs from indirect emissions can be compensated via national measures, subject to EU state aid rules, a provision that has received criticism from both member states and industries due to the risk that the EU level playing field may become distorted as some member states may compensate and others not. In 2013 the Commission is expected to review the current list of sectors exposed to a significant risk of carbon leakage, a process that began in 2012. The new list will be applicable for the years 2015 to 2019.

Use of offsets Several quantitative and qualitative restrictions apply to the use of ERUs and CERs. Credits from GHG emissions reduction projects registered before December 31, 2012 can be used from all countries, except projects from:

- Land-Use, Land-Use Change, and Forestry (LULUCF) projects.
- Nuclear projects.
- Large hydropower projects not in compliance with the World Commission on Dams guidelines.
- HFC-23 destruction projects (as of May 1, 2013).
- N_2O destruction projects from adipic acid production (as of May 1, 2013).

117 Source: European Commission, *Allowances and caps*, 11 April 2013, http://ec.europa.eu/clima/policies/ets/cap/index_en.htm.
118 Source: European Commission, *Roadmap for moving to a low-carbon economy in 2050*, 11 April 2013, http://ec.europa.eu/clima/policies/roadmap/index_en.htm.
119 For example, CEPS Carbon Market Forum, *Submission to the EC, Consultation on structural options to strengthen the EU Emissions Trading System*, February 2013.
120 Source: European Commission, *Reducing emissions from the aviation sector*, 23 February 2012, and European Commission, *Proposal for a decision of the European Parliament and of the Council on derogating temporarily from Directive 2003/87/EC of the European Parliament and of the Council establishing a scheme for greenhouse gas emissions allowance trading within the community*, 2012.
121 Source: European Commission, *Free allocation based on Benchmarks*, 4 January 2013, http://ec.europa.eu/clima/policies/ets/cap/allocation/index_en.htm.
122 Free allocation will remain for heat production for use by non-ETS installations, and for the power sector in some member states where modernization is necessary for the transition to a lower-carbon power sector.

For credits for emission reductions after January 1, 2013, only ERUs from countries that have ratified CP2 (see Section 2.2.3) and CERs from projects registered before December 31, 2012 or registered after December 31, 2012 but hosted by LDCs[123] are eligible (see Section 2.2.1).[124, 125] In addition, the EU is introducing new registry rules for the use of ERUs, which are expected to enter into force in May 2013 (see Section 2.2.3).

» The current low EUA prices lead to split views concerning the ETS's effectiveness as a policy instrument, and the consequences for long-term investments. «

Existing installations may use credits up to an amount that is at least 11% of their allocation for 2008 to 2012 in the period 2008 to 2020. The maximum credits that an existing installation can use in Phase III is the maximum amount allowed for the period 2008 to 2020 minus the amount already used by the installation in Phase II. New entrants in the EU ETS may use credits of at least 4.5% of their verified emissions in 2013–2020. Aviation operators may use project credits of at least 1.5% of their verified emissions in 2013–2020. In the whole EU ETS, the total use of credits may not exceed 50% of the emission reductions below 2005 levels made in the EU ETS. The exact amount of international credits allowed per operator still needs to be determined.[126] International credits must be exchanged into Phase III allowances before surrendering them for compliance.

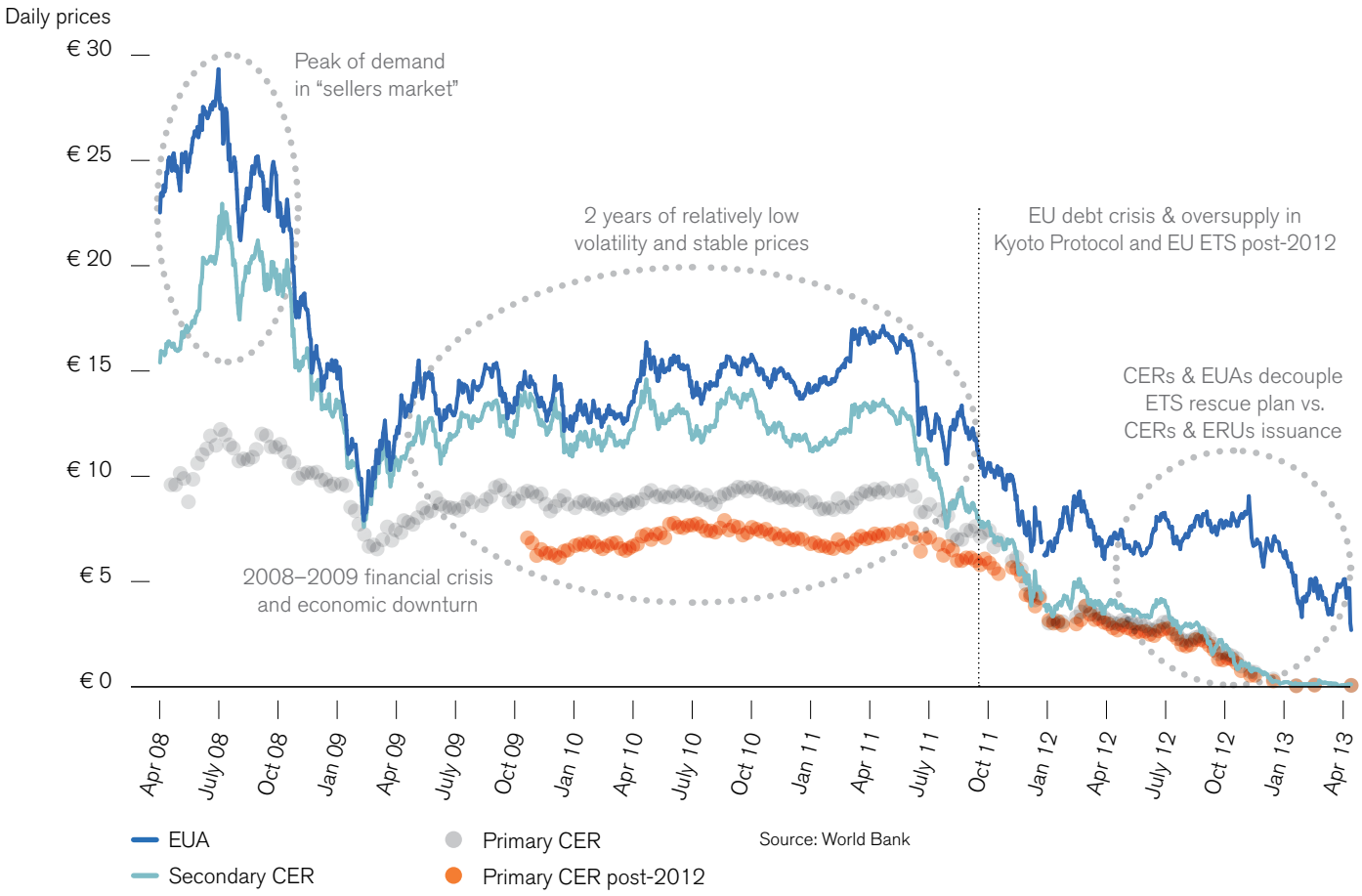
The maximum amount still allowed (i.e., the maximum demand) for international offsets in the EU ETS between 2013 and 2020 is estimated to be around 700 $MtCO_2e$. Including a projected demand from EU Member States of 700 $MtCO_2e$, this results in a demand of less than 1,400 $MtCO_2e$ coming from the EU. The supply of ETS-eligible CDM credits is estimated at around 1,700 $MtCO_2e$.[127] There is therefore sufficient supply of international credits to meet the EU's demand.

Price stabilization mechanisms Under current rules there are no explicit price stabilization mechanisms in the EU ETS, except for some provisions in the event of excessive (upward) price fluctuations.[128] Debates are ongoing whether such mechanisms could strengthen the ETS (see also performance and effectiveness section below) as part of the structural reform discussion to address the low carbon price due to excess allowances currently available as a result of the economic crisis. Several stakeholders consider the establishment of a centrally managed reserve of allowances a good mechanism to stabilize price, based on clear, predictable, rules defined in advance.[129]

Performance and effectiveness The EU ETS is currently the topic of lively debate about the record-low EUA prices in the system. The prices are a reflection of the unexpectedly low emissions in Europe as a result of the ongoing economic crisis. On the one hand, prices are kept above zero by the long-term signal provided by the linear cap reduction factor of 1.74%, which will continue post-2020, under current rules. On the other hand, the absence of long-term binding targets for 2030 and beyond keeps prices low. The importance of these long-term considerations is demonstrated by a volatility to short-term developments that relates to this political agenda. For Kyoto credits the picture is different: while a large number of CERs are available – and continue to become available – for use in the system, the maximum

123 As defined by the UN, *List of least developed countries*, accessed on 4 April 2013, http://www.un.org/esa/policy/devplan/profile/ldc_list.pdf.
124 CERs from projects registered after 31 December 2012 hosted by countries with bilateral agreements with the EU are also eligible. No such agreement has been signed so far.
125 Source: European Commission, *Questions & answers on use of international credits in the third trading phase of the EU ETS*, February 2013, http://ec.europa.eu/clima/policies/ets/linking/faq_en.htm.
126 Source: European Commission, *Questions & answers on use of international credits in the third trading phase of the EU ETS*, January 2012
127 See Table 1.
128 Source: European Commission, *Directive 2009/29/EC, Article 29*, 26 June 2009.
129 Source: European Commission, *Summary or the results of the online consultation*, 1 March 2013.

Figure 4: EUA and CER prices (2008–2013)



Source: World Bank

level of offsets was restricted at the time the scheme was set up. Due to limited demand from other sources (other carbon markets or countries) until at least 2015, this caused CER prices to collapse during 2012; for this and a variety of other reasons, a decoupling with EUA prices occurred. This decoupling was predicted by some analysts.[130]

The current low EUA prices lead to split views concerning the ETS's effectiveness as a policy instrument and the consequences for long-term investments. Some stakeholders highlight that the ETS is a mechanism designed to deliver certain environmental objectives, and a low price is a signal that the system is working well.[131] In anticipation, the Commission has proposed short and medium-term policy measures aims to strengthen the EU ETS.

While surplus grows, decisions are pending. At the beginning of the third trading period, the surplus of allowances in the EU ETS reached 1.7 billion allowances, according to analysts after 2012 emissions data were released early April 2013.[132] The figure did not come as a surprise: in *The state of the European carbon market in 2012*,[133] published November 2012, the Commission estimated the surplus at the start of Phase

130 Source: Bellassen V., Stephan N., and Leguet B., *Will there still be a market price for CERs and ERUs in two years time?*, CDC Climat, May 2012.
131 Source: Brown, L. M., Hanafi, A., and Petsonk, A., *The EU Emissions Trading System, results and lessons learned*, Environmental Defense Fund, 2012.
132 Source: Thomson Reuters Point Carbon, *Carbon Market Europe*, Vol 12, Issue 13, 5 April 2013.
133 Source: European Commission, *Report from the Commission to the European Parliament and the Council: The state of the European carbon market in 2012*, 4 November 2012, http://ec.europa.eu/clima/policies/ets/reform/docs/com_2012_652_en.pdf.

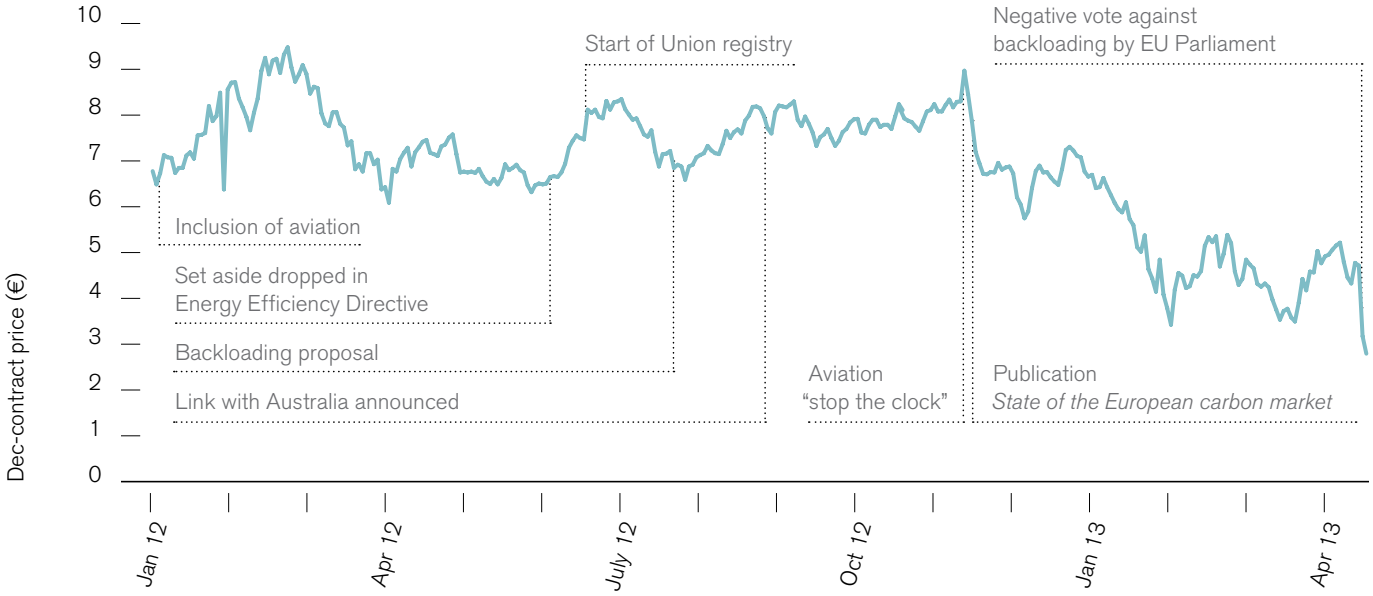
III to be around 1.5 to 2 billion allowances. Market players agree that the surplus will persist throughout most or all of the third trading period. A study commissioned by the environmental groups WWF and Greenpeace projects a surplus of 1.4 billion allowances in 2020 without any changes to the rules or operation of the system.[134]

On July 25, 2012 the Commission proposed to temporarily postpone the auctioning of a number of allowances (backloading) by changing the auctioning timeline for 900 million allowances from 2013–2015 towards the end of Phase III.[135] While not directly changing the amount of allowances in the system, this backloading proposal was hoped to improve the supply/demand balance in the shorter term. However, the backloading proposal prompted a wider debate about market intervention between member states, policy makers, and business groups: eight months later both the European Parliament and the Parliament's climate change committee chose not to implement the Commission's proposal. On April 16, 2013 the Parliament voted against backloading, causing EUA prices to drop.[136]

To complement backloading, the Commission has identified six options to structurally strengthen the EU ETS in its first report on the state of the European carbon market. These include options to increase the stringency of the EU's 2020 target (with a corresponding reduction in EU ETS cap), permanently retire a number of allowances, tighten the ETS annual linear reduction factor, alter the rules for the use of international credits, introduce price stabilization mechanisms, and add additional sectors.[137]

Many business groups are opposed to any measures, while those supporting such measures (e.g., utilities, energy companies) generally favor a larger annual reduction of the cap in line with a 2030 target, and if needed, the retirement of a significant number of allowances in the short term. These different views may be explained by

Figure 5: Carbon price development labeled with key developments in the EU ETS in 2012



Source of carbon price (EUA price of December delivery contracts): Thomson Reuters Point Carbon, April 14, 2013

134 Source: Öko Institute, *Strengthening the European Union Emissions Trading Scheme and raising climate ambition*, June 2012.
135 Source: European Commission, *Emissions Trading: Commission prepares for change of the timing for auctions of emissions allowances*, 25 July 2012, http://ec.europa.eu/clima/news/articles/news_2012072501_en.htm
136 Source: Bloomberg, *European Parliament Rejects EU Carbon-Law Fix Proposal*, 16 April 2013.
137 Source: European Commission, *Report from the Commission to the European Parliament and the Council: The state of the European carbon market in 2012*, 4 November 4, 2012, http://ec.europa.eu/clima/policies/ets/reform/docs/com_2012_652_en.pdf.

the fact that the power sector could benefit from tighter carbon future, which might depend on more extensive electrification.[138] It implies more investments in renewables, flexible grids, and storage capacity, while increased carbon costs can be passed through. This is different for the manufacturing industry. All groups, however, stress that a clear, stable, and predictable long-term framework is key to driving investments and are calling for clarity on binding 2030 targets.

Figure 5 summarizes the key policy events in the EU ETS since January 2012.

MRV and registry Each ETS operator is required to have a monitoring plan. Emissions have to be third-party verified and reported to national competent authorities before the end of March every year. Verification can only be done by independent accredited verifiers.

MRV requirements have become more harmonized since June 2012, when the Commission adopted two Regulations, one on Monitoring and Reporting and the other on Verification and Accreditation. A Regulation applies directly to member states, in contrast to the previous EU decision on MRV that needed national implementation and, as a consequence, was subject to different interpretations between member states. To further facilitate increased harmonization, the Commission has developed templates for monitoring plans for both stationary installations and aircraft, as well as a wealth of guidance documents and tools.[139]

In June 2012 the single Union Registry went online and replaced national registries, following a revision of the ETS Directive in 2009. This registry contains accounts, verified emissions, and surrendered allowances for each ETS installation in the 31 countries covered by the EU ETS.

Linking to other schemes Norway, Iceland, and Liechtenstein have been linked to the scheme since 2008. In August 2012 the European Commission and Australia announced an official intention to fully link with each other no later than July 1, 2018.[140] Once established, such a link would create the first such intercontinental linking of ETS. A future agreement is foreseen between the European and Australian authorities to entail full fungibility of carbon allowances; those issued in one ETS can be used for compliance in the other ETS.

On January 24, 2013 the European Commission requested a negotiating mandate from the European Council to enter into linking negotiations with Australia.[141] Further formal negotiations would be needed with respect to key policy issues such as acceptance of third-party units, the role of land based domestic offsets, carbon leakage provisions, and MRV. Meanwhile, an interim one-way link will be established from July 1, 2015, during which Australian companies can use EUAs to fulfill their obligations in Australia, but not the reverse. From 2018 a full link will be established, allowing the use of allowances in both directions. No mandate is required from the Council for this one-way link.

To facilitate linking, Australia will not implement the initially planned (temporary) floor price and will introduce a new sub-limit of 12.5% to the use of eligible Kyoto units [CERs, ERUs, and Removal Units (RMUs)]. In addition, technical registry arrangements will be made to establish the interim link, for which Australia held a public consultation in March 2013.[142]

Both the EU and Australia need to adopt an agreement on the details of linking by mid-2015 to facilitate commencement no later than July 1, 2018. It is expected that this link will control the price of carbon in Australia, keeping it lower than otherwise predicted because

138 Source: Eurelectric, *Energy Roadmap 2050*, February 2012.
139 Source: European Commission, *Monitoring, reporting and verification of EU ETS emissions*, 12 April 2013, http://ec.europa.eu/clima/policies/ets/monitoring/documentation_en.htm.
140 Source: European Commission, *Australia and European Commission agree on pathway towards fully linking Emissions Trading systems*. Press release, 28 August 2012, http://europa.eu/rapid/press-release_IP-12-916_en.htm.
141 Source: European Commission, *Linking EU ETS with Australia: Commission recommends opening formal negotiations*, 24 January 2013, http://ec.europa.eu/clima/news/articles/news_2013012401_en.htm.
142 Source: Australian Government Department of Climate Change and Energy Efficiency, *Consultation on registry arrangements to facilitate linking with the EU Emissions Trading System*, March 2013, http://www.climatechange.gov.au/government/submissions/registry-arrangements-EU-trading.aspx.

Australian parties can use lower-priced EUAs for compliance. The link with Australia can also provide a further source of demand within the EU scheme.

The EU is also in advanced negotiations with Switzerland about a market link. During a third round of negotiations in October 2012, the delegations agreed on a timetable for the next stage of the process, according to which the negotiations could be completed over the course of 2013. For more details, see Section 3.2.4.

Looking ahead In 2013 decisions about the EU ETS, in particular the six proposed measures, are expected to refine and improve the system further, based on the experience gained from having the measure in place for seven years. Structural reforms to the EU ETS will also form an important backdrop to the development of wider EU climate policy. The Commission is expected to draft legislation outlining a European 2030 energy and climate package later this year, and the EU ETS will continue to have a central role in this package.

3.1.2 California's Cap-and-Trade Program

California's Cap-and-Trade Program started in 2012 and entered into its first compliance period as of January 1, 2013. First price signals are emerging, and discussions with Québec about linking are becoming more concrete.

California has been part of the Western Climate Initiative (WCI) since 2007. The first compliance period is from 2013 to 2014, the second from 2015 to 2017, and the third from 2018 to 2020.

Scope In 2013 the program cap is 162.8 $MtCO_2e$, which is about 35% of California's total GHG emissions (448 $MtCO_2e$ in 2010).[143] The cap decreases by 2% to 159.7 $MtCO_2e$ in 2014. With increased scope the cap is 394.5 $MtCO_2e$ in 2015 and then decreases by 3% annually to reach a cap of 334.2 $MtCO_2e$ in 2020.[144, 145]

Sectors that are covered include electric utilities, cement, lime, nitric acid, refineries, and electricity generation that exceeds 25,000 tCO_2e/y. The program covers the six Kyoto GHGs[146] as well as NF_3 and other fluorinated GHGs. From 2015 onwards, transportation fuel distributors and upstream natural gas suppliers will be added to the scheme, a unique feature compared to other existing or emerging emissions trading schemes, after which the scheme is expected to cover about 85% of California's GHG emissions.

Allocation approaches In November 2012 the first carbon allowances were allocated to covered entities using a benchmark approach similar to that used in the EU ETS.[147] At the same time, the first auction of allowances was held. Due to regulatory uncertainties, allowances were sold at just above the US$10 auction reserve price. A second auction in February 2013 cleared at much higher prices (US$13.62),[148] a sign that confidence is building amongst market players.

Competitiveness considerations California's Cap-and-Trade Regulation contains two provisions to account for competitiveness concerns. Participants in the scheme can be awarded additional free allowances to compensate for the near-term competitiveness issues associated with transition into the scheme, and also for longer-term competitiveness issues related to trade

143 This is including LULUCF. Source: California Environmental Protection Agency, Air Resources Board(ARB), *California Greenhouse Gas Inventory for 2000-2010*, 21 March 2013.
144 Source: California Environmental Protection Agency ARB, *California Cap-and-Trade Regulation, Section 95841*, 1 September 2012, http://www.arb.ca.gov/cc/capandtrade/september_2012_regulation.pdf.
145 Source: California Environmental Protection Agency ARB, *California Cap-and-Trade Regulation Initial Statement of Reasons, Appendix E: Setting the Program Emissions Cap*, http://www.arb.ca.gov/regact/2010/capandtrade10/capv3appe.pdf.
146 The six Kyoto GHGs are CO_2, CH_4, N_2O, HFC, SF_6 and PFC.
147 Source: California Environmental Protection Agency ARB, *Allowance Allocation*, 19 March 2013, http://www.arb.ca.gov/cc/capandtrade/allowanceallocation/allowanceallocation.htm#industry.
148 Source: California Environmental Protection Agency ARB, *California Air Resources Board Quarterly Auction 2*, February 2013, http://www.arb.ca.gov/cc/capandtrade/auction/february_2013/auction2_feb2013_summary_results_report.pdf.

exposure with regions of the United States that do not have carbon pricing mechanisms. The rules for additional free allocation will be reviewed every three years.[149] Industrial participants will also receive compensation for increased electricity prices caused by the inclusion of electricity distributers in the scheme. This compensation may take the form of an energy-efficiency program or direct rebates to retail customers. Details are still under development.

Use of offsets Compliance entities are allowed to use up to 8% of their compliance obligation in offset credits in each compliance period. Only Air Resources Board (ARB) offset credits and sector-based offset credits may be used for compliance.[150]

Offset credits must be generated from projects in the United States that operate in accordance with an ARB protocol. Four protocols are currently in place: US forest projects, urban forest projects, livestock projects, and ozone-depleting substance projects. In addition, registry offset credits and early action offset credits can be changed into ARB offset credits if they meet the regulatory requirements and the projects were developed using the four protocols.[151] ARB is currently developing two additional protocols for Board consideration later this year. Those include a protocol for destruction of methane from coal mine and changes to rice cultivation practices to avoid methane emissions.

Sector-based offset credits, including REDD credits, may be used to cover up to 2% of the total compliance obligation in the first and second compliance period, and to cover up to 4% in the third compliance period. This amounts to around 80 $MtCO_2e$ over 2013–2020.[152] The regulation does not currently allow for the use of any sector-based credits, but ARB is evaluating the potential for REDD offset credits and recommendations from the REDD Offset Working Group (ROW). The ROW was established following the signing of a Memorandum of Understanding between the governors of California, Chiapas, and Acre in 2010.[153] The purpose of the ROW is to investigate the inclusion of REDD credits in California's Cap-and-Trade Program, which could result in a link with REDD initiatives in Chiapas and Acre (see Section 2.4). In January 2013, the REDD Offset Working Group published draft recommendations on how to include REDD credits in California's Cap-and-Trade Program,[154] which will serve as a main input for the development of the regulations.

Price stabilization mechanisms The allowance budgets for each year from 2013 to 2020 are included in the regulation. Any changes to the current cap levels will require a change to the legislation. An auction reserve price (i.e., the minimum price that allowances can be sold for at an auction) is set at US$10/$tCO_2e$ in 2012, increasing by 5%/y plus inflation. A price containment reserve will include 4% of total allowances to be sold in case the price of allowances becomes too high. Allowances from this reserve will be offered at auction four times a year, at three price levels: US$40, US$45, and US$50/$tCO_2e$.[155] These prices will escalate each year by 5% plus inflation.

Performance and effectiveness The scheme has only just started operation and it is too early to assess performance.

MRV and registry During the summer of 2012, the compliance instrument tracking system was launched with the commencement of entity registration. The tracking system is a stand-alone system where all compliance instruments, carbon allowances, and compliance offset credits are created, traded, and retired. Registration requires users to successfully complete "know-your-customer" requirements. California has also launched

149 Source: California Environmental Protection Agency ARB , *California Cap-and-Trade Regulation Initial Statement of Reasons*, Appendix J: Allowance allocation, http://www.arb.ca.gov/regact/2010/capandtrade10/capandtrade10.htm.
150 For more detailed information see Kossoy, A. and Guigon, P., *State and Trends of the Carbon Market Report*, World Bank, 2012.
151 Source: California Environmental Protection Agency ARB, *Compliance Offset Program*, 1 March 2013, http://www.arb.ca.gov/cc/capandtrade/offsets/offsets.htm.
152 Source: Authors' calculation, confirmed with California Environmental Protection Agency ARB.
153 Source: REDD Offset Working Group, About ROW, accessed on 1 May 2013, http://stateredd.org/about-row/.
154 Source: REDD Offset Working Group, *Draft recommendations*, 24 January 2013, http://stateredd.org/recommendations/.
155 Source: California Environmental Protection Agency ARB, *Presentation to the PMR California Cap on Greenhouse Gas Emissions and Market-Based Compliance Mechanisms*, 15 March 2013, http://www.thepmr.org/events/eventlist/other-events/pmr-information-sharing-emissions-trading-north-america-march-2013.

its auction platform and has held a practice auction to familiarize market participants with the auction process. California has had a mandatory GHG reporting program since 2007 and has currently revised its online reporting tool. The mandatory reporting regulation includes provisions for third-party verification consistent with international standards.

Linking to other schemes Plans to link with Québec were approved by the State Governor in April 2013, which should help accelerate the process of linking. A few days later ARB approved the date of January 1, 2014 to officially link with Québec. Both jurisdictions are members of WCI, and linking has been planned since 2012.

The majority of stakeholders' covered entities are not, however, in favor of linking. These stakeholders maintain that alterations to the system after linking would require changing the regulations in two jurisdictions, which is likely to be more difficult than changing regulations in one. California's stakeholders also want both California and Québec to have more experience with their own programs before linking.

Some analysts believe that linking will cause an increase in allowance prices, compared to the Californian scheme alone, depending on the level of offsets generated in Québec.[156] Linkage should also reduce price volatility. After linking, the domestic offsets approved in one scheme would be fully fungible in the other. Québec currently has three offset protocols approved.

Although Québec has no forestry offset protocol yet, some environmental groups fear that in the future, offsets from Canadian forestry would become fungible in California. Such stakeholder concerns are related to the existing environmental protection standards for forests in Canada, which are seen as less environmentally stringent than California's regulations.[157]

Looking ahead California's Cap-and-Trade Program is currently the subject of several lawsuits. In one lawsuit environmental groups are claiming that all four California-approved offset protocols are not delivering additional emission reductions. Early in 2013 the Californian court ruled in favor of the California ARB, the state-government's body responsible for development and adoption of ETS regulations in California.

Another lawsuit, by the California Chamber of Commerce, was filed just one day before the first auction. It was claimed in this action that allowances made available via auctions should be considered an illegal tax and therefore all allowances should be distributed for free. The National Association of Manufacturers (NAM), a US industry lobby group that has been active nationally in opposition to climate change related legislation, joined the Chamber of Commerce in the claim. The first hearing is scheduled for August 2013.[158]

Over the next twelve months, California's Cap-and-Trade Program will undergo some amendments based on lessons learned from the scheme's operation and feedback collected recently. In particular:

- The level of the benchmarks for free allocation and the provisions to prevent possible carbon leakage will be reviewed.
- ARB will further work on rules to prevent "resource shuffling," which is the shuffling of source streams of (already contracted) imports of electricity to less carbon-intensive resources in order to lower compliance costs.
- Rulemaking on auctions and related information disclosure will be further developed.
- ARB will be proposing additional offset project protocols.

156 Source: Bloomberg, *California Carbon Advances after Governor Approves Québec link*, 9 April 2013, http://www.bloomberg.com/news/2013-04-09/california-carbon-advances-after-governor-approves-Québec-link.html.

157 An overview of stakeholder comments is available via California Environmental Protection Agency ARB, *Board Meeting Comments Log*, http://www.arb.ca.gov/lispub/comm/bccommlog.php?listname=capandtradelinkage12.

158 Source: Thomson Reuters Point Carbon, *U.S. trade group adds muscle to California carbon lawsuit*, 19 February 2013, http://www.pointcarbon.com/news/euets/1.2189938?date=20130219&sdtc=1.

ARB expects that a proposal on these points will be sent to the Board for consideration by the end of 2013. The next year will offer California a range of important lessons to help refine and improve the scheme.

Box 2: California's Compliance Offset Program

By Richard W. Corey,
Executive Officer, California Air Resources Board

In designing its Cap-and-Trade Program, the California Air Resources Board (ARB) saw many benefits associated with carbon offsets. As an important market feature, offset credits can provide covered entities a source of low-cost emission reductions for compliance flexibility. The inclusion of offset credits will also support the development of innovative projects and technologies from sources outside capped sectors that can play a key role in reducing emissions both inside and outside California. To date, ARB has adopted protocols for four project types, forestry, urban forestry, destruction of ozone depleting substances, and livestock digesters. These project types will also provide non-GHG related environmental co-benefits, such as protecting watersheds and the ozone layer. The four current protocols are only applicable in the United States, use a performance standard approach for addressing additionality, and include transparent, conservative quantification methods.

California's compliance offset program relies on multiple levels of offset project information review prior to review by ARB and issuance of compliance offset credits. The parties involved in this review include independent third-party verifiers trained and accredited by ARB, and approved voluntary offset project registries. Once ARB adopts a compliance offset protocol, it may be used by any project developer. ARB's role includes adoption of compliance offset protocols, all policy decision making, program oversight and enforcement, and final project review and issuance of compliance offset credits.

Some stakeholders have expressed concerns about the use of offsets in California's market program. ARB has designed the program to address many of these concerns and assure that only real GHG reductions will be issued compliance offset credits. The Cap-and-Trade Program also includes a maximum offset usage limit of up to 8% for each compliance period. This limit ensures GHG reductions occur within the covered entities. The offset usage limit and annually escalating floor price in the quarterly allowance auctions also work to provide a price signal to incent investments in low carbon technology.

This year will mark another significant milestone for California's Cap-and-Trade Program. ARB expects to issue the first of many compliance offset credits for use in its market program. There are also additional offset protocols under development. With the knowledge that there are many eyes on California, we're excited to launch our offset program and share our experiences.

3.1.3 Kazakhstan

Kazakhstan's Emissions Trading Scheme (KAZ ETS) has a mandatory ETS in place that covers CO_2 emissions.[159] CO_2 and CH_4 are subject to GHG emissions monitoring regulations,[160] but CH_4 is currently not included in at least the pilot phase. The pilot phase takes place in 2013, and the second phase from 2014 to 2020.

Scope The total GHG emissions of Kazakhstan were 318 $MtCO_2e$[161] in 2010, and the cap for the KAZ ETS in 2013 is 147 $MtCO_2e$ plus a 20.6 $MtCO_2e$ reserve. The cap will decrease by a linear amount annually in the second phase. The ETS covers facilities emitting more than 20,000 tCO_2e/y in agriculture, transport, oil and gas, mining and metallurgy, the chemical sector, and the power sector.[162]

Allocation approaches Free allocation is determined on the basis of historical emissions. In the pilot phase 100% free allocation is given based on the 2010 emissions. In the second phase free allocation is based on emissions over the last two years preceding the new period, aligned with the program for GHG emissions reduction that the operator submitted when entering the KAZ ETS.[163]

New facilities from priority sectors (see Competitiveness considerations) receive free allocation from the allowance reserve based on their planned capacity (increase in capacity) and a new assessment of their energy saving measures.[163] In addition, operators of new and expanding facilities can request the authorized body to auction a portion of the allowance reserve. If at least ten operators of new or expanding facilities submit a request, the authorized body will consider auctioning a portion of the reserve. This auctioned portion is limited to up to 30% of the reserve in the first auction, and the rest is equally distributed over the current period. Timing and amount of the auction will be published at least one month before the auction.[164]

Competitiveness considerations Priority sectors that should receive free allocation of allowances are defined. These are the same sectors that are currently covered by the KAZ ETS plus the petrochemical sector.[165]

Use of offsets Currently, only domestic offsets are allowed in the KAZ ETS. Two types of domestic offsets can be used for compliance: "primary drive" domestic offsets and converted domestic offsets. Participants in the KAZ ETS can directly invest in a domestic offset project to generate offset credits. The credits from the project in which the participant has invested can then be directly used for compliance in the KAZ ETS by only the investor or a third party appointed by the investor. Credits generated in this manner are called primary drive domestic offset credits. There is no limit on the use of primary drive offsets.

Whilst there is also no explicit limit on the use of converted domestic offsets, emission reductions from this type of domestic offset project can only be used for compliance in the KAZ ETS mobilized by conversion into allowances from the reserve. Therefore, if the reserve is empty, converted domestic offsets cannot be used; this means that, therefore, the size of the reserve represents

159 Source: Government of the Republic of Kazakhstan, *No. 1588 National Allocation Plan for greenhouse gas emissions by 2013*, 13 December 2012, http://adilet.zan.kz/rus/docs/P1200001588#z5 (Russian).
160 Source: Government of the Republic of Kazakhstan, *No. 655 List of GHG emissions subject to state regulation*, 22 May 2012, http://adilet.zan.kz/rus/docs/P1200000685#z5 (Russian).
161 Source: JRC/PBL, *EDGAR version 4.2 FT2010*. Joint Research Centre of the European Commission/PBL Netherlands Environmental Assessment Agency, 2012, available at: http://edgar.jrc.ec.europa.eu/index.php.
162 Source: Thomson Reuters Point Carbon, *The Domestic Emissions Trading Scheme in Kazakhstan*, February 2013, http://www.ebrdpeter.info/Reports/20130411%20EBRD%20PETER%20Project%20-%20Kazakhstan%20ETS.pdf.
163 Source: Government of the Republic of Kazakhstan, *No. 586 Rules for assigning greenhouse gas emissions*, 7 May 2013, http://adilet.zan.kz/rus/docs/P1200000586#z5 (Russian).
164 Source: Government of the Republic of Kazakhstan *No. 151-ө Regulation of emissions trading of greenhouse gas emissions and carbon units*, 11 May 2012, http://adilet.zan.kz/rus/docs/V1200007711#z6 (Russian).
165 Source: Government of the Republic of Kazakhstan, *No. 685 On the definition of priority sectors for the provision of allowances required for the allocation of quotas for greenhouse gas emissions*, 25 May 2012, http://adilet.zan.kz/rus/docs/P1200000685#z5 (Russian).

the maximum amount of domestic offset reductions that can be used in the system.[166] Domestic offset projects have to be developed according to the rules set out by the government.[167, 168]

The regulation for converted allowances contains provisions for the use of CERs and ERUs in the KAZ ETS by converting the international credits into allowances in the same manner as domestic offsets. This provision is conditional to Kazakhstan receiving its AAUs, which means that CERs and ERUs cannot be used in the KAZ ETS before Kazakhstan has its target for CP2 approved. Kazakhstan has also indicated its intention to develop JI projects. JI projects may not be implemented at facilities that fall under the KAZ ETS.[169]

Price stabilization mechanisms No price stabilization measures are currently in place in the KAZ ETS. Banking and borrowing between the pilot phase and second phase is not allowed.

Performance and effectiveness The scheme has only just become operational and it is too early to assess performance.

MRV and registry The operator in the KAZ ETS includes detailed monitoring and annual reporting procedures. The annual GHG inventory report must be verified by independent accredited organizations.[170]

All allowances and domestic offsets are registered in the State registry. After Kazakhstan has reached an international agreement on climate change, AAUs, ERUs, CERs, and RMUs can also be held in the State registry.[171] The State registry is still under development.[172]

Linking to other schemes The KAZ ETS is considering linking to the EU ETS and potentially other schemes.[173] Upon establishing a bilateral or multilateral agreement between the Republic of Kazakhstan and other countries, the mutual recognized allowances can be used in the KAZ ETS for compliance. The limits and conditions of the use of the mutual recognized allowances will be specified in the national allocation plan of the relevant period.[174]

Looking ahead During this pilot phase the regulatory framework will be further developed through learning-by-doing for the second phase.

3.1.4 New Zealand

The New Zealand Emissions Trading Scheme (NZ ETS) started in 2008 and will progressively regulate emissions of the six Kyoto GHGs in all sectors of the economy by 2015. The ETS obligation on the importation of synthetic GHGs from imported goods and motor vehicles has been removed from 2013 through an ETS amendment in 2012 and is replaced by a levy that is linked to the carbon price and transition measures.[175] The scheme is mandatory and includes some voluntary opt-ins. The scheme was amended in 2012, and discussions continue about New Zealand's commitments at the international level, which shape the cap of the NZ ETS.

166 Source: Government of the Republic of Kazakhstan *No. 148-ə On approval of the rules for converting units of project-based mechanisms in the regulation of emissions and removals of greenhouse gases in allowances*, 10 May 2012, http://adilet.zan.kz/rus/docs/V1200007688#z6 (Russian).
167 Source: Government of the Republic of Kazakhstan *No. 156-ə Rules for the development of internal projects to reduce greenhouse gas emissions*, 14 May 2012, http://adilet.zan.kz/rus/docs/V1200007730#z2 (Russian).
168 Source: Government of the Republic of Kazakhstan *No. 151-ə Regulation of emissions trading of greenhouse gas emissions and carbon units*, Section 5, 11 May 2012, http://adilet.zan.kz/rus/docs/V1200007711#z6 (Russian).
169 Source: Government of the Republic of Kazakhstan *No. 897 On the Rules implementing project-based mechanisms in the regulation of emissions and removals of greenhouse gas*, 30 June 2012, http://adilet.zan.kz/rus/docs/P1200000897#z5 (Russian).
170 Source: Government of the Republic of Kazakhstan *No. 840 Rules for monitoring and controlling inventory of greenhouse gas emissions*, 26 June 2012, http://adilet.zan.kz/rus/docs/P1200000840#z5 (Russian).
171 Source: Government of the Republic of Kazakhstan *No. 147-ə Rules on the state registry of carbon units, 10 May 2012*, http://adilet.zan.kz/rus/docs/V1200007702#z6 (Russian).
172 Source: Project PETER, *Kazakhstan Institutional Arrangements and Stakeholders*, accessed on 11 April 2013, http://ebrdpeter.info/EngKazakhstan.html.
173 Source: Thomson Reuters Point Carbon, *Existing Emissions Trading Schemes – A Comparative Analysis*, prepared for the PETER project, February 2013, http://ebrdpeter.info/Reports/20130308%20EBRD%20PETER%20Project%20ETS%20Comparison.pdf.
174 Source: Government of the Republic of Kazakhstan, *No. 153-ə Rules on the mutual recognition of allowances and other units of carbon credits on the basis of international agreements with the Republic of Kazakhstan*, 11 May 2012.
175 Source: Ministry for the Environment of New Zealand, *ETS 2012 Amendments: Synthetic Greenhouse Gases*, July 2012, updated November 2012.

Scope Total GHG emissions in New Zealand were 79.9 $MtCO_2e$ in 2011, of which 32 $MtCO_2e$ were covered by the ETS in 2011.[176, 177] The NZ ETS currently covers the six Kyoto GHGs in forestry, transport fuels, coal mining and imports, gas mining, geothermal energy, industrial processes, and synthetic gases and waste, which entered the scheme this year. Agriculture (roughly half of New Zealand's emissions) currently only has a reporting obligation and will fully enter the NZ ETS with compliance obligations only when a further decision to do this is made by Parliament. Voluntary reporting of emissions from synthetic gases, waste, and agriculture amounted to 6.4 $MtCO_2e$ in 2011. Electricity generation is not included in the NZ ETS, as it places the obligations on the upstream energy sectors (coal, gas, and geothermal) and it is assumed the costs are passed on to the customers.[178]

The NZ ETS legislation requires that a cap (linked to New Zealand's overall Kyoto target) be established and set for five years ahead, before emission units may be auctioned to NZ ETS participants. There will be no absolute cap on domestic emissions because an unlimited number of international offsets can be used. In CP1 New Zealand committed to returning to 1990 emissions levels by 2012. Participants in the NZ ETS must surrender allowances to match all of their emissions for a given year with a range of units, including New Zealand Units, as well as ERUs, CERs, and RMUs.

Allocation approaches Some allowances are allocated for free on the basis of emissions/revenue for the trade-exposed industrial sectors, forestry and fishing. There may be auctioning in the future.

Competitiveness considerations The government implemented several changes to the scheme in 2012 in order to reduce the cost impacts of the NZ ETS beyond 2012.[179] Among others the requirement to surrender only one carbon unit for every two tons of carbon emissions has been extended for all non-forestry sectors at least until the next review of the NZ ETS, which will most likely take place in 2015. This effectively halves the price of the allowances.

Use of offsets ERUs, RMUs, and CERs are allowed, but qualitative restrictions apply similar to the EU ETS. New Zealand AAUs are also allowed for compliance. Only one eligible offset has to be surrendered for every two tons of CO_2 emitted.

ERUs from HFC-23 and N_2O destruction projects, as well as CERs and ERUs from large-scale hydroelectricity projects, were banned from the NZ ETS from December 18, 2012. CERs from HFC-23 and N_2O destruction projects were already banned from late 2011. Credits from these project types that entered the New Zealand registry before December 18, 2012 can still be used for compliance. There are no quantitative restrictions on the use of offsets.

The demand for international offsets under the NZ ETS depends on the actual domestic emissions in any given year for the participating sectors. Kyoto Protocol CP1 ERUs, RMUs, and CERs may still be surrendered by NZ ETS participants, to cover their calendar 2013 and 2014 emissions. However, New Zealand has not made a "quantified emissions limitation or reduction commitment" for CP2, but has made a commitment under the UNFCCC. For that reason, vintage CP2 units will only be available to the New Zealand Registry under restricted circumstances: they must be CERs from CDM projects in which New Zealand is a direct participant. The government has not yet decided what, if any, specific rules will apply for these CP2 units in the NZ ETS.

CERs and ERUs vintage from Kyoto Protocol CP1 will be cancelled unless they are carried over into CP2. This means that they will not be available for use by NZ

176 Source: Ministry for the Environment of NewZealand, *New Zealand's Greenhouse Gas Inventory 1990–2011 and Net Position Snapshot April 2013*, http://www.mfe.govt.nz/publications/climate/greenhouse-gas-inventory-2013-snapshot/index.html.

177 Source: JRC/PBL, EDGAR version 4.2 FT2010. Joint Research Centre of the European Commission/PBL Netherlands Environmental Assessment Agency, 2012, available at: http://edgar.jrc.ec.europa.eu/index.php.

178 Source: Ministry for the Environment of New Zealand, *Energy in the New Zealand Emissions Trading Scheme*, 3 December 2012, http://www.climatechange.govt.nz/emissions-trading-scheme/participating/energy/.

179 Source: Ministry for the Environment of New Zealand, *2012 Amendments to the New Zealand Emissions Trading Scheme (NZ ETS): Questions and answers*, 19 March 2013, http://www.climatechange.govt.nz/emissions-trading-scheme/ets-amendments/questions-answers.html.

ETS participants beyond May 31, 2015, which is the last surrender date before likely cancellation.[180] The government recently consulted with account holders on whether individual account holders will be allowed to carry over any CERs or ERUs. Any carry-over must be limited to the maximum allowed under international carry-over rules. According to the compliance projections of the government under these rules, the demand for CP1 CERs and ERUs is around 70 $MtCO_2e$ out of the total projected demand of 170 $MtCO_2e$ over 2013–2020. In the event private account holders are not allowed to carry any over, a larger demand of NZ allowances is expected after 2015.

Price stabilization mechanisms To limit CO_2 costs, participants can buy a New Zealand Unit at a fixed price of NZ$25 from the government for compliance. Due to the temporary rule that non-forestry participants can surrender one allowance for two tons of emissions,[181] this fixed price effectively means a carbon price ceiling of NZ$12.5 per tCO_2e.

Performance and effectiveness A comprehensive review of the NZ ETS was completed in September 2011, and several recommendations have been adopted since that time.[182, 183] The price of NZ allowances have dropped from NZ$20 two years ago to less than NZ$2 early 2013, because covered entities can cover their emissions by an unlimited amount of cheap international offsets.[184] Therefore, the cost of compliance within the NZ ETS has become very low.

MRV and registry The New Zealand scheme employs self-reporting, with regular audits. The New Zealand Emissions Unit Register (NZ EUR) is the registry for the NZ ETS.[185]

Linking to other schemes and looking ahead While the prospect of linking with Australia looked positive for a long time,[186, 187] recent discussions between the two countries have failed to deliver a commitment, and there are doubts on the prospect of linking in the short term.[188] One complication is that both countries have different commitments in the transition period to 2020: while Australia opted for new commitments under the second commitment period of the Kyoto Protocol in Doha 2012, New Zealand decided to make a non-binding commitment under the UNFCCC.[189]

3.1.5 Regional Greenhouse Gas Initiative (RGGI)

RGGI is a cap-and-trade program covering CO_2 emissions from power plants in the Northeast and Mid-Atlantic U.S. states. It is the first mandatory emissions trading scheme in the United States, initially covering the states of Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Rhode Island, and Vermont.[190]

180 Source: Ministry for the Environment of New Zealand, *Consultation on domestic carry-over provisions*, 19 March 2013, http://climatechange.govt.nz/consultation/ets/proposed-options-for-carry-over-units-ets-2013.html.
181 This measure was supposed to end on 31 December 2012, but has been extended post-2012 without specified end date through an ETS 2012 amendment. Source: Ministry for the Environment of New Zealand, *ETS 2012 Amendments: Key Changes for Participants and Industrial Allocation Recipients*, July 2012, updated November 2012.
182 Source: New Zealand Government, *NZ ETS Review 2011*, 28 October 2011, http://www.climatechange.govt.nz/emissions-trading-scheme/ets-review-2011/.
183 Source: New Zealand Cabinate, *Emissions Trading Scheme Review 2012: Final Decisions on Amendments to the Climate Change Response Act 2002*, 2 July 2012, http://www.climatechange.govt.nz/emissions-trading-scheme/ets-amendments/cabinet-minute-12-2310.pdf.
184 Source: Thomson Reuters Point Carbon, *Carbon Market Australia – New Zealand, Vol 6, issue 2*, 1 March 2013, http://www.pointcarbon.com/polopoly_fs/1.2202614!CMANZ20130301.pdf.
185 Source: New Zealand Emissions Unit Register, *Website: About us*, accessed on 19 March 2013, http://www.eur.govt.nz/about-us.
186 Source: New Zealand Government, *Progress made on trans-Tasman carbon market*, 2 August 2012, http://www.beehive.govt.nz/release/progress-made-trans-tasman-carbon-market.
187 Source: New Zealand Government, *Australia and New Zealand advance linking of their emissions trading schemes*, 5 December 2011, http://www.beehive.govt.nz/release/australia-and-new-zealand-advance-linking-their-emissions-trading-schemes.
188 Source: Bloomberg, *Little Prospect Seen in Short Term for Linking Australia, New Zealand Carbon Schemes*, 08 March 2013.
189 Source: Government of New Zealand, *New Zealand Commits to UN Framework Convention*, 9 November 2012.
190 Source: RGGI, *Regional Greenhouse Gas Initiative*, accessed on 15 April 2013, www.rggi.org.

The program has been operating since January 1, 2009, with the first compliance period ending in 2011, and the second compliance period in operation from 2012 to 2014.

New Jersey participated in the first compliance period but withdrew from RGGI in November 2011, planning to take action on climate change through other state-based policies.[191] In addition, objections to continued participation in the program were also raised by the states of New Hampshire, Delaware, and New York.[192]

In 2012 a comprehensive review of RGGI was undertaken, including stakeholder assessments. The participating RGGI states published recommendations based on this review in February 2013.[193]

Scope The program covers all electricity generator units with an electrical capacity of 25 MW or greater. During the first compliance period, annual CO_2 emissions from these regulated units averaged approximately 114 $MtCO_2$ (126 million short tons of CO_2)[194] in the ten-state region.[195] The overall GHG emissions were 419 $MtCO_2e$ for the RGGI states in 2010.[196]

For the first compliance period, the cap was established at 171 $MtCO_2$ (188 million short tons of CO_2 per year) for the ten-state region, including New Jersey.

After the withdrawal of New Jersey, the cap for the second compliance period was set at 150 $MtCO_2$ (165 million short tons of CO_2) for the remaining nine participating states. From 2015 onwards an annual reduction of 2.5% to the cap was planned, to reach a 10% total reduction over 2009–2014 levels by 2018. This is achieved by a reduction in each participating state's budget of 2.5% each year.

Following the 2012 review, the RGGI states proposed a 45% reduction to the RGGI cap in 2014 to 83 $MtCO_2$ (91 million short tons of CO_2). The cap would decline 2.5% each year from 2015 to 2020. The new cap is projected to generate approximately 80–90 million short tons of cumulative emission reductions by 2020, when compared to the current RGGI program. The stringency of the cap will also be safeguarded by a provision to not reoffer unsold 2012 and 2013 allowances at the end of the second compliance period. Further provisions have been made to address the banked allowances held by participants from previous years and ensure that a surplus is not built up that damages the effective operation of the program.[197]

Allocation approaches The majority of allowances are allocated through regular, quarterly auctions, with a small share sold at a fixed price. In the first compliance period, 89% of allowances were offered for sale at auction, 1% were sold at a fixed price, and 10% were delegated as state set-aside allowances.[198]

Competitiveness considerations In February 2013, the RGGI states committed to investigating issues and to look at options related to emissions from imported electricity in the coming year. Policy options will be accompanied by modeling of price and energy implications and consideration of practical and legal considerations.

Use of offsets Power plants participating in RGGI are allowed to use offsets to meet up to 3.3% of their compliance obligations. In the first compliance period, power plants were also allowed to use offsets, including international offsets, to cover up to 5 or 10% of their obligation if auction allowance prices reached US$7

191 Source: Department of Environmental Protection, State of New Jersey, *Notice of withdrawal of agreement to the RGGI memorandum of understanding*, November 29, 2011.
192 Source: Tuerk, A. et al, *Emerging Carbon Markets: Experiences, Trends and Challenges*, January 2013, http://www.climatestrategies.org/research/our-reports/category/63/370.html.
193 Source: RGGI, *RGGI 2012 Program Review: Summary of Recommendations to Accompany Model Rule Amendments*, 7 February 2013, http://www.rggi.org/docs/ProgramReview/_FinalProgramReviewMaterials/Recommendations_Summary.pdf.
194 Source: RGGI, *97% of RGGI Units Meet First Compliance Period Obligations*, 4 June 2012 http://www.rggi.org/docs/PR060412_Compliance.pdf.
195 Source: International Carbon Action Partnership (ICAP) ETS Interactive Map, accessed on 15 April 2013, http://icapcarbonaction.com.
196 Only CO_2 emissions from fuel combustion. This does not include New Jersey, which withdrew from RGGI in 2011. Source: U.S. EPA, *CO_2 Emissions from Fossil Fuel Combustion*, accessed on 2 May 2013, http://www.epa.gov/statelocalclimate/documents/pdf/CO2FFC_2010.pdf.
197 These adjustments will be made to the overall cap over a number of years. The adjustment for privately held allowances over the period 2009–2011 will be accounted for by a downward adjustment of the cap over the years 2014-2020. The adjustment for the period 2012–2013 will be spread over the years 2015–2020.
198 Source: RGGI, *First Compliance Period CO_2 allocation*, 27 February 2012, http://www.rggi.org/docs/Allowance-Allocation.pdf.

or US$10 respectively, thus aiming at playing a role of pricing compliance mechanism to the program.[199] However, a recent review includes the recommendation to remove this price compliance offset trigger mechanism (see below).

Offsets are accepted from any of five project categories: landfill methane, sulfur hexafluoride (SF_6) reduction, forestry, energy efficiency, and manure management. Acceptable offsets must generate emission reductions in one of the participating states and must follow the appropriate RGGI rules and protocols. The recent review expanded the acceptable offsets for forestry, introducing a new RGGI Forest Offset protocol modeled on the California Forestry Offset protocol.[200]

Price stabilization mechanisms The review also found that the price stabilization mechanisms in RGGI, which involve an increase in offsets allowed at a certain carbon allowance trigger price, would not operate in a sufficiently transparent and predictable way.

Therefore, the review recommendations introduce a Cost Containment Reserve (CCR) as a cost containment mechanism. The CCR acts as a staged price relief mechanism. The CCR creates a fixed additional supply of allowances that are only available for sale if CO_2 allowance prices exceed certain price levels (US$4 in 2014, US$6 in 2015, US$8 in 2016, and US$10 in 2017, rising by 2.5% to account for inflation each year thereafter). The CCR will be filled with 5 million allowances in 2014, and 10 million per year thereafter. The CCR replaces the previous price stabilization mechanisms in the RGGI.

Performance and effectiveness A recently published review of RGGI found that emissions in the region have been reduced significantly below the cap due to a number of factors. In addition, the clearing prices for allowances at auction have been very low. Clearance prices of current allowances ranged between a low of US$1.86 (September 2010) and a high of US$3.51 (March 2009) over the first 19 auctions held between September 2008 and March 2013. The March 2013 auction saw allowances clearing at US$2.80, a significant increase on the US$1.93 price of the previous four auctions.[201] This increase may reflect announcements made in February 2013 to tighten the cap.

The RGGI state's recommendations to tighten the cap were accompanied by an economic analysis that, under certain scenarios, projected future allowance prices of between US$3.60 (2014) and US$10.20 (2020) under the new tighter cap.[202, 203] The increase in prices is expected to result in US$2.2 billion (2010) of additional cumulative income from auctions.[204]

Furthermore, the scheme is delivering other benefits to the RGGI states. An independent report concluded that the investment of RGGI proceeds from the first three years of the scheme will generate US$1.6 billion in net economic benefit to the region by the end of 2020.[205]

MRV and registry Emissions data is recorded in accordance with the State CO_2 Budget Trading Program regulations and U.S. Environmental Protection Agency (US EPA) regulations. Quality assurance of this data is provided by the US EPA.

Linking to other schemes RGGI has no current plans to link to other schemes. RGGI shares best practices and lessons learned regularly with other jurisdictions, such as California.

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199 Source: RGGI, *Fact Sheet: RGGI Offsets*, http://www.rggi.org/docs/RGGI_Offsets_in_Brief.pdf.
200 Source: RGGI, *Regional Greenhouse Gas Initiative Offset Protocol U.S. Forest Projects*, 7 February 2013, http://www.rggi.org/docs/ProgramReview/_FinalProgramReviewMaterials/Forest_Protocol_FINAL.pdf.
201 Source: RGGI, *Allowances offered and sold by auction*, accessed on 14 April 2013, http://www.rggi.org/market/co2_auctions/results.
202 Source: *RGGI IPM Analysis: Amended Model Rule*, 8 February 2013, http://www.rggi.org/docs/ProgramReview/February11/13_02_11_IPM.pdf.
203 Source: NESCAUM, *REMI Economic Impact Analysis Assumptions and Results: 91 Cap Bank Potential Scenario*, 7 February 2013, http://www.rggi.org/docs/ProgramReview/February11/13_02_11_REMI.pdf.
204 Source: RGGI, *RGGI States Propose Lowering Regional CO_2 Emissions Cap 45%, Implementing a More Flexible Cost-Control Mechanism*, February 7, 2013, http://www.rggi.org/docs/PressReleases/PR130207_ModelRule.pdf.
205 Source: RGGI, *RGGI States Propose Lowering Regional CO_2 Emissions Cap 45%, Implementing a More Flexible Cost-Control Mechanism*, 7 February 2013, http://www.rggi.org/docs/PressReleases/PR130207_ModelRule.pdf.

Looking ahead Each of the RGGI states now plan to revise their CO_2 Budget Trading Programs through their individual state-specific statutory and regulatory processes so that they are consistent with the new Model Rule.

The next review of RGGI will begin by 2016. It will focus on the cap after 2020 and other design elements.

3.1.6 Québec (Canada)

The Québec Cap-and-Trade System[206] is part of the WCI.[207] Along with California, these are the only two members of the WCI that have schemes in place. Discussions with California about linking are becoming more concrete (see above).

The first compliance period for the scheme is 2013 to 2014, the second compliance period is from 2015 to 2017, and the third compliance period is from 2018 to 2020.

Scope The scheme covers the electricity sector and named industrial sectors, such as manufacturing,[208] whose total GHG emissions are equal to or exceed 25,000 tCO_2e/y; coverage expands to include fuel distributors in the second compliance period.

Total GHG emissions for Québec were 82.5 $MtCO_2e$ in 2010.[209] The cap for the first compliance period is 23.2 $MtCO_2e$ and remains constant for the period. In the second compliance period, the cap is 65.3 $MtCO_2e$, with a linear annual decrease of 2.1 $MtCO_2e$. The scheme covers all six Kyoto GHGs and NF_3. Therefore, in the first compliance period the scheme covers approximately 30% of total GHG emissions in the province.[210] In 2015, the scheme will cover approximately 85% of total GHG emissions in the province.

Allocation approaches The majority of allowances are distributed for free, based on historical emissions, production level, and GHG intensity target.[211] In the first compliance period, free allocation to participants will cover 100% of process emissions and at least 80% of combustion-related emissions. In the compliance periods that follow, free allocation will decrease by approximately 1–2% per year. Electricity producers and distributors, as well as fuel distributors, are subject to 100% auctioning.[212]

Competitiveness considerations Free allocation of allowances is intended to protect participants against competitiveness concerns.[213]

Use of offsets The total amount of offsets allowed for compliance per emitter is limited to 8% of its GHG emissions in that compliance period.[214]

To reward early action, early reduction credits can be issued for GHG reductions in participating industries made between January 1, 2008 and December 31, 2011 that fulfill the criteria set out in the cap-and-trade regulations.

Offsets are issued for domestic offset projects. Currently, only offsets obtained from projects carried out through one of the three protocols are eligible for compliance: covered manure storage facility projects for

206 Source: Province of Québec, *Website on Carbon Market*, accessed on 1 April 2013, http://www.mddefp.gouv.qc.ca/changements/carbone/index.htm.
207 Source: WCI, *Website on Western Climate Initiative Inc.*, accessed on 1 April 2013, http://www.wci-inc.org.
208 Source: Provincial Government of Québec, *Règlement concernant le système de plafonnement et d'échange de droits d'émission de gaz à effet de serre*, 14 December 2011, updated 1 April 2013. http://www2.publicationsduquebec.gouv.qc.ca/dynamicSearch/telecharge.php?type=3&file=/Q_2/Q2R46_1.HTM.
209 This is excluding LULUCF emissions. Source: Québec Ministry of Sustainable Development, Environment, Wildlife and Parks, *Inventaire québécois des émissions de gaz à effet de serre en 2010 et leur évolution depuis 1990, Direction des politiques de la qualité de l'atmosphère*, February 2013, http://www.mddefp.gouv.qc.ca/changements/ges/2010/inventaire1990-2010.pdf.
210 Source: Provincial Government of Québec, *O.C. 1185-2012 Determination of annual caps on greenhouse gas emissions relating to the cap-and-trade system for greenhouse gas emission allowances for the 2013–2020 period*, 12 December 2012.
211 Not accounting for changes in emissions since 2010.
212 Source: Myriam Blais, Québec Ministry for Economics and Finance, *Presentation on Québec's Cap & Trade regulation*, March 2013, http://www.thepmr.org/events/eventlist/other-events/pmr-information-sharing-emissions-trading-north-america-march-2013.
213 Source: Provincial Government of Québec, *Système de plafonnement et d'échange de droits d'émission de gaz à effet de serre (GES) Foire aux questions*, accessed on 9 April 2013, http://www.mddefp.gouv.qc.ca/changements/carbone/faq-spede.pdf.
214 Source: Québec Ministry of Sustainable Development, Environment, Wildlife and Parks, *Regulation respecting a cap-and-trade system for greenhouse gas emissions allowances*, 1 April 2013.

methane destruction, landfill site projects for methane destruction, and projects on ozone depleting substance destruction from refrigerators. Other offsets are not eligible for compliance at this moment.

Price stabilization mechanisms A minimum price of allowances at auctions is set at CN$10/t$CO_2$e in 2012, increasing by 5%/y plus inflation. There is also a system to set up a reserve of allowances, which are then to be sold at one of three pre-determined fixed prices, currently CN$40, CN$45, CN$50/t$CO_2$e for year 2012, increasing annually by 5% plus inflation.

Performance and effectiveness The scheme is at a very early stage and performance cannot be evaluated yet.

MRV and registry The scheme operates using a set reporting guideline, and also requires verification by an accredited organization.[215] Some elements of allowance tracking and registry have been delegated to the WCI.

Linking to other schemes In December 2012 Québec adopted an amendment to its Regulation that will enable a link between the Québec and California schemes.[216] The details of the Québec scheme conform to the WCI methodologies ,and therefore the scheme is ready to be linked, as appropriate.

3.1.7
Tokyo, Saitama and Kyoto (Japan)

While the Japanese government is considering a national ETS, sub-national carbon pricing initiatives are already implemented. There are cap-and-trade or ETS-like schemes in operation in Tokyo, Saitama, and Kyoto. See Section 3.2.3 for more information.

3.2
OTHER EXISTING CARBON PRICING MECHANISMS

3.2.1
Carbon taxes in Australia, British Columbia, Denmark, Finland, Ireland, Japan, Norway, South Africa, Sweden, Switzerland, United Kingdom

Putting a price on carbon is done either by emissions trading schemes such as those described above, or using carbon taxes. Countries can choose carbon taxes as the sole instrument to price carbon, or use taxes as a complement to other measures, including carbon markets.

» Taxes can complement carbon markets and act in tandem or offer an alternative. «

For the purposes of this report, carbon taxes are defined as a tax using a metric directly based on carbon (i.e., per tCO_2e). In some cases countries implement fossil fuel taxes, or other taxes with the stated goal of reducing GHG emissions; however, such taxes are not included here. Table 4 shows a sample of carbon taxes currently in place.

Some carbon taxes have been in place for longer, such as those introduced in the early 1990s in Scandinavia. Others have only been introduced recently, or are scheduled. However, these new carbon taxation instruments are much fewer in number than the emerging carbon markets described in Section 3.3.

215 Source: Province of Québec, *Regulation respecting mandatory reporting of certain emissions of contaminants into the atmosphere*, 1 April 2013, http://www2.publicationsduquebec.gouv.qc.ca/dynamicSearch/telecharge.php?type=3&file=/Q_2/Q2R15_A.HTM.

216 Source: Québec Ministry of Sustainable Development, Environment, Wildlife and Parks, *Québec gives green light to carbon market*, December 13. 2012, http://www.mddefp.gouv.qc.ca/communiques_en/2012/c20121213-carbone.htm.

Scope Table 4 shows that the major taxes are mostly in Europe, with some additional examples in British Columbia in Canada, Japan, and South Africa. Carbon taxation, according to the definition here, is not widely used and is only rarely the sole policy to price carbon in an economy.

In European countries, carbon taxation can target sectors not covered by other carbon pricing policies and can also strengthen existing policies to help reach higher ambitions; for example, the UK carbon price floor strengthening the EU ETS price signal helps achieve the UK's carbon reduction goals.

Competitiveness consideration Carbon taxes can also contain a number of exemptions, which vary from region to region. These exemptions (see Table 4) are sometimes linked to initiatives that businesses take to reduce emissions, as in Denmark. However, some exemptions are related to competitiveness concerns as in Norway and South Africa and, therefore, may affect the environmental effectiveness of the tax.

Relationship to other carbon pricing mechanisms In countries where taxation was introduced earlier, other carbon pricing mechanisms have now been added, including the EU ETS. In Australia the fixed price scheme leads directly into an ETS, and in South Africa taxation represents the first steps towards carbon pricing.

Taxes can complement carbon markets and act in tandem or offer an alternative. European countries with carbon taxation use this in a complementary role to the existing EU ETS, and in Japan and Switzerland carbon taxes exist alongside a range of other policies. In South Africa, an offset mechanism is being developed to offset carbon tax liability up to a maximum of 10%, depending on the sector.

Performance and effectiveness Carbon taxation has been operating in Denmark, Finland, Norway, and Sweden since the early 1990s and therefore there is some evidence already available that, on balance, carbon taxation delivers emission reductions below business as usual.[217] In some cases, it is suggested that even greater emission results could be achieved if carbon taxation regimes had fewer exemptions.[218]

The tax in British Columbia, for example has been under review since 2012, in order to consider its environmental impact and also any economic impact, or impact on particular sectors.[219] The CO_2 tax review was made available in the Budget 2013.[220] Many stakeholders support an increase in the CO_2 tax and an expansion of its scope to all industrial emissions. Other stakeholders including businesses and industry associations, expressed concerns on the impact of the CO_2 tax on their competitiveness. They requested tax reliefs or even a reduction or elimination of the tax. Taking all stakeholder comments into consideration, the government announced in February 2013 that tax levels will remain stable and that scope will not expand to cover any additional sectors, such as industrial processes or non-combustion emissions. An earlier study indicated that the carbon tax was correlated with a 15% decrease in consumption of the fuels subject to the tax and a mostly stable GDP, although acknowledges that causality is not proven and that the system needs to be reviewed after a longer period.[221]

217 Source: Andersen M.S., *Vikings and virtues: a decade of CO_2 taxation*, 2004, Climate Policy 4, 13–24.
218 Source: B. Metz, O.R. Davidson, P.R. Bosch, R. Dave, L.A. Meyer (eds), *Contribution of Working Group III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*, 2007, Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, http://www.ipcc.ch/publications_and_data/ar4/wg3/en/ch13s13-2-1-2.html.
219 Source: British Columbia Ministry of Finance, *Carbon Tax Review and Carbon Tax Overview*, accessed on 12 April 2013, http://www.fin.gov.bc.ca/tbs/tp/climate/carbon_tax.htm.
220 Source: British Columbia Ministry of Finance, *Budget and Fiscal Plan 2013/14 – 2015/16*, pp. 58-63, 19 February 2013.
221 Source: Sustainable Prosperity, *British Columbia's Carbon Tax Shift: The First Four years*, June 2012, www.sustainableprosperity.ca.

Table 4: Examples of carbon taxes implemented and scheduled around the world

Country	Name	Description	Applies to	Rate
Australia	Carbon Pricing Mechanism (a fixed price scheme)	See Section 3.2.2		A$23/tCO$_2$ (US$24/tCO$_2$) with 2.5% annual increase[222]
British Columbia	Revenue Neutral Carbon Tax *Starting year: 2008*	The purpose of this tax is to put a price on carbon emissions to encourage less use of fossil fuels and reduce GHG emissions. Revenue neutral means that the revenue is recycled back into the economy through various tax reductions	All consumers of fossil fuels No exemptions are given[223]	CN$30/tCO$_2$ (US$29/tCO$_2$).[224] Tax rate from 2012[225]
Denmark	CO$_2$-afgiftsloven (CO$_2$ tax act) *Starting date: 1992*	The purpose of this tax is to reduce GHG emissions. Complementary policy measure to the EU ETS	Households, services and transport fuels except gasoline/petroleum pay in full Industry only pays for the share of heat used for spatial heating Operators covered by the EU ETS are partly exempt from these taxes and will only be taxed at the minimum rate as specified in the EU Energy Taxation Directive Energy-intensive industries are largely exempt if they enter a voluntary agreement on energy efficiency	Equivalent to around Dkr.150/tCO$_2$ (US$26/tCO$_2$).[226] Tax rate from 2010, varies per fuel type Annual increase of 1.8% in 2008–2015
Finland	Hiilidioksidivero (CO$_2$ tax) *Starting date: 1990*	The purpose of this tax is to reduce GHG emissions. Complementary policy measure to the EU ETS	All consumers of fossil fuels Certain industries or certain fuel use are (partially) exempt from the carbon tax. Fuels for electricity production, commercial aviation and commercial yachting are exempt as well	For liquid traffic fuels equivalent to €60/tCO$_2$ (US$78/tCO$_2$).[228] Tax rate from January 1, 2012 For heating traffic fuels equivalent to €30/tCO$_2$ (US$39/tCO$_2$).[228] Tax rate from January 1, 2012 For coal and natural gas equivalent to €30/tCO$_2$ (US$39/tCO$_2$).[228] Tax rate from January 1, 2011[227]

222 Exchange rate US$1 = A$0.97 (19 April 2013).
223 Source: British Columbia Ministry of Finance, *Myths and Facts About the Carbon Tax*, accessed on 21 March 2013, http://www.fin.gov.bc.ca/tbs/tp/climate/A6.htm.
224 Exchange rate US$1 = CN$1.02 (18 March 2013).
225 Source: British Columbia Ministry of Finance, *How the Carbon Tax Works*, accessed on 21 March 2013, http://www.fin.gov.bc.ca/tbs/tp/climate/A4.htm.
226 Exchange rate US$1 = Dkr.5.76 (18 March 2013).
227 Source: Ministry of Environment of Finland, *Environmentally related energy taxation in Finland*, 2 October 2012, http://www.environment.fi/default.asp?contentid=263158&lan=en&clan=en.
228 Exchange rate US$1 = €0.77 (18 March 2013).

Country	Name	Description	Applies to	Rate
Ireland	Natural Gas Carbon Tax (NGCT) *Starting date: 2010*	The purpose of this tax is to reduce GHG emissions. Complementary policy measure to the EU ETS	All consumers of fossil fuels in the Republic of Ireland Operators covered by the EU ETS are partly exempt from these taxes and will only be taxed at the minimum rate as specified in the EU Energy Tax Directive	For natural gas and mineral oil equivalent to€20/tCO_2 (US$26/$tCO_2$).[228] Tax rate from May 1, 2012
	Mineral Oil Tax: Carbon Charge (MOTCC) *Starting date: 2010*			
	Solid Fuel Carbon Tax *Starting date: 2013*			For solid fuels equivalent to €10/tCO_2 (US$13/$tCO_2$).[228] Tax rate from May 1, 2013 €20/tCO_2 (US$26/$tCO_2$).[228] Tax rate from May 1, 2014
Japan	Tax for Climate Change Mitigation *Starting date: 2012*	The goal of this tax is to put an economy-wide and fair burden for the use of all fossil fuels depending on environmental load (CO_2 emissions factor) to strengthen climate change mitigation	All consumers of fossil fuels Exemptions and tax returns apply for certain parts of the agriculture, transport and industry sectors	Equivalent to¥289/tCO_2 (US$3/$tCO_2$).[229] Tax rate from October 2012.[230] Gradual increase over 3.5 years
Norway	CO_2 avgift (CO_2 tax) *Starting date: 1991*	The purpose of this tax is to reduce GHG emissions. The highest tax rate applies to the production of gas and oil offshore in order to encourage the use of electricity generated onshore instead of electricity generated on the petroleum platforms[231]	All consumers of mineral oil, gasoline and natural gas Offshore production and distribution of oil and gas. Both the EU ETS and the CO_2 tax is imposed on this industry[232] Operators not in the offshore petroleum business and covered by the EU ETS and certain other industries are (partially) exempt from the carbon tax to preserve their competitive position	Rates in the range of Nkr.25–410/tCO_2 (US$4–71/$tCO_2$).[233] Tax rates in 2013 depending on fossil fuel type and usage[234]

229 Exchange rate US$1 = ¥94.98 (18 March 2013).
230 Source: Ministry of Environment of Japan, *Details on Carbon Tax (Tax for Climate Change Mitigation)*, accessed on 19 March 2013, http://www.env.go.jp/en/policy/tax/env-tax/20121001a_dct.pdf.
231 Source: Ministry of Environment of Norway, *Norway steps up efforts on climate change*, 22 June 2012, http://www.regjeringen.no/en/dep/md/Whats-new/news/2012/norway-steps-up-efforts-on-climate-chang.html?id=686815.
232 Source: Ministry of Finance of Norway, *CO_2-avgift*, accessed on 11 April 2013, http://www.regjeringen.no/templates/RedaksjonellArtikkel.aspx?id=558367&epslanguage=NO (Norwegian).
233 Exchange rate US$1 = NKr.5.80 (18 March 2013).
234 Source: Ministry of Finance of Norway, *Skatter, avgifter og toll 2013*, accessed on 19 March 2013, http://www.regjeringen.no/nb/dep/fin/dok/regpubl/prop/2012-2013/prop-1-ls-20122013/11/9.html?id=702764 (Norwegian).

Country	Name	Description	Applies to	Rate
South Africa	South African Carbon Tax[235] *Starting date: 2015*	South Africa plans to introduce the carbon tax in January 2015 to reduce its GHG emissions and to provide the necessary credible long-term CO_2 price signal to stimulate behavior changes towards low carbon alternatives. The implementation of gradual phasing out of overlapping taxes and CO_2 tax revenue recycling for complementary policies such as the proposed Energy Efficiency Savings Tax Incentive are under consideration	Comprehensive coverage of all economic sectors[236] In the first phase (2015–2020) 60% of the actual emissions are temporarily exempt from the tax, with additional allowances for tax exemptions for emissions intensive and trade-exposed industries up to 90%, including the possibility to reduce carbon tax liabilities through an offset program[237]	Equivalent to R120/tCO_2 (US$13/$tCO_2$).[238] Tax rate from January 2015. Annual increase of 10% in 2015–2020[239]
Sweden	Koldioxidskatt (CO_2 tax) *Starting date: 1991*	The purpose of this tax is to reduce GHG emissions. Complementary policy measure to the EU ETS	Households and services in full Non-ETS industry and agriculture partially exempt Operators covered by the EU ETS are partly exempt from these taxes and will only be taxed at the minimum rate as specified in the EU Energy Taxation Directive, except for heat production. ETS industry heat production partially exempt depending on heat generation from CHP/non-CHP	Equivalent to Skr1050/tCO_2 (US$163/$tCO_2$).[240] Tax rate from 2009
Switzerland		See Section 3.2.3		
United Kingdom	Carbon Price Floor *Starting date: 2013*	The Carbon Price Floor aims to reduce the volatility of EUA prices. This is done by adding a carbon price support rate as an additional levy on the electricity bill. The carbon price support rate is the difference between the EUA price and the annual Carbon Price Floor target (starting from £16/tCO_2e in 2013, linearly increasing to £30/tCO_2e by 2020), and is updated annually[241]	Electricity generators	Equivalent to £4.94/tCO_2 (US$7/$tCO_2$). Tax rate in April 2013.[242] Changing each year depending on the EUA price

235 Source: Partnership for Market Readiness, *Tackling Climate Change: Pricing Carbon to Achieve Greenhouse Gas Mitigation*, 13 March 2013, https://www.thepmr.org/system/files/documents/PMR_Event_Booklet_March%202013.pdf.
236 At the time of writing this report details on the scope have not been published yet. However, the desired scope was indicated in the South African government, *National Climate Change Response White Paper*, 19 October 2011 http://www.info.gov.za/view/DownloadFileAction?id=152834.
237 Source: Partnership for Market Readiness, *South Arica, Policy Mapping Workshop: South Africa's Policy Interaction Experience*, accessed on 11 April 2013 http://www.thepmr.org/country/south-africa-0.
238 Exchange rate US$1 = R9.19 (18 March 2013).
239 Source: Department National Treasury, Government of South Africa, *Reducing Greenhouse Gas Emissions: Carbon Tax Policy Proposals*, 30 March 2012, http://www.energy.gov.za/files/IEP/presentations/ReducingGreenhouseGasEmissionsCarbonTaxPolicyProposals_30March2012.pdf.
240 Exchange rate US$1 = Skr6.44 (18 March 2013).
241 Source: Source: HM Revenue & Customs, *Carbon Price Floor*, accessed on 17 April 2013, http://www.hm-treasury.gov.uk/d/carbon_price_floor.pdf.
242 Source: HM Revenue & Customs, *Budget 2013: Carbon Price Floor*, accessed on 2 May 2013, http://www.hmrc.gov.uk/budget2013/tiin-1006.pdf

3.2.2 Australia

In 2011, the Australian government decided as part of a comprehensive climate strategy to introduce the Carbon Pricing Mechanism (CPM), which came into operation in July 2012. Implementation is taking place in two steps: a fixed price period is in place from 2012 to 2015, and a flexible price period will begin in 2015. The CPM is established and described in the Clean Energy Act 2011.[243] The CPM represents a significant step for Australia, after struggling for many years to put clear carbon pricing mechanisms in place. The New South Wales Government closed the Greenhouse Gas Reduction Scheme (GGAS) on July 1, 2012, upon the commencement of the CPM, to reduce duplication among the Federal and State schemes and to minimize costs for electricity consumers.[244]

Scope The CPM covers 60% (330 $MtCO_2e$) of the total emissions of 629 $MtCO_2e$[245] (excluding emissions from LULUCF in 2012) in Australia. The scheme covers[246] entities in industrial sectors whose direct emissions exceed[247] 25,000 tCO_2e/y, facilities that are large gas consumers,[248] and landfill facilities that emit more than 25,000 tCO_2e/y. Large liquid fuel users will "opt-in" to the CPM from July 2013 and then be covered by the CPM rules.

No cap is needed for the fixed price period, and the legislation sets out the cap-setting approach in detail for the flexible price period and also defines a fallback option for the cap in the same period. The default cap for 2015 to 2016 is defined as the total emissions for the financial year beginning on July 1, 2012 minus 38 $MtCO_2e$. In each year that follows, the cap will be reduced by 12 $MtCO_2e$ per year.[249]

Australia's Climate Change Authority is responsible for regularly reviewing the Clean Energy Act itself, but also the level of the carbon cap, Australia's overall emissions trajectory, and the ability to meet any relevant targets. In addition, the relevant Minister can request a review of any of these issues, including the cap. In the active cap-setting approach, before proposing the cap to the Parliament, the Minister has to take into account a list of requirements relating to international and national circumstances in the area of climate change and carbon markets, including the Climate Change Authority's most recent report. Once the cap has been approved by Parliament, it will be announced publicly. The cap for 2015–2019 will be announced in 2014. In the subsequent years, the cap will be defined one year at a time; that is, in 2015, the information for the cap in 2020 will be announced, so that the cap is always known five years in advance. This scheme provides flexibility and should be able to capture shocks to the system, such as a sudden economic growth or recession, by adjusting the trajectory for the cap that is being set five years later.

Allocation approaches Entities can only receive free allocation of carbon units through one of the industry assistance programs.[250] Entities can also purchase carbon units for compliance from the Clean Energy Regulator via the Australian National Registry of Emissions Units (ANREU).[251] In the fixed price period, entities can only purchase carbon units from the Clean Energy Regulator up to their amount of emissions, and the units

243 Source: Australian Government, *Clean Energy Act 2011*, C2013C00058, accessed on 17 April 2013, http://www.comlaw.gov.au/Details/C2011A00131/Html/Text#_Toc308513787.
244 Source: GGAS, *Scheme Administrator Notice, Closure of GGAS, Notice for all GGAS Stakeholders – GGAS to close on 1 July 2012*, 5 April 2012
245 Source: JRC/PBL, *EDGAR version 4.2 FT2010*. Joint Research Centre of the European Commission/PBL Netherlands Environmental Assessment Agency, 2012, available at: http://edgar.jrc.ec.europa.eu/index.php.
246 Source: Australian Government Clean Energy Regulator, *Who is liable*?, 24 January 2013, https://www.cleanenergyregulator.gov.au/Carbon-Pricing-Mechanism/Liable-entities/Pages/default.aspx.
247 Direct emissions.
248 Consume sufficient natural gas to generate 25,000 tCO_2e or more.
249 Source: Australian Government, *Clean Energy Act 2011, C2013C00058*, accessed on 17 April 2013, http://www.comlaw.gov.au/Details/C2013C00058/Html/Text#_Toc346702134.
250 Source: Australian Government Clean Energy Regulator, *Industry assistance*, accessed on 15 April 2013, http://www.cleanenergyregulator.gov.au/Carbon-Pricing-Mechanism/Industry-Assistance/Pages/default.aspx.
251 Source: Australian Government Clean Energy Regulator, *Step 5: Surrender enough units to satisfy liability in ANREU*, accessed on 15 April 2013, http://www.cleanenergyregulator.gov.au/Carbon-Pricing-Mechanism/steps-for-liable-entities/step-5/Pages/default.aspx.

will be immediately surrendered upon purchase. Carbon units obtained through free allocation can be traded, but not banked for future years.[252] In the flexible price period, the Clean Energy Regulator sells the carbon units through auctions, and the total available amount will be capped.[253] All carbon units obtained through free allocation and auctions will be tradable and bankable during the flexible price period.

Competitiveness considerations Free allocation of units will be based on successful applications for the "Jobs and Competitiveness Program." Under this program, entities that are high emissions-intensive trade-exposed activities will receive free certificates covering 94.5% of industry average carbon costs in the first year. Those that are less emissions-intensive trade-exposed receive assistance of 66% of industry average costs. After the initial free allocation, assistance will reduce by 1.3% each year.[254] As of April 5, 2013, 47 emissions-intensive trade-exposed activities have been identified, resulting in 88 million free units issued for the period 2012–2013.[255] Furthermore, eligible coal-fired power plants receive free carbon units as part of the Coal-Fired Generation Assistance package until 2016–2017.[256] The purpose of these free carbon units is to assist the highly emissions-intensive power plants to adjust to the carbon price and transform the power sector.

Use of offsets Entities can use domestic offset certificates Australian Carbon Credit Units (ACCUs) from the Carbon Farming Initiative (CFI) that covers land-based emissions and sinks. Farmers and land managers can earn ACCUs by storing carbon emissions or reducing GHG emissions on the land.[257] The CFI encourages sustainable farming and provides a source of income for landscape restoration projects. During the fixed price period, entities can buy domestic offset certificates to compensate for up to 5% of their emissions, and during the flexible price period, for up to 100%.[258] In 2012, 47 projects were registered, of which 31 are landfill gas projects and 5 of these generated credits.[259]

International offsets (CERs, ERUs) can also be used to compensate emissions in the flexible price period to cover up to 12.5% of entities' emissions obligations. This 12.5% restriction was added following the decision to link the Australian scheme to the EU ETS. The eligibility of CERs and ERUs are in line with the provision of EU ETS; that is, units from nuclear projects, destruction of HFC-23, and destruction of N_2O from adipic acid plants and from certain large hydropower projects are banned (see Section 3.1.1). RMUs will be accepted.

Before linking with the EU ETS, analysts predicted an expected demand of up to 350 $MtCO_2e$ Kyoto offsets (i.e., CERS, ERUs, and RMUs) over the period 2013 to 2020. After linking, this is estimated to be around 90 $MtCO_2e$.[260] AAUs are not eligible for use as offsets under the scheme's current design.[261]

252 Source: Australian Government Clean Energy Regulator, *Carbon Units*, 8 June 2012, http://www.cleanenergyregulator.gov.au/ANREU/Concise-description-of-units/Carbon-units/Pages/default.aspx.
253 Source: Australian Government Clean Energy Regulator, *Establishing a system for auctioning carbon units*, accessed on 15 April 2013, http://www.cleanenergyregulator.gov.au/Carbon-Pricing-Mechanism/About-the-Mechanism/auctioning-carbon-units/Pages/default.aspx.
254 Source: Australian Government Clean Energy Regulator, *Jobs and Competitiveness Program*, accessed on 8 April 2015, http://www.cleanenergyregulator.gov.au/Carbon-Pricing-Mechanism/Industry-Assistance/jobs-and-competitiveness-program/Pages/default.aspx.
255 Source: Australian Government Clean Energy Regulator, *Issue of free carbon units*, accessed on 8 April 2015, http://www.cleanenergyregulator.gov.au/Carbon-Pricing-Mechanism/Industry-Assistance/jobs-and-competitiveness-program/free-carbon-units/Pages/default.aspx.
256 Source: Australian Government Clean Energy Regulator, *Coal-fired generation assistance*, accessed on 15 April 2013, http://www.cleanenergyregulator.gov.au/Carbon-Pricing-Mechanism/Industry-Assistance/coal-fired-generators/Pages/default.aspx.
257 Source: Australian Government Clean Energy Regulator, *About the initiative*, 1 March 2013, http://www.cleanenergyregulator.gov.au/Carbon-Farming-Initiative/About-the-initiative/Pages/default.aspx.
258 Source: Australian Government Clean Energy Regulator, *Eligible emissions units*, accessed on 1 May 2013, http://www.cleanenergyregulator.gov.au/Carbon-Pricing-Mechanism/About-the-Mechanism/Emissions-units/Pages/default.aspx.
259 Source: Australian Government Clean Energy Regulator, *Register of Offsets Projects*, 4 March 2013, http://www.cleanenergyregulator.gov.au/Carbon-Farming-Initiative/Register-of-Offsets-Projects/Pages/default.aspx.
260 Calculation provided by the World Bank.
261 Source: Australian Government Clean Energy Regulator, *Eligible emissions units*, accessed on 1 May 2013, http://www.cleanenergyregulator.gov.au/Carbon-Pricing-Mechanism/About-the-Mechanism/Emissions-units/Pages/default.aspx.

Price stabilization mechanisms The price for the fixed price period was A$23 (US$24)/tCO_2e in 2012 and will increase by 2.5% plus inflation annually. On July 1, 2013 the price will increase to A$24.15/$tCO_2e$ and to A$25.40/$tCO_2e$ on July 1, 2014. For the first three years, a price ceiling will apply in the flexible period and be set by regulations in 2014 at A$20 above the expected price of EUAs for 2015–16 and will rise by 5% plus inflation annually. Banking and limited borrowing of carbon units will be allowed in the flexible price period.[262] The original plan for a three-year price floor starting at A$15 and rising by 4% each year was removed, following the decision to establish a link to the EU ETS.

Performance and effectiveness The scheme has been in operation since July 2012, and therefore it is premature to assess its performance. However, a reduction of several gigawatts of capacity in older coal-fired power plants, retired or mothballed, directly following the introduction of the CPM may indicate some impact on the power sector already.[263]

MRV and registry In 2012 eligible companies have started to register at the ANREU and to apply for the National Greenhouse and Energy Reporting (NGER) scheme. This process is still ongoing and has to be finished end of August 2013. As of March 2013, 360 entities[264] were registered in the Liable Entities Public Information Database.

Under the scheme's reporting requirements, facilities or corporate groups that meet the given thresholds have to submit to the competent authority (Clean Energy Regulator) by October 31 an annual report that will be published on February 28 of the following year. With the report, the entity has to deliver data on energy production, energy consumption, and GHG emissions.

Verification of the data is randomly conducted by the Clean Energy Regulator by the setting up of independent audits and inspections. In case of not complying with the reporting rules set by the Clean Energy Regulator, fines up to A$220,000 or daily fines of $A11,000 for each day of non compliance-must be paid.[265]

Linking to other schemes In 2012 the EU and Australian government decided to link the CPM with the EU ETS (see Section 3.1.1). From July 2015 (the flexible phase), the CPM will establish a one-way link with the EU ETS. Australian entities participating in the CPM will have access to EUAs for the purpose of meeting their obligations. Australian entities will be able to use non-Australian allowances to cover up to 50% of their obligation, of which a maximum of 12.5% of their total obligation can be CERs or ERUs. The two-way link, to be implemented no later than July 2018, is expected to be formalized through an agreement between the Australian government and the European Commission.[266] The linkage has started a critical public discussion in Australia, because current EUA prices are much lower than the prices in Australian modeling and budget projections.

Looking ahead This policy is still in a learning phase for companies and for the government. An institutional setup is in place and running with the main design features already set. The scheme faces political uncertainty

262 Source: Australian Government Clean Energy Regulator, *Flexible price period from 2015*, 15 January 2013, https://www.cleanenergyregulator.gov.au/Carbon-Pricing-Mechanism/About-the-Mechanism/Flexible-Price-from-2015/Pages/default.aspx.
263 Source: Thomson Reuters Point Carbon, *Australian generator shuts coal-fired units*, 12 October 2012, http://www.pointcarbon.com/news/1.2018428
264 Source: Australian Government Clean Energy Regulator, *LEPID for 2012-13 financial year*, 8 March 2013, http://www.cleanenergyregulator.gov.au/Carbon-Pricing-Mechanism/Liable-Entities-Public-Information-Database/LEPID-for-2012-13-Financial-year/Pages/default.aspx.
265 Source: Australian Government Clean Energy Regulator, *Compliance, Education and Enforcement Policy*, 2012, http://www.cleanenergyregulator.gov.au/About-us/Corporate-policies/Documents/CER-Compliance-Education-and-Enforcement-policy.pdf.
266 Source: Australian Government Minister for Climate Change and Energy Efficiency, *Australia and European Commission agree on pathway towards fully linking emissions trading systems*, 28 August 2012, http://www.climatechange.gov.au/minister/greg-combet/2012/media-releases/August/JMR-20120828.aspx.

in the short-term, however. This is because Australia's opposition Liberal party has pledged to repeal the CPM. A recent survey of carbon pricing experts in Australia underlines this profound policy uncertainty.[267]

3.2.3 Japan

At COP 15 in Copenhagen in 2009, Japan pledged to reduce national GHG emissions by 25% on 1990 levels. Although this ambitious target is currently under review and likely to be adjusted, it will be a challenge for the country to meet any substantial target without the use of international offsets. Gross GHG emissions in Japan in 2010 were 1,379 $MtCO_2e$.[268]

Complementing its domestic actions, Japan has been actively purchasing CERs, ERUs, and AAUs for the fulfillment of its CP1 Kyoto target and has thus developed into an important source of demand for international offsets. Japan has decided not to participate in CP2 of the Kyoto Protocol; however, its original Copenhagen pledge to reduce national GHG emissions by 25% on 1990 levels by 2020 remains. Although this ambitious target is currently under review and likely to be adjusted, it will be a challenge for the country to meet its pledged target without the use of international offsets. The Fukushima accident and the resulting temporary shift from nuclear power to fossil fuel plants pose an additional challenge in this regard.

In response to this and for the purpose of boosting technology exports, the country is in the process of setting up a so-called Joint Crediting Mechanism (JCM) or Bilateral Offset Credit Mechanism (BOCM) as a complementary instrument to the CDM.[269]

Under bilateral agreements between Japan and a developing host country, companies can obtain carbon credits through the dissemination of low carbon technologies and services. The scheme is being developed jointly by the Ministry of Economy, Trade and Industry of Japan and the Japanese Ministry of the Environment (MOEJ). Given the business and export opportunities the scheme presents, it enjoys the support of many Japanese companies.

Details of the institutional design, including necessary documentation, steps in the project cycle, and MRV methodologies, are currently under development and being tested and improved in demonstration projects.[270] Eligibility is planned to be determined through checklists or benchmarking, and currently wide sector coverage, including transport, waste, energy and REDD+, is being aimed for. Project emission reductions are planned to be calculated against a "reference scenario" which is to be set below business-as-usual emissions with crediting threshold and conservative default values, thereby aiming to achieve a net decrease and/or avoidance of GHG emissions. Standardized sheets for GHG calculations and monitoring are provided. The methodologies and credits will be approved bilaterally by a joint committee set up between the Japan and the partner country. Third-party validation and verification will be required to ensure compliance with the scheme's rules. A registry system will also be established to avoid double-counting.

Since 2010 Japan has conducted over 100 feasibility studies to identify projects and develop methodologies. Demonstration projects to test and define MRV methodologies started in 2012. The first JCM/BOCM pilot projects are planned to start during 2013, initially producing non-tradable credits only. In January 2013 Japan

267 Source: Jotzo, F. Jordan, T. and Fabian, N., *Policy Uncertainty about Australia's Carbon Price: Expert Survey Results and Implications for Investment*, December 2013, The Australian Economic Review, vol. 45, no. 4, pp. 395–409.
268 Source: JRC/PBL, *EDGAR version 4.2 FT2010*. Joint Research Centre of the European Commission/PBL Netherlands Environmental Assessment Agency, 2012, available at: http://edgar.jrc.ec.europa.eu/index.php.
269 Details on the JCM/BOCM can be found at the "*New Mechanisms Information Platform*": http://www.mmechanisms.org/e.
270 See presentation on the New Mechanisms Information Platform website.

and Mongolia signed the first bilateral agreement for the JCM/BOCM, followed by signature on a bilateral agreement with Bangladesh in March 2013. Japan is also negotiating with a number of other countries, including India, Indonesia, and Vietnam.

Japan is seeking international recognition of the scheme under the UNFCCC framework in order to be able to use credits for compliance for its international pledge as well as to promote the benefits of reduced transaction costs and hence greater potential to stimulate private-sector and developing country involvement. The government favors a flexible, decentralized FVA to reflect different national circumstances. It argues that a variety of approaches ensure greatest efficiency to address climate change. However, the issues of environmental integrity, double-counting, as well as impacts on the global market in terms of additional supply are hurdles for the scheme to achieve international recognition and fungibility of credits.[271]

Besides the bilateral scheme, a great variety of carbon pricing instruments is either under consideration, under development, or already implemented in Japan. On a national level, Japan has implemented the Japan Voluntary Emissions Trading Scheme (JVETS),[272] which ended at the end of the 2011 financial year, the trial emissions trading scheme that ended at the end of the 2012 financial year, and Keidanren Voluntary Action Plan.[273] Furthermore, Japan has two domestic voluntary crediting schemes that are operating in parallel: the Japan Domestic Credit Scheme (J-CDM) and Offset Credit Scheme (J-VER). Both mechanisms ended in fiscal year 2012, since the J-CDM was implemented under the Kyoto Protocol Target Achievement Plan that ends in fiscal year 2012 as well. From fiscal year 2013 onwards, J-CDM and J-VER have merged into the J-Credit Scheme. The rules and regulations of this new domestic voluntary crediting scheme have been established, and the scheme methodology is undergoing public consultation, which closed at the end of April 2013.[274] To create awareness for carbon offsetting, in 2012 MOEJ initiated the Japan Carbon Offsetting Scheme (JCOS), which is, contrary to what the name suggests, a certification/labeling scheme and not an offset issuance scheme.[275]

While the Japanese government is considering a national ETS, sub-national carbon pricing initiatives are already implemented. Cap-and-trade schemes or ETS-like schemes are in operation in Tokyo, Saitama, and Kyoto. The Tokyo and Saitama schemes are slightly different in their design and therefore not fully linked; however, the local governments and some cities are working towards a joint metropolitan scheme.[276] Additionally, various prefectural carbon offset schemes are also active in Japan.

The Tokyo Cap-and-Trade Program is in its first compliance period, which lasts from fiscal year 2010 to fiscal year 2014. It is a mandatory ETS that covers CO_2 emissions in buildings with a consumption of more than 1,500 kL/y of crude oil equivalent for more than three consecutive years. The total GHG emissions in Tokyo for 2010 were 57.2 $MtCO_2e$,[277] and the scheme aims to reduce emissions by 6% on the base year in the first compliance period. Allowances are allocated for free, based on historical emissions and a compliance factor. Domestic offsets and some renewable credits are eligible in the scheme.

271 Source: New Market Mechanism Information Platform, *The Joint Crediting Mechanism / Bilateral Offset Credit Mechanism*, http://www.mmechanisms.org/e/, accessed on 22 March 2013, and CDC Climat Research. Japan's Bilateral Offset Crediting Mechanism: A Bilateral Solution to a Global Issue? Climate Brief N°11 , January 2012, http://www.cdcclimat.com/IMG/pdf/12-01_climate_brief_11_-_japan_s_bilateral_offset_crediting_mechanism.pdf.

272 For more information, see Section 6.9 of *State and Trends of the Carbon Market 2012* and http://www.env.go.jp/earth/ondanka/det/jvets.html (Japanese).

273 For more information, see Section 6.9 of *State and Trends of the Carbon Market 2012* and http://www.keidanren.or.jp/policy/vape.html (Japanese).

274 For the draft rules and regulations of the J-Credit Scheme, see http://japancredit.go.jp/menu04/rule.html (Japanese).

275 For more information see http://www.jcs.go.jp/info.html (Japanese).

276 Tokyo and Saitama linking announcement and intention to work towards a broader metropolitan ETS, see http://www.kankyo.metro.tokyo.jp/climate/large_scale/attachement/cap_and_trade_saitama_pref_news110428.pdf (Japanese).

277 Source: Tokyo Metropolitan Government, *Greenhouse gas emissions in Tokyo*, accessed on 15 April 2013, http://www.kankyo.metro.tokyo.jp/climate/other/emissions_tokyo.html (Japanese).

Linking with the Saitama Prefecture had 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. The scheme allows trade of excess emission year by year, but no trade has occurred yet.

In 2010, the "Basic Act on Global Warming Countermeasures" passed the Lower House. The Act includes provisions to establish a feed-in tariff, a carbon tax, and a domestic ETS. Various studies have been conducted for a domestic ETS by MOEJ.[278] The feed-in tariff and the carbon tax have already been implemented; however, in the wake of opposition from industrial sector and the Great East Japan Earthquake of 2011, an ETS was abandoned in November 2012. At this time the government continues to discuss the future direction of an ETS.

3.2.4 Switzerland

In May 2011, Switzerland made the strategic decision to gradually phase out nuclear energy, which currently provides 40% of the country's electricity generation.[279] Switzerland's overall 2050 Energy Strategy supports Swiss climate change policy, which includes a target to reduce domestic emissions by at least 20% by 2020.

The Swiss CO_2 Act, the centerpiece of Swiss climate policy, has been in force in revised form since January 1, 2013.[280] It includes a combination of emissions trading, CO_2 taxation, and domestic carbon offsetting, in addition to other measures such as the buildings program for refurbishment and technical prescriptions for vehicles. The total GHG emissions of Switzerland were 54 $MtCO_2e$ in 2010.[281]

Scope Since 2008, a CO_2 incentive levy has applied to all hydrocarbon fuels used for heating and also for products such as coal, oil and natural gas, equal to SFr.36/tCO_2 (US$38/$tCO_2$) since 2010.[282] The CO_2 ordinance describes planned increases in the CO_2 levy. The increase will occur if predefined intermediary objectives for the emissions trajectory are not met.

Gasoline and diesel fuels are not affected by the CO_2 levy, but manufacturers and importers of these fuels are obliged by 2020 to domestically offset 10% of CO_2 emissions resulting from the energetic use of motor fuels over the period 2013 to 2020.[283] This percentage is increasing over time to allow the development of domestic projects. The fuel importers have joined in associations, which manage the fulfillment of their carbon offset obligations.[284]

New fossil fuel power thermal plants have to compensate their emissions by 100%, of which at least 50% should be covered by domestic emission reductions. For the time being, it is not clear whether such plants will be built. Although Swiss ETS installations cannot use domestic offsets for compliance, the emission reductions obligations by fossil fuel thermal power plants and the transport sector will create significant domestic offset demand.

278 Source: Ministry of the Environment, Government of Japan, *Overview of the Bill of the Basic Act on Global Warming Countermeasures (Provisional Translation)*, accessed on 25 March 2013, http://www.env.go.jp/en/earth/cc/bagwc/overview_bill.pdf; Ministry of the Environment, Government of Japan, *Overview of domestic ETS studies by the Japanese Ministry of Environment*, accessed on 26 March 2013, http://www.env.go.jp/earth/ondanka/det/capandtrade.html (Japanese).

279 Source: IEA / OECD, Summary of *Energy policies of IEA countries – Switzerland 2012 review*, 2012, http://www.iea.org/Textbase/npsum/switzerland2012sum.pdf.

280 Source: Bundesamt für Umwelt BAFU, *Revidiertes CO_2-Gesetz ab 01.01.2013 in Kraft*, 20 March 2013, http://www.bafu.admin.ch/klima/12325/12329/index.html?lang=de.

281 Source: JRC/PBL, *EDGAR version 4.2 FT2010*. Joint Research Centre of the European Commission/PBL Netherlands Environmental Assessment Agency, 2012, available at: http://edgar.jrc.ec.europa.eu/index.php.

282 Rate used: SFr.1 = US$1.065 (15 March 2013).

283 Source: Bundesamt für Umwelt BAFU, *Kompensation von CO_2-Emissionsen: Treibstoffe*, accessed on 20 March 2013, http://www.bafu.admin.ch/klima/12325/12349/12350/index.html?lang=de.

284 An example is the Foundation for Climate Protection and Carbon Offset (KliK foundation): http://www.klik.ch/en/Home.1.html.

The Swiss ETS had its first phase from 2008 to 2012. Its second phase covers the period 2013 to 2020. The Swiss ETS cap in the second phase is the 2010 GHG emissions targets for covered sectors, falling linearly by 1.74% annually. The Swiss ETS covers industry with a thermal input greater than 20 MW and also allows industries to opt-in voluntarily under certain conditions. The Swiss ETS covers the six Kyoto GHGs and NF_3.

Allocation approaches The Swiss ETS provides allowances for free, based on benchmarks and historical production, in a similar manner to the EU ETS. There is also some auctioning.

Use of offsets ERUs and CERs are allowed in the scheme with qualitative restrictions including those in the EU ETS, but also introduces additional quality criteria.[285, 286] The use of ERUs and CERs is also subject to quantitative restrictions.[287] For the second phase, ETS companies that were included in the first phase can use a maximum of 11% of their allocation in 2008–2012 minus the amount that they have already used in the first phase. ETS companies joining the Swiss ETS in the second phase can use ERUs and CERs up to 4.5% of their verified emissions in 2013–2020.

Linking to other schemes Under the revised CO_2 Act, large emitters are required to participate in the ETS, while medium-sized companies may voluntarily participate in it.[288] Switzerland is not part of the EU ETS but has fully prepared to link its ETS to the EU ETS by adapting the legal system and making key design features, such as the benchmarking approach for free allocation, largely compatible with the EU ETS.[289] Both the Swiss Federal Council[290] and the EU Council[291] gave their mandate to start negotiations. During the third round in October 2012, the delegations agreed on a timetable for the next stage of the process, according to which the negotiations could be completed over the course of 2013.[292]

3.3 EMERGING CARBON MARKETS

3.3.1 China

In October 2011, China's National Development and Reform Commission (NDRC) designated seven provinces and cities – Beijing, Shanghai, Tianjin, Chongqing, Guangdong, Hubei, and Shenzhen – as pilots to test ETS.[293] The NDRC has the official oversight role for the schemes, along with the relevant local Development and Reform Commissions (DRCs).

The pilots will start at different times over the course of 2013. The Shanghai and Shenzhen schemes are expected to be in operation by mid-2013, with the others following. Shenzhen plans to start trading on June 17, 2013.[294]

285 Source: Swiss Department of the Environment, Transport, Energy and Communications, *Foreign emission reductions (certificates)*, accessed on 15 April 2013, http://www.bafu.admin.ch/emissionshandel/05545/12456/index.html?lang=en.
286 Source: Swiss Department of the Environment, Transport, Energy and Communications, *Regulation on the reduction of CO_2 emissions Annex B*, 1 January 2013, http://www.admin.ch/ch/d/sr/641_711/app2.html.
287 Source: Confederation Suisse, *Fact sheet - Emissions Reductions Achieved Abroad: Quality, Quantity and Carry-Over*, 30 November 2012, http://www.bafu.admin.ch/emissionshandel/05556/index.html?lang=en.
288 In general, mandatory participation starts at 20 MW of installed capacity and voluntary participation at 10 MW. More details are available at: Bundesamt für Umwelt BAFU, *Participating in the ETS and deadlines*, accessed on 20 March 2013, http://www.bafu.admin.ch/emissionshandel/05545/12432/index.html?lang=en.
289 Source: Bundesamt für Umwelt BAFU, *Emissions allowances issued for free (benchmark approach)*, accessed on 20 March 2013, http://www.bafu.admin.ch/emissionshandel/05545/12434/index.html?lang=en.
290 Source: Bundesamt für Umwelt BAFU, *Linking the Swiss and EU emissions trading schemes: the negotiation process*, accessed on 20 March 2013, http://www.bafu.admin.ch/emissionshandel/10923/10926/index.html?lang=en.
291 Source: European Commission, *International carbon market*, accessed on 20 March 2013, http://ec.europa.eu/clima/policies/ets/linking/index_en.htm.
292 Source: Bundesamt für Umwelt BAFU, *Third round of Swiss-EU negotiations on linking of emissions trading systems*, accessed on 20 March 2013, http://www.bafu.admin.ch/dokumentation/medieninformation/00962/index.html?lang=en&msg-id=46471.
293 Source: National Development and reform of China, *Notice on Carbon Emissions Trading System Pilots*, 29 October 2012, http://www.ndrc.gov.cn/zcfb/zcfbtz/2011tz/t20120113_456506.htm.
294 Source: Shenzhen Special Zone Daily, *Shenzhen ETS plans to start trading this June*, 7 April 2013, http://www.ghg-manage.com/News/1341/ShowNews.

In 2012, implementation plans were adopted by Beijing, Shanghai, and Guangdong, outlining general ETS frameworks; Tianjin released its plan in early 2013.[295] Shenzhen, a Special Economic Zone designed to promote market policies in China, is the only pilot that has passed a local bill on its ETS.[296] The pilots have converged on many design elements but also offer some variety, which may provide the national government with lessons to inform the development of a national market. Hubei has announced plans to kick off its scheme on August 2013.[297]

In parallel with the development of regional ETS pilots, initial research and design of a national ETS has also been carried out, partially funded by the PMR. In March 2013 the PMR approved the provision of US$8 million to finance the implementation of China's Market Readiness Proposal (MRP). The MRP includes a three-year work plan on the core components of a national ETS in China, including policy background, coverage identification, main technical and institutional elements (data, management system, and legal framework), ETS components (scope, cap setting, allowance allocation, MRV, registry, compliance rules, price stabilization mechanism, offset mechanism and linking, participants and trading products), as well as special studies on state-owned enterprises and on the power sector.

The final date for a national scheme has not been set, although the 15th Five Year Plan includes aspirations for a national ETS by 2015. It is possible that China will launch additional test schemes in regions and cities in its 16th Five Year Plan (2016). It is not yet clear how the pilot schemes will relate to the development of a national scheme.

The NDRC issued rules to regulate the voluntary emissions reduction credits market in China, in the form of Chinese Certified Emission Reductions (CCERs) in June 2012.[298] The regulation puts NDRC in a central position to facilitate and monitor the CCER market. CCER will be issued in the unit of tCO_2e and will include CO_2, CH_4, N_2O, HFCs, PFCs, and SF_6 (the six Kyoto GHGs).

International donors are offering support for the development of the ETS pilots and national scheme. The United Nations Development Programme (UNDP) and the Norwegian government are supporting registry development for the national scheme, and the PMR is providing support on the national scheme framework. GIZ and other institutions are providing MRV capacity building with the EU providing support on a range of ETS issues, including capacity building, and the Asian Development Bank (ADB) and the UK Prosperity Fund Programme supporting certain pilots. The Australian government also initiated some exchange between Chinese national government and experts, local ETS pilots, and the Australian ETS community.[299]

Scope Table 5 shows some of the key information contained in the ETS implementation plans that have been approved by the NDRC (Beijing, Shanghai, Guangdong, and Tianjin) or are in the approval process. These plans contain general information of local pilots design and need to be further detailed for the operationalization of the ETS pilots. These plans contain general information of local pilots design and need to be further detailed for the operationalization of the ETS pilots.

295 Source: Beijing: Point Carbon, *Beijing releases draft rules for emissions trading scheme*, 28 March 2012, http://www.pointcarbon.com/news/1.1813608., Shanghai: Shanghai Municipal Government, *Official Government notice for construction of ETS Pilot*, 3 July 3 2012, http://www.shanghai.gov.cn/shanghai/node2314/node2319/node12344/u26ai32789.html, Guangdong: Guangdong Provincial Government, *Official Government notice for construction of ETS Pilot*, 7 September 2012, http://zwgk.gd.gov.cn/006939748/201209/t20120914_343489.html, Tianjin: Tianjin Municipal Government, *Official Government notice for construction of ETS Pilot*, 27 February 2013, http://www.tjzfxxgk.gov.cn/tjep/ConInfoParticular.jsp?id=38237, International Carbon Action Partnership (ICAP) ETS Interactive Map, accessed on 19 March 2013, http://icapcarbonaction.com.

296 Source: Shenzhen Government, *Press Conference of Shenzhen ETS Pilot Progress* (in Chinese), 19 September 2012, http://www.sz.gov.cn/cn/xxgk/xwfyr/wqhg/20120919/.

297 Source: Hubei People's Government General Office, *Announcement on the Hubei ETS Pilot Implementation Plan (in Chinese)*, 18 February 2013 http://gkml.hubei.gov.cn/auto5472/auto5473/201302/t20130227_435678.html.

298 Source: NDRC: *Tentative Measures for the Administration of Voluntary Greenhouse Gasses Emissions Reduction Trading*, 13 June 2012, http://www.ghg-manage.com/News/167/ShowNews.

299 Source: The Hon Greg Combet, Australian Minister for Climate Change Industry and Innovation, *Media Release: Australia and China Strengthen carbon market collaboration*, 9 April 2013.

Table 5: Key characteristics of the six (out of seven) of the Chinese ETS pilots with official implementation plans

	Beijing	Shanghai	Guangdong	Tianjin	Shenzhen[300, 301]	Hubei[302, 303]
Launch of the plan	April 10, 2012	August 16, 2012	September 7, 2012	February 5, 2013	Under review with NDRC	Under review with the NDRC. Planned for July 2013
Type of ETS	Mandatory	Mandatory	Mandatory	Mandatory	Mandatory	Mandatory
Type of cap	Absolute	Absolute	Absolute	Absolute	Absolute	Absolute
Total GHG emissions in the region	100 $MtCO_2e$ (2011)[304]	240 $MtCO_2e$ (2010)[305]	510 $MtCO_2e$ (2010)[306]	130 $MtCO_2$ e (2010)[307]	83.4 $MtCO_2e$ (2010)[308]	Not provided in the plans
Estimated coverage of the scheme	Not available	110 $MtCO_2e$[309]	214 $MtCO_2e$[310]	78 $MtCO_2e$[311]	31.7 $MtCO_2e$[295]	Approximately 35% of total emissions in Hubei
Sectors covered	Industrial and non-industrial companies and entities, incl. electricity providers, the heating sector, manufacturers, and major public buildings (about 600 entities)	Energy-intensive industries, aviation, (air) ports, railways, and commercial buildings (197 companies)	Nine energy-intensive industries incl. power (827 companies, accounting for 42% of power consumption of province)	Five energy-intensive industries (iron and steel, chemical, power and heat production, petrochemical, oil and gas exploration) and large buildings	Twenty-six sectors covered	Iron and steel, chemicals, cement, automobile manufacturing, electricity generation, non-ferrous metals, glass, pulp and paper, other high emission industries
Thresholds	10 $ktCO_2e/y$	20 $ktCO_2e/y$	20 $ktCO_2e/y$	20 $ktCO_2e/y$	20 $ktCO_2e/y$	60 kt sce/y
Allocation	Free quota for 2013–2015. Auctioning of small reserve	Free quota for 2013–2015. Grandfathering with performance based correction factors. Auctioning to consider	Free quota 2013–2015. Grandfathering auctioning complimentary	Free quota 2013–2015. Grandfathering and benchmarking. May update cap and allocation annually	Free allocation with progressive increase in auctioning	80% free allocation with 20% allocation based on sectoral benchmarks. 10% auctioning after 3 years. 100% auctioning by 2030 unless a domestic carbon market in place
MRV	Draft plans: monitoring by Beijing DRC, verification by third party	Provisional guideline for MR in force since January 2013. Sector specific guidance documents	Draft plans: verification by third party	Draft plans: verification by third party		

300 Source: Institute for Industrial Productivity, *Country Factsheets: China*, accessed April 2013, http://iepd.iipnetwork.org/policy/carbon-emissions-trading-pilots.
301 Source: Climate Strategies, *Emerging Carbon Markets: Experiences, Trends and Challenges*, January 2013, pp. 17-18.
302 Source: Hubei People's Government General Office, *Announcement on the Hubei ETS Pilot Implementation Plan* (Chinese), 18 February 2013.
303 Source: Shanghai Environment and Energy Exchange, *Hubei plans to start carbon trading in the second half of the year* (Chinese), 4 April 2013.
304 Source: Sina Finance, Start of the Beijing ETS pilot planned compulsory for 600 facilities (Chinese), April 2012.
305 Source: Shanghai Government Statistics, *Main annual energy consumption under basic circumstances* (Chinese), accessed on 15 April 2013, http://www.stats-sh.gov.cn/tjnj/nj12.htm?d1=2012tjnj/C0501.htm.
306 Source: Thomson Reuters Point Carbon, *China's Guangdong to launch world's 5th biggest CO_2 market*, 11 September 2012.
307 Source: Thomson Reuters Point Carbon, *Tianjin ETS to cover 60 pct of emissions: report*, 17 April 2012.
308 Source: Australian Minister for Climate Change Industry and Innovation, *Media Release: Australia and China Strengthen carbon market collaboration*, 9 April 2013.
309 Source: Thomson Reuters Point Carbon, *Shanghai CO_2 scheme to cover half of emissions: report*, 23 July 2012.
310 Source: Australia China Connections, *Snapshot: Guangdong's Emissions Trading Scheme*, accessed on 10 April 2013, http://www.chinaconnections.com.au/en/magazine/current-issue/18-current-issue/1643-snapshot-guangdongs-emissions-trading-scheme.
311 Source: Renmin Net Tianjin Window, *Wang Jing: Initial draft of the Tianjin ETS pilot covers five industrial sectors* (Chinese), 13 April 2012.

The inclusion of the aviation sector in the Shanghai ETS will test the impact of the scheme on this sector. This inclusion may also be pertinent to the EU ETS aviation dispute.[312]

Competitiveness considerations As only seven regions are testing the ETS, the impacts of the schemes on local economy and industries are being given special attention by local governments. Econometric analysis has been carried out to estimate such impacts.[313] To a certain extent, the choice of "grandfathering" as the main allocation methodology across the schemes demonstrates an attempt by government to reduce the impact of the ETS on participating companies.

Use of offsets The ETS pilot plans released so far will all allow the use of domestic offsets, in the form of CCERs. CCERS are backed by national regulation and have strong support from NDRC. CCERs could support the transition from a CDM project structure in China, which has been the dominating structure for China's carbon trading activities, to a cap-and-trade scheme. This transition is facilitated by linking CCER offsets with regional ETSs and, eventually, the national cap-and-trade scheme.

Limits on the use of offsets are expected in the pilots in order to ensure an appropriate supply/demand balance in the systems. Tianjin has officially announced a limit on the use of offsets at 10% of the annual reduction obligations.[314] Beijing and Shenzhen will also accept CCERs up to 10%, although with some qualitative standards in Shenzhen. Shanghai is likely to allow CCERs to cover 5–10% of reduction obligations, which may change over time depending on the economic circumstances. Hubei has announced a limit on the use of CCERs (including forestry credits) of 15% for incumbents and 10% for new market entrants.[315]

Price stabilization mechanisms Price stabilization mechanisms, government intervention, or other technical fixes are being considered in many pilots to allow flexibility.[316] These mechanisms are informed by the experiences of the EU ETS and the uncertainties associated with China's projected growth rates. In the context of China's regulated economy, government intervention in an ETS is a logical design feature.

The exact design of price stabilization mechanisms are still under discussion. Options include:

- The use of verified emissions data in a compliance year to adjust total allowances to issue for the coming year, thus modulating the supply/demand balance.
- The use of direct price stabilization measures such as price ceilings, floor prices, and/or government-determined prices. Alternative options to direct price stabilization measures such indirect interventions or mechanisms (e.g., price containment reserves) are also being examined.[317]

Decisions on price stabilization mechanisms will take place in the coming year.

Performance and effectiveness The main objective of the piloting phase is to build knowledge and capacity to prepare an expanded ETS or a national scheme in the future. The regional pilots have not yet finished their allowance allocation to market participants and started trading; therefore, performance and effectiveness cannot be measured. The short trading period, uncertainty of the usage of allowances after 2015, and lack of a secondary market will probably constraint market liquidity and trading volume and will limit prices in most schemes between 2013 and 2015. Such a learning-by-doing phase will nevertheless supply crucial experiences and lessons to advance future carbon trading in China.

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312 Sources: Spiegel online, *Emissions Scheme Dispute: China Bans Airlines from Paying EU Carbon Tax*, 6 February 2012, http://www.spiegel.de/international/business/emissions-scheme-dispute-china-bans-airlines-from-paying-eu-carbon-tax-a-813544.html.

313 For example, ADB has supported two projects including such impact analysis for Tianjin and Shanghai pilots, see: ADB, accessed on 19 April 2013, http://www.adb.org/projects/45038-001/main, and http://www.adb.org/projects/46054-001/main.

314 Source: Carbon Finance, *Tianjin publishes ETS framework*, 13 March 2013, http://www.carbon-financeonline.com/content/news/tianjin-publishes-ets-framework.html.

315 Source: Shanghai Environment and Energy Exchange, *Hubei plans to start carbon trading in the second half of the year* (in Chinese), 4 April 2013, http://www.cneeex.com/tpfjy/tjydt/383057.shtml#.

316 Source: EurActiv, *China keen to avoid EU's CO_2 market problems*, 23 July 2012, http://www.euractiv.com/climate-environment/china-keen-avoid-co2-rollercoast-news-514050.

317 Source: Discussions with the Chinese exchanges.

MRV and registry MRV rules and regulations are being developed by regional pilots to support their ETSs, and the national authority is also developing national sector-specific MRV rules. Some of the pilots have been conducting bottom-up data collection, on which the final allowance allocation arrangement will be based. Regional trading platforms and registries are being developed, with linkage to the national registry of CCERs.

Linking to other schemes Only Guangdong and Hubei are reported to have considered cross-regional trading, linking the two schemes, during 2013–2015.[318] No details have been announced, and it is clear that for the piloting phase, the most important task for each pilot is to ensure first the setup of its individual market.

Looking ahead The emerging ETS in China forms part of a complex policy framework. The existing policy structure in China is highly regulated and includes a number of policies that could overlap with the ETS. These policies include, but are not limited to, energy efficiency targets, white certificate (energy saving) trading schemes, and quotas for fossil fuel use and renewable energy. The overlapping and interaction of these policies, some of which are still under progress, on the one hand provide foundations, infrastructure, capacity, and data basis for ETS in China. On the other hand they offer some challenges (e.g., multiple targets such as energy, renewable, carbon etc.) that might lead to confusion for local governments and enterprises, overlapping of mitigation efforts, and multiple trading commodities (with potential of double accounting).[319]

In addition, discussion continues about the potential for a carbon tax in China. The Ministry of Finance has been researching this topic since 2007; however, there is no clear timeline and scheme yet.[320] In early 2013 the Head of the Ministry of Finance's tax policy division again indicated a possible carbon tax in China.[321] Research and political debate are expected to take more time before a decision on carbon finance in China could be made.

»In China, 2012 has been a year of intensive preparation to move the seven regional ETS pilots from paper to reality.«

The pilots will continue to focus on finalizing the details of the ETS, including the list of participants,[322] the MRV system, and procedures and data collection for cap setting and allowance allocation.

Structures for effective carbon finance to complement and work within the ETS are being encouraged in some pilots like Shanghai and Shenzhen. This support may allow the financial sector to engage in the ETS pilots. However, discussions about carbon finance are still at an early stage.

318 Source: China Southern News, *Hubei: the Dark Horse in ETS pilots*, 3 October 2011, http://news.ycwb.com/2011-10/03/content_3587592.htm.
319 Source: China Emissions Trading Scheme: Policies and Challenges presentation, 13 March 2013, http://www.thepmr.org/content/policy-mapping-workshop-chinas-ets-policies-and-challenges.
320 Source: Hook, L. *China's carbon tax: not so quick*, Financial Times, 4 March 2013, http://blogs.ft.com/beyond-brics/2013/03/04/chinas-carbon-tax-not-so-quick/?utm_source=Sinocism+Newsletter&utm_campaign=ddaf953090-Sinocism03_05_13&utm_medium=email#axzz2MZPFiNW9.
321 Source: Business Green, *China pushes forward with carbon tax plans*, accessed on 15 March 2013, http://www.businessgreen.com/bg/news/2249513/china-pushes-forward-with-carbon-tax-plans, and the original essay on the Ministry of Finance website, tax policy division, accessed on 15 March 2013, http://www.mof.gov.cn/zhengwuxinxi/diaochayanjiu/201302/t20130218_733573.html.
322 Up to now, Shanghai is the only one who has published their list of ETS participants: see Shanghai Municipal Development and Reform Commission, *List of ETS Participants (First Group)*, accessed on 20 March 2013, http://www.shdrc.gov.cn/main?main_colid=319&top_id=312&main_artid=22019.

China has had a change of leadership in 2013, with a new president and prime minister who will govern for the next 10 years.[323] In addition, there will be State Council institutional reform and the transformation of government functions,[324] ministries, and provincial-level leadership. These changes will have an impact on the 16th Five Year Plan and future carbon market development in China.

Summary In China, 2012 has been a year of intensive preparation to move the seven regional ETS pilots from paper to reality. In 2013 the ETS designs will be finalized and the schemes will begin operation. Meanwhile, research and preparations for a national ETS have been started and expected to take at least couple more years, without a clear timeline for launching yet. The interaction of an ETS with other policies, the debate on carbon tax and carbon finance, as well as political challenges present a mix of risks and opportunities. Given the size of its economy and emissions, China's emissions trading schemes are significant carbon pricing instruments.

3.3.2 Republic of Korea

The Republic of Korea (Korea) passed its ETS law in May 2012, followed by a presidential decree containing more details of the scheme in November 2012. The mandatory cap-and-trade program with voluntary opt-in will be the first national ETS in a non-Annex I country. The first commitment period will be from 2015 to 2017, the second commitment period from 2018 to 2020, and the third commitment period from 2021 to 2026. Currently, the detailed design elements are being developed.

Scope Approximately 60% of the nation's GHG emissions (646.8 $MtCO_2e$ in 2010)[325] are covered by the ETS. The scheme covers the six Kyoto GHGs. The ETS covers business entities emitting over 125,000 tCO_2e/y and single installations emitting over 25,000 tCO_2e/y. This amounts to roughly 460 entities in total.

The final ETS emissions cap is to be announced in 2014, which should reflect the national GHG emissions reduction target (30% below business-as-usual emissions in 2020). Korea is also working on dividing the emissions reduction target between ETS and non-ETS sectors.

Allocation approaches In the first commitment period, allocation will most likely be free, using a grandfathering approach. A useful element to prevent over allocation is the availability of historical third-party verified emissions, data that is collected during the mandatory participation of energy-intensive companies in the current Greenhouse Gas and Energy Target Management System (TMS).

In subsequent commitment periods, the share of allocations decreases. While the allocation methodology for subsequent periods is still unknown, the government is currently researching the feasibility of adopting product benchmarks for the purpose of free allocation of allowances, similar to that in the EU and California. When and to what extent benchmarks will be used in Korea may be clarified in late 2013 or early 2014. Similar to the EU and California, the bottom-up determined allocation will be corrected with a reduction factor in case the allocation exceeds the ETS cap.

323 Source: The Washington Post, *Xi's election to presidency completes China's leadership transition*, 14 March 2013, http://www.washingtonpost.com/world/xis-election-to-presidency-completes-chinas-leadership-transition/2013/03/14/d35c8248-8c58-11e2-9f54-f3fdd70acad2_story.html.

324 Source: China Daily, *Highlights of China's cabinet reshuffle and government function transformation*, 10 March 2013, http://www.chinadaily.com.cn/china/2013npc/2013-03/10/content_16295119.htm.

325 Source: JRC/PBL, *EDGAR version 4.2 FT2010*. Joint Research Centre of the European Commission/PBL Netherlands Environmental Assessment Agency, 2012, available at: http://edgar.jrc.ec.europa.eu/index.php.

Competitiveness considerations An example of international alignment can be found in provisions to prevent carbon leakage: both the criteria used to define sectors at significant risk of carbon leakage exposure and the provision of 100% free allocation for these sectors are copied from the EU ETS.

Use of offsets In the first and second periods, only domestic offsets with applicable standards are allowed; international offsets are allowed from the third period onwards.

Price stabilization mechanisms The Korean ETS provides clear market stabilization mechanisms: if the carbon price is too high or too low or if there is too high demand,[326] the government may decide – through a review committee and only after a governmental decision – to make use of five predefined tools to repair the supply/demand imbalance. These tools are:

1. Make additional allowances available from an allowance reserve.
2. Set minimum and maximum allowance possession limits.
3. Limit the amount of banking and borrowing.
4. Limit the use of offsets.
5. Set a price floor and/or ceiling.

To further ensure market stability, participation in the trading market will be limited in the first two compliance periods (2015–2020) to Korean compliance entities and a few selected public financial institutions only.

Performance and effectiveness The scheme is not yet in operation, and therefore it is too early to estimate its effectivenesss.

MRV and registry Third-party verified emissions will be self-reported annually. The emissions must be certified by the Competent Authority.

Linking to other schemes No linking is planned at this point; however, Korea is designing key elements of its ETS, such as the National Allocation Plan and MRV guidance, as much as possible in line with international standards, set mainly by Europe. This would minimize systematic changes and hence administrative costs once linking becomes more concrete, although this is only expected for the period after 2020.

Looking ahead In the coming period, Korea will work on several key design elements, amongst others:

- The national GHG forecast and ETS impact assessment, which will be delivered through the Basic Plan (December 2013).
- The final ETS cap, to published in the National Allocation Plan (June 2014).

3.3.3 Other potential schemes in Brazil, British Columbia, Chile, Costa Rica, Mexico, Turkey, and Ukraine

Several other jurisdictions are planning or considering setting up emissions trading schemes. These are briefly described below.

British Columbia remains a member of the WCI. In 2008 British Columbia passed the "Greenhouse Gas Reduction (Cap and Trade) Act,"[327] which provides the statutory basis for implementing an ETS. In the Greenhouse Gas Reduction Targets Act of 2007, British

326 The price is considered too high when for a period of six months the carbon price is more than three times the carbon price in the previous two years. The price is considered too low when for a period of one month the carbon price is more than 60% lower compared to the carbon price in the previous two years. The demand is considered too high when the monthly carbon price is two times higher than any monthly price in the previous two years, due to a more than twofold increase in trade volumes for one month.

327 Source: British Columbia's Ministry of Environment, *Greenhouse Gas Reduction (Cap and Trade) Act*, accessed on 25 March 2013, http://www.env.gov.bc.ca/cas/mitigation/ggrcta/index.html.

Columbia commits to reduce GHG emissions by 33% below 2007 levels by 2020 and 80% below 2007 levels by 2050. British Columbia planned to start a cap-and-trade program at the beginning of 2012;[328] however, British Columbia has so far not implemented an ETS and continues to monitor the progress of the WCI. Certain sections of the Greenhouse Gas Reduction (Cap and Trade) Act are therefore not in force.[329]

Turkey has a National Climate Change Action Plan[330] in place, which highlights the implementation of a comprehensive installation-level MRV scheme. Turkey adopted a detailed GHG MRV regulation in 2012. Turkey is a participant in the PMR and will be undertaking feasibility studies on the best way to implement a carbon market between now and 2015.[331]

Ukraine passed a draft law "On regulation of energy savings" in November 2010 that provides the foundation for implementing a domestic ETS by January 1, 2013. However, in July 2012 the draft law was withdrawn from consideration by Parliament.[332, 333] Currently, a new law for the domestic ETS is being drafted led by the State Environmental Investment Agency, and a presentation to parliament is planned at the end of 2013.[334] Ukraine also plans to develop a GHG data management system and an MRV system as part of activities under the PMR.[335] Other activities could include the development of long-term GHG emissions projections and a detailed ETS framework.

Chile is a member of the PMR and has recently released its approved MRP, and the PMR will now contribute to the implementation phase.[336] Chile has already investigated the institutional framework and policy context to support the selection of an appropriate policy. Chile will now carry out several activities with the overall objective of developing a roadmap with the design and eventual implementation of an ETS in the energy sector. Preparatory activities will include economic analysis and modeling, engagement with stakeholders, and design of MRV, registry, regulatory, and institutional frameworks.

Costa Rica is a member of the PMR and has recently released its approved MRP, and the PMR will now contribute the implementation phase.[337] Costa Rica aims to achieve carbon neutrality by 2021, and developing a carbon market is central to Costa Rica's sustainability objects. The carbon market will be developed in stages, starting with the preparation of key market infrastructure, including developing the Costa Rican carbon offset unit and REDD+ integration. The second stage would be a voluntary participation stage followed by strengthening of market demand and international linkages.

Brazil enacted in December 2009 the National Climate Change Policy, which aims for the development of a Brazilian emissions reduction market. At this time

328 Source: British Columbia's Ministry of Environment, *Greenhouse Gas Reduction (Cap and Trade) Act*, accessed on 25 March 2013, http://www.env.gov.bc.ca/cas/mitigation/ggrcta/emissions-trading-regulation/index.html.
329 For an overview of the sections of the Greenhouse Gas Reduction (Cap and Trade) Act that are in force see BC Laws, *Greenhouse Gas Reduction (Cap and Trade) Act[SBC 2008] Chapter 32*, accessed on 25 March 2013, http://www.bclaws.ca/EPLibraries/bclaws_new/document/ID/freeside/00_08032_01.
330 Source: Republic of Turkey, Ministry of Environment and Urbanization, *National Climate Change Action Plan*, July 2011, http://www.cem.gov.tr/erozyon/Files/faaliyetler/dis_iliskiler/iklim_degisikligi_cerceve_sozlesmesi/Cevre_Bak_Ulusal_Eylem_Plani_ing_2011_2023_2_.pdf .
331 Source: PMR, *Turkey*, accessed on 26 March 2013, http://www.thepmr.org/country/turkey-0.
332 Source: Ukrainian Government, *The draft law on regulation of energy and its status*, accessed on 26 March 2013, http://w1.c1.rada.gov.ua/pls/zweb_n/webproc4_1?id=&pf3511=38724 (Ukrainian).
333 Source: Ukrainian Government, *Draft Resolution on withdrawal of the draft law of Ukraine on the regulation of energy savings*, accessed on 26 March 2013, http://w1.c1.rada.gov.ua/pls/zweb_n/webproc4_1?pf3511=43812 (Ukrainian).
334 Source: State Environmental Investment Agency of Ukraine, *Ukraine's progress in creating a domestic emissions trading scheme*, October 2012, http://www.thepmr.org/system/files/documents/Ukraine%20WB%20PMR%20Oct%202012%20JV%20NP%201.pdf.
335 Source: PMR, *Ukraine*, accessed on 26 March 2013, http://www.thepmr.org/country/ukraine-0.
336 Source: Ignacio Fernandez, Ministry of Energy Chile, *Chile: Final Market Readiness Proposal*, 11 March 2013, http://www.thepmr.org/country/chile-0.
337 Source: Costa RiCN Ministry for Environment and Energy, *Costa Rica Market Readiness Proposal (MRP) Partnership for Market Readiness Final Report*, February 2013, http://www.thepmr.org/country/costa-rica-0.

an ETS is still under consideration along with other carbon pricing instruments, including sectoral crediting approaches and a carbon tax, as part of Brazil's activities under the PMR.[338] Regional ETSs are also under consideration in São Paolo and Rio de Janeiro.

Mexico is exploring the potential of credited NAMAs in the context of the PMR.[339] However, Mexico passed a General Climate Change Law in April 2012, which created the possibility of developing a voluntary ETS. However, no further plans have been made public since the new government was elected in July 2012.[195]

In addition to the countries already mentioned, Columbia, India, Indonesia, Jordan, Morocco, Peru, South Africa, Thailand and Vietnam are all implementing countries in the PMR and are considering carbon pricing mechanisms in that context.[340]

Box 3: Pricing carbon: multilateral arrangements and domestic action

By Fernando Tudela Abad,
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Carbon pricing is potentially the single most powerful policy for effective, long-term climate change mitigation, and the only way to redress the market failure that unleashed this global problem.

The three basic strategies that, independently or jointly, may lead to carbon pricing are set in motion by an interplay between multilateral arrangements and domestic action:

1. Regulation of GHG emissions, with economic implications that, indirectly, may price carbon.
2. Market approaches:
   a) cap-and-trade
   b) crediting mechanisms
3. Carbon taxes

Both in developed and developing countries, multilateral arrangements (UNFCCC, Kyoto Protocol) have been so far the main drivers for domestic action. →

338 Source: PMR, *Brazil*, accessed on 24 March 2013, http://www.thepmr.org/country/brazil-0.
339 Source: PMR, *Morocco*, accessed on 19 April 2013, http://www.thepmr.org/country/mexico-0.
340 Source: PMR, *Participants*, accessed on 24 March 2013, http://www.thepmr.org/content/participants.

Participation in Kyoto's CDM started carbon pricing in many developing countries. Latin America and the Caribbean (LAC) is the region that has so far mobilized more CERs per capita (0.75). However, the scale of mitigation achieved through the CDM in the region [337 Mt CO_2e (CERs) until 2012] has been modest and, given the current plummeting demand and dwindling prices, the outlook is sobering. Arguably, beyond its limited mitigation effect, the main merits of the CDM might be:

a. Institutional building: The CDM induced climate change offices (at least Designated National Authorities; DNAs) throughout the region. These offices were then in a position to transcend the CDM and undertake broader domestic action.
b. Mainstreaming: The CDM called for the involvement of different sectors and, in particular, the participation of economic/financial institutions in climate issues.

The multilateral negotiations have paved the way to the establishment of new market (and non-market) mechanisms that may overcome some of the current limitations affecting the CDM: meager demand, scale restricted to project/program of activities, high transaction costs, and no incentives to enhance mitigation beyond offsetting.

The prospect of adopting a new instrument with legal force in 2015, which might enter into force in 2020, fuels the exploration of some anticipatory initiatives. It is unlikely that many developing countries might take on increased commitments without testing first in practice the feasibility, cost-effectiveness and, particularly, the development dividend of actions needed for compliance. Not waiting for any specific outcome in the negotiations, some countries from LAC and other regions are already enhancing their capacities and exploring options that may allow them to harness market forces to mitigate climate change. The resulting domestic action may in turn facilitate success in the multilateral negotiations.

This is the significance of initiatives such as the Partnership for Market Readiness (PMR), hosted by the Carbon Finance Unit of the World Bank, whereby 16 implementing countries, including six LAC countries, can experiment with market mechanisms on a no-lose basis and enhance their mitigation ambition even before the adoption of a new global arrangement.

section **4**

Emerging trends in carbon pricing

4 Emerging trends in carbon pricing

There has been a surge in activity in carbon pricing mechanisms over the past year. The wise old statesmen of the cap-and-trade world – the EU ETS, New Zealand and RGGI – have now been joined by newer, early stage cousins: California, Québec, and Australia. Moreover, China, Korea, and Ukraine are crafting their own schemes, adding variety to the mix. In parallel, and with a sense of urgency, governments and other stakeholders are trying to breathe new life into the existing international carbon pricing mechanisms. Review processes are prolific and new options being explored.

Today, jurisdictions with carbon pricing mechanisms implemented and scheduled emit roughly 10 $GtCO_2e/y$, equivalent to 21% of the 50 $GtCO_2e$ emitted globally.[341] If China, Brazil, Chile, and the other emerging economies eyeing these mechanisms are included, carbon pricing mechanisms could reach countries emitting 24 $GtCO_2e$ per year, or almost half of the total global emissions. Implemented and scheduled emissions trading schemes and carbon taxes put a carbon price on at least 3.3 $GtCO_2e/y$, or 7% of global emissions.

Table 6 shows the total emissions in jurisdictions with implemented and scheduled emissions trading schemes and provides an estimate of scheme coverage and cap information, where available. This table provides a sense of the scope of the different schemes.

Often, the details of such mechanisms are key. Therefore, it is not surprising that these schemes have distinctive and unique design features. However, at the core, these mechanisms do face some common challenges and have converged upon common solutions. This section considers these in more detail covering:

- Ambition
- Price stabilization mechanisms
- The use of offsets
- Coordination and linking
- The national context
- Economic growth

341 Source for national GHG emissions: JRC/PBL, *EDGAR version 4.2 FT2010*. Joint Research Centre of the European Commission/PBL Netherlands Environmental Assessment Agency, 2012, available at: http://edgar.jrc.ec.europa.eu/index.php. Rounded to the nearest gigaton.

Table 6: Estimated coverage of implemented and scheduled emissions trading schemes

Carbon pricing mechanism	GHG emissions of country / region ($MtCO_2e$)[342]	GHG emissions capped by the carbon pricing mechanism ($MtCO_2e$)[343]	Estimated coverage[344]
European Union Emissions Trading System[345]	4,409[346]	2,250	45%
California's Cap-and-Trade Program	448	163	35% (85% as of 2015)
Kazakhstan's Emissions Trading Scheme	318	168	50%
New Zealand Emissions Trading Scheme	80	32[347]	50% (100% as of 2015)[348]
Regional Greenhouse Gas Initiative	419[349]	83	20%
Québec Cap-and-Trade System	83[350]	23	30% (85% as of 2015)
Tokyo Cap-and-Trade Program	57	10	20%
Australia Carbon Pricing Mechanism	629	330	60%
Swiss Emissions Trading Scheme	57	3[351]	10%
Beijing Pilot Emissions Trading Scheme	100	N/A, under development	50%
Shanghai Pilot Emissions Trading Scheme	240	110	45%
Tianjin Pilot Emissions Trading Scheme	130	78	60%
Chongqing Pilot Emissions Trading Scheme	N/A	N/A, under development	N/A
Guangdong Pilot Emissions Trading Scheme	510	214	40%
Hubei Pilot Emissions Trading Scheme	N/A	N/A, under development	35%
Shenzhen Pilot Emissions Trading Scheme	83	32	40%
Korea's Emissions Trading Scheme	647	N/A, under development	60%
British Columbia Cap-and-Trade Program	62[352]	N/A, under consideration	N/A
Turkey Emissions Trading Scheme	420	N/A, under consideration	N/A
Ukraine Emissions Trading Scheme	397	N/A, under consideration	N/A
Chile Emissions Trading Scheme	107	N/A, under consideration	N/A
Brazil Emissions Trading Scheme	1,621	N/A, under consideration	N/A

342 Annual values. Source for national GHG emissions: JRC/PBL, *EDGAR version 4.2 FT2010*. Joint Research Centre of the European Commission/PBL Netherlands Environmental Assessment Agency, 2012, available at: http://edgar.jrc.ec.europa.eu/index.php, or unless otherwise specified or as specified in Section 3. Includes all GHG and all sectors. Rounded to the nearest megaton.

343 Annual values. The cap of the scheme is considered as the GHG emissions capped by the scheme and, where not available, the covered emissions are used instead.

344 The estimated coverage as given in this report or obtained from International Carbon Action Partnership (ICAP), *ETS Interactive Map*, accessed on 15 April 2013, http://icapcarbonaction.com. Numbers are rounded to the nearest 5%.

345 The numbers provided include aviation.

346 Emissions from EU-27 countries. Source: UNFCCC Greenhouse Gas Inventory. See Section 3.1.1.

347 This does not include the sectors Synthetic gases and Waste that entered the NZ ETS in 2013.

348 Source: New Zealand Government, *NZ ETS Review 2011*, 28 October 2011, http://www.climatechange.govt.nz/emissions-trading-scheme/ets-review-2011/.

349 Only CO_2 emissions from fuel combustion. See Section 3.1.5.

350 This is excluding LULUCF. See Section 3.1.6.

351 Only verified emissions from the first phase of the Swiss ETS. Source: Swiss Federal Office for the Environment (FOEN), *Emissions Trading Registry, Reports*, accessed on 2 May 2013, https://www.national-registry.ch/Edition.aspx?menu=yes.

352 Source: British Columbia Ministry of Environment, *British Columbia Greenhouse Gas Inventory Report*, June 2012.

Setting ambition at the outset *Setting an appropriate ambition level for a carbon pricing mechanism is both critical to its success and also a significant challenge.*

Carbon pricing mechanisms can only force emission reductions if they squeeze emissions tightly. This ambition is determined by overall national targets and takes various forms, including baselines, caps, level of carbon tax and limits and quality of offsets. The ambition at the heart of these schemes influences the carbon prices that result. Without careful planning, and sometimes even with such planning, prices can plummet or skyrocket in a very short space of time. Specific stabilization mechanisms, such as cost containment reserves, are often added to control the price further.

Where ambition is too high, opponents rally, it becomes difficult to garner appropriate support from all stakeholders, and plans can be quashed or watered down making their efforts redundant. For years, strong opposition stood in the way of the initial setup of an Australian carbon pricing scheme. Similarly, the rapid depletion of membership and activity in WCI provides strong evidence for this challenge. In the EU ETS free allocation of allowances has been used since the beginning of the scheme to satisfy the demands of stakeholders, from industrial participants in the early phases to the power sector in parts of Eastern Europe in Phase III. Some schemes are introduced through pilots or in phases, which can gently ease participants into the scheme.

Schemes with low ambition may create a cap that tries hard to satisfy all parties, such that the demand in the scheme becomes negligible. It is vital that the supply/demand balance is right, in emissions trading schemes in particular, to ensure effective carbon pricing. The emerging Chinese pilots are being designed with great care in order to establish the correct level of ambition and stringency to ensure liquidity, whilst preserving economic growth. It is an enormous challenge, in technical terms, to get the level of ambition right in advance even with strong political will and appropriate stakeholder support. Even long-running schemes have found this to be the case, as demonstrated by the significant difference between emissions and the cap in both the EU ETS and RGGI.

A misalignment of targets and emissions in the Kyoto Protocol created hot air and an imbalance of ambition. Now, a new approach to ambition was taken at the international level under the Kyoto Protocol: a subsequent Doha decision prevents targets that allow absolute growth of emissions in CP2. This bold move ensures higher ambition within the context of an international agreement, but uncertainty remains about whether Ukraine, Kazakhstan, and Belarus would join.

» Carbon pricing is getting a higher billing and a wider profile, becoming integrated with core development and growth priorities. «

Several emissions trading schemes explore how to increase ambition predictably over time. For example, at the international level, the Kyoto Protocol includes a "ratcheting up" mechanism. Targets under the Kyoto Protocol are first fixed as a "floor of ambition" and a date is set for countries to increase their ambition. Established regional schemes, such as RGGI and the EU ETS, include a set trajectory of annual reductions to the emissions cap.[353]

Price stabilization mechanisms *New price stabilization mechanisms are being observed in emerging emissions trading schemes, complementing measures in existing schemes. Banking and borrowing between phases, price ceilings and floors, and price containment reserves and changes can all act as price stabilization mechanisms.*

353 1.74% reduction factor for the cap in the EU ETS from 2013 and 2.5% reduction factor in RGGI from 2015 to 2020.

Even when ambition has been set, carbon pricing can still be volatile and unpredictable. Effective price stabilization mechanisms are important to keep this behavior in check and to maintain long-term emission reductions. Carbon pricing mechanisms are designed using assumptions of economic growth, technology development, and other factors, all of which determine expected prices or taxation levels. If reality diverges from these assumptions, mechanisms can become ineffective. Even if reality follows assumptions, carbon prices in a scheme may still become higher or lower than those desired. Price volatility harms confidence in the price signal, which is the core element of carbon pricing and guides investment decisions towards low-carbon development.

The recent financial and economic crisis in Europe and the United States ran shockwaves through several of the most established cap-and-trade schemes, causing prices to fall. As highlighted in this report, the EU ETS and RGGI have both made or proposed adjustments to take account of the impact of unexpected fluctuations in economic activity. These changes are effective actions that indicate that these policies fall within a cycle of policy review and improvement, and help create more resilient carbon pricing tools.

A first attempt at price stabilization was made through provisions on banking and borrowing allowances between commitment periods, as in the Kyoto Protocol and the EU ETS after Phase I. But these have proved to be insufficient in the case of the Kyoto Protocol, where overall demand is lacking. In the EU ETS, a large oversupply in the scheme dulls the longer term pricing signal that banking provides, rendering this provision only slightly effective.

The banking provisions in the EU ETS could even be described as counterproductive. The banking of allowances from Phase II to Phase III is exacerbating oversupply and, as they learn from this harsh experience, newer carbon pricing mechanisms are often including additional, new safeguards to provide flexibility in the future. Australia's CPM, for example, includes a rolling target-setting approach that can adjust for new perspectives. We can expect innovation and new solutions as other emerging schemes consider how to keep carbon prices flexible, but within limits.

Some carbon pricing mechanisms deal specifically with concerns about low carbon prices by, for instance, mandating a price floor. The UK's carbon price floor, for example, is intended to supplement the (currently low) EU ETS prices for some participants, and also designed to stimulate long-term investment in low-carbon infrastructure. The UK's long-term target is to reduce GHG emissions by 80% by 2050.[354]

Other schemes, such as that of California, RGGI, and Québec, provide specific price stabilization mechanisms to prevent carbon prices from becoming too high. Several other schemes also allow the use of offsets as price stabilization mechanisms. Table 7 summarizes price stabilization mechanisms and information on prices for selected carbon pricing mechanisms.

Offsets *The role for domestic offsets and bilateral offset schemes is growing, whilst demand for CERs and ERUs falls.*

The success of JI, CDM and the voluntary market has depended on demand for offsets; however, the failure to create strong demand continues to dog these markets. Looking at the national and regional schemes explored in this report, there remains demand for international offsets in some schemes, such as New Zealand; greatly reduced demand in other schemes, such as the EU ETS; and full exclusion of CERs in schemes such as RGGI. Some bilateral schemes and also new market mechanisms are exploring alternatives sources of demand, and approaches to offset standards. Non-ETS sectors can also continue to provide demand for international offsets, and it is estimated that the EU's Effort Sharing Decision for these sectors will lead to an estimated demand of around 700 $MtCO_2e$ for CERs and ERUs.

354 Source: UK Department of Energy and Climate Change, *Carbon Budgets*, 8 April 2013, https://www.gov.uk/government/policies/reducing-the-uk-s-greenhouse-gas-emissions-by-80-by-2050/supporting-pages/carbon-budgets.

Table 7: Price information for selected carbon pricing mechanisms

Carbon pricing mechanism	Price stabilization mechanism[355]	Prices per tCO_2e	
		Original currency	US$[356]
Mechanisms under the Kyoto Protocol			
Clean Development Mechanism	*None*	See Section 2	
Joint Implementation	*None*		
International Emissions Trading	*None*		
Emissions Trading Schemes			
European Union Emissions Trading System	*No explicit mechanism* Some provisions in the event of excessive (upward) price fluctuations	See Section 2	
California's Cap-and-Trade Program	*Auction reserve price:* US$10 in 2012, increasing by 5%/y plus inflation. *Price containment reserve:* allowances from this reserve will be offered at auction four times a year, at three price levels: US$40, US$45 and US$50 for 2012, increasing annually by 5% plus inflation	US$14	US$14[357]
Kazakhstan's Emissions Trading Scheme	*No explicit mechanism*	N/A	N/A
New Zealand Emissions Trading Scheme	*Fixed price ceiling:* NZ$25. In practice: due to the temporary rule that non-forestry participants can surrender one allowance for two tons of emissions, this means a price ceiling of NZ$12.5.	NZ$1	US$0.85[358]
Regional Greenhouse Gas Initiative	Currently: *offset trigger mechanism* (% of allowed offset increases to 5% of obligation if auction allowance prices reach US$7 and to 10% if prices reach US$10). Proposed change (following review of scheme): removal of the offset trigger mechanism and creation of a *cost containment reserve* (CCR), consisting of a fixed quantity of allowances, in addition to the cap, only available for sale if allowance prices exceed US$4 in 2014, US$6 in 2015, US$8 in 2016, and US$10 in 2017, rising by 2.5%, to account for inflation, each year thereafter.	US$2[359]	US$2
Québec Cap-and-Trade System	*Auction reserve price:* CN$10 in 2012, increasing by 5%/y plus inflation. *Price containment reserve:* allowances from this reserve will be offered at auction four times a year, at three price levels: CN$40, CN$45, and CN$50 for 2012, increasing annually by 5% plus inflation	N/A	N/A
Australia Carbon Pricing Mechanism	*Fixed price* from 2012 to 2015: A$23 in 2012, will increase by 2.5% plus inflation annually in the fixed price period. *Fixed price ceiling* for the first three years of the flexible period: price will be set in 2014 at A$20 above the expected price of EUAs for 2015–2016, rising by 5% plus inflation annually	A$23	US$24
Swiss Emissions Trading Scheme	*No explicit mechanism*	SFr.18[360]	US$19

355 Prices are given per tCO_2e.
356 Exchange rates as specified in Section 3.2.1.
357 Source: Thomson Reuters Point Carbon, *News, Market Data, California*, price for December 2013 California carbon allowances (CCAs) on 2 May 2013.
358 Price per NZU: NZ$2; 1 NZU for 2 tCO_2e. Source: Thomson Reuters Point Carbon, *News, Market Data, NZ ETS*, NZU price on 2 May 2013. Exchange rate US$1 = NZ$1.18 (2 May 2013).
359 Source: CME Group, *Regional Greenhouse Gas Initiative (RGGI) CO_2 Allowance Futures*, accessed on 2 May 2013, http://www.cmegroup.com/trading/energy/emissions/regional-greenhouse-gas-initiative-rggi-futures_quotes_globex.html.
360 Source: OTC-X Platform, *CO_2-Emissionsrecht CHU*, accessed on 2 May 2013, https://www.otc-x.ch/markt/instrument/valor/999999.html.

Carbon pricing mechanism	Price stabilization mechanism[355]	Prices per tCO_2e	
		Original currency	US$[356]
Carbon taxes			
British Columbia Revenue Neutral Carbon Tax	Tax levels remain stable until further notice	CN$30	US$29
Denmark CO_2 Tax	Annual increase of 1.8% in 2008–2015	Dkr.150	US$26
Finland CO_2 Tax	Tax rate depends on the fuel type	€30–60	US$39–78
Ireland Natural Gas Carbon Tax, Mineral Oil Tax: Carbon Charge and Solid Fuel Carbon Tax	Fixed rate	€20	US$26
Japan Tax for Climate Change Mitigation	Gradual increase over 3.5 years	¥289	US$3
Norway CO_2 Tax	Tax rate depends on fuel type and usage	Nkr.25–410	US$4–71
South African Carbon Tax	Will be implemented from January 2015. Annual increase of 10% in 2015–2020	R120	US$13
Sweden CO_2 Tax	Fixed rate	Skr1050	US$163
Swiss CO_2 Tax	Fixed rate	SFr.36	US$38
United Kingdom Carbon Price Floor	Tax rate changes every year and is the difference between the EUA price and the annual carbon floor price target. Floor price target is starting from £16/tCO_2 in 2013, linearly increasing to £30/tCO_2 by 2020	£4.94	US$7

Offsets, in the form of CERs and ERUs, have been successful in mobilizing emission reductions in many countries, and also support the development of skills and capacity in the broader emission reductions industry. Some countries, such as China and Ukraine, are making a transition from solely hosting offsets for use in the international market, to establishing their own domestic carbon pricing mechanisms. This focus on domestic action across many sectors is likely to push up the scale of emissions that carry a price tag. Therefore, the transition from a situation in which most carbon pricing relies on offsets to one in which more national carbon pricing mechanisms are in place will be important to increasing the global impact of carbon pricing.

Examples of domestic offsets include CCERs in China, as well as the use of domestic offsets in the RGGI scheme along with those of California, Québec and Australia. These domestic offsets can stimulate inward investment and help reduce emissions in hard-to-reach sectors.

Even in countries that do not have a full emissions trading scheme, domestic offsets can still play a role in emission reductions. For example, offsets in Costa Rica are supporting the implementation of its carbon neutrality goal, and in South Africa they will be complementing a carbon tax. Furthermore, the voluntary carbon market continues to provide useful methodologies and approaches that can help support the development of offsets for compliance schemes, as in California or for REDD.

International credits, including CERs and ERUs, in individual carbon pricing mechanisms also have the potential to create further indirect links between regional and domestic schemes. However, the current trend is towards direct linking rather than international credits.

Coordination and linking take a step forward *The development of many different carbon pricing mechanisms in parallel requires coordination to facilitate global action and an eventual global carbon market. Linking needs to be timed carefully to allow new schemes to establish themselves before linking takes place.*

Significant concrete commitments to linking were taken since 2012. For example, the EU–Australia link, the EU–Switzerland link, and the California–Québec link are all getting closer. In each case, the next step, detailed practical actions to achieve linking, are now in train. In addition, the Korea is building compatibility with other emissions trading schemes into its scheme at an early stage, to allow for future linking. Approaches between the different pilots in China are also being aligned to some degree, particularly in relation to MRV. Such coordination is likely to ensure more coordination between China's regions with a view to a wider national market being created.

Design elements highlighted in this report, such as price stabilization mechanisms, are showing some convergence. Such convergence is a reflection of the open dialogue between jurisdictions, both established and emerging market-based mechanisms. However, at the same time the detailed design of some scheme elements, including price stabilization mechanisms and the approach to cap adjustments, can also act as a barrier to linking by increasing the complexity of discussions about equivalence, comparability, and equity between schemes. The PMR, donors, and other forums offer an opportunity for countries to align individual approaches at the technical level, which might help the establishment of fungible mechanisms within a fragmented but workable market. Setting up a framework such as the WCI, which defines common design parameters, helps enable linking (e.g., between California and Québec).

Linking needs to be carefully timed. Ideally, new emissions trading schemes need to take their first steps, and experience teething trouble and refinement before connections are made with schemes elsewhere. Furthermore, linking plans can impact schemes very early on. In the case of Australia, for example, the initially proposed price floor was removed just after the scheme started, as a result of the decision to establish a link with the EU ETS. Unilateral links, which allow credits from one scheme to be used in another but not the reverse, can be a stepping stone towards a full bilateral link but might also be considered less bold and less risky than bilateral links. The bilateral link, as in the case of the EU ETS and Australia, represents a step forward towards establishing a global carbon market. However, it also makes it more difficult to take future decisions such as the current proposed EU ETS structural reforms, because an additional jurisdiction will need to agree.

National context *The national context is leading the development of carbon pricing mechanisms.*

Carbon pricing mechanisms are developing in every continent, making it a global phenomenon. The topic of climate change is becoming increasingly important within national agenda. Carbon pricing is getting a higher billing and a wider profile, becoming integrated with core development and growth priorities. Moreover, discussions on this hot topic are moving from Foreign Affairs Ministries to a wider audience within governments, including Treasuries and Finance Ministries. With a new, higher profile at a national level, domestic considerations become a crucial determinant of the choice and design features of carbon pricing mechanisms.

Motivations for introducing carbon pricing mechanisms include energy and environmental concerns, a desire to make economic and environmental gains at home through revenue recycling and domestic offsets, or to show regional leadership. By taking actions at the national level, countries can make decisions more quickly and easily than possible in the international context. On balance, the increase in carbon pricing activity reflects a mainstreaming of climate change issues.

Diverse national flavors can be seen, both in the range of carbon pricing mechanisms implemented and those scheduled. In Indonesia and Costa Rica for example, the carbon pricing mechanism forms a key part of an overarching national strategy and roadmap towards carbon neutrality. In China, emissions trading schemes are being approached intensely as a headline policy in parallel with many other policies to support overarching energy and environmental goals. As such, heated debate persists in China, with carbon taxation sometimes presented as a competitor of emissions trading. However, this report shows that carbon taxation is often complementary to existing emissions trading schemes, or can act as a first carbon pricing mechanism, as in South Africa or Australia. Japan demonstrates innovation across all possible carbon pricing mechanisms, from voluntary to offsets to taxation to mandatory cap-and-trade, and including an international mechanism.

Different countries have different capacities to engage with and introduce carbon pricing mechanisms. As a result, countries are choosing an appropriate level of engagement. LDCs, for example, provide CERs to the EU ETS, and the Korea is now ready to set up its own scheme. The voluntary market continues to supplement activity where there is no clear will to take action. This report demonstrates movement between different approaches, as capacity and ambition develop.

Where national circumstances change, carbon pricing mechanisms will feel the impact and need to adapt accordingly. The recession is having an impact on the EU ETS, and rapid growth in China informs its emerging emissions trading schemes. However, even less direct priority changes can knock carbon pricing down the priority list for governments and derail some of the progress towards a more widespread price on carbon.

Most carbon pricing mechanisms implemented and scheduled involve a staged approach, in compliance periods, or a piloting approach. These carbon pricing mechanisms can gradually develop and improve and could eventually form the basis for a global carbon market, through bottom-up linking.

The international process can also profit from experiences and lessons learned from activities taking place at a national level. In this way, domestic implementation of carbon pricing mechanisms can assist the international community to test and establish a range of mechanisms that can be drawn from and be implemented within a future agreement, whatever form it might take. Furthermore, domestic initiatives might increase countries' willingness to engage in carbon pricing at the international level in the future.

Focusing on economic growth *Existing carbon pricing mechanisms include various design options to secure economic growth.*

Fears about low economic growth and the sustainability of jobs and industries can fuel resistance to carbon pricing mechanisms. The expansion of carbon pricing mechanisms feeds deep-rooted concerns about risks to international competitiveness. Similarly, mechanisms that are also highly ambitious are creating specific concerns about securing economic growth at the national level as well as at the sector or participant level.

Some carbon pricing mechanisms include specific design features to manage concerns about competition. They include the carbon leakage provisions of the EU ETS and California's Cap-and-Trade Program. Moreover, RGGI is considering policy solutions to the challenges posed by imported electricity, and Korea's scheme is considering competitiveness implications at the early design stage. Other solutions such as border tax adjustments have been raised by observers as a potential solution to questions about competitiveness.

Competitiveness concerns can also be managed at a higher level through design conditions. Some schemes that focus on only one sector and a wide region (e.g., RGGI and electricity producers) can reduce the scale of competitiveness concerns amongst participants by excluding sectors, such as industry, which may have had significant concerns about competitiveness. In other cases, sector inclusion can exacerbate the problem such as the inclusion of some international flights in the EU ETS, which had implications well beyond carbon markets.

Carbon taxation at the national level can also cause competitiveness concerns, and some taxation measures take this into account through tax exemptions such as in the case of trade-exposed sectors in Norway and South Africa. However, the inclusion of too many exemptions can also reduce the effectiveness of a carbon pricing scheme.

International cooperation offers a solution to competitiveness concerns. However, current international negotiations have shown that progress is slow and there is tangible risk of a lowest common denominator approach. Equally problematic is that ambition levels are reasonable but the process of agreement can be stalled making it extremely challenging to reach agreement in enough time to tackle the climate challenge.

Even if the international stage fails to offer a solution, the continuing increase in the number of individual carbon pricing mechanisms, and their scope, should help to answer competitiveness questions. Growth in individual schemes within one region or in one economic zone, for example the proliferation of activity in the Asia Pacific region, can go far to alleviate such concerns.

The recent implementation of many carbon pricing schemes provides evidence that countries increasingly are seeing carbon pricing as an opportunity, through the development of improved industrial efficiency and technology development with export potential. This opportunity for carbon pricing to deliver benefits to the overall economy could spur others around the world to jump on the carbon pricing bandwagon.

What next? This report showed a remarkable dynamic in developing regional, national, and sub-national direct carbon pricing initiatives. A lot has been achieved already, including an informal bottom-up international cooperation where the different jurisdictions talk and learn from each other, complementing the more top-down UNFCCC process. This has led to the emergence of common design features, in particular related to emissions trading schemes and an increasing convergence of views on what is best practice.

From this starting point, there is a clear momentum to address broader policy issues such as ambition levels in different jurisdictions and in different sectors of the economy; the degree to which regional, national, or sub-national carbon prices can and should converge; and related to that, the degree to which the corresponding pricing schemes can and should link to each other in various ways. As regards offsets, a wealth of experience with CDM and JI is already available, informing policy makers on their performance – or non-performance – on a range of attributes. These characteristics include their ability to identify least-cost mitigation options, to support countries in sustainable development and ambition, to deliver results-based international support, or to reduce price volatility in ETS.

Direct carbon pricing initiatives will also need to reflect on how they relate to indirect carbon pricing through taxing fossil fuels, removing fuel subsidies, results-based financing, or regulation in various dimensions including economic rationale, political and administrative feasibility, and efficiency. Answers to these questions will not be clear-cut, but substantial progress in better understanding and in distilling good practice can be expected in the years to come.

This new series of carbon pricing reports will accompany this process of deepening the understanding of carbon prices, starting from mapping of where we are today – a growing landscape of different regional, national, and sub-national direct carbon pricing initiatives – and moving beyond mapping into so-far-unanswered economic and policy questions in line with developments on the ground.

GLOSSARY

Additionality

A project activity is additional if anthropogenic GHG emissions are lower than those that would have occurred in the absence of the project activity.

Annex I (Parties)

The industrialized countries listed in Annex I to the UNFCCC were committed to return their GHG emissions to 1990 levels by 2000. They currently include Australia, Austria, Belarus, Belgium, Bulgaria, Canada, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Japan, Latvia, Liechtenstein, Lithuania, Luxembourg, Malta, Monaco, the Netherlands, New Zealand, Norway, Poland, Portugal, Romania, Russian Federation, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey, Ukraine, the United Kingdom, and the United States, as well as the European Union.

Assigned Amount Unit (AAU)

Annex I Parties are issued AAUs up to the level of their assigned amount, corresponding to the quantity of GHG they can release in accordance with the Kyoto Protocol (Article 3), during the first commitment period of that protocol (2008–2012). One AAU represents the right to emit one metric ton of carbon dioxide equivalent.

Backloading

To rebalance supply and demand of emission allowances in the EU ETS in the short-term the European Commission proposed to temporarily postpone the auctioning of 900 million allowances from 2013–2015 towards the end of Phase III by changing the auctioning timeline. This measure would affect the distribution of auctions over the period but it would not reduce the overall number of allowances to be auctioned during Phase III. On April 16, 2013 the Parliament voted against backloading.

Banking or Carry-over	Compliance units under the various schemes to manage GHG emissions in existence may or may not be carried over from one commitment period to the next. Banking may encourage early action by mandated entities depending on their current situation and their anticipations of future carbon constraints. In addition, banking brings market continuity. Banking between Phase I and Phase II of the EU ETS is not allowed; it is allowed between Phase II and further phases. Some restrictions on the amount of units that can be carried over may apply; for instance, EUAs may be banked with no restriction, while the amount of CERs that can be carried over by a Kyoto Party is limited to 2.5% of the assigned amount of each Party.
Baseline	The emission of GHG that would occur without the policy intervention or project activity under consideration.
Benchmarking	Benchmarking is used to compare operations of a company with those of others, to industry average, or to best practice, to determine whether they have opportunities to improve energy efficiency or reduce GHG emissions. In the EU ETS free allocation is carried out on the basis of ambitious benchmarks of GHG emissions performance. These benchmarks reward best practice in low-emission production.
Cap-and-Trade	Cap-and-trade schemes set a desired maximum ceiling for emissions (or cap) and let the market determine the price for keeping emissions within that cap. To comply with their emission targets at least cost, regulated entities can either opt for internal abatement measures or acquire allowances or emission reductions in the carbon market, depending on the relative costs of these options.
Carbon Asset	The potential of GHG emission reductions that a project is able to generate and sell.
Carbon Dioxide Equivalent (CO_2e)	The universal unit of measurement used to indicate the global warming potential of each of the six GHG regulated under the Kyoto Protocol. Carbon dioxide – a naturally occurring gas that is a by-product of burning fossil fuels and biomass, land-use changes, and other industrial processes – is the reference gas against which the other GHG are measured, using their global warming potential.
Carbon Finance	Resources provided to activities generating (or expected to generate) GHG emission reductions through the transaction of such emission reductions.
Carbon Leakage	Shift in CO_2 emissions from countries taking stringent mitigation actions to countries taking less stringent mitigation actions.
Certified Emission Reduction (CER)	A unit of GHG emission reductions issued pursuant to the Clean Development Mechanism of the Kyoto Protocol and measured in metric tons of carbon dioxide equivalent. One CER represents a reduction in GHG emissions of one metric ton of carbon dioxide equivalent.

Chinese Certified Emission Reduction (CCER)	The NDRC issued rules to regulate the voluntary emission reduction credits market in China, in the form of CCERs, in June 2012. CCER will be issued in unit of tCO_2e, and will include CO_2, CH_4, N_2O, HFCs, PFCs, and SF_6.
Clean Development Mechanism (CDM)	The mechanism provided by Article 12 of the Kyoto Protocol, designed to assist developing countries in achieving sustainable development by allowing entities from Annex I Parties to participate in low-carbon projects and obtain CERs in return.
Climate Action Reserve (CAR)	The Climate Action Reserve is a US-based offsets program that establishes regulatory quality standards for the development, quantification, and verification of GHG emission reduction projects in North America; issues carbon offset credits known as Climate Reserve Tons (CRT) generated from such projects; and tracks the transaction of credits over time in a transparent, publicly accessible system.
Conference of the Parties (COP)	The supreme body of the UNFCCC. It currently meets once a year to review the UNFCCC's progress. The word "conference" is not used here in the sense of "meeting" but rather of "association," which explains the seemingly redundant expression "fourth session of the Conference of the Parties."
Conference of the Parties Serving as the Meeting of the Parties (CMP)	The UNFCCC's supreme body is the COP, which serves as the meeting of the Parties to the Kyoto Protocol. The sessions of the COP and the CMP are held during the same period to reduce costs and improve coordination between the UNFCCC and the Kyoto Protocol.
Designated Operational Entity (DOE)	A designated operational entity is an independent auditor who assesses whether a potential project meets all the eligibility requirements of the CDM (validation) and whether the project has achieved GHG emission reductions (verification and certification).
Effort Sharing Decision	The Effort Sharing Decision establishes binding annual GHG emission targets for EU Member States for the period 2013–2020. These targets concern emissions from most sectors not included in the EU ETS, such as transport (except aviation), buildings, agriculture and waste.
Emission Reduction	The measurable reduction of release of GHG into the atmosphere from a specified activity, and a specified period of time.
Emission Reductions Purchase Agreement (ERPA)	Agreement that governs the transaction of emission reductions.
Emission Reduction Unit (ERU)	A unit of emission reductions issued pursuant to Joint Implementation. One ERU represents the right to emit one metric ton of carbon dioxide equivalent.

Emissions Trading Scheme (ETS)	See cap-and-trade.
European Union Allowance (EUA)	The allowances in use under the EU ETS. An EUA unit is equal to one metric ton of carbon dioxide equivalent.
European Union Emissions Trading System (EU ETS)	The EU ETS was launched on January 1, 2005, as a cornerstone of EU climate policy toward its Kyoto commitment and beyond. Through the EU ETS, member states allocate part of the efforts toward their Kyoto targets to domestic emission sources (mostly utilities). The EU ETS will continue beyond 2012 in its Phase III, with further cuts in emissions (by 21% below 2005 levels in 2020 or more, depending on progress in reaching an ambitious international agreement on climate change).
First Commitment Period under the Kyoto Protocol (CP1)	The five-year period, from 2008 to 2012, during which industrialized countries committed to collectively reduce their GHG emissions by an average of 5.2% compared with 1990 emissions under the Kyoto Protocol.
Framework for Various Approaches (FVA)	Defined at COP 17 in Durban, general framework at the UNFCCC level that allows various approaches, including opportunities for using markets, to enhance the cost-effectiveness of, and to promote, mitigation actions, bearing in mind different circumstances of developed and developing countries, that must meet standards that deliver real, permanent, additional and verified mitigation outcomes, avoid double counting of effort, and achieve a net decrease and/or avoidance of GHG emissions.
Greenhouse Gas (GHG)	Both natural and anthropogenic, GHGs trap heat in the Earth's atmosphere, causing the greenhouse effect. Water vapor (H_2O), carbon dioxide (CO_2), nitrous oxide (N_2O), methane (CH_4), and ozone (O_3) are the primary GHGs. The emission of GHG through human activities (such as fossil fuel combustion or deforestation) and their accumulation in the atmosphere is responsible for an additional forcing, contributing to climate change.
Japan Voluntary Emissions Trading Scheme (JVETS)	Under the JVETS, companies receive subsidies to implement mitigation activities in line with voluntary commitments and can resort to emissions trading (including offsets) to meet their commitments with more flexibility. Though growing, its impact remains limited: over the first three years of the scheme, participants (288 companies) reduced their emissions by about one million tCO_2e. The JVETS has contributed to the development of an MRV system, third-party verification system, and the registry system. The JVETS has been incorporated into the Experimental Integrated ETS as one of the participating options.
Joint Implementation (JI)	Mechanism provided by Article 6 of the Kyoto Protocol whereby entities from Annex I Parties may participate in low-carbon projects hosted in Annex I countries and obtain Emission Reduction Units (ERUs) in return.

Kyoto Mechanisms	The three flexibility mechanisms that may be used by Annex I Parties to the Kyoto Protocol to fulfill their commitments. These are the Joint Implementation (JI, Article 6), Clean Development Mechanism (CDM, Article 12), and International Emissions Trading (Article 17).
Kyoto GHGs	The Kyoto Protocol regulates six GHGs: carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_20), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF_6).
Kyoto Protocol	Adopted at the third Conference of the Parties to the UNFCCC held in Kyoto, Japan, in December 1997, the Kyoto Protocol commits industrialized country signatories to collectively reduce their GHG emissions by at least 5.2% below 1990 levels on average over 2008–2012 while developing countries can take no-regret actions and participate voluntarily in emission reductions and removal activities through the CDM. The Kyoto Protocol entered into force in February 2005.
Monitoring Plan	A set of requirements for monitoring and verification of emission reductions achieved by a project.
National Allocation Plan (NAP)	A document used in preparation of Phases I and II of the EU ETS. These documents were established by each European member state and reviewed by the European Commission, and specify the list of installations under the EU ETS and their absolute emissions caps, the amount of CERs and ERUs that may be used by these installations, as well as other features, such as the size of the new entrants reserve, the treatment of exiting installations, and the process of allocation (free allocation or auctioning).
Nationally Appropriate Mitigation Action (NAMA)	Refers to a set of mitigation policies and/or actions a developing country undertakes aiming at reducing its GHG emissions and reports to UNFCCC on a voluntary basis. The concept of NAMAs was defined in 2007 under the UNFCCC Bali Action Plan, as "Nationally Appropriate Mitigation Actions by developing country Parties in the context of sustainable development, supported and enabled by technology, financing and capacity building, in a measurable, reportable and verifiable manner."
New Market-based Mechanism (NMM)	Defined at COP 17 in Durban, new market-based mechanism, operating under the guidance and authority of the COP, to enhance the cost-effectiveness of, and to promote, mitigation actions, bearing in mind different circumstances of developed and developing countries, which is guided by decision 1/CP.18, paragraph 51. It may assist developed countries to meet part of their mitigation targets under the UNFCCC but should consider the principle of supplementarity.

New South Wales Greenhouse Gas Reduction Scheme (NSW GGAS)	The NSW GGAS commenced on 1 January 2003. It was one of the first mandatory GHG emissions trading schemes in the world. GGAS aimed to reduce GHG emissions associated with the production and use of electricity. It achieved this by using project-based activities to offset the production of GHG emissions. The NSW GGAS was closed on July 1, 2012 upon the commencement of the CPM.
New Zealand Emissions Trading Scheme (NZ ETS)	The NZ ETS will progressively regulate emissions of the six Kyoto GHGs in all sectors of the economy by 2015. Forestry has been covered since 2008; by July 1, 2010, stationary energy, industrial process, and liquid fossil fuel were phased in.
Offset	An offset designates the emission reductions from project-based activities that can be used to meet compliance or corporate citizenship objectives vis-à-vis GHG mitigation.
Primary Transaction	A transaction between the original owner (or issuer) of the carbon asset and a buyer.
REDD Plus (REDD+)	All activities that reduce emissions from deforestation and forest degradation and contribute to conservation, sustainable management of forests, and enhancement of forest carbon stocks.
Regional Greenhouse Gas Initiative (RGGI)	Under RGGI, 9 Northeast and Mid-Atlantic states aim to reduce power sector CO_2 emissions by 10% below 2009 levels in 2019. Within this ten-year phase, there are three shorter compliance periods.
Registration	The formal acceptance by the CDM Executive Board of a validated project as a CDM project activity.
Removal Unit (RMU)	RMUs are issued by Parties to the Kyoto Protocol in respect of net removals by sinks from activities covered by Article 3(3) and Article 3(4) of the Kyoto Protocol.
Secondary Transaction	A transaction where the seller is not the original owner (or issuer) of the carbon asset.
Second Commitment Period under the Kyoto Protocol (CP2)	The eight-year period, from 2013 to 2020, in which Annex I Parties to the Kyoto Protocol committed to reduce GHG emissions by at least 18 percent below 1990 levels. The composition of Parties in the second commitment period is different from the first.

Supplementarity	Following the Marrakesh Accords, the use of the Kyoto mechanisms shall be supplemental to domestic action, which shall thus constitute a significant element of the effort made by each Party to meet its commitment under the Kyoto Protocol. There is no quantitative limit, however, to the utilization of such mechanisms. Supplementarity also needs to be considered in the development of modalities and procedures for the UNFCCC NMM.
Union Registry	An online database that holds accounts for stationary installations which have been transferred from national registries, as well as accounts for aircraft operators, which have been included in the EU ETS since January 2012. The Union registry replaces EU member states' national registries.
United Nations Framework Convention on Climate Change (UNFCCC)	The international legal framework adopted in June 1992 at the Rio Earth Summit to address climate change. It commits the Parties to the UNFCCC to stabilize human induced GHG emissions at levels that would prevent dangerous man-made interference with the climate system, following "common but differentiated responsibilities" based on "respective capabilities."
Validation	Validation is the process of independent evaluation of a project activity by a Designated Operational Entity (DOE) against the requirements of the CDM. The CDM requirements include the CDM modalities and procedures and subsequent decisions by the CMP and documents released by the CDM Executive Board.
Verified Emission Reduction (VER)	A unit of GHG emission reductions that has been verified by an independent auditor. Most often, this designates emission reductions units that are traded on the voluntary market.
Verification	Verification is the review and *ex post* determination by an independent third party of the monitored reductions in emissions generated by a registered CDM project or a determined JI project (or a project approved under another standard) during the verification period.
Voluntary Carbon Market	The voluntary carbon market caters to the needs of those entities that voluntarily decide to reduce their carbon footprint using offsets. The regulatory vacuum in some countries and the anticipation of imminent legislation on GHG emissions also motivates some pre-compliance activity.
Western Climate Initiative (WCI)	The Western Climate Initiative is a collaboration among states and provinces to tackle climate change at a regional level. Currently British Columbia, California, Ontario, Quebec and Manitoba are working together through the WCI to develop and harmonize their emissions trading scheme policies.

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