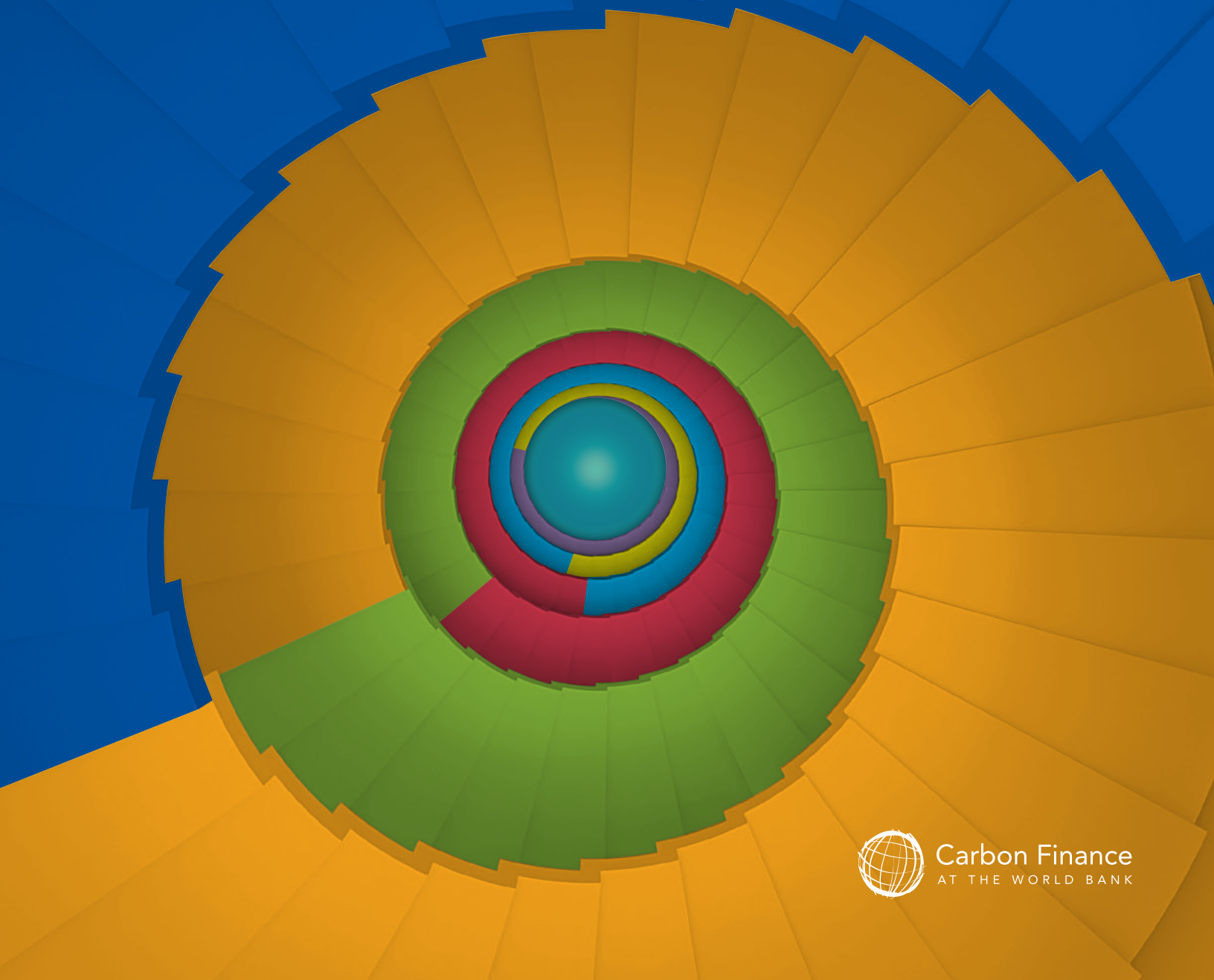
STATE AND TRENDS OF THE carbon market 2012

Washington DC, May 2012



Carbon Finance
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STATE AND TRENDS OF THE carbon market 2012

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List of abbreviations and acronyms

ACCU	Australian Carbon Credit Unit
AAU	Assigned Amount Unit
AAUPA	AAU Purchase Agreement
AB 32	Global Warming Solutions Act of 2006 Assembly Bill 32
ACR	American Carbon Registry
ADB	Asian Development Bank
aEUA	Aviation European Union Allowance
AfDB	African Development Bank
AWG-KP	Ad Hoc Working Group on Further Commitments for Annex I Parties under the Kyoto Protocol
AWG-LCA	Ad Hoc Working Group on Long-term Collaborative Action
BC	British Columbia
BOCM	Bilateral Offset Credit Mechanism
CAPEX	Capital Expenditures
CARB	California Air Resources Board
CAR	Climate Action Reserve
CCA	California Carbon Allowance
CCFE	Chicago Climate Futures Exchange
CCS	Carbon Capture and Storage
CCX	Chicago Climate Exchange
CDM	Clean Development Mechanism
CER	Certified Emission Reduction
CFI	Carbon Farming Initiative
CH_4	Methane
CME	Coordinating Managing Entity
CMM	Coal Mine 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
COD	Chemical Oxygen Demand
COP	Conference of the Parties
CPA	CDM Programme Activity
CPF	Carbon Partnership Facility
CPM	Carbon Price Mechanism
CPUC	California Public Utilities Commission
CP-1	First Commitment Period under the Kyoto Protocol
CRT	Climate Reserve Ton
CU	Carbon Unit
DC	Designated Consumer
DNA	Designated National Authority
DOE	Designated Operational Entity
EB	Executive Board of the CDM
EBRD	European Bank for Reconstruction and Development
EC	European Commission
ECJ	Court of Justice of the European Union
ECX	European Climate Exchange
EE	Energy Efficiency
ER	Emission Reduction
ERPA	Emission Reduction Purchase Agreement
ERU	Emission Reduction Unit
ETS	Emissions Trading Scheme
EU	European Union
EUA	European Union Allowance
EU ETS	European Union Emissions Trading Scheme
EUTL	European Union Transaction Log
FY	Fiscal Year
FYP	Five-Year Plan
GCF	Green Climate Fund
GDP	Gross Domestic Product
GGAS	New South Wales Greenhouse Gas Reduction Scheme
GHG	Greenhouse Gas
GIS	Green Investment Scheme
GW	Gigawatt
HFC	Hydrochlorofluorocarbon
ICE	IntercontinentalExchange
IFC	International Finance Corporation
IEA	International Energy Agency
IFI	International Financial Institution
IFRS	International Financial Reporting Standard
IMF	International Monetary Fund

IOU	Investor-Owned Utility
IRR	Internal Rate of Return
J-VER	Japan Verified Emission Reduction
J-VETS	Japan-Voluntary Emissions Trading Scheme
JI	Joint Implementation
JISC	Joint Implementation Supervisory Committee
KM	Kyoto Mechanism
KP	Kyoto Protocol
LDC	Least Developed Country
lCER	Long-term Certified Emission Reduction
LFG	Landfill Gas
LoA	Letter of Approval
LULUCF	Land Use, Land Use Change and Forestry
MAD	Market Abuse Directive
MDB	Multilateral Development Bank
MiFiD	Markets in Financial Instruments Directive
MOP	Meeting of the Parties
MRV	Measurement, Reporting and Verification
MW	Megawatt
MWh	Megawatt hour
NAMA	Nationally Appropriate Mitigation Action
NAP	National Allocation Plan
NAPCC	National Action Plan on Climate Change
NDRC	National Development and Reform Commission
N_2O	Nitrous Oxide
NMM	New Market Mechanism
NPV	Net Present Value
NZ ETS	New Zealand Emissions Trading Scheme
NZU	New Zealand Unit
OECD	Organisation for Economic Co-operation and Development
OTC	Over-the-Counter
PAT	Perform Achieve and Trade
pCER	Primary Certified Emission Reduction
PDD	Project Design Document
PFC	Perfluorocarbon
PIN	Project Idea Note
PMR	Partnership for Market Readiness
PoA	CDM Programme of Activities
RE	Renewable Energy
REC	Renewable Energy Certificate
REDD	Reducing Emissions from Deforestation and Forest Degradation
REDD+	Extends REDD by including sustainable forest management, conservation of forests, and enhancement of carbon sinks.
RET	Renewable Energy Target
RGGI	Regional Greenhouse Gas Initiative
RMU	Removal Unit
sCER	Secondary Certified Emission Reduction
SCF	Strategic Climate Fund
SF_6	Sulfur Hexafluoride
SME	Small and Medium-size Enterprise
tce	Tons of Coal Equivalent
tCER	Temporary Certified Emission Reduction
tCO_2	Ton of Carbon Dioxide
tCO_2e	Ton of Carbon Dioxide Equivalent
TMS	Target Management System
UN	United Nations
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
VAT	Value-added Tax
VCS	Voluntary Carbon Standard
VCU	Verified Carbon Units
VER	Verified Emission Reduction
WB	World Bank
WCI	Western Climate Initiative
YOY	Year on Year

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SECTION 1

Executive summary

WITH MEMORIES OF THE 2008-2009 FINANCIAL CRISIS STILL VIVID, 2011 emerged as yet another turbulent year for capital markets. Volatility increased for energy-related commodities, including carbon, with the onset of the Arab Spring, the shutdown of nuclear power stations in Japan and Germany in the wake of the Fukushima disaster,[1] and the downgrade of the United States' AAA credit rating. Equally relevant was the crisis of confidence that ensued as the Greek debt crisis intensified, spurred by fears that it would spread to other European Union (EU) economies and lead to a double-dip recession.

Carbon markets were not immune to the economic volatility. Compounded by increasing signs of long-term oversupply in the EU Emissions Trading Scheme (EU ETS), the backbone of the EU's climate policy and the engine of the global carbon market, carbon prices plummeted toward the end of the year.[2] Yet even as prices declined, the value of the global carbon market climbed in 2011, driven predominantly by a robust increase in transaction volumes. The total value of the market grew by 11 percent (%) year on year (yoy) to US$176 billion (€126 billion), and transaction volumes reached a new high of 10.3 billion tons of carbon dioxide equivalent (CO_2e) (see Table 1).[3]

Central to the rise in global transaction volumes, EU Allowance (EUA) trading volumes increased, reaching 7.9 billion tons of CO_2e, valued at US$148 billion (€106 billion). Supported by increased liquidity in the Certified Emission Reduction (CER) market and in nascent secondary Emission Reduction Unit (ERU) exchange-based activity, trading volumes for secondary Kyoto offsets also soared in 2011, increasing by 43% yoy to 1.8 billion tons of CO_2e, valued at US$23 billion (€17 billion). Largely driven by hedging and arbitrage, trading volumes for all assets increased as annual greenhouse gas (GHG) emissions in Europe declined for the second time in three years (primarily driven by weak industrial activity in the EU) and forecasts of compliance demand were dwarfed by the oversupply of allowances. As compliance demand and prices deteriorated, the issue of whether current carbon prices can sufficiently spur long-term low-carbon investments emerged in the debate, surfacing a key challenge in this market: an oversupply created as a consequence of demand responding to the current macroeconomic scenario versus a pre-established supply determined under very different market conditions.

The value of the pre-2013 primary CER market declined once again in 2011 as a consequence of the imminent end of the first commitment period of the Kyoto Protocol. Market value fell by 32%

1. The Fukushima disaster was a consequence of the earthquake and tsunami in Japan in March 2011.
2. Prices for December 2012 delivery of EU Allowances (Dec 12 EUA) and December 2012 delivery of Certified Emission Reductions (December 12 CERs) fell by 50% year on year (yoy) and 62% yoy respectively, from January 3, 2011, to December 30, 2011. Source: IntercontinentalExchange (ICE) Futures Europe.
3. Differences in 2010 figures reflect changes in the methodology to calculate the value and volume of trades. For detailed information regarding the methodology used to measure asset volumes and values, see the Methodology section at the end of this Report.

Table 1: Carbon market at a glance, volumes and values, calendar 2010-2011

	2010		2011	
	Volume ($MtCO_2e$)	Value (US$ million)	Volume ($MtCO_2e$)	Value (US$ million)
Allowances market				
EUA	6,789	133,598	7,853	147,848
AAU	62	626	47	318
RMU	-	-	4	12
NZU	7	101	27	351
RGGI	210	458	120	249
CCA	-	-	4	63
Others	94	151	26	40
Subtotal	**7,162**	**134,935**	**8,081**	**148,881**
Spot & Secondary offset market				
sCER	1,260	20,453	1,734	22,333
sERU	6	94	76	780
Others	10	90	12	137
Subtotal	**1,275**	**20,637**	**1,822**	**23,250**
Forward (primary) project-based transactions				
pCER pre-2013	124	1,458	91	990
pCER post-2012	100	1,217	173	1,990
pERU	41	530	28	339
Voluntary market	69	414	87	569
Subtotal	**334**	**3,620**	**378**	**3,889**
TOTAL	**8,772**	**159,191**	**10,281**	**176,020**

Sources: World Bank, Forest Trends-Ecosystem Marketplace for data on the voluntary market and Thomson Reuters Point Carbon for data on the California offsets
Subtotals and totals may not add up due to rounding

yoy to US$1.0 billion (€0.7 billion). The size of the ERU and Assigned Amount Unit (AAU) markets also decreased, by 36% and 49% respectively. In stark contrast to this, the post-2012 primary market increased by a robust 63% yoy to US$2 billion (€1.4 billion) despite depressed prices. Although China remained the largest source of contracted CERs, African countries – largely bypassed in the pre-2013 market – emerged stronger in 2011 and accounted for 21% of post-2012 CERs contracted during the year. Despite the increase in post-2012 volumes, purchase agreements became less binding due to lingering uncertainties regarding residual compliance demand and the eligibility of international credits in existing frameworks and schemes under development.

The year ended with the 17th Conference of the Parties (COP) in Durban, South Africa. While COP 17 did not adopt the incremental emission reduction commitments necessary to close the gap as per the ambitious level set by the UNFCCC Parties, it signaled a political commitment to resolve critical issues that were far from certain prior to the meeting. In particular, three key results formed the backbone of the Durban Platform for Enhanced Action: (i) the formal provision for a second commitment period of the Kyoto Protocol;[4] (ii) the launch of the Green Climate Fund to scale up long-term climate finance to developing countries; and (iii) the formal provision for a roadmap toward a global legal agreement on climate change (the "Durban Platform") to be agreed in 2015 and

4. To become a reality, the necessary decision to that effect will need to be adopted at COP 18.

take effect in 2020. The decision on a new market mechanism further strengthens the international trust in the UNFCCC process. Still, the restricted geographic scope of the Kyoto Protocol's second commitment period and prospects for a global deal to take effect in 10 years did not satisfy the immediate needs of the existing carbon market infrastructure, and the Durban Platform could not reverse the downward spiraling of the carbon price that produced record lows through early 2012.

At a time when uncertainties surround the existing carbon markets, it becomes more important than ever to take stock of the cumulative impact of carbon market mechanisms. To date, US$28 billion worth of pre-2013 CERs have been contracted forward (US$30 billion, combined with ERUs); if all underlying projects are implemented, these contracts will have supported additional investments of more than US$130 billion in developing countries[5,6] and confirm that project-based mechanisms have the capacity to mobilize capital efficiently toward cost-effective low-carbon investments. More broadly, low-carbon initiatives, including market mechanisms, have broken the inertia and significantly raised awareness of the climate challenge.

In this context, several domestic and regional low-carbon initiatives, including market mechanisms, gained increasing traction in both developed and developing economies in 2011 and early 2012. The global carbon market welcomed the news in late 2011 that the Australian Parliament had passed the ambitious Clean Energy Act, which will bring a nationwide cap-and-trade scheme to Australia by 2015. The scheme is expected to cover roughly 60% of the country's 600 million tons of CO_2e per year. In 2011, California's cap-and-trade regulation was adopted by the California Air Resources Board. California's plan is set to go into effect in 2013; with a coverage expansion planned for 2015, the plan is expected to cover 85% of California's annual emissions. Québec, which emits 12% of Canada's annual GHG emissions, adopted its own cap-and-trade plan, and the province is now working toward linking it with California's (within the context of the Western Climate Initiative) starting in 2013. In addition, both Mexico and the Republic of Korea got their comprehensive climate bills passed a few days apart in April 2012. These initiatives combined mean five new jurisdictions are adopting economy-wide cap-and-trade schemes. These events are particularly noteworthy in contrast to 2010, when no such initiatives were launched. Now the world looks with particular attention to China, which is also among the frontrunners in the race to become a low-carbon economy. Its advanced plan to pilot several regional cap-and-trade schemes is expected to provide the foundation for a nationwide scheme in the coming years.

Initiatives that attract competitive private sector participation are essential to identifying and implementing least-cost solutions for climate change mitigation and adaptation, and market-based mechanisms can catalyze such participation. However, the allocation of private capital toward the deployment of new low-carbon technologies at scale has been constrained by the low price prevailing in the short term and the absence of a price signal in the long term, and compounded by nervous financial markets that favor exposure to less risky assets and markets. More ambitious targets are needed from a larger number of countries to foster demand that can set the groundwork for a truly transformational carbon market – one that can emerge from fragmented but workable market initiatives. The challenge then will be to chart a course to further evolve these initiatives through linking and potentially reshaping the global carbon map.

5. World Bank estimates from 2011 and based on CDM projects in its own pipeline led to an average 1°:5 ratio between CER purchase values and the additional investments required for the underlying project to be implemented.
6. This value refers to the cumulative 2.4 billion CERs contracted in the primary market from 2002-2011. The value does not ensure the actual transfer of funds from the buyer to the seller as payments for emission reductions purchased in the primary market are commonly made upon delivery.

SECTION 2

Introduction: a changing climate

SINCE 2007, BOTH CLIMATE SCIENCE AND CLIMATE ECONOMICS HAVE ADVANCED DRAMATICALLY, mainly in response to the Stern Review in 2006 and the Intergovernmental Panel on Climate Change's Fourth Assessment Report in 2007. As climate science has matured, its limitations have also been revealed, meaning that the impacts of climate change are still difficult to predict. Carbon-cycle positive feedbacks may lead to far-reaching changes that are increasingly difficult to reverse once they have taken place. In addition, climate risks involve tipping points at which abrupt, perhaps irreversible transitions could occur.[7]

Climate damages have already begun to occur; these are disproportionally impacting the poor, who are the least resilient and most vulnerable. From 1970-2008, over 95 percent (%) of natural-disaster-related deaths occurred in developing countries. Even under rapid mitigation scenarios, the magnitude and rate of climate change-related damage is expected to worsen in years to come, caused by the delayed effects of past emissions and emissions expected in the near future (i.e., the cumulative emissions over time).

As agreed at the 15th Conference of the Parties (COP) under the United Nations Framework Convention on Climate Change (UNFCCC) in 2009, the Copenhagen Accord declared that deep cuts in global emissions are required "so as to hold the increase in global temperature below two degrees Celsius." It also called for an assessment that would consider strengthening the long-term goal, including "temperature rises of 1.5 degrees." The Copenhagen Accord also invited parties to submit mitigation plans with the UNFCCC. To date, 90 countries, including 48 developing nations[8] have registered plans with the UNFCCC to reduce emissions by 2020.

Despite international efforts, the climate change challenge remains daunting and the search for long-term solutions continues. Total anthropogenic greenhouse gas (GHG) emissions at the end of 2009 were estimated at 49.5 gigatons of carbon dioxide equivalent ($GtCO_2e$) and GHG emission levels of approximately 39-44 $GtCO_2e$ in 2020 would be consistent with a "likely" chance of limiting global warming to 2° C. However, under business-as-usual projections, global emissions could reach 56 $GtCO_2e$ by 2020; even if the highest ambitions of all countries associated with the Copenhagen Accord are implemented, annual (GHG) emissions would still reach 49 $GtCO_2e$ by 2020.[9]

7. Source: Stockholm Environment Institute. *Climate Economics: The State of the Art*, November 2011.
8. Source: *Mobilizing Climate Finance*, a paper prepared at the request of the G20 finance ministries, 2011 (http://climatechange.worldbank.org/content/mobilizing-climate-finance).
9. Source: UNEP, *The Emissions Gap Report*, November 2010.

Other scenarios show that the world is on a trajectory that results in a level of emissions consistent with a long-term average temperature increase of more than 3.5° C, assuming the implementation of recent government policy commitments, or 6° C or more without them.[10]

In addition, as the global population heads toward 9 billion by 2050,[11] there is likely to be increased pressure on the natural resources that supply energy and food. Global investments of US$38 trillion in energy-supply infrastructure are required between 2011 and 2035, two-thirds of this in non-OECD countries. However, total new investments in clean energy reached US$260 billion only in 2011, with less than one-third of all clean energy financial investments being made in non-OECD countries.[12] If stringent new action is not forthcoming by 2017, the energy-related infrastructure then in place will generate all the CO_2 emissions allowed up to 2035, leaving no room for additional power plants, factories, and other infrastructure unless they are zero-carbon.[13]

At times of macroeconomic uncertainty, "climate change will test the ability of governments to lead, as never before. Trade-offs will be necessary in the choices policymakers must make – between the urgency of today's problems and the need to prepare for future risks."[14] Furthermore, the interplay between climate change mitigation, adaptation, and disaster risk management will have a major influence on resilient and sustainable pathways.

10. Source: International Energy Agency (IEA), *World Energy Outlook 2011*, November 2011.
11. Source: OECD. *Environmental Outlook to 2050: The Consequences of Inaction*, 2012.
12. In addition, total renewable energy subsidies totaled US$66 billion, compared to US$409 billion in global fossil-fuel subsidies in 2011. Source: Bloomberg New Energy Finance, *Finance Summit*, March 20, 2012.
13. Four-fifths of the total energy-related CO_2 emissions permissible by 2035 are already "locked-in" by our existing capital stock (power plants, buildings, factories, etc.). Source: International Energy Agency (IEA), *World Energy Outlook 2011*, November 2011.
14. Source: World Resources Institute (WRI) in collaboration with United Nations Development Programme, United Nations Environment Programme, and World Bank. *World Resources 2010–2011: Decision Making in a Changing Climate – Adaptation Challenges and Choices*, 2011.

SECTION 3

European Union Emissions Trading Scheme (EU ETS)

3.1 AT A GLANCE

In 2011, the total transaction value in the European Union Emissions Trading Scheme (EU ETS) rose 11 percent (%) year on year (yoy) to US$171.0 billion (€122.3 billion). The primary catalyst was a steep increase in the trading volume of European Union Allowances (EUAs), secondary Certified Emission Reductions (sCERs), and Emission Reduction Units (ERUs), which collectively rose 20% to 9.7 billion tons. EUA volumes[15] represented 81% of all EU ETS transactions during the year.

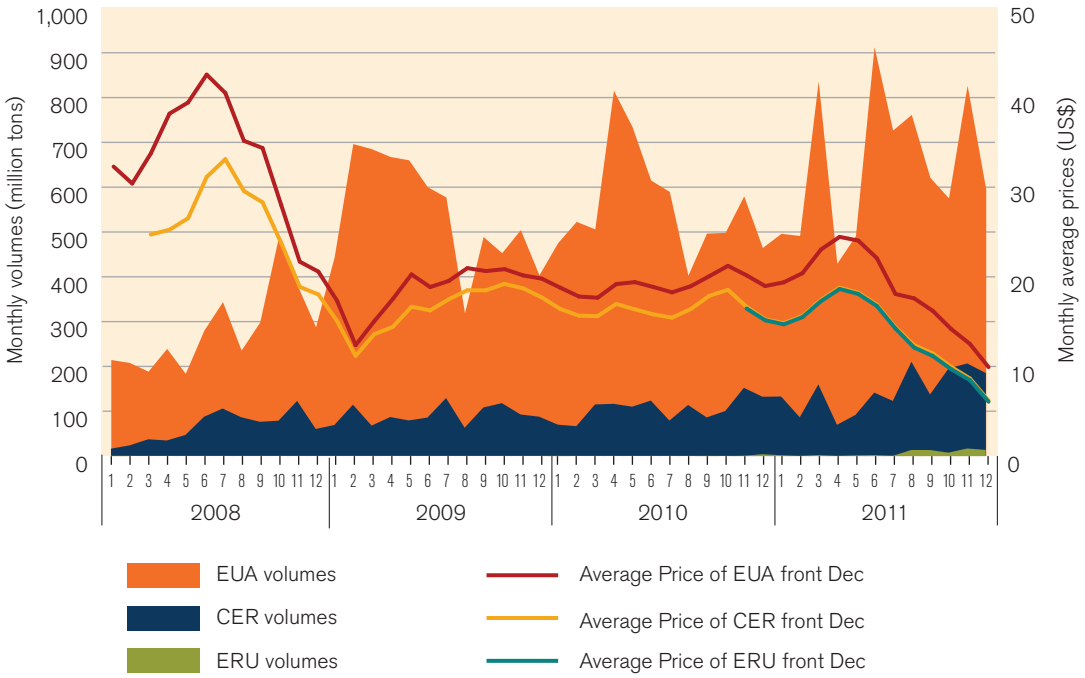
The growth in overall transaction value occurred despite annual average prices falling substantially for all three asset classes. The annual average EUA price declined 4% yoy to US$18.8/ton (€13.5/ton). Similarly, the annual average secondary CER and ERU combined price declined 21% yoy to US$12.8/ton (€9.2/ton).[16]

Although average prices ended down, the year started strongly. EUA prices staged a robust 20% increase during the first 5 months of 2011,[17] tracking broad-based gains in other commodity markets. The rally extended through to May 2011 before peaking, reversing all gains, and then hitting new lows. The trend down coincided (see Figure 1) with the worsening of the Greek debt crisis, which sparked fears of systemic contagion (particularly to Spain and Italy) and concern about a second EU recession in recent years. Fears about weak demand intensified in June when the European Union (EU) proposed a new Energy Efficiency Directive (EED) that mandated energy efficiency measures.[18]

The new factors for concern were compounded by: (i) the dramatic reduction in EU emissions during the 2008-2009 economic downturn, followed by a weak industrial recovery;[19] (ii) substantial investment in domestic renewable energy capacity in recent years;[20] and (iii) the current supply of international offsets – largely stimulated by the EU ETS itself. Together these factors painted a clear picture that the oversupply of EUAs already seen in Phases I and II of the EU Scheme would likely remain for several more years.

15. Including primary EUAs sold by member states, which accounted for approximately 1% of EUA volumes and values.
16. Differences in 2010 figures reflect changes in the methodology to calculate the value and volume of trades. For detailed information regarding the methodology used to measure asset volumes and values, see *Methodology*.
17. A 20% increase versus the closing price on January 3, 2011.
18. Prices fell by almost 20% over the three days following the publication of the draft EED on June 22, 2011.
19. The GHG emissions declined 11% between 2008 and 2009, following a 15% reduction in the EU industrial activity in the same period. Source: Communication from Sikorski, Trevor, Barclays Capital, March 2012.
20. Investments in wind and solar capacity in 2010 and 2011 amounted to 50 gigawatts in Europe.

Figure 1: Prices and volumes for EUAs, CERs and ERUs in the secondary market, 2008-2011[21]



Source: World Bank

"Trading volumes soared in 2011, coinciding with the second decline in verified emissions in three years. A considerable portion of the trades is primarily motivated by hedging, portfolio adjustments, profit taking, and arbitrage."

Trading volumes soared in 2011, coinciding with the second decline in verified emissions in three years.[22,23] This was mainly driven by weak industrial activity in the EU ETS perimeter and oversupply dwarfing compliance demand. A milder winter in Europe also contributed to the decline in emissions, as less fuels were burned for heating. These are strong indications that the collective demand for carbon permits and offsets has a limited impact in market players' trading. A considerable portion of the trades is primarily motivated by hedging, portfolio adjustments, profit taking, and arbitrage.

3.2 AN EXPANDED SCOPE FOR THE EMISSIONS CAP IN THE EU STARTING IN 2012

3.2.1 New gases and assets are integrated into the Scheme

Substantive changes in the operation and emissions coverage of the EU ETS are set to start in 2013, as part of its Phase III. The process actually started in 2012 with preparatory measures and the inclusion of the aviation sector. That sector will represent the second-largest emitting sector covered by the scheme.

21. Prices are based on the front-December contracts for each respective year (Source: ICE). Volumes exclude primary EUAs sold by EU governments.
22. On April 2, 2012, the European Commission released verified emissions data for the EU ETS (89% of installations have reported until that date). Emissions declined by 2.4%, from 1.75 billion tons in 2010 to 1.7 billion tons in 2011.
23. In April 2012, the EC published additional 2011 EU ETS verified emissions data. With around 97% of installations reporting their emissions, final estimates for 2011 reached 1,896 Mt, or a 2.2% fall in emissions from 1,938mt in 2010. The figure includes new entrants and excludes installations that failed to comply. By including them, the decline would be 2.5%. Source: Jefferies Bache, *Global Commodities*, April 12, 2012.

The power sector remains the largest sector covered by the EU ETS. Since its early days, the EU ETS has covered emissions in power stations and other combustion plants, oil refineries, coke ovens, iron and steel plants, cement, glass, lime, bricks, ceramics, pulp, paper, and board sectors. Through 2012, the only greenhouse gas (GHGs) covered by the scheme is carbon dioxide (CO_2).[24]

As of 2013, the scope of the ETS will be extended to include other sectors and GHGs. CO_2 emissions from petrochemicals, ammonia, and aluminium will be included, as will N_2O emissions from the nitric, adipic and glyocalic acid production, and perfluorocarbons from the aluminium sector. The capture, transport, and geological storage of CO_2 emissions will also be covered. These sectors will receive free allowances, based on industry-specific benchmarks.

The total number of allowances in the EU-wide cap in 2013 will be equivalent to the average total number of allowances issued by member states during Phase II. The cap has been established to deliver an overall reduction of 21% in the verified emissions by 2020 against 2005 levels. In contrast to previous phases, the number of allowances will decrease 1.74% annually until 2020. The linear annual decrease will better represent the expected decline in emissions over that period.

The preliminary cap for the year 2013 has been set at 2,039 million tons of CO_2 equivalent ($MtCO_2e$). The final number will be adjusted, however, to reflect the broadened scope of the scheme starting in 2013, any small operators that member states have chosen to exclude, the inclusion of the aviation sector, and the inclusion of emissions from Norway, Iceland, and Liechtenstein. Accounting for the changes in scope, these numbers may start at 2,291 $MtCO_2e$ in 2013 and decline to 2,024 $MtCO_2e$ in 2020.[25] The Phase III of the EU ETS is expected to provide stronger price signals due to a longer trading period (eight years versus five years in Phase II), the annually declining emissions cap, and a substantial increase in the level of auctioning (from less than 4% in Phase II to over 50% in Phase III).[26] Over 1,200 million EUAs are expected to be auctioned every year starting in 2013, compared to less than 100 million EUAs sold in 2011.[27]

3.2.2 Many fewer allowances will be allocated for free

Full auctioning becomes the rule from 2013 onward for electricity generators, who emit the majority of GHG emissions in the EU ETS. Few member states will be given the option to postpone the full auctioning process temporarily; most will start with 30% auctioning in 2013 and progressively get to 100% by 2020. For other sectors, free allocations will be progressively phased out starting at 80% in 2013, decreasing to 30% in 2020, and reaching 0% in 2027. Exceptions will apply for installations in sectors that are found to be exposed to a significant risk of "carbon leakage."[28]

Harmonization has also been an objective in areas resulting in an EU-wide emissions cap (replacing the national caps for member states in Phases I and II) and rules for transitional free allocations (EU-wide rules will apply equally to all installations across the EU with the same or similar activities).

As of January 2013, auctioning will take place on a common EU-wide platform for most European member states. However, in February 2011,

24. Netherlands has opted to also cover emissions from nitrous oxide (N_2O).
25. Source: Deutsche Bank, *EU Emissions: Scoping the Cap over Phase 3,* February 13, 2012.
26. In the interest of solidarity, 12% of the total allowances auctioned will be redistributed to member states with lower GDP.
27. Directive 2003/87/EC allows Member States to auction and/or sell up to 5% of their EUAs in Phase I and 10% in Phase II. These may include EUAs from closure and surplus of the New Entrant Reserve.
28. Two thirds of the emissions in these sectors come from industry exposed to significant risks of carbon leakage and will benefit from full free allocation up to their industry specific benchmarks until 2020. Benchmarks reflect the 10% most efficient installations, with the 90% less efficient installations being required to either reach the benchmark or purchase additional allowances.

Germany, Poland, and the United Kingdom informed the European Commission (EC) of their decision to opt out of the common auction platform and instead appoint their own auction platforms. These platforms still need to satisfy the rules of the Auctioning Regulation and will require approval from the EC, the Council and the European Parliament.

A decision was taken to establish a transitional common auction platform in 2012 to conduct auctions on a provisional basis. A subsequent common auction platform, to which the provisions of the Auctioning Regulation will apply in full, is to be appointed soon thereafter. On a competitive procurement basis, common auction platforms will be appointed for a period of maximum 5 years. The amendment to the Auctioning Regulation agreed to by member states in July 2011 provides for the auctioning of 120 million Phase III EU allowances (EUAs) in 2012. The first auctions of EU Aviation Allowances (aEUAs) will also take place in 2012, which is the year in which aircraft operators come under the EU ETS.

The estimated timetable of the early auctions is as follows:[29]

- In December 2011, Germany closed the procurement for its transitional platform.
- In February 2012, the UK closed the procurement for its platform.[30]
- On March 9, Germany notified the Commission that it intends to appoint the European Energy Exchange AG (EEX) in Leipzig as its transitional opt-out auction platform.
- On March 24, the call for tender for the transitional common auction platform under the EU ETS was published (with a closing date of May 3).
- On April 25, an amendment to Annex 3 of the Auction Regulation, to list the German transitional platform, was endorsed by the EU's Climate Change Committee. This amendment has been submitted to the Council and the European Parliament for a three-month scrutiny period. Provided no objections are raised, the Commission can adopt the amendment. This platform would become operational and could start early auctions in September 2012 the earliest.
- In the end of April, the UK notified the Commission that it intends to appoint IntercontinentalExchange (ICE) as its opt-out auction platform.
- In the summer of 2012, the selection of the common transitional platform is expected to be announced.
- As the auction platform proposed by Germany, also the auction platform proposed by the UK is to be listed in Annex 3 to the Auctioning Regulation, following the same procedures. At the earliest in November of 2012, the UK platform could start early auctions.
- Auctions on the transitional common auction platform are to start after summer 2012. The Commission has refrained from providing precise estimates for a starting date.
- Poland has not yet launched a tender procedure for its opt-out auction platform. Though no formal decisions are known as of the writing of this report, Poland indicated it would turn to the transitional common auction platform for auctioning its share of allowances until its opt-out auction platform is appointed and approved, as foreseen in the Auctioning Regulation.

The first stage of the procurement procedure to appoint an auction monitor – that will monitor the auctions on all auction platforms – is to be published soon.

29. Some data were sourced from Dufour, Claire. *Auctions in 2012 & 2013 Expected volumes and calendar*, February 2012.
30. The maximum appointment duration for any auction platform is five years.

In December 2011, the European Investment Bank started the monetization of Phase-3 EUAs under the "NER 300," a program focused on supporting the deployment of commercial low-carbon demonstration projects (primarily carbon capture and storage (CCS) and innovative renewable technologies). The program will be funded from the sale of 300 million EUAs from the Phase III New Entrants Reserve (NER) of the EU ETS. The European Investment Bank (EIB) was chosen by the European Commission and member states as the agent to conduct the sale, with the responsibility for monetizing the first tranche of 200 million allowances within 10 months of delivery (an indicative volume of sales of 20 million allowances per month).[31]

3.3 A QUICK REVIEW OF THE SUPPLEMENTARITY LIMIT FOR OFFSETS IN THE EUROPEAN SCHEME

Phase III of the EU ETS also marks a substantial reduction in the relative volume of international credits that are eligible for compliance purposes. A total of 1,400 million tons of CERs and ERUs are eligible for compliance by installations during Phase II of the scheme, representing approximately 13% of the average allocation in the period 2008-2012 (about 280 $MtCO_2e$ per year). In contrast, the import cap for international credits in Phases II and III combined (2008-2020), defined under the revised EU ETS Directive, is approximately 1,700 $MtCO_2e$, corresponding to an average supplementarity limit of 6%, or less than half of the average supplementarity limit in Phase II.

As broadly known since 2009, during Phase III Kyoto credits will no longer be *de facto* compliance units and their fungibility into EUAs will be conditional. In addition, CERs and ERUs issued against emissions reductions taking place before 1 January 2013 (CP-1), will have to be swapped into EUAs by March 31, 2015. Credits issued against emission reductions occurred after 2012 (CP-2), but generated from projects registered before December 31, 2012, will be fully fungible throughout Phase III. Finally, CP-2 credits from projects registered after December 31, 2012, will only be eligible (and swapped into EUAs) if they come from a project in a Least Developed Country (LDC) or a country with whom the EU has signed a bilateral agreement.[32] These restrictions might have been avoided if an international agreement had been reached at the COP 15 in Copenhagen.

The ban of credits from hydrofluorocarbons (HFCs) and from adipic acid N_2O projects completes the known list of qualitative restrictions. CP-2 credits generated from these projects will not be eligible for compliance, while the surrender of CP-1 HFC and adipic acid N_2O credits will only be eligible for Phase II compliance until April 30, 2013.

For further details regarding Phase III of the EU ETS, including import volumes and rules governing the import of offsets into the EU ETS, please refer to *State and Trends of the Carbon Market 2010*.[33]

3.4 DID THE DURBAN OUTCOMES CHANGE ANYTHING FOR THE KYOTO OFFSETS IN THE EU ETS?

The COP-17 in Durban in December 2011 concluded with the adoption of the Durban Platform for Enhanced Action. The associated Ad Hoc Working Group on a Durban Platform for Enhanced Action (AWG-DP) was mandated to develop a "protocol, legal instrument, or an agreed outcome with legal force" to be adopted by 2015 and to come into effect and be implemented

31. Until March 31, 2012, the EIB reported having sold 78.6M EUAs, for a total value of € 670.6 million.
32. For the list of LDCs, see http://ec.europa.eu/clima/policies/ets/linking/docs/def_ldc_en.pdf.
33. Source: Kossoy, A. and Ambrosi, P., *State and Trends of the Carbon Market 2010 – "What lies ahead for the EU ETS" and "Annex I: Supplementarity under the EU Climate and Energy Package*" pages 17 and 63, respectively, June 2010.

starting in 2020. This outcome raised questions in the market as to whether the Durban Platform met the requirements of an effective "international agreement on climate change" per Article 11a(7) of the EU ETS Directive and Article 5(3) of the Effort Sharing Decision. Some players initially argued that the Durban outcomes were sufficient to remove the proposed qualitative restrictions on the eligibility of some Kyoto offsets, including CP-2 credits from projects registered after 2012 in countries other than LDCs.

In response to the debate, the EC in January 2012 clarified that Articles 11a(7) of the EU ETS Directive and Article 5(3) referred to the adoption of a future international agreement at the COP-15 in Copenhagen in 2009 (which did not happen), and that they "limit", rather than "broaden" the acceptance of CDM credits. The EC added that "the adoption of a second commitment period of the Kyoto Protocol without a legally binding agreement for the period beyond 2012 under which other developed countries commit themselves to comparable emission reductions and economically more advanced developing countries commit themselves to contributing adequately according to their responsibilities and capabilities is therefore not an international agreement as referred to in Article 11a(7) of the EU ETS Directive and Article 5(3) of the Effort Sharing Decision." They also said, "Once an international agreement is reached, the limitation to CDM credits from new projects from the LDCs for the period starting in 2013 continues to apply… Credits from projects in LDCs and other countries started before 2013 will only be accepted if they originate from countries that have ratified the agreement." If an international agreement is adopted in 2015, even a currently eligible CP-2 credit from a project registered by the CDM Executive Board prior to December 31, 2012, could become ineligible for surrender if deriving from a host country that does not ratify the agreement. In practice, this means that a CER holder will not know whether assets are eligible until their delivery.

The EC has made clear that the current restrictions could be expanded if deemed appropriate, heightening even more the uncertainties faced by project developers and market players holding Kyoto offsets.

3.5 ENSURING THE RELEVANCE OF THE EU ETS IN THE EU'S OBJECTIVES TO CURB EMISSIONS

3.5.1 Many low-carbon initiatives; too many?

The EU has historically taken international leadership in initiatives toward reaching a low-carbon economy. Maybe as a consequence of that impetus, however, the parallel establishment of several policies and initiatives has raised concern as to whether these mechanisms can co-exist without undermining one another given the overlaps and competing outcomes.

One example is the UK carbon floor price introduced in March 2011 and set to be implemented as of April 2013. The floor price is targeted at fossil fuel power generators and aims to tax the difference between the price of EUAs and the UK's notional carbon floor price. The purpose of the tax is to encourage investment in new low carbon generation.[34] Although it is acknowledged that complementary measures to the EU ETS will be needed for the UK to meet its ambitious 80% emission reduction target by 2050 (relative to 1990 levels), some market participants have expressed concern that the unilateral UK measure could potentially result in carbon "leakage."[35] In addition, if successfully implemented, the measure could put downward pressure on EUA

34. The floor will start at around £16/tCO_2e in 2013 and follow a linear path, increasing at around £2/tCO_2e per year to target £30/tCO_2 e in 2020, rising to £70/tCO_2e in 2030 (in 2009 prices). The "carbon price support rates" (the levy on fossil fuels) will be equivalent to £4.94/tCO_2 in 2013-2014. Source: HM Treasury. *Carbon Price Floor Consultation: The Government Response*, March 2011. In March 2012, the UK administration set the rate for 2014-2015 at £9.55/tCO_2e (i.e., about 30% higher than the £7.28/tCO_2 e previously indicated for the same period).
35. Investment may eventually be relocated to other countries with lower carbon taxes.

prices due to lower demand from cleaner British utilities, and eventually provide a disincentive for further EU abatement in the short run.

An Energy Efficiency Directive (EED),[36] proposed by the EC on June 22, 2011, might also end up putting downward pressure on EUA prices. The aim of the EED is to save energy and to reach the EC's self-imposed target of a 20% cut in primary energy consumption by 2020 (relative to 1990 levels).[37] Expected to be implemented by January 1, 2014, the EED is designed to incentivize energy efficiency at several stages of each member state's energy chain – from the transformation of energy and its distribution to its final consumption. The EED defines several proposed measures, including:

- Energy distributors or retail energy sale companies across all member states will have the legal obligation to save 1.5% of their energy sale volumes every year.
- Public sector entities will have to purchase energy efficient buildings, products, and services. In addition, they will also have to progressively reduce the energy consumed on their own premises by carrying out annual renovation works covering at least 3% of their total floor area.
- Member states will have to ensure that all new thermal electricity generation with total thermal input exceeding 20 MW are provided with equipment allowing for heat recovery by high-efficiency cogeneration.

The new EED is designed to lower energy consumption and GHG emissions in the EU. Similar to the UK floor price proposal, however, the measure does not tighten the cap. As a result, it will create a surplus of allowances that may potentially push EUA prices down.

3.5.2 And then comes a set-aside and its arduous decision process

Recognizing its possible impact on carbon prices and the importance of providing a long-term price signal, the EED includes a proposal to set aside a number of EUAs from the Phase III auctions as an option to spur low-carbon investment and to support carbon prices in the EU ETS.[38]

A proposal to set aside EUAs is not new. It was first mentioned by the EC in mid-2010,[39] and the same language used in the EED was inserted in the "Roadmap for moving to a competitive low-carbon economy in 2050"[40] in March 2011. While the set-aside has been brought on the table by the EC at several occasions, the key motivation has evolved over time. In 2010 the set-aside was mentioned as a way to smooth the transition to a more ambitious 30% reduction target. In the low-carbon roadmap it was mentioned as a tool to neutralize the price depressing effect arising from more aggressive energy efficiency measures. In June 2011, and just days before ascending to a six-month presidency of the EU, Poland – a country with high coal-based electricity generation – vetoed the Council's conclusions on the EU's Climate Roadmap for the first time.

36. Source: Proposal for a Directive of the European Parliament and of the Council on Energy Efficiency and Repealing Directives 2004/8/EC and 2006/32/EC, June 22, 2011 (http://eurlex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2011:0370:FIN:EN:HTML).
37. Equivalent to 368 million tons of oil equivalent (Mtoe) reduction compared to the projected consumption of 1,842 Mtoe in 2020.
38. "In the implementation of the 20% energy efficiency target, the Commission will have to monitor the impact of new measures on Directive 2003/87/EC establishing the EU's Directive on emissions trading in order to maintain the incentives in the emissions trading system rewarding low carbon investments and preparing the ETS sectors for the innovations needed in the future. In this respect, appropriate measures need to be considered, including recalibrating the emissions trading system by setting aside a corresponding number of allowances from the part to be auctioned during the period 2013 to 2020, should a corresponding political decision be taken." Source: *Proposal for a Directive of the European Parliament and of the Council on Energy Efficiency and Repealing Directives 2004/8/EC and 2006/32/EC*, June 22, 2011.
39. The EU Emissions Trading Scheme could reach a 30% emission reductions target by setting aside 1.4 billion allowances in Phase III, corresponding to an average reduction of 15% in auctioning rights per member state. Source: Carbon Finance Online, referring to a EC communication, May 2010.
40. In order to keep climate change below 2°C, the European Council reconfirmed in February 2011 the EU objective of reducing greenhouse gas emissions by 80-95% by 2050 compared to 1990. The "Roadmap for moving to a competitive low-carbon economy in 2050," published by the European Commission on March 8, 2011, laid out a plan for the EU to meet that target. It indicates that a cost effective and gradual transition toward a competitive low carbon economy would require a 40% domestic reduction of greenhouse gas emissions compared to 1990 as a milestone for 2030, and 80% for 2050 compared to 1990. http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2011:0112:FIN:EN:HTML.

The set-aside discussion could not be more pertinent. On April 2, 2012, based on data reported by almost 10,000 installations representing 89% of EU ETS emissions, verified emissions covered by the scheme declined 2.4% yoy in 2011. Although 19 out of the 26 countries that reported data had reduced their emissions, the largest drops were observed in Finland, Denmark, Lithuania, and Sweden. In contrast, the biggest increases came from Spain and Romania. The fall in emissions was mainly driven by a 3.1% decline in emissions from the power sector.[41] The decline translates into an additional surplus of about 380 million EUAs in the scheme, now expected to be oversupplied by about one billion tons until 2020.[42]

For a draft Directive to become law in the EU, it must pass through a tripartite co-decision process, involving the initial proposal by the EC, followed by negotiation and approvals by the EU Parliament and the Council of Ministers.[43] What follows is a summary of the relevant steps in the EED process – those taken and those remaining:

- On December 20, 2011, the Environment, Public Health and Food Safety Committee (ENVI) of the EU Parliament voted favorably to amend the EED in order to withhold an amount of EUAs from the EU ETS. The amendments included (i) allowing for a set-aside of 1.4 billion allowances, and (i) a tightening of the annual linear-reduction factor to be used to calculate the ETS cap from 2014 (to 2.25% from the existing 1.74%).[44]
- Still as part of the parliamentary approval process, on February 28 the Industry and Trade Committee (ITRE) of the European Parliament – which is the lead Parliamentary Committee on this Directive – voted on a compromise amendment. The ITRE vote diluted the amendments previously voted on by the ENVI. It left open the possibility of a set-aside at some point, but only subject to a Commission assessment and no longer specifying the number of EUAs that should be withheld ("The Commission shall, if appropriate, amend the regulation referred to in article 10 (4) of Directive 2003/87/EC in order to implement appropriate measures which may include to withhold the necessary amount of allowances."). Moreover, the ITRE also left open whether or not any future set-aside would constitute a permanent or provisional withdrawal of allowances.[45] Some analysts believe the decision on permanence might take a couple of years.
- So-called informal trilogues between the Council of Ministers, the European Parliament, and the European Commission are expected to be held between mid-April and mid-May, 2012.
- The next steps in the process are votes in the Parliament (June 11) and the Council (June 15). If both the Parliament and the Council agree to leaving open the option of a set-aside within the Energy Efficiency Directive, this would invite the Commission to propose withholding a certain number of EUAs from the market for the period 2013-20.[46]

Although several stakeholders have also voiced support for a set-aside as a tool to neutralize the effect of the severe economic recession, which led to the oversupply of allowances, this process has also raised questions as to whether a regulatory change to reduce the oversupply temporarily and support carbon prices is worth the risks it creates. Unless a permanent cancellation of allowances is agreed

41. Still, emissions by the largest emitters in the EU ETS (all power plants) increased. Emissions in the Polish state-owned power plant Belchatow, the top emitter for the fourth year in a row, increased by 11%. Source: Thomson Reuters Point Carbon. *Carbon Market Daily*, April 2, 2012.
42. Source: Deutsche Bank. *EU Emissions: 2011 VED Raises the Pressure*, April 4, 2012.
43. European Commission, *Co-decision Step by Step* (http://ec.europa.eu/codecision/stepbystep/diagram_en.htm).
44. Source: Deutsche Bank. *ENVI Vote Underpins Option Value, Global Markets Research,* December 20, 2011.
45. The ITRE did not vote to raise the linear-reduction factor used to set the cap. Source: Deutsche Bank. *ITRE Vote Underpins Option Value, Global Markets Research*, February 28, 2012.
46. Source: Deutsche Bank. *EU Carbon Markets: Q2: Moment of Truth for a Set-Aside*, March 27, 2012.

upon,[47] withholding volumes at the beginning of Phase III just to return them later will not change the overall supply for Phase III. In addition, some market analysts believe that the downside intervention may set a precedent for a similar intervention on the other side when/if prices rise.

Despite a general consensus against direct price intervention in the market and the adoption of extraordinary measures introduced on an ad hoc basis as short-term fixes,[48] market players and regulators still agree that a long-term price signal is required for the scheme to continue to drive low-carbon investment. The deep wounds of the economic downturn in EU industrial activity are unlikely to heal soon and should lead to a prolonged oversupply of allowances in the market. The EU would need an average annual 4.3% growth in its Gross Domestic Product (GDP) from 2013 onward to cancel out the oversupply.[49] In this context, the adoption of specific targets for 2030 and beyond (i.e., the 2050 Roadmap) would provide the long-term trajectory required to sustain confidence in the market mechanism and promote low-carbon investment.

Finally, subject to the same concerns regarding the credibility risk resulting from short-term market interventions, other alternatives that have been suggested by market participants include restoring the scarcity initially conceived for the EU ETS through the adoption of tighter caps beyond 2020 and mandating an EUA price floor. While the former is extremely unlikely to gain political traction, the latter could be achieved through the adoption of a reserve price in the Phase III auctions.[50] It would remove the downside risk and provide a transparent signal to the market of the EU's long-term low-carbon trajectory. It is expected that the collapse in carbon prices has reduced revenues from EU ETS auctions by the order of €100bn to 2020.[51] However, in light of the current oversupply in the market, a reserve price for auctions could only be implemented if accompanied by the set-aside or it could freeze investors' purchases of allowances at the auctions. In the absence of a consensus for a set-aside, a reserve price could still be evaluated in the context of wider carbon market reforms. Other possibilities discussed include the establishment of a carbon central bank.[52]

During the Informal Environment Council meeting on April 19, 2012, the European Climate Action Commissioner announced that aiming to achieve a smooth transition to the third phase of the EU ETS starting next year the Commission the EC would produce a first annual report on the functioning of the European carbon market and conduct a review of the auction time profile for Phase III. This review could lead to a proposal to amend the EU ETS Auctioning Regulation before the end of the year with the aim to auction fewer allowances in the early years of phase III.[53] This provisional withdrawal of allowances in the beginning of Phase III could represent an easier way compared to a change in the EED, to restore longer-term scarcity in the EU ETS, as its approval would only require qualified majority in Climate Change Committee (Comitology Procedure).

During the discussions on supply-side management, prices have remained volatile as market participants nervously reacted to each new announcement or rumor. A market analyst summarized this by saying that "this perhaps reflects how desperate EU ETS participants have become when they are

47. A permanent cancellation or removal of allowances would require a change to the EU ETS Directive, to reduce the emissions cap to 2020 and then cancel a volume of EUAs in the set-aside consistent with the new cap, while a set-aside to be reintroduced should only require a change of the Auction Regulation, i.e., a lighter regulatory process.
48. These could reduce the predictability of the scheme, and undermine support for and trust in it. Source: Centre for European Policy Studies, *The EU Emissions Trading Scheme as a Driver for Future Carbon Markets*, 2012.
49. Panel discussion hosted by the European Energy Exchange (EEX) on "The European Carbon Market in 2012," March 2012.
50. Although the "reserve price" is foreseen in the existing ETS Auctioning Regulation, it can only be used to align auction clearing price with the going secondary market price and not to impose a price higher than the secondary market price.
51. Source: Climate Strategies, *Strengthening the EU ETS - Creating a stable platform for EU energy sector investment*, March 2012.
52 Sources: Deutsche Bank. *EU Energy: ETS Reform Should Not Be Set Aside*, April 12, 2012.
53 http://ec.europa.eu/commission_2010-2014/hedegaard/headlines/news/2012-04-19_01_en.htm

reduced to reacting to the possibility of a decision to recommend a study into potentially making a proposal at some point in the future."[54]

3.6 INFRASTRUCTURE AND MARKET INTEGRITY: THE IMPORTANCE OF BEING SECURE

After VAT fraud and CER recycling, in 2009 and 2010 respectively, the EU ETS in early 2011 saw a wave of cyber-attacks targeting its registry infrastructure. At least three million units were stolen from national registries,[55] accounting for roughly 0.15% of overall emissions allowances (€50 million).[56] Fraudsters used classic cyber-criminality techniques[57] to access accounts in several national registries and to transfer allowances, perhaps benefiting from weak security safeguards and the speed of transaction execution. To prevent further attacks, the European Commission suspended all registries on January 19, 2011. They were reopened gradually, after each country provided sufficient evidence its registry met minimum security criteria. The final registry (Lithuania) reopened a full three months after the first suspension.

3.6.1 Market response: a spot market in dormancy

Although the national registries subjected to cyber-attacks quickly published lists of serial numbers[58] of allegedly stolen carbon units, these were only based on the incidents actually publicized by account holders and thus brought no guarantee of being exhaustive or up to date. The risks perceived by market participants were two-fold. First, a criminal liability risk for possession of the stolen carbon units was exposed. Second, an economic risk, because it was unclear whether the current holder would have to return them to the initial holder. The confusion amongst market participants was worsened by the lack of harmonization across the EU over the legal classification of carbon units as a type of property and the absence of a mandate for the European Commission to centralize information and publish the list of allegedly stolen allowances.[59]

Spot trading was suspended on most exchanges, ahead of or right after the European Commission closed the national registries. ICE delisted daily EUA and CER contracts, which are yet to be reintroduced as of April 2012.[60] The Green Exchange also suspended its Daily EUA contract. It re-listed it in April 2011[61] – forbidding delivery of those allegedly stolen carbon units reported by national registries – but saw only 1,000 EUAs traded throughout the rest of the year.[62] BlueNext resumed spot trading in May 2011, after strong market model revamping. The applied security measures consisted of limiting trading to carbon units, the origin of which had been verified and legitimated prior to joining the platform.[63] Although this initiative allowed exchange-based spot transactions to resume in the EU ETS, the restrictions kept liquidity and volumes at lower levels than they were before the cyber attacks. To handle spot trading, some market participants turned to over-the-counter bilateral

54. Source: JEFCO2 Flash Note, January 24, 2012.
55. Thefts were reported in Austria, Czech Republic, Germany, Greece, Italy, and Romania.
56. Source: De Perthuis, Christian. *Carbon markets regulation: The case for a CO_2 Central Bank*, Climate Economics Chair, 2011.
57. Two types of cyber-attacks were used: "Phishing," which consists of duping an account holder to obtain confidential access information (e.g., a fake official e-mail or Web site), and "hacking," which are direct attacks on registries using Trojan horse-type viruses to break into the account structure.
58. And, subsequently, a number of carbon exchanges.
59. Source: Sartor, O. *Closing the door to fraud in the EU ETS*. CDC Climat Research, 2011.
60. Source: ICE Clear Europe. *Circular 11/007-Suspension of trading in EUA and CER Daily Futures Contracts*. January 19, 2011.
61. Green Exchange also suspended futures contracts for March 2011 delivery. Source: Green Exchange, *Delisting of In Delivery Month European Union Allowance (EUA) Futures Contract (codes EAF and 6T) for delivery in March 2011*. CME Group, Advisory notice, March 10, 2011.
62. Source: Green Exchange, *Suspension of Trading and Force Majeure Declaration with Respect to Daily European Union Allowance (EUA) Futures (code EUL) Contract*. CME Group, advisory notice, January 19, 2011.
63. Under a so-called "Safe Harbor Initiative," the carbon units which are candidates to join BlueNext's trading platform must enroll in a two-step verification process. First, the exchange identifies each transfer that the unit has been subject to up to the account it originates (i.e., state's account (EUA, ERU) or CDM Registry (CER)). Second, each transfer identified must be declared legitimate by an authorized representative of the account that the transfer was initiated from.

transactions with well-known counterparties (see Section 3.7.3), deploying purchase agreements with new liability clauses for the seller to compensate the buyer should the transacted units be subject to claims in the future. Interestingly, no such disruption was observed on the exchange-based Futures and Options market, with volumes growing during 2011 (see Section 3.7.2). The security measures set up by the exchanges consisted of a consolidated list of allegedly stolen carbon units prohibited for delivery at settlement of the relevant exchange contracts. Although this brings no guarantee that the units delivered will not be subject to claims in the future, market participants appear to have deemed the risk as marginal.[64]

Box 1: Trading around the risk of receiving stolen allowances
By Peter Zaman, Partner, Reed Smith.

Any market will face the risk of attracting criminal elements if the market is poorly regulated and provides the opportunity for criminal elements to act with ease. For reasons well known to all, the EU ETS market faced such challenges between 2010 and 2011, the impact of which is still felt today with the continued suspension of exchange-based spot trading.

To their credit, market regulators woke up to the weaknesses that the criminal elements were exploiting and took rapid steps to try to eradicate them. Most of these steps are incorporated into the technical changes introduced via the Registries Regulations; others, in particular those relating to the future regulatory treatment of carbon units, are still being finalized. In a very short period of time, the EU ETS market will notice a sea change in both the way it operates its trading activities as well as the way such activities are regulated. While it remains to be seen just how effective these new rules will be in securing the market, the overall position is likely to be much improved – especially once trading transitions to the new Union Registry in the middle of 2012. That said, one must assume that the determined efforts of cyber attackers cannot be prevented indefinitely. A risk of receipt of stolen allowances will continue to exist, even when trading transfers to the Union Registry.

The biggest issue faced by market participants following their receipt of stolen carbon units in 2010 and 2011 arose from the legal uncertainty as to what type of legal property right they should be classified under. For example, where a person receives stolen goods, the laws of a member state will know under what circumstances the receiver of the goods will or will not acquire good title to those goods. This is because in most jurisdictions there is a specific or established legal framework dealing with goods and it is generally known whether a particular type of property is or is not a good. If the property in question is not a good (e.g., if it is a dematerialized instrument), there is likely to be a different legal framework that would be applicable to determining the question of whether good title may be received by the receiver.

The issue facing the market was the lack of certainty as to which of these various legal frameworks a carbon unit fell within. This is because there was almost no national level determination and no EU-wide determination of what type of property right a carbon unit is. Even if the legal classification was established in one member state, once the carbon unit moved across the border to another registry it became subject to the laws of that member state – and the issue would need to be settled in accordance with the conflicts of law rules between those two member states. In short, no certainty could be gained as to determining the legitimacy of a claim for the return of the stolen carbon units by the victim of the cyber theft. This led to inertia in the market, most immediately reflected in the unwillingness of market participants to trade spot carbon credits. Rather curiously, the volume of futures contracts was less impacted.

64. We estimate that roughly 215 million EUAs and 63 million CERs were delivered at expiration of the December 2011 contracts across the different exchanges. This accounts for 5% and 7% respectively of the total volumes exchanged for those contracts since inception, which is comparable to previous year's figures (e.g., 5% EUA and 4% CER in 2010). If market participants had perceived any risk over the units to be delivered, we believe they would have closed long open positions, or rolled them over to the December 2012 expiry.

Box 1: Trading around the risk of receiving stolen allowances *(continued)*

Rightly or wrongly, a perception exists that spot trading is riskier than futures trading in carbon units. The accuracy of this perception can be argued both ways. On the one hand, exchange-based spot trading was unregulated; as a result, participation in exchange-based spot trading did not invite the same degree of regulatory supervision as the futures markets. Given that many exchanges that offered futures products also offered spot products, and the requirements for participation in the exchange did not wildly differ between the two products, it is not clear that the lack of regulation of exchange-based spot trading was any more dangerous that futures trading. Similarly, the shorter settlement life of a spot transaction reduces the credit risk exposure faced by counterparties compared to those trading futures. However, given that most exchanges maintain margin collateral for their futures exposures, comfort is drawn from this against executing such trades.

In terms of the legal uncertainty that would arise where a counterparty would receive stolen carbon units, however, the issue would be the same whether they were received under a spot transaction or a futures transaction. The only difference is volumetric, in that for a futures contract the risk arises only on the settlement date of that contract; whereas, for a spot contract with a T+2 settlement, the risk arises each time a spot trade settles. This creates the risk of a legal issue occurring more frequently.

The solution proposed by the regulators in Article 37 of the Registries Regulation does not solve the legal property question but rather leaves it to be answered by national laws. In the absence of a common approach adopted by all member states this maintains the *status quo* problem. That is not to say that Article 37 does not give some guidance to member states as to how a carbon unit should be viewed under its national laws. For example, Article 37 invites member states to treat carbon credits as fungible units to which the crediting of those carbon credits in an account in the Union Registry is meant to "prima facie" represent evidence of title. Further, a purchaser of a carbon unit for value in good faith should receive good title to that carbon unit even where the seller himself did not have good title. Unfortunately, Article 37 goes on nonetheless to allow the national laws of a member state to continue to apply as long as the impact of such laws does not lead to the unwinding of a settled delivery of a carbon unit. For example, equitable claims (such as those raised in the recent English case of *Armstrong DLW GmBH v. Winnington Networks Limited)* may continue to be available to victims of the thefts to pursue against the holders of allegedly stolen carbon units.

Although Article 37 has improved the position of the receiver of an allegedly stolen carbon unit, its benefits seem to be available only after the Union Registry is fully operational and trading has migrated there. It is understood that exchanges that have suspended their spot offerings are likely to re-engage with the market once the transition to the Union Registry has been completed. This is clearly a positive reaction to the efforts of the regulator. Similarly, in the context of the OTC markets, IETA and EFET have both adopted uniform language in their latest standard market documentation that deals with the allocation of the risk of receipt of stolen carbon units between the buyer and the seller. It relies on the regulator's approach of introducing Article 37 to give protection to innocent purchasers and, at its core, is recognition that the best way to prevent the market from becoming frozen with fear of receipt of stolen carbon units is to reduce the risk of the claim in the first place. This is not to say that some claims will not arise, but the circumstances in which they arise, will now depend on the strength of the protections that Article 37 affords the holder of stolen carbon units.

If the exchanges also adopt the solution introduced in the OTC markets, the management of risk for dealing with stolen carbon units would be greatly mitigated.

3.6.2 Regulatory response: enhanced registry infrastructure

Since the first Registry Regulation[65] in 2004, several amending texts have been introduced to respond to the challenges faced by the EU ETS and to adapt to its evolutions.[66] Accurate accounting and transaction integrity within the EU registry system currently relies on two texts: the 2010 Registry Regulation,[67] which replaced the 2004 text as of January 1, 2012, and the 2011 Registry Regulation,[68] passed in November 2011, which sets the new registry functioning rules for the third phase of the EU ETS. The 2011 Registry Regulation also contains provisions that amend the 2010 Registries Regulation in response to the January 2011 cyber-attacks (see Table 2).

In addition, in 2012, the EU will fully decouple its registry operations from the National Registries established under the Kyoto Protocol and centralize technical management in a Union Registry (UR) built as a single infrastructure and operated by a single software.

The Community Independent Transaction Log (CITL) currently automatically checks, records, and authorizes all transactions of EU

Table 2: New Registry Security Measures in the EU ETS

Measure	Description	Application date
Enhanced control for account opening	Stronger and harmonized Know-Your-Costumer (KYC) checks. The following document must be provided and certified by the competent authorities: ID, certified power of attorney, company registration certificate, VAT registration number, financial statement, and domiciliation certificate.	November 2011 (enter into force of the 2011 Registry Regulation).
Enhanced transactions security	- Two-factor authentication (e.g., login and password + SMS/ token/ certificate). - Four-eye principle (two authorized representatives). - Out-of-band confirmation of transactions (e.g., SMS). - 26-hour delay is applied at initiation of a transfer. Does not apply to transfers to a trusted account. - Transfers can be initiated anytime but they are processed between 10am and 4pm CET from Monday to Friday. - Trusted account list.* - New account categories with flexibility over application of transaction security measures.*	Activation of the Union Registry (expected mid-2012). *available after the summer.
Strengthened registry oversight	- Registry administrators can suspend access to their registry, and/or blocks transfers upon suspicions of security breach or fraud. - European Police Office (Europol) has permanent access to data stored in the Union Registry and European Union Transaction Log (EUTL).	November 2011 (enter into force of the 2011 Registry Regulation).
Enhanced protection of the good faith acquirer	- Non-display of the serial numbers of allowances. For Kyoto units, only the country code and project number is visible. Access limited to registry administrators. - Full fungibility of allowances (substitutability). - Irrevocability of transfers. - Acquisition in good faith will gives full entitlement to purchased allowances.	Activation of the Union Registry (expected mid-2012).

Source: World Bank, European Commission.

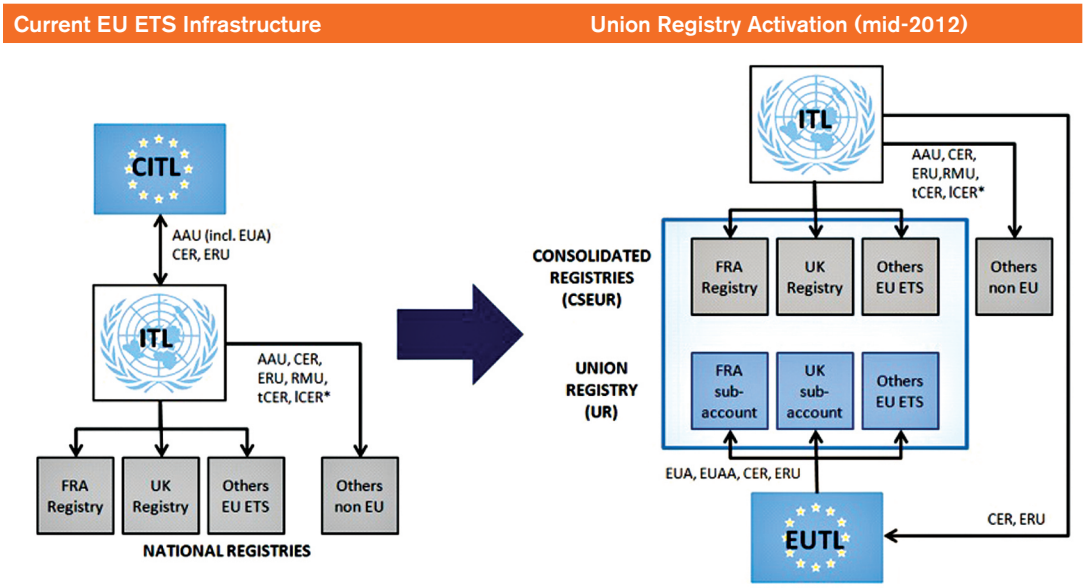
65. Source: European Commission, *Commission Regulation (EC) No 2216/2004 of 21 December 2004 for a standardized and secured system of registries*, 2004.
66. Source: Rapin, D. *Sécurité des registres et transactions*, Club Tendances Carbone, CDC Climat Research, June 2011.
67. Source: European Commission, *Commission Regulation (EC) No 920/2010 of October 7, 2010 for a standardized and secured system of registries*, 2010.
68. Source: European Commission, *Commission Regulation (EC) No 1193/2011, November 18, 2011, establishing a Union Registry for the trading period commencing on January 1, 2013, and subsequent trading periods, of the Union emissions trading scheme*, 2011.

ETS-compliant instruments (EUAs, CERs and ERUs) that take place between accounts in the national registries of its 27 Members States, plus those of Norway, Iceland, and Liechtenstein (see Figure 2). The International Transaction Log (ITL) performs the same functions on Kyoto units (AAUs, RMUs, CERs, ERUs etc.) between the national registries of Annex B countries. As EUAs are currently tagged AAUs, and thus Kyoto units, their transactions are also overseen by the ITL. The activation of the Union Registry (UR) necessitates the full migration of all EU ETS participants' accounts from the national registries to the UR National accounts. National registries must remain active and linked to the ITL until 2015 for the purpose of Kyoto compliance. They will be kept separate in a Consolidated System of European Registries (CSEUR). All EU ETS compliance units (EUAs, aEUAs, CERs, ERUs) will be traded within the UR and overseen by the EUTL, and only Kyoto Units (CERs and ERUs) will be subject to ITL controls. Each national registry administrator will be in charge of its country's accounts within the UR, and manage the EU ETS participants' accounts that fall within its jurisdiction.

3.6.3 Market oversight review: toward classifying carbon as a financial instrument

In the EU ETS, most secondary market transactions involve derivatives contracts.[70] Such transactions fall under the scope of EU financial regulation, and thus are protected by strict integrity and transparency requirements. These are mainly specified in the Markets in Financial Instruments Directive (MiFID), which sets transaction reporting obligations, and the Market Abuse Directive (MAD), which allows national supervisory authorities to take measures against observed market abuse (i.e., market manipulation and/or insider dealing).[71] Although the primary auction market – through which States sell emission allowances – does not fall under financial regulation, the Auctioning Regulation sets a specific oversight framework with similar integrity

Figure 2: EU registry infrastructure: transition to the Union Registry



*tCERs and lCERs refer to temporary CERs generated from Land-Use, Land-Use Change, and Forestry (LULUCF) CDM projects.
Source: World Bank, European Commission, Clifford Chance,[69] BlueNext

69. Zaman, P. Changing times: *Trading carbon in Phase 3 and the fallout from cyber thefts*, Clifford Chance, 2011.
70. Derivatives contracts are financial instruments whose value derives from that of an underlying asset.
71. Other requirements cross-referencing to MIFID are set in the provisions of the Anti-Money Laundering Directive and the Settlement Finality Directive.

and transparency measures. Secondary market spot transactions involving emission allowances and Kyoto credits, however, do not benefit from any regulatory supervision.[72] In a December 2010 Communication to the Parliament, the European Commission called for consideration of two options to address this existing gap.[73] The first option would consist of classifying carbon units as financial instruments. The EC took the opportunity of the ongoing reviews of both MiFID and MAD throughout 2011-2012 to integrate them into the list of financial instruments, with necessary adjustments to avoid knock-on effects.[74] The second option would create a new oversight regime "tailor-made" to the specificities of spot carbon trading. Despite industry's concerns over the inclusion of carbon in MIFID,[75] emissions allowances and Kyoto credits were added to the proposal to revise MiFID submitted by the EC to the European Parliament and Council in October 2011.[76]

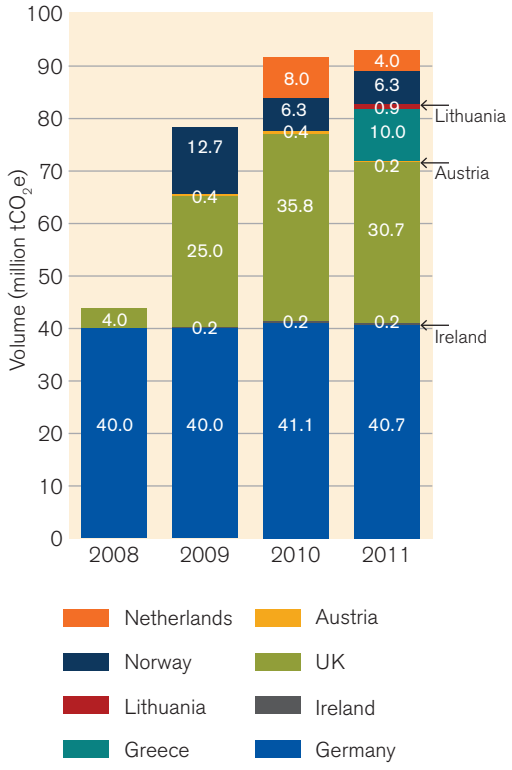
Financially regulated entities must conform to organizational, operational, and reporting obligations,[77] and thus may bear the implied compliance costs. To illustrate, financially regulated entities are subject to risk-based capital requirements, which mandate them to maintain a minimum capital reserve, and therefore limit cash availability for production and investment. In addition, intermediation activities are subject to Know-Your-Customer (KYC) standards (i.e., established customer due diligence procedures). Current proposals would exempt ETS operators from compliance obligations to the extent that spot carbon trading is for their own account and remains ancillary to their core activity. Intermediation services in spot trades would however require investment firm status under MiFID rules. The impact on carbon market participants of these changes cannot be fully assessed as of today as a number of aspects are still under discussion. For example, the limit between proprietary trading and intermediation may be tested for those energy groups that include carbon procurement in their power sales contacts with covered industrials. It is also still to be determined if carbon offset originators will fall under the financial regulation. Votes by the Economic and Monetary Affairs Committee (ECON) and in a plenary session of the Parliament are expected in July and September 2012 respectively. The revised directive would enter into force in 2013.

3.7 EU ALLOWANCES: THE NUMBERS BEHIND THE GROWING TRADING VOLUMES

EUA transactions in 2011 reached US$147.8 billion (€105.7 billion), representing an 11% yoy increase compared to US$133.6 billion (€101.1 billion) in 2010. The increase was led by a 16% yoy increase in the volumes traded. A total of 7.9 billion EUAs were traded in the market in 2011, compared to 6.8 billion EUAs the previous year. The increase in volumes was partly offset by a 4% decline in prices. The weighted average EUA price fell from US$19.7/ton in 2010 to US$18.8/ton in 2011. The decline was more pronounced in the asset's official currency (Euros), falling from €14.9/ton in 2010 to €13.5/ton in 2011 (10% decline). Prices continued to fall in the first months of 2012, reaching historic lows of €6.2/ton in early April.[78]

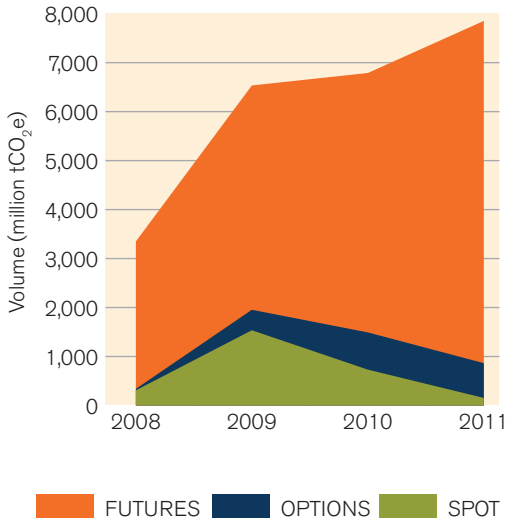
72. Spot transactions through a regulated market platform are subject to the financial regulation.
73. Source: European Commission, Communication to the European Parliament, *Towards an enhanced market oversight framework for the EU Emissions Trading Scheme*, December 2010.
74. Source: European Commission, *Discussion paper in view of a European Climate Change Programme (ECCP) stakeholder meeting on carbon market oversight organized by the commission services*, May 2011.
75. Source: International Emissions Trading Association, *IETA Response MiFID Consultation*, February 2011.
76. Source: European Commission. *Proposal for a Directive of the European Parliament and of the Council on markets in financial instruments repealing Directive 2004/39/EC of the European Parliament and of the Council*, October 2011.
77. Source: Patay, M. Alberola, E. *Le marché secondaire sous régulation financière: la MiFID. Club Tendances Carbone*, CDC Climat Research, March 2012.
78. Historic low prices during Phase II of the EU ETS based on ICE Daily futures on April 2, 2012. Prices were not tracked after this date.

Figure 3: Annual volume of primary EUAs sold by member states, 2008-2011



Volumes include auctions and regular sales, realized through exchanges, private banks and/or directly.
Source: World Bank

Figure 4: Annual EUA volumes, 2008-2011



Source: World Bank

3.7.1 The primary EU Allowance market

About US$1.7 billion (€1.2 billion), or slightly more than 1% of the total EUA market value, was represented by EUAs sold in the primary market by European governments through auctions or direct sales. About 92.9 million EUAs were sold by eight governments in 2011. Germany and the UK combined to be responsible for 77% of the total volume, or 71.4 million tons (see Figure 3).

3.7.2 A Shrinking spot market

Following the security issues discussed in Section 3.6, many market players had to rethink their trading strategies. The spot market, which totaled US$7.5 billion and represented 7% of the EUA market in 2008, dramatically increased to US$26.8 billion in 2009 (22% of all EUAs in the market that year). This was partly explained by the VAT fraud volumes; however, its value steadily declined in the following years. Last year, spot EUA trades totaled US$2.8 billion, or 2% of the EUA annual trading value. The decline in EUA spot trade value becomes even more evident if the total sale of primary EUAs by most member states is excluded. About US$1.2 billion, or 42% of the EUA spot value in 2011, consisted of primary EUA transactions.

In 2011, EUA futures volumes grew by 32% yoy to 7.0 billion EUAs, valued at US$130.8 billion (see Figure 4), representing over 88% of all EUA transactions. Options on EUAs continued to expand, totaling US$14.2 billion in 2011 (representing 10% of EUA transaction value), a US$13.6 billion increase on 2008 values when options represented US$0.6 billion (1% of EUA transaction value at the time).

3.7.3 Increasing bilateral trades

Transactions in the EU ETS may follow several different paths. Negotiations may happen within (e.g., screen transactions) or on off-exchange platforms. The latter may still be intermediated by brokers or cleared on the exchanges (see Figure 5).

Types of Transactions				
Negotiation within exchanges†	**Negotiation outside exchanges**			
	Cleared at exchanges		Not cleared	
	Intermediated‡	Not intermediated&	Intermediated#	Not intermediated*

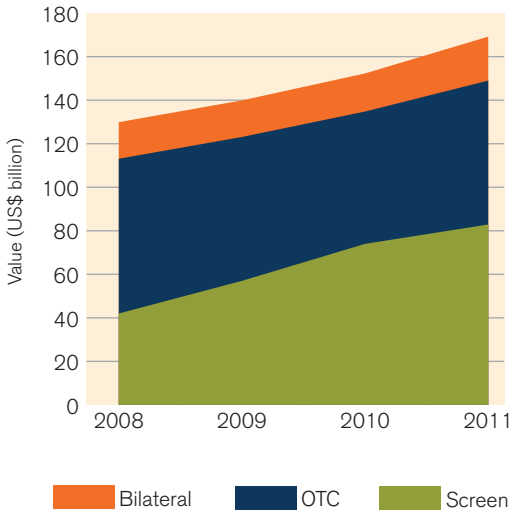
† Exchange-based: assets negotiated within the exchanges' platform i.e., screen)
‡ Over-the-Counter (OTC): assets negotiated outside the exchanges, with the intermediation of brokerage firms, still cleared at exchanges
# Over-the-Counter (OTC): assets negotiated outside the exchanges, with the intermediation of brokerage firms, not cleared at exchanges
& Billateral: assets negotiated bilaterally (buyers and seller), without intermediation of brokerage firms, still cleared at exchanges
* Billateral: assets negotiated bilaterally (buyer and seller), without intermediation of brokerage firms, not cleared at exchanges

Source: World Bank

Figure 5: Transactions in the EU ETS

About 15% of all trading volume in the secondary spot and futures markets – for both EU Allowances and offsets (i.e., CERs and ERUs) – has been reported as realized bilaterally and not intermediated (i.e., not through brokers nor cleared on the existing European exchanges). These transactions are represented with the symbol "*" in Figure 5.[79]

In 2011, with the occurrence of stolen EUAs, another significant change was observed in the *modus operandi* of the market. A portion of spot allowance and offset volumes previously traded over the counter (OTC) or on an exchange was migrated toward bilateral transactions. These transactions are mainly composed of trades between utilities or financial players with their clients, many of them industrials with limited or no access to exchanges due to the high fees and stringent access rules. The shift occurred as exchanges exercised increased scrutiny (which certain market participants viewed as cumbersome) in an effort to contain market oversight. In addition, some players reported favoring long-term relationships with trustworthy commercial partners. More broadly, bilateral transactions have been reported as enabling large volume transactions and reducing administrative complexity (e.g., no exchange or brokerage documentation and fees).



Source: World Bank

Figure 6: Trading alternatives: exchange, OTC, and bilateral trades

Bilateral trades reached over US$17.3 billion worth of transactions in the secondary EUA market (i.e., excluding the volumes sold by member states), or a 15% increase yoy, and US$2.9 billion for secondary Kyoto offsets, an 18% growth yoy.

Most transactions during 2011, however, were exchange-based screen trades. Following a steady increase since 2005, screen trades for EUAs, CERs, and ERUs combined to represent 49% of all trade values, reaching US$82.9 billion in 2011.[80] OTC trades reached 39% (most cleared at the exchanges); bilateral trades, 12%[81] (see Figure 6).

79. The data for the screen and exchange-cleared transactions are obtained from the exchanges. The data for the OTC transactions are obtained from brokers. In order to avoid double counting for the OTC transactions cleared at exchanges and obtained from both exchanges and brokers, the authors count the largest among the two data on a daily basis.
80. Primary EUAs were treated separately and are not included in these numbers.
81. Bilateral overall values are lower than 15% since options markets are exclusively traded through OTC or exchanges.

3.7.4 Who is trading, how, and why they trade

The EU ETS witnessed a substantial number of transactions in 2011 originated by few large players. Throughout the year, a handful of the largest players were responsible for approximately one third of all trades in the scheme. The process of market consolidation that commenced a few years ago and continued in 2011 has accentuated this process. Large players continued to acquire under-valued portfolios from smaller (including cash-strapped) players and rapidly expanded their market positions and influence.

At the time that compliance becomes less relevant than trading opportunities, it is not surprising that some large non-EU players are involved in the market. In 2010 and during the first half of 2011, about 10% of volumes traded in the EU ETS were reportedly originated from outside the EU block. Engagement by non-EU players in the market, however, shrunk alongside the first signs of the pricing crunch in mid-2011. Their exit has also contributed to the accentuation of the decline in prices.

With the increasing share of futures and options in the carbon market, sophisticated trading tools (including financial and macroeconomic indices, statistical algorithms, and model forecasts) are being used to inform decision making. Some of the parameters include the correlation between carbon and other energy-related commodities (e.g., power prices in Germany as the largest economy in the EU and with utilities representing the largest buyer sector in the scheme), gas-coal switch costs in Europe (i.e., clean dark and clean spark spreads),[82] and open interest (reflecting market moves and players' future expectations).[83]

The following text and figures provide further details as to how the above-mentioned and other indices and parameters are considered by traders in their search for profit opportunities and portfolio adjustments (see Box 2).

Box 2: Within the trades
By Carine Hemery, Energy Market Analyst, Orbeo

The EU ETS, the main carbon market in the world, operates in 30 countries and covers CO_2 emissions from installations such as power stations and industrial factories. In order to anticipate the behavior of the compliance buyers and sellers, major traders follow several indicators that play on carbon price dynamics.

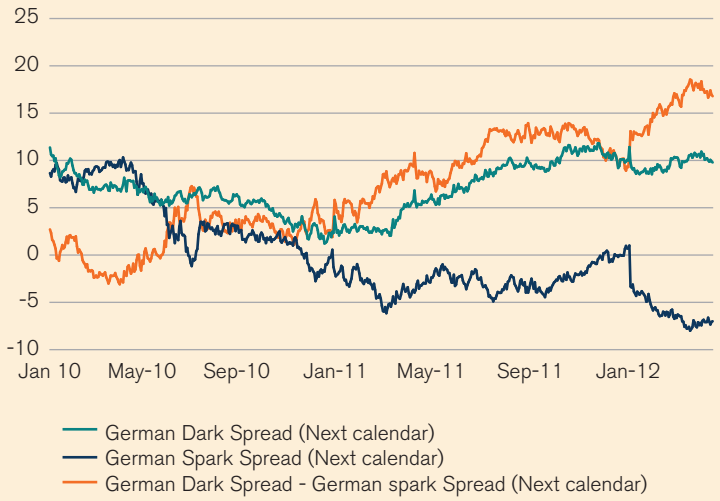
Due to the design of Phases II and III, it is estimated that the industrial sector is mainly in excess of allowances while the utilities sector faces a shortage. In the EU ETS, the power and heat sector has a crucial role in influencing supply and demand. As utilities are the main players in this market, their need for carbon allowances and their buying strategies influence a lot the evolution of carbon prices. Utilities are the most active participants in the market and their behavior influences the evolution of carbon prices. as the evaluate their carbon needs in line with their energy mix. Furthermore, utilities can decide whether to sell part of their power production on the forward market (up to three years) as a way of managing the risk linked to price fluctuations and the associated

82. Among key indicators are the clean dark spread and clean spark spread. The former refers to the theoretical gross margin of a coal-fired power generator from selling a unit of electricity after paying for the cost of fuel and carbon allowances. High clean dark spreads in practice mean that coal-fired generation is economically viable, considering both fuel and EUA prices. The clean spark spread is a similar indicator that refers to the theoretical gross margin calculation for a gas-fired generator.
83. Open interest refers to the total number of open contracts, and it applies to the futures and options market. It is often used to confirm trends and trend reversals. An increase in open interest along with an increase in daily prices indicates an upward trend. Similarly, an increase in open interest along with a decrease in prices indicates a downward trend. An increase or decrease in prices while open interest declines indicates a possible trend reversal.

Box 2: Within the trades *(continued)*

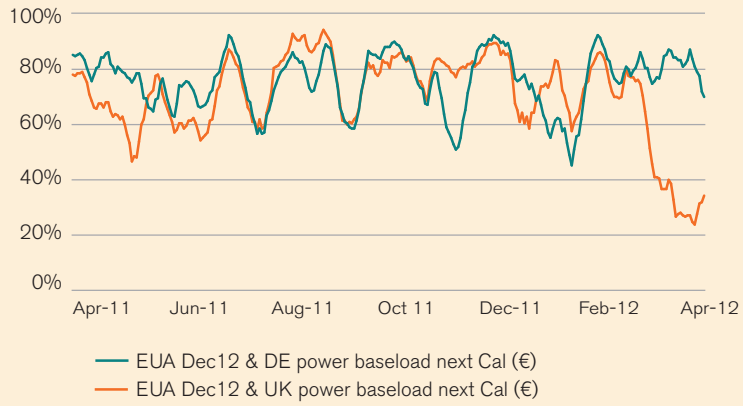
impact on their revenue. When they sell their power forwards to get rid of price risk, utilities relate the sales to their anticipated generation. In effect, they commit plants and technology clusters of their production fleet and make the sales correspond to types of plants according to their maturity and the shape of the power delivered (baseload, mid-merit, peak). Then, according to merit order (which depends on the relative competitiveness of fuels at the time of the decision), large coal or baseload gas plants (CCGT) are hedged. Companies that sell power forwards generally simultaneously buy the required inputs (coal, gas, and carbon), reflecting a management practice to secure the generation margins as they sell their power.

Utilities, therefore, have to hedge their carbon emissions. For arbitrage purposes, utilities look at their margin and follow the evolution of clean spark spread and clean dark spread. First, if spark and dark spreads increase, utilities take advantage of higher margins and sell more power forwards to take advantage of improving clean spreads. This should in turn increase demand for carbon allowances and support carbon prices. Market traders following these indicators could decide to buy allowances in order to take advantage of rising prices. Second, traders follow the gap between clean dark and clean spark spreads. If the clean spark spread is above the clean dark spread, and if this discrepancy increases, utilities have more incentive to produce electricity via gas plants (CCGT) as clean spark spreads evolve in favor of gas use. In this case, utilities should emit less CO_2 and their demand for carbon allowances should decrease, pushing prices down. In this case, traders could decide to sell EUAs in order to capture the anticipate price drop.



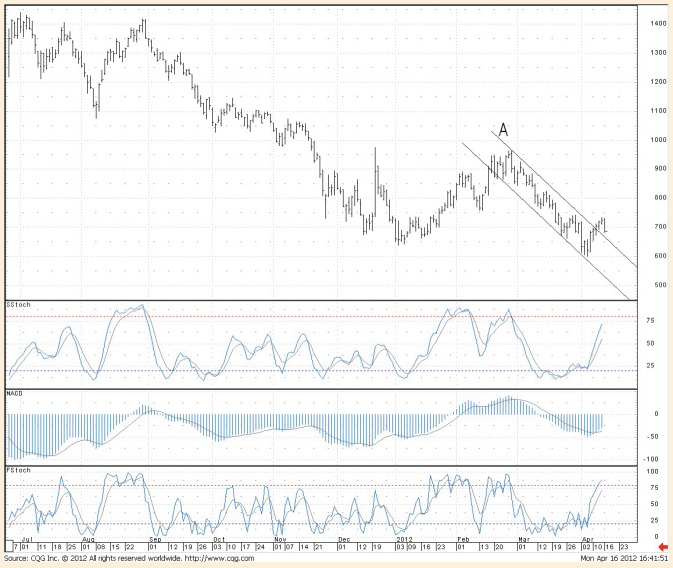
Utilities closely follow the evolution of European energy prices in order to take advantage of improving margins. Therefore, European energy prices are one of the main drivers of carbon prices. Over time, this link evolves and is more or less important. In order to follow this relationship, traders look at the evolution of the correlation between carbon prices and European energy prices (European gas or power prices). For example, if the correlation is high between European gas (Next season NBP gas) and carbon (Dec12 EUA), traders analyze the fundamental picture (e.g., weather, storage level, and so forth) of the European gas market in order to anticipate the evolution of gas prices in the short term and trade directly on the carbon market.

Box 2: Within the trades *(continued)*



Regarding the industrial sector, the surplus of allowances depends mainly on the industrial production and the economic activity across Europe. Indeed, following the 2008 financial crisis, Europe entered into a recession and industrial activity fell strongly. European emissions from the industrial sector decreased drastically, generating an excess of allowances. This led industrials to sell their excess carbon allowances and pushed carbon prices down. Traders follow key economic indicators, including those published weekly and/or monthly the Eurozone Purchasing Managers Index (PMI), industrial new orders, and expected gross domestic output (GDO) growth. If these indicators are improving or better than market expectations, traders anticipate that European economic activity should increase the need for allowances by industrials and push carbon prices upward. Traders expecting this dynamic either buy allowances or decide to wait to sell.

The carbon market is more and more traded and liquid. Traders use techniques applied in equity, oil, and other very liquid markets. Technical analysis is one of the best known techniques and is a method for forecasting price movements based on the study of past price movements. This method is based on several indicators of estimated past prices and several charts of prices over time in order to define the future trajectory. The main indicators are the Moving Average Convergence-Divergence (MACD), the Relative Strength Index (RSI), and the Slow and Fast Stochastics. The value of these different indicators relative to target levels indicates whether the contract is overbought or oversold. If several indicators show that the contract is overbought, then prices should fall. As is shown in this chart, Slow Stochastics and MACD give profitable buy or sell signals. Traders following these indicators would sell carbon allowances from date A, anticipating that carbon prices should fall in the coming days or weeks.



3.8 SECONDARY OFFSETS: SMALLER FIGURES, SIMILAR PATTERNS

In 2011, the value of secondary CER and ERU transactions combined rose 12% yoy to US$23.1 billion (€16.6 billion), compared to US$20.5 billion (€15.6 billion) in 2010. Traded volumes rose by a robust 43% yoy to 1.8 billion tons, compared to 1.3 billion tons in 2010.

Despite secondary CER and ERU traded volumes increasing, prices fell dramatically in 2011, particularly during the second half of the year. The decline in offset prices was much more pronounced than for EUAs. The weighted average price for CERs and ERUs combined fell 21% from US$16.2/ton (€12.3/ton) in 2010 to US$12.8/ton (€9.2/ton) in 2011. Having hovered around €13/ton in April and May of 2011, CER prices landed slightly above €4/ton by year end, after hitting consecutive lows almost on a weekly basis in the previous three months.

The accentuated decline in Kyoto offset prices led to a widening of the CER versus EUA spread. The price of a secondary CER at year end was slightly above 60% of the EUA price, having started 2011 at 86% of the EUA price. The spread continued to widen in the first months of 2012 and for the first time ever, in early February, secondary CER prices reached levels below 50% of EUAs.[84]

In 2011, CERs continued to represent the bulk of secondary Kyoto offset transactions, totaling US$22.3 billion, or 97%. In the previous year, the nascent ERU market had represented only 0.5% of the total Kyoto offset trading value.

3.8.1 Myths and facts

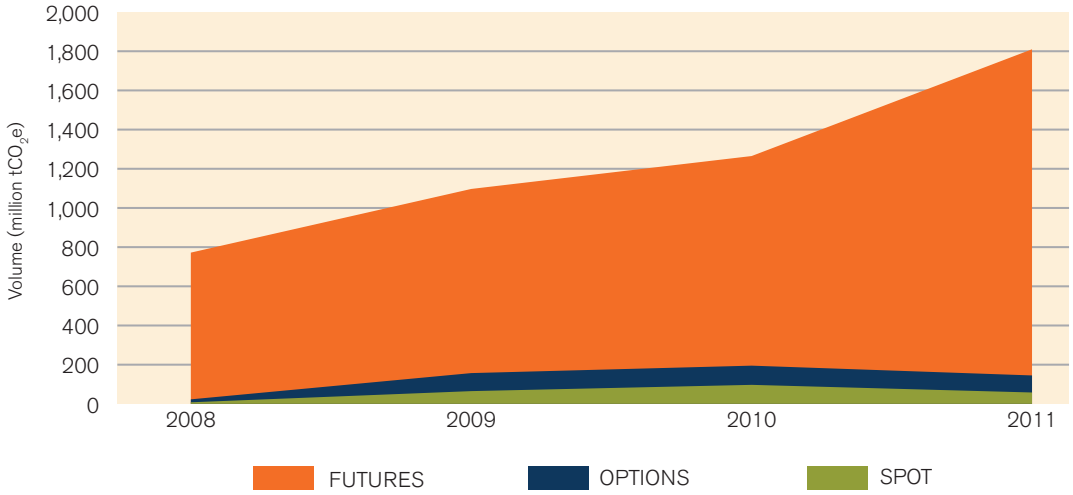
In the past, many have attributed declining CER prices to a decline in the CER issuance (i.e., low CER liquidity would damage its credibility as an effective compliance asset in the EU Scheme), as well as to an increase in the CER issuance (i.e., accentuating the oversupply in the market). Also, many have attributed both low and high temporary CER-EUA spreads to pushing CER prices down.

To date, the price of Kyoto assets is almost entirely driven by the EU ETS; this is a one-way street. The proportion of CERs and ERUs in the EU Scheme is limited (i.e., about 1.7 billion tons until 2020, representing about 6% of the overall EU ETS cap for the same period), and their eligibility is uncertain until their usage. In addition, it is clear that the supply of CERs and ERUs will be much greater than their import limit into the EU Scheme, and that these credits will be available much earlier than the expiration of their eligibility period (i.e., CP-2 credits from projects to be registered prior to the end of 2012 are, in principle, eligible until 2020).

The truth is that short-term issuance rates or momentary trading dynamics have limited influence in the long-term Kyoto asset prices. Unless the CER price is sufficiently low (relative to the EUA price) to account for the incremental risk of importing them, demand for CERs will decline (in favor of less risky EUAs). Furthermore, the supplementarity limit under the EU ETS is quickly being exhausted. Once it is reached (and most analysts forecast this period to be reached in the next 1-3 years),[85] the CER and ERU volumes, expected to be in billions of tons, will require much more than the welcome but insufficient demand coming from the nascent Australian market.

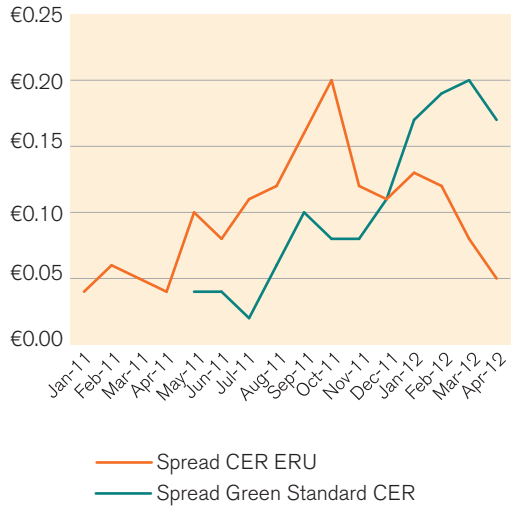
84. ICE Daily futures on February 8, 2012, reached €8.13 and €4.06 for EUAs and CERs, respectively.
85. CDC Climat Research recently forecasted that the demand for CERs and ERUs will be saturated by 2013-2014. Source: "Valentin Bellassen, Nicolas Stephan and Benoît Leguet. *Will there still be a market price for CERs and ERUs in two years time?* CDC Climat Research, Climate Brief n°13, March 2012.

Figure 7: Annual CER and ERU volumes, 2008-2011



Source: World Bank

Figure 8: Spreads CERs versus ERUs and "green" versus "standard" CERs, 2011-2012



Source: World Bank

3.8.2 Futures market with the lion's share

As in the EUA market, the bulk of secondary CERs and ERUs were traded in the futures market. Secondary CER and ERU futures volumes increased by 56% yoy to almost 1.7 billion tons in 2011, representing 92% of secondary offset volumes traded (and the same percentage was observed for CERs and ERUs when evaluated separately). The value of the secondary offsets traded in the futures market reached US$21.2 billion in the period (out of the total secondary offset trading value of US$23.1 billion).

Secondary CER and ERU futures volumes increased by 122% compared to 2008 – when this market started gaining traction alongside the increase in CER issuance (see Figure 7).

3.8.3 What spreads can tell

A clear trend can be observed in the price differential between those CERs that are eligible in Phase III of the EU ETS (i.e., so-called Green CERs) and those CERs that will not be eligible. The spread between the two asset classes more than quadrupled from January 2011 to date,[86] indicating that the market is pricing in these qualitative restrictions.[87]

The narrow spread between CERs and ERUs reflects less liquidity in the latter asset. The spread between the two asset classes has risen by only €0.05 since January 2011 (see Figure 8).[88]

86. As of April 2012.
87. Source: Spot prices from BlueNext.
88. Data reflect prices collected until early April 2012.

3.9 AVIATION: THE POLEMIC NEW KID ON THE BLOCK

3.9.1 Background:

The Kyoto Protocol states: "The Parties included in Annex I shall pursue limitation or reduction of emissions of greenhouse gases not controlled by the Montreal Protocol from aviation and marine bunker fuels, working through the International Civil Aviation Organization and the International Maritime Organization, respectively."[89]

Although discussions on how to reduce global emissions from aviation have evolved under the auspices of the International Civil Aviation Organization (ICAO),[90] only very recently has some progress been made.[91] Meanwhile, the global GHG emissions released from the aviation sector increased by more than 40% between 1997 and 2008. According to ICAO, the bulk of emissions in the sector still come from international flights (62%).[92] In addition, despite the fast growth of international aviation emissions in developing countries, particularly in Asia, emissions in industrialized countries account for 65% of total emissions in the sector.[93] Thus, including the aviation sector in the EU Emission Trading Scheme (EU ETS) represents the first significant regulatory initiative to cap CO_2 emissions in this sector and address the issue at scale.

In addition, since 2002 the European Council has repeatedly called on the European Commission (EC) to propose action to reduce the climate change impact of international air transport. At the ICAO's 36th Assembly held in September of 2007, and recalling that the 1944 Chicago Convention on International Civil Aviation ("Chicago Convention") expressly recognizes the right of each contracting party to apply on a non-discriminatory basis its own air laws and regulations to the aircraft of all States, the member states of the European Community, and 15 other European States reserved the right under the Chicago Convention to enact and apply market-based measures on a non-discriminatory basis to all aircraft operators of all States providing services to, from, or within their territory.

Thus, on November 19, 2008, Directive 2008/101/EC of the European Parliament and of the Council amended Directive 2003/87/EC that had established emissions trading in the European community, so as to include aviation activities in the scheme as of January 1, 2012. The Directive states: "Aviation contributes to the overall climate change impact of human activities and the environmental impact of greenhouse gas emissions from aircraft can be mitigated through measures to tackle climate change in the EU and third countries, especially in developing countries, and to fund research and development for mitigation and adaptation including in particular in the fields of aeronautics and air transport."

The Directive also allows some flexibility, giving airlines from other countries the option of seeking alternative ways to reduce or mitigate airline emissions: "The Community and its Member States should continue to be in contact with third parties during the implementation of this Directive and to encourage third countries to take equivalent measures. If a

89. The Kyoto Protocol to the UNFCCC of December 11, 1997.
90. ICAO is a specialized agency of the United Nations created in 1944 to promote the safe and orderly development of international civil aviation throughout the world.
91. In October 2010, the ICAO Assembly adopted Resolution A37-19, aiming to include a 2% annual fuel efficiency improvement up to year 2050 and a medium-term goal of stabilizing global CO_2 emissions at 2020 levels. Measures to meet these targets include improving the fuel economy of new planes; replacing less-efficient aircraft; improving the operation of existing flights in ways that economize on fuel; development of a global CO_2 certification standard for aircraft; and facilitating the development and deployment of sustainable alternative fuels for aviation. The ICAO Assembly also agreed on a set of guiding principles for the design and implementation of market-based-instruments, such as minimizing carbon leakage and market distortions, avoiding double charging for aviation emissions, and fair treatment of aviation relative to other sectors. Source: Keen, M., Parry, I., and Strand, J. *Market-Based Instruments for International Aviation and Shipping as a Source of Climate Finance*, 2012.
92. All flights between EU Member States are considered to be international flights.
93. Source: Keen, M., Parry, I., and Strand, J. *Market-Based Instruments for International Aviation and Shipping as a Source of Climate Finance* referring to ICAO, 2009 (data from 2007), 2012.

third country adopts measures, to reduce the climate impact of flights to the Community, the Commission can adopt implementing legislation to exempt incoming flights from that country to provide for optimal interaction between the Community scheme and that country's measures, after consulting with that country."[94]

3.9.2 Rules and participants:

The EU Emissions Trading Scheme (EU ETS) was launched in 2005 as one of the pillars of the Union's efforts to combat climate change. The inclusion of the aviation sector from January 1, 2012 onward represents a new step in the implementation of the EU ETS.

All flights that arrive at or depart from an EU airport are included in the EU ETS. Some exceptions apply, including commercial air transport operators that operate for three consecutive four-month periods with fewer than 243 flights per period; flights with total annual CO_2 emissions below 10,000 tons per year; and military, firefighting, humanitarian, emergency medical service, and training flights.

In addition to the 27 EU member states, the scheme for aviation also covers Iceland and Norway.[95] Croatia will be included in 2013 to the extent that the country accedes to the EU.[96]

A large number of the airline operators affected by the EU ETS are of non-European origin. As a result, the inclusion of aviation is also a major test of the EU's proactive climate policy of engaging other countries to participate in a global low-carbon economy.

Although included in the scheme in 2012, airline operators will be required to join the other European compliance installations, offset, and report their actual annual emissions for the previous year in March 2013 only.[97] Different from other ETS sectors, the 2020 target for aviation is not set at -21% from 2005 levels. In 2012, the aviation sector has to reduce its emissions by 3% compared with its average historical annual emission (2004-2006), between 2013 and 2020, the sector will have to reduce its annual emissions by 5% per year.

The allocation of the allowances or emission permits – called EU Aviation Allowances (aEUAs) – to aircraft operators will be mostly free of charge,[98] with 15% of the allowances put up for auction. Starting in 2013, 3% will be set aside for new operators and to assist aircraft operators with sharp increases in the number of tons of kilometers performed (i.e., fast-growing airlines).[99] The number of allowances to be auctioned in each period by each member state will be proportionate to its share in the total attributed aviation emissions for all member states for the reference year reported. For the period from January 1 to December 31, 2012, the reference year shall be 2010; for each subsequent period, the reference year shall be the calendar year ending 24 months before the start of the period to which the auction relates. Other rules include:

94. "The EU is firm on the implementation of its aviation ETS legislation, while engaging positively in the International Civil Aviation Organization (ICAO)'s accelerated work on market-based measures. This work under ICAO should move beyond discussions in order for decisions to be made to limit global aviation emissions. The EU cannot suspend its legislation. However, our legislation foresees flexibility to exempt incoming flights to take into account action by third countries. Furthermore, we will review and possibly amend our legislation if and when an agreement on market-based measures is found in ICAO." Statement by Mr. Jos Delbeke, Director-General for Climate Action, February 8, 2012, and following a speech at the conference *A New Flightplan - Getting global aviation climate measures off the ground,* February 7, 2012.
95. Already integrated in the European civil aviation market through the European Economic Area (EEA; 1994), on June 21, 2011, Iceland and Norway also signed an agreement adopting the Civil Aviation Agreement between the U.S. and the EU.
96. Switzerland is not covered, but the country is currently in negotiations with the EC on linking its domestic emissions trading scheme to the EU ETS starting in 2013. If the two schemes are linked this would include the aviation sector. Source: Thomson Reuters Point Carbon, *Carbon Market Monitor,* November 4, 2011.
97. On January 30, 2012, the European Commission has partially activated the new Union Registry to enable access for aircraft operators.
98. Allocations to all commercial airlines with significant operations to or from the EU are published at http://ec.europa.eu/clima/policies/transport/aviation/allowances/links_en.htm.
99. If unused by the end of the period, the aEUAs set aside for the special reserve will be auctioned to airlines.

- At least 15 months before the start of each period the Commission shall calculate and adopt a decision setting out (a) the total quantity of allowances to be allocated for that period; b) the number of allowances to be auctioned; (c) the number of allowances in the special reserve for aircraft operators; and (d) the number of allowances to be allocated free of charge (i.e., the difference between the sum of b and c, and the total).
- Within three months from the date on which the Commission adopts a decision, each administering member state shall calculate and publish the total allocation of allowances for the period (and for each year) to each aircraft operator whose application was submitted to the Commission. The allocation will be based on performance benchmarks.
- By February 28, 2012, and by February 28 of each subsequent year, the competent authority of the administering member state shall issue to each aircraft operator the number of allowances allocated to that aircraft operator for that year.
- aEUAs can only be used by airline operators to account for their emissions,[100] whereas EU Allowances (EUAs), which are issued to the existing power and industrial plants, are eligible for compliance by all sectors covered by the cap-and-trade scheme, including operators in the aviation sector.
- Aviation operators are allowed to use ERUs and CERs to comply with their obligations under the scheme. For the 2012 compliance period, aircraft operators may use CERs and ERUs up to 15% of the number of allowances they are required to surrender. Under Directive Article 11a, airlines can carry over their 15% offset entitlement from 2012 into subsequent years. For subsequent periods until 2020, the usage of CERs and ERUs is set at a minimum of 1.5% of verified emissions.[101]
- All revenues from auctioning aviation allowances are to be used on climate-related initiatives.[102]

> "The aviation sector will therefore become the second largest economic sector in the EU ETS after energy generation."

3.9.3 How representative is aviation within the EU ETS?

In 2008, the aviation sector accounted for 4% of total CO_2 emissions from fuel combustion in the EU, and 13% of emissions from all transport sources. In 2012, around 4,000 airlines are expected to increase the emissions covered by the EU ETS by approximately 223 $MtCO_2e$,[103] representing 11% of covered emissions. The aviation sector will therefore become the second largest economic sector in the EU ETS after energy generation. It is estimated that aviation emissions in the EU ETS will rise above 300 $MtCO_2e$ in 2020, indicating a much more dynamic growth rate than other sectors. This year, based on its historic emissions, airlines using EU airports receive 213 million aEUAs, and 208.5 $MtCO_2e$ per year from 2013 onward.[104] About 180 million aEUAs (i.e., 85% of the total), will be

100. Installations from other sectors covered by the EU ETS cannot use aEUAs for their own compliance since the Kyoto Protocol does not cover emissions from aviation.
101. Source: Directive 2009/29/EC of the European Parliament and of the Council of April 23, 2009.
102. Revenues "should be used to tackle climate change in the EU and third countries, inter alia, to reduce greenhouse gas emissions, to adapt to the impacts of climate change in the EU and third countries, especially developing countries, to fund research and development for mitigation and adaptation, including in particular in the fields of aeronautics and air transport, to reduce emissions through low-emission transport and to cover the cost of administering the Community scheme. The proceeds of auctioning should also be used to fund contributions to the Global Energy Efficiency and Renewable Energy Fund, and measures to avoid deforestation. Member States shall inform the Commission of actions taken pursuant to this paragraph." Source: Directive 2008/101/EC of the European Parliament and of the Council, November 19, 2008.
103. Source: Deutsche Bank, *EU Emissions: Scoping the Cap over Phase 3*, February 3, 2012.
104. "Based on average annual historical aviation emissions for the period 2004-2006, the number of aviation allowances to be created in 2012 amounts to 212,892,052 tons (97% of historic aviation emissions), and the number of aviation allowances to be created each year from 2013 onwards amounts to 208,502,525 tons (95% of historic aviation emissions)." Source: Questions & Answers on historic aviation emissions and the inclusion of aviation in the EU's Emission Trading System (EU ETS), press release, Europa Web site, March 7, 2011.

allocated for free to airlines in 2012. From 2013-2020, the level of free allocations will decline by approximately 3%, and operators will receive about 170 $MtCO_2e$ in free allowances per year. The 3% of free aEUAs will be set-aside in a special reserve.

Still, airline operators are expected to be short of allowances in 2012 and through the entire period. The sector's overall requirement has been estimated at about 400 $MtCO_2e$ over the period from 2012 to 2020.[105] Assuming the price of Kyoto offsets will remain lower than the price for allowances and that they will be available in sufficient amounts, the sector should use those assets up to the import limit, reaching a demand of up to around 63 $MtCO_2e$ until 2020. These numbers are likely to be lower, though, as fuel efficiency gains reduce CO_2 emissions from aircraft.[106]

Depending on airlines' decisions on how much to pass on the additional cost to end users, the cost of a flight per passenger could rise by €2-12 (US$2.66-15.96).[107] Other studies refer to a potential increase in the range of 1.3-6.5%. However, the possibility of passing through these costs to consumers depends on the price elasticity of demand for aviation tickets[108] as well as to the extent to which airlines are exposed to competition. Some U.S. airlines have recently announced a US$3 increase in their tariffs for flights to Europe.

Airline companies are expected to enter the market gradually, depending on the extent of their compliance requirements, even though the low carbon price is already spurring them to some action. Lufthansa and Air France-KLM have already joined European exchanges (i.e., EEX and BlueNext, respectively) as part of their trade strategies. In addition, it has been reported that the international airline partnership Star Alliance will likely tender for a broker this year to help its members buy CO_2 permits; Air France-KLM, a member of rival group SkyTeam, has said its alliance partners would give a right of first refusal to each other when selling allowances.

Box 3: The point of view of a market player: the right pathway to address aviation emissions
By Pierre Albano, Head of Environment, Air France

Aviation achieved outstanding track record in reducing carbon intensity

Aviation has achieved CO_2 efficiency improvements unparalleled in other transport modes. A jet aircraft coming off the production line today is over 70% more fuel efficient per passenger seat kilometer than one delivered in the 1960s. Aircraft operators, manufacturers, airports, and air navigation service providers are joining forces in a comprehensive strategy to further improve emissions efficiency. But the 1.5 to 2% annual improvement achieved with best available and foreseen technologies and procedures is not enough to offset the 4 to 5% annual growth of the air transport demand. The aviation sector is determined to do its fair share to address the global challenge of climate change and, in 2008, and the whole industry committed to cap net aircraft emissions from 2020 onward and work to achieve the ambitious goal of a 50% reduction in net emissions by 2050 compared to 2005 levels.

105. Deutsche Bank estimates the aviation net EUA demand at 390 $MtCO_2$ (*EU Emissions: What is the Value of a Political Option, November 29, 2011)*; CDC Climat Research estimates 420$MtCO_2$ (*Aviation in the EU ETS: ECJ clears the runway*, Tendances Carbone #65, January 2012).
106. It is estimated that technological improvements will reduce CO_2 emissions by between 1-2% per year from 2010 to 2020. Optimization of passenger load factors and use of sustainable alternative jet fuels available by the end of the decade can add another 5.5% reduction in the sector CO_2 emissions. Source: De Perthuis, C., Jouvet, P.A., *Climate Economics in Progress 2011*, 2011.
107. Source: Thomson Reuters Point Carbon, citing information from the EC, *Carbon Market Daily*, December 21, 2011.
108. If the price of aviation increases by 10%, then the quantity demanded will decrease by 6% to 14%. Source: Faber, J., Brinke, L., *The Inclusion of Aviation in the EU Emissions Trading System*, September 2011.

Box 3: The point of view of a market player: the right pathway to address aviation emissions *(continued)*

Aviation can only be a net carbon credits buyer

Transporting people and goods, aviation provides an essential service and brings enormous benefits to communities and economies around the globe. This mission was enshrined in the preamble of the Chicago Convention governing international aviation since 1946. Demand for air transport is not expected to decline. In the near future, no breakthrough technology for low carbon aircraft or fuel is foreseen and the actual emissions can only continue to grow. Meeting its emissions targets and closing the gap will therefore require the aviation sector to turn to the use of available mitigation measures outside the sector through the full and unrestricted access to the global carbon market. No doubt aviation will remain a net carbon credit buyer until biofuels and new-generation technologies are broadly deployed.

Aviation in the EU ETS

Aviation is an ultimate global and interconnected industry. Any mechanism, be it a carbon offset or cap and trade, can only be efficiently developed at the global level. Governments, meeting in the United Nation's specialized agency for aviation (ICAO) have not reached any agreement on a global framework. The difficulties and slow pace of progress are not different from those encountered within the global climate negotiations dividing developed and developing nations. Considering the lack of progress, the European Union unilaterally decided to include international aviation in the first of its kind regional ETS. Although this type of instrument is relevant to aviation, as recognized by ICAO, the EU ETS is fiercely opposed by almost all non-EU countries. Indeed, the EU ETS is the legal framework for the EU's independent commitment to reduce its emissions. In this context, it is hardly conceivable for non-EU countries to let their nationals contribute to meeting the EU's self-imposed targets, particularly while they have not been part of the decision whatsoever.

Beyond the sovereignty issue, aviation being a net buyer means that international operators are invited to purchase permits from other EU-based sectors, thus ultimately financing de-pollution investments within Europe. China or India for instance already prohibits their airlines from complying with the EU ETS obligations and, in many countries, countermeasures and restrictions on European airlines are being considered.

ICAO must be the solution provider

An aggressive unilateral EU position would raise the risk of a major trade conflict; in a sector international by nature, multilateralism must prevail. Governments have a key role to play in ICAO in agreeing upon a global regulation for international aviation emissions. The current momentum, especially after the Durban unanimous commitment for a legally binding treaty by 2015, must help in finding a mechanism, hopefully based on a much-needed global carbon market, for adoption at the ICAO Assembly in autumn 2013.

The EU ETS is the law. Although a compromise solution must be found, in the meantime airlines will start trading carbon credits on EU market.

For additional information, please refer to Annex 1: International Reaction to Aviation in the EU ETS.

SECTION 4

Market instruments under the UNFCCC

4.1 DURBAN CLIMATE NEGOTIATIONS AND POLICY EVOLUTION

The seventeenth Conference of the Parties (COP 17) to the United Nations Framework Convention on Climate Change (UNFCCC) took place in Durban, South Africa in December 2011. While the outcome provides no guarantee that the UNFCCC 2°C target will be reached, it represents a political commitment to resolve critical issues that were far from certain prior to the meeting.

Three key results formed the backbone of the Durban Platform for Enhanced Action that brought Parties to agreement. These include: (i) provision for the Kyoto Protocol (KP)'s second commitment period to become a reality, with agreement that the necessary decision to that effect will be adopted at COP 18; (ii) the launch of the Green Climate Fund to scale-up long-term climate finance to developing countries; and (iii) provision for a roadmap toward a global legal agreement on climate change by 2015 (the "Durban Platform"). These key decisions – along with other elements of the Durban Agreement (see Box 4), particularly relating to new mechanisms – signaled continued confidence in the UNFCCC process as the forum to address global climate change and contribute momentum toward climate action.

While the provision on the second commitment period to the Kyoto Protocol represents an important milestone, it still requires eventual accession or ratification by the requisite number of parties to enter into force. Until then, the Kyoto Protocol Second Commitment Period will operate under "provisional application."[109] Under this provisional legal framework, the second commitment period is to start on January 1, 2013, and conclude at either the end of 2017 or 2020 (yet to be decided). The scale of ambition and quantified GHG targets (referred to as quantified emission limitations or reductions objectives – QELROs) of Annex I Parties is to be determined at the end of 2012. The provisional framework was a further important milestone for the continuation of the Kyoto Protocol's Clean Development Mechanism (CDM) with no gap when the current phase concludes at the end of 2012.

The second commitment period is expected to be limited to the 27 Parties forming the European Union (EU), as well as Norway, Switzerland, and Iceland. Croatia will also join upon its ascension to the EU. While Canada decided to withdraw from the KP late 2011, Japan, and the Russian Federation remain signatories of the KP but have already communicated their intention not to participate in its second commitment period. Australia and New Zealand have yet to confirm their intention to ratify the second commitment period.[110]

109. "Provisional application is a recognized technique in treaty law by which states undertake to apply a treaty pending its entry into force" – Vienna Convention on the Law of Treaties Article 25. It is designed to prevent legal gaps between successive treaty regimes and allows states to provisionally apply legal obligations that are largely the same as if the treaty were entered into force.
110. No decision has been taken by the two countries at the time of writing this Report.

Box 4: Key elements of the Durban decisions

- The Durban Platform for Enhanced Action. By 2015 a "protocol, legal instrument, or an agreed outcome with legal force" will be defined, to be implemented by 2020.
- The Kyoto Protocol will see a second commitment period from 2013 until either 2017 or 2020. Annex I Parties participating in the 2nd commitment period are to submit information on their emissions targets (quantified emission limitations and reduction objectives - QELROs) by May 2012 with a decision to adopt them to be taken in December 2012. NF3 is an additional gas under this 2nd period.
- The Green Climate Fund will start operations with the World Bank as interim trustee and the UNFCCC and Global Environment Facility as interim secretariat. It will be accountable to and function under the guidance of the Conference of the Parties. The GCF will help scaling up long-term financing for developing countries – rising to US$100 billion per year by 2020.
- The Adaptation Committee is to start work by defining what information is to be incorporated into National Adaptation Plans.
- The modalities and procedures of the Technology Executive Committee (TEC) to assist technology development and transfer have been approved.
- There is agreement to develop general guidelines for measurement, reporting, and verification (MRV) of domestic actions in developing and developed countries.
- Modalities and Procedures for a New Market Mechanism (NMM) operating under the guidance and authority of the COP to be considered by the COP in December 2012. A decision on a framework for various approaches, including market-based approaches not developed under the UNFCC, will also be considered.
- Further CDM improvements to increase efficiency, scale, and outreach confirmed, using standardized baselines, PoAs, and simplified additionality approaches. Carbon capture and storage projects are now eligible. The materiality standard was completed.
- Modalities for countries to submit reference levels for REDD+ were agreed. Decision on REDD+ financing allows for both public and private financing for REDD+, including recognizing that market-based approaches may be developed in the coming years.

The effectiveness of the decision on the KP's second commitment period has further come into question due to the lack of agreement on the carryover of Assigned Amount Units (AAUs) from the first to the second commitment periods. This issue has the capacity to affect the scale of ambition considerably and is to be the subject of negotiations at COP 18 in December 2012.

Perhaps most critically, the Durban Platform launches a process to develop a "protocol, legal instrument, or agreed outcome with legal force...to come into effect and be implemented from 2020" that is applicable to "all parties."[111] These negotiations are to be completed no later than 2015 and to come into effect by 2020. Negotiators wrestled over this language until past the COP deadline to forge the compromise considered essential to the formation of the next phase in a global climate agreement.

The Durban Platform also calls for an ambitious rise in the level of mitigation, to be informed by the scientific assessment of the Intergovernmental Panel on Climate Change (IPCC). In addition to making progress on mitigation, the Durban

111. The reference to "all parties" is significant in that is signals a break from the categories of "Annex I" (those parties – developed countries and economies in transition – with emissions obligations) and "non-Annex I" (those parties – developing countries - without emissions obligations) that characterizes previous UNFCCC decisions. It reflects the need for global action, beyond mitigation by the developed countries and economies in transition, to achieve the ultimate objective of stabilizing GHG concentrations in the atmosphere to a level below 2°C above pre-industrial levels deemed necessary to prevent dangerous human-made interference with the climate system.

Platform identifies the need to ensure progress on other key negotiating issues, namely adaptation, finance, technology development and transfer, transparency of action, and support for capacity building. Finally, two other policy discussions witnessed significant progress: the continuation of the CDM reform and the development of new market mechanism.

The Durban Platform signals sustained interest in continuing to improve the effectiveness and efficiency of the CDM. Significant progress was achieved in Durban toward establishing a materiality standard in the context of the CDM. Parties also agreed to include carbon capture and storage (CCS) as an eligible CDM project activity. A high-level policy dialogue on the CDM was launched by the Executive Board of the CDM.

Negotiators also recognized the progress made in 2011 to implement the CDM reform decisions taken at the sixth Conference of the Parties serving as the meeting of the Parties (CMP6) in Cancun (2010) with regard to the following:

- **Standardization:** Standardization refers to replacing requirements for individual analysis of projects by using pre-approved values or assumptions that are deemed applicable to a class of projects. The purpose of standardization is to promote efficiency and multiplier effects by replacing subjective analysis with default application criteria. Key achievements in 2011 in this regard are the a) micro-scale additionality guidelines,[112] which allow positive lists to determine whether projects are additional; b) the UNFCCC's framework for sector-specific baselines, which refers to the standardization of baseline emission factors and additionality; and c) the guidelines on suppressed demand, which allow countries with suppressed demand to define the baseline using predicted consumption or production rates rather than relying on historic data. The UNFCCC Secretariat is currently conducting an assessment of all methodologies to determine what elements could be standardized. The standardized baseline framework is also to be extended to forestry and transport projects.[113]
- **Streamlining administrative procedures:** A key example of this is the merger of the two procedures to handle post-registration changes (deviations from the monitoring plan and project design changes) into one approval step, which became effective upon the adoption of the new project cycle procedure,[114] thus saving time and transaction cost. A second example is the introduction of risk-based control systems that move away from assessing 100 percent (%) of cases and relieve the regulator from dealing with "straightforward" cases of issuance.[115]

Negotiators decided that reform in these areas would continue in 2012, including the simplification of regulations governing Programmes of Activities (PoAs). While no major progress on PoAs was achieved in 2011, the Durban CDM decision provides for opportunities to make progress on PoA regulatory reform in 2012. Furthermore, ongoing work on standardization could prepare the ground for more far-reaching improvements on PoAs as well as the project cycle for standalone projects.[116]

Major progress was also made on the development of new market mechanisms under the Convention (UNFCCC).[117] This led to a decision on "various approaches, including opportunities for using

112. Source: EB 63, Annex 23, Guidelines for demonstrating of additionality of micro-scale project activities, http://cdm.unfccc.int/UserManagement/FileStorage/WVI3RN692YMCGLZT40QXBOUA8H5KFP.
113. Source: http://unfccc.int/resource/docs/2011/cmp7/eng/03p01.pdf, p. 7, paragraph 19.
114. The procedure can be found on the UNFCCC Web site under information for the EB 63 meeting Annotated Agenda, Annex 11 - Draft clean development mechanism project cycle procedure.
115. Source: EB 61 Annotated Agenda, Annex 5 - Assessment report of CDM project cycle operations.
EB 61 Report, Annex 23 - Guidance for the development, revision and consolidation of standards and procedures related to the CDM project cycle (version 01).
116. Source: World Bank. *Improving efficiency and outreach of the CDM through standardization*, May 2012.
117. Distinct from the negotiations on market mechanisms taking place under the Kyoto Protocol.

"These decisions represent the foundation upon which national governments can indicate that there is a global consensus toward regional, national, and local initiatives that help address climate change"

markets to enhance the cost-effectiveness of, and to promote mitigation actions," and provided for (i) a framework for treatment of "various approaches," which is understood to cover non-market-based approaches as well as GHG crediting programs developed outside the UNFCCC; and (ii) the establishment of a New Market Mechanism (NMM) operating under the guidance and authority of the Conference of the Parties (with modalities and procedures to be elaborated).

Building on the 2010 Cancun decision, the NMM is to (i) stimulate mitigation across broad segments of the economy (i.e., go beyond a project-by-project approach); (ii) safeguard environmental integrity; (iii) ensure a net decrease and/or avoidance of global GHGs; (iv) assist developed countries to meet their mitigation targets; and (v) ensure good governance and robust market functioning and regulation.

These decisions represent the foundation upon which national governments can indicate that there is a global consensus toward regional, national, and local initiatives that help address climate change, even if the design of a global regulatory framework is still not clear. Thus, while the Durban outcome in and of itself is not the kind of global market that was envisioned in 1997 with the adoption of the Kyoto mechanisms, Durban leaves open the door to a wider array of market-based climate-friendly actions. These actions may offer the potential to be credited in the future, whether through a "new market mechanism," the docking of national actions within other national or regional schemes, and/or by devising a means to credit other sectoral activities.

At the same time, Durban highlighted the disparities in national preferences and priorities, casting uncertainty around the path toward a global agreement. These outcomes, in particular relating to the restricted geographic scope of the Kyoto Protocol's second commitment period and prospects for a global deal to take effect in 2020 only did not satisfy the immediate needs of the existing carbon market participants. To this extent, the Durban Platform failed to reverse the downward spiraling price trajectory that produced consecutive record lows into early 2012.

4.2 KYOTO FLEXIBILITY INSTRUMENTS

4.2.1 The Clean Development Mechanism

4.2.1.1 At a glance

The primary market for pre-2013 Kyoto offsets continued to decline in 2011. The volume of primary CERs (pCERs) contracted fell 27% year on year (yoy) to approximately 91 million tons of carbon dioxide equivalent (tCO_2e). As a result, the total value of the primary CDM market fell by 32% yoy to US$ 990 million (€711 million).

The sharp decline in market value reflects the downward trend in average prices, tracking movements in the secondary market. The average estimated offset price for all CER contracts signed in 2011 fell from US$11.8 (€9.1/ton) in 2010 to US$10.9 (€7.9/ton) (see Figure 9).

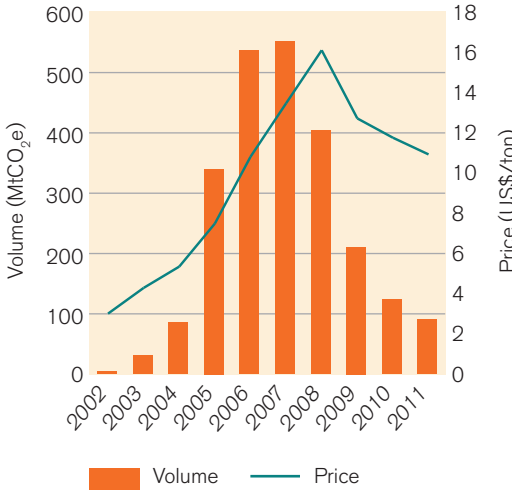
As the first commitment period of the Kyoto Protocol comes to an end, the above numbers become less meaningful, as only one year of contract volumes (and value) can be counted. Thus, given the narrow scope of the pre-2013 market, a separate analysis is necessary for the post-2012 segment of the market.

The post-2012 market tells a very different story. In 2011, the market for post-2012 pCERs grew substantially and took over the pre-2013 market, at about twice its size. Volumes contracted rose to 173 million tCO_2e ($MtCO_2e$), equating to a 63% yoy rise in market value to nearly US$2 billion (€1.4 billion) (see Table 3).

The contractual terms in the Emission Reductions Purchase Agreements (ERPAs) reveal important information necessary for understanding the shape and form of the current post-2012 primary market as well as the trends. The strong conditional precedents imposed by buyers for ERPAs to become effective[118] encouraged many buyers to sign those contracts with the confidence that they would be able to exit from their commitments if and when needed. Due to the conditional safety clauses and without a brighter market outlook, it is unlikely that a substantial proportion of these post-2012 ERPAs will be exercised at the indicative prices and volumes established in these documents.

In addition to the emergence of less-binding purchase obligations, uncertainty surrounding post-2012 demand and the eligibility of pCERs led most buyers to contract volumes using option structures.[119] As in 2010, a significant portion of the primary market in 2011 was transacted using call options in an effort to manage risk and also take positions.[120] Options were primarily contracted on existing projects, representing the CERs not yet transacted in existing ERPAs and up to the end of the project's crediting period of 10 or 21 (3 times 7) years. The vast majority of these were for projects in China.

"without a brighter market outlook, it is unlikely that a substantial proportion of these post-2012 ERPAs will be exercised at the indicative prices and volumes established in these documents."



Source: World Bank

Figure 9: Volumes and average prices for pre-2013 CER transactions since 2002[121]

	2010		2011	
	Volume ($MtCO_2e$)	Value (US$ million)	Volume ($MtCO_2e$)	Value (US$ million)
Pre-2013	124	1,458	91	990
Post-2012	100	1,217	173	1,990
Total	**224**	**2,675**	**263**	**2,980**

Source: World Bank

Table 3: Volumes and value for CER transactions in the primary market, 2010-2011[122]

118. Refer to the next sections for further details.
119. Since the buyer of an option gains the right but not the obligation to execute, these volumes have not been accounted for in this report.
120. Although all volumes have been tracked, the authors have decided to only account for firm contractual obligations in this report. For further details, see *Methodology*.
121. Please note that differences between the numbers reported this year and last reflect the change in the methodology adopted, as well as additional information obtained after the last report was released concerning earlier transactions.
122. In order to determine the post-2012 market value, annual volumes were multiplied by either the fixed price in these contracts, or by the corresponding December-expiring contract prices (from ICE) in the case of contracts with floating prices. Unless the specific discount was reported, a discount equivalent to 15% was applied over December-expiring contract prices for 2010 deals and 25% for 2011 deals. For further details, see *Methodology*.

Very few post-2012 projects have been granted Letters of Approval (LoAs) by the Chinese National Development and Reform Commission (NDRC)[123] for post-2012 CERs. When provided, volumes in the LoAs implied that CERs would be generated until approximately 2015. This can be explained by the fact that China has indicated its intention to launch a domestic market in the next few years; it is assumed by many analysts that these credits could provide liquidity for this market. In addition, it is likely that, by 2015, the EU ETS will have reached its import cap on international credits. As a result, all post-2015 volumes reported in China were contracted through options.

4.2.1.2 Lack of demand determines the new contract dynamics

As reported last year, those governments that have historically engaged in origination activities and have been large promoters of the project-based primary market have gradually shifted their efforts toward the Assigned Amount Unit (AAUs) and secondary CER (sCER) markets. This is because AAUs deliver predictable volumes (this is important as the first commitment period of the Kyoto Protocol comes to an end). Similarly, sCERs have minimal delivery risks and can be obtained through fast and simple contractual processes.

Compliance-driven demand for primary offsets from the private sector has also dropped substantially. As annual emissions in the EU fell for the second time in three years due to weak industrial activity, demand for compliance assets as a whole also fell. As reported in the section 3, analysts' forecasts estimate that the scheme will be collectively oversupplied by over one billion tons until 2020, including the exhaustion of the Kyoto offsets allowed into the scheme (these forecasts assume that the necessary volume of Kyoto offsets will be available in the market at a price lower than the EUAs). However, due to the high volume of CERs and ERUs already contracted by EU ETS operators, the residual amount allowed into the EU Scheme until 2020 up to its exhaustion is likely to be considerably lower than one billion (see Section 3.5.2). If the figures above are confirmed, EU ETS operators would thus not need to import any additional offsets beyond what has already been secured.[124]

Finally, the carbon market has continued to consolidate (e.g., Carbon Resource Management was fully acquired by Vitol in early 2011, and Climate Change Capital was acquired by Bunge Limited, in February 2012). Project portfolios were also absorbed – at sometimes undervalued levels – as part of these acquisitions. This shifted investment away from new projects and was another contributing factor to the downward trend in pre-2012 primary market deals and the consequent buyers' market that exists today.

The minimal pre-2013 residual compliance demand and signals of oversupply through to 2020 have also increased the bargaining power of active buyers. This has been reflected in ERPAs where the terms and conditions increasingly transfer offset eligibility risk to the seller. As a result, pre-2013 project registration and EU ETS eligibility have become standard clauses in the majority of ERPAs. In addition, more stringent conditionality and guarantee clauses have been reported. These include pricing realignment with voluntary market (or other market) levels and the shift from firm commitment into options if the market is not liquid enough to absorb the offsets at the buyer's discretion, even if the offsets remain eligible.

A more-complex dynamic emerged in the second half of 2011. As explained above, buyers have incorporated the lessons learnt from pre-2013 ERPAs to negotiate softer and less binding post-2012 ERPAs. However, to further minimize risk, several buyers who in the past had an incentive to keep contracts operational, sought renegotiation of existing ERPA volumes and prices. Others simply terminated ERPAs in their

123. NDRC represents the Chinese designated national authority (DNA) responsible for authorizing the sale of the credits.
124. Still, the achievement of the collective targets does not mean that every operator has reached its targets.

entirety. Motives and arguments included any window of opportunity to be found in the terms of unfulfilled contractual clauses, such as annual or cumulative delivery volumes.

It has been reported that many sellers have tried to find mutually acceptable compromise solutions to deal with these new challenges. In many cases, sellers resolved to convert fixed-price contracts to floating-price contracts or negotiated post-2012 offsets in exchange for pre-2013 offsets. Others resolved to temporarily hold project verification and/or payment of delivered offsets to avoid the possibility of price and volume cuts.[125]

Some large buyers also reportedly used their size and contractual position to impose ERPA renegotiations. Having hired the Designated Operational Entity (DOE) themselves, these buyers threatened to delay verification or cancel the DOE contract. Alternatively, by being the sole CDM focal point in certain projects, they renegotiated contracts based on the fact that the project's CERs would only be transferred upon their sole request, thus leaving sellers with no choice other than to accept new contractual terms.

A few deals have still been reportedly signed above prevailing secondary market prices, mainly by governments. Reasons to pay above-market prices are that (i) low prices do not secure the CER delivery (i.e., projects may not remain commercially viable and collapse before delivering, or sellers may be inclined to breach the contract when/if prices recover); (ii) low prices would primarily attract riskier projects rather than more solid ones – thus increasing the chance for underdelivery; and (iii) low prices would ultimately lead to more fundamental questions related to the project's additionality. In addition, some large investors had reasons to pay above the prevailing market prices, especially when dealing with state-owned companies, since carbon would be for them an entry point to negotiate much bigger contracts in other sectors.

4.2.1.3 A fading pre-2013 market and a promising post-2012 market

Pre-2013: despite many sellers' preferences for fixed-price contracts, buyers were reportedly able to negotiate most pre-2013 ERPAs at floating prices. As explained in previous reports, the buyers' preference for floating prices is a clear indication that downside risk prevails in today's market. Most deals were reportedly signed at 80-95% of the spot CER price at the time of delivery.

Those fixed-price ERPAs that were observed in 2011 were primarily in China where the NDRC's indicative national floor price remains. Overall, the pCER price averaged €7.9 and hovered in the €7–9 range across the market. Prices fell by 11% on an annual basis compared to the average €8.9 average price in 2010.

Above prices reflect deals almost entirely signed during the first half of the year, when sCER prices were still being traded in the €11.5–13.0 range. In the second half of the year, the accentuated decline of sCER prices led both buyers and sellers to lose pricing references and origination activity froze. Buyers were concerned about where the bottom line would be. By the end of the year, prices had dropped to levels that forced project developers to make sure prices were still above the underlying project's marginal abatement cost (i.e., their natural breakeven point).

At the same time, the very few CP-1 CERs from industrial gases – although not eligible for the EU ETS after April 2013 – continued to be on the radar screen of government buyers that can potentially use them until the end of the Kyoto Protocol "true up" period in 2015. They were purchased either in the primary or secondary markets, and prices for these assets followed the AAU prevailing prices, which are equally acceptable as Kyoto compliance assets.

Post-2012: the weighted average price for post-2012 primary market deals in 2011 was €8.3,

125. Similar practices were reported by Thomson Reuters Point Carbon, on *CER buyers seek contract rejigs, exits as prices collapse,* January 6, *2010.*

down from €9.2 in 2010. As already explained, in order to estimate the post-2012 market value, weighted average prices in this report were calculated using either the fixed prices reported or, in the case of ERPAs with floating prices, the December-expiring CER prices from ICE for each future date (e.g., Dec-13, Dec-14, and so on). Then a 25% discount, consistent with market practices reported, was applied to the resulting prices for those future vintages. Given the fact that post-2012 sCERs trade at a premium to pre-2013 CERs (i.e., these are CERs eligible for the EU ETS Phase III), the weighted average prices provided in this report are higher than the price in the €6–8 range in the rare fixed-price contracts reported, mostly until mid-2011.

Safety provisions made almost all ERPAs look like quasi-options, with extremely few exceptions being reported. At the time when many government buyers continued to receive clear instructions to refrain from any exposure to post-2012 offsets, private sector buyers were responsible for the majority of contracts. Still, post-2012 CERs continue to be valued at zero by many buyers concerned about the possibility of financial losses. Although few ERPAs up to 2020 reported, most contracts limited to the end of the project's first crediting period or 2015, whichever comes first. In effect, this reduces the overall value of ERPA contracts for monetization purposes.

The unpredictable futures market and the oversupplied EU ETS led buyers to pursue post-2012 deals at floating prices. On the other hand, sellers seeking finance have indicated a strong preference for fixed-price contracts, at least for the initial years of their contracts. However, in a buyers' market, very few succeeded to conclude sales contracts at fixed prices. As a result, some sellers simply chose not to sell. Prices traded in a range of 70-85% of the spot CER price at delivery.

The post-2012 market resembles the early days of the carbon market, when activity was primarily motivated by either testing ground objectives or by first mover opportunities rather than demand *per se*. These market players can benefit from favorable prices, commercial terms, and the transfer of eligibility risk to sellers. Nevertheless, these same low prices and safety provisions undermine the possibility for these projects to succeed. Since carbon revenues are difficult to forecast and extremely limited under these circumstances, it is challenging to assert that a project would not have happened without the CDM, thus questioning its additionality.

To date, sCER prices represent a natural ceiling for pCERs (i.e., the buyers opportunity cost). These prices are at the same level – or even at a lower level than – what is perceived to be the breakeven point for several CDM investments, which represents the natural floor for pCERs from the supply (i.e., project developer) side. These conditions have created a strong mismatch in pricing expectations between buyers and sellers.

Current prices and practices provide little incentive for project developers to pursue either new CDM credits or pursue issuance from existing CDM projects, given that monitoring and verification costs and CDM fees combined can outweigh the risk-adjusted revenues from selling CERs, particularly for smaller projects. It is clear that a curbed supply will not be noticed, given that the EU ETS is largely oversupplied. However, this situation undermines the further development of this market mechanism and its capacity to direct capital toward effective, low-cost solutions.

4.2.1.4 Who bought and who sold

The decline in pCER prices and looser commercial terms incentivized some private sector buyers to capitalize on low-hanging fruits and early mover opportunities for both pre-2013 and post-2012 CERs. In addition, some government buyers remained engaged partly to honor previous commitments, as did a handful of multilateral and governmental agencies that wound up funds close to full subscription.

China increased its share of pre-2013 transactions to a record 79 million tons or 87% of all

volumes contracted in the primary market during the year. Paradoxically, since global pre-2013 pCER transacting volumes shrunk to record lows, the volumes contracted in China in 2011 also represent the lowest volumes in absolute terms since 2005. Cumulatively, China has been the host to 1.6 billion pCERs or 71% of the 2.3 billion CERs contracted in the primary market since 2005 (see Figure 10).

Other Asian countries produced about 6% of pre-2013 pCER transactions in 2011, followed by Africa with 4%. Latin America, a region which was the source of almost 20% of the global pCERs contracted in 2005, after having almost sourced most of its projects in advanced stage of development, represented 2% of the market in 2011 (the same percentage as the previous year).

Although new primary market transactions decreased in Latin America, in April of 2012 the market welcomed the issuance of the first temporary CERs in a reforestation project in Brazil.[126,127]

The post-2012 market offers a very different picture (see Figure 11). China accounted for 73 million tons or 43% of post-2012 pCERs in 2011.[128] Other Asian countries, including India, Vietnam, and Indonesia, accounted for 43 million tons or 25% of the volume. Africa emerged as a significant newcomer, accounting for 36 million tons or 21% of post-2012 CERs. Key countries included Democratic Republic of Congo, Burundi, and Nigeria, among others. Contracts based on stronger commitments were reported for ERPAs signed in Africa, particularly in Least Developed Countries (LDCs), given the eligibility of these assets in Phase III of the EU ETS. As in the pre-2013 market, a smaller market share (19 million tons or 11% of the volume) derived from Latin American countries.

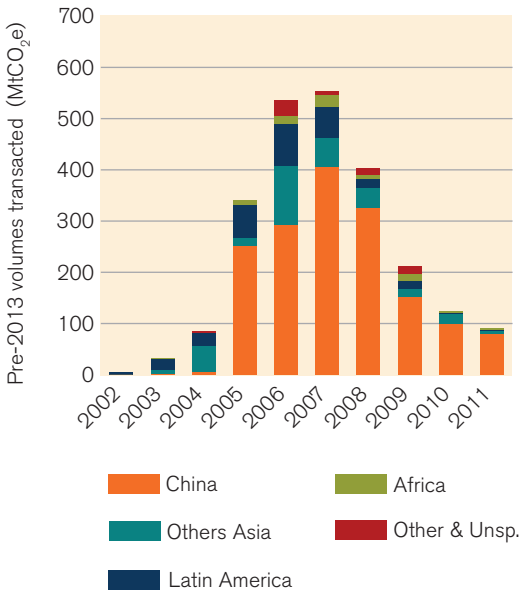


Figure 10: Pre-2013 volumes transacted by seller 2002-2011 ($MtCO_2e$)

Source: World Bank

> "Africa emerged as a significant newcomer, accounting for 36 million tons or 21% of post-2012 CERs."

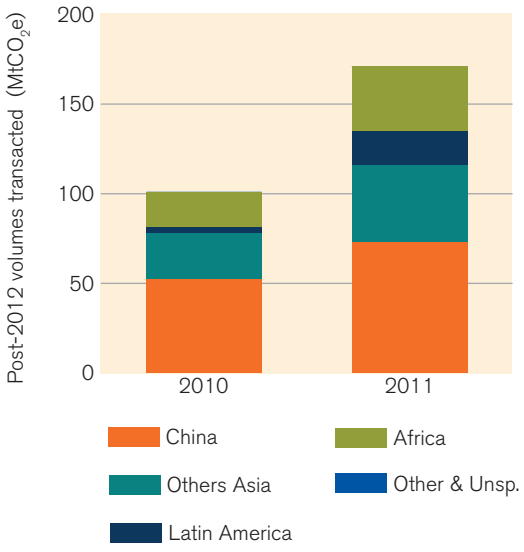


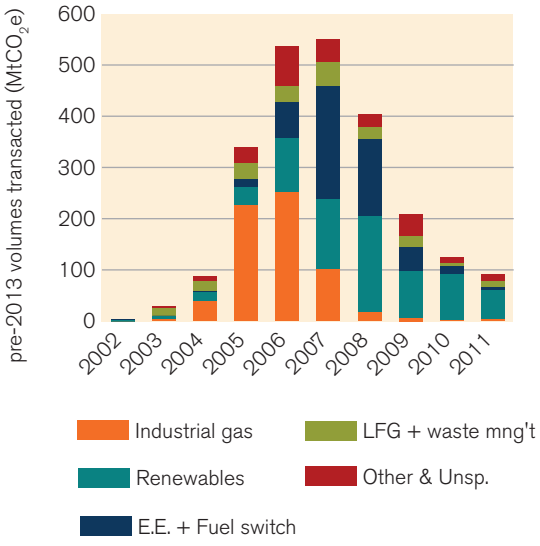
Figure 11: Post-2012 volumes transacted per seller, 2010-2011[129]

Source: World Bank

126. Over 4 million tCERs were issued in the "Reforestation as Renewable Source of Wood Supplies for Industrial Use in Brazil".
127. For additional information on land-use activities and investment, please refer to Annex 2: Land-use Carbon
128. As previously explained, much larger volumes were reported in China, but sourced as options rather than purchase agreements.
129. Post-2012 transactions were not being collected prior to 2010.

The larger interest in Africa comes at a time when buyers reiterate their desire to diversify the geographic origin of their project portfolio in order to reduce their risk exposure to the few traditional sellers. The emergence of Africa is also becoming increasingly evident in other stages of project development. The 46 projects located in the Sub-Saharan Africa region that started validation in 2011 have the potential to deliver almost 30 million CERs in the coming years.[130]

Figure 12: Pre-2013 volumes transacted per sector 2002-2011 ($MtCO_2e$)

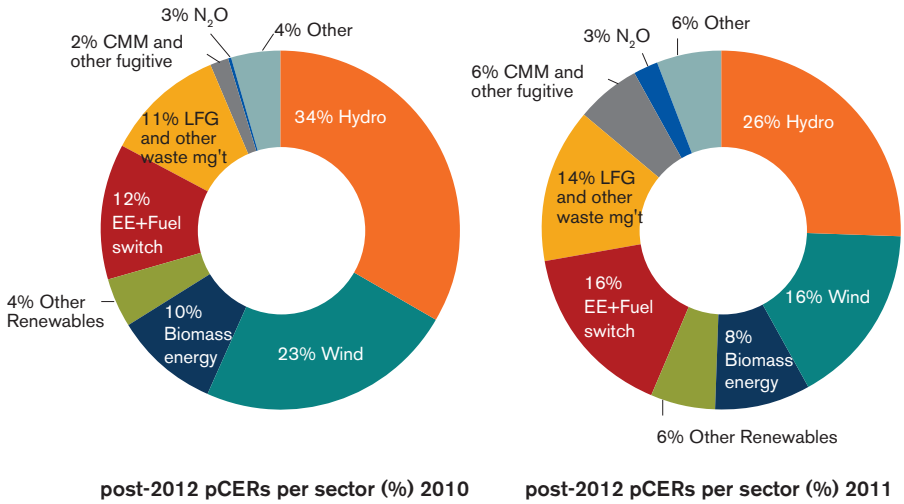


Source: World Bank

No significant shift was observed in CDM project technologies. Carbon revenues continue to leverage relatively low-risk investments in proven technologies by improving the marginal rates of return and enhance the chances of the projects being developed and remaining operational. As a result, after almost completely exhausting the market for HFCs and N_2O, most primary CERs in recent years have been generated from wind, hydro, and other renewable energy projects. On trend with 2010, these projects produced 57 million tons or 63% of all pre-2013 CERs in 2011. Other prominent project activities included energy efficiency, waste management, and coal mine methane (see Figure 12).

The post-2012 market looks very similar. Renewable energy projects accounted for 97 million tons, representing 56% of market share (up from 71 million tons in 2010). The largest volumes in 2010 and 2011 came from hydro (34 million tons or 34% in 2010, and 45Mt or 26% in 2011) and wind (23Mt or 23% in 2010, and 28Mt or 16% in 2011). Other large volumes in both years derived from energy efficiency, biomass energy, waste management, and fuel switch projects (see Figure 13).

Figure 13: Post-2012 pCERs per sector, 2010-2011 (%)



Source: World Bank

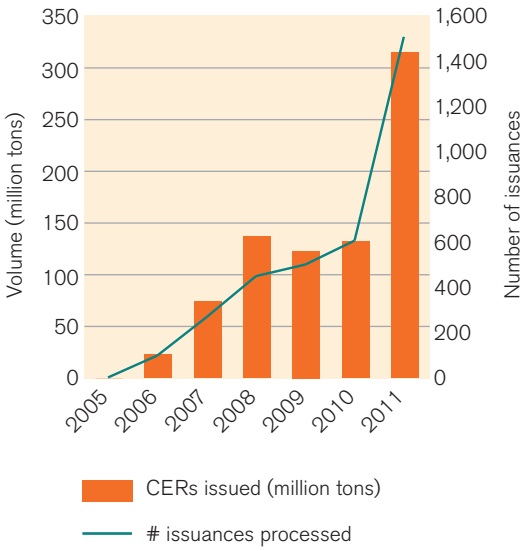
130. Source: UNEP Risoe, CDM Pipeline, April 2012.

The geographic origin of primary offset buyers shifted due to market consolidation and interest in alternative mechanisms. As in 2010, Japan reduced its position in the pre-2013 and post-2012 primary market following its announcement to support bilateral schemes rather than Kyoto flexibility mechanisms. Japanese buyers contracted only 1% of the pre-2013 market (for both CERs and ERUs), down from 13% in 2009, and 2% of the post-2012 market, down from 24% in 2009 (in this case pCERs only). Entities in the UK transacted the largest share, accounting for 47Mt or 39% of pre-2013 pCERs and 44Mt or 26% of post-2012 pCERs. The primary catalyst for this was the high concentration of buyers in the UK. However, a large portion of these volumes are known to be redistributed upon delivery. Switzerland had a robust increase in 2010 and in 2011 in both pre-2013 and post-2012 markets compared to previous years. The Swiss market share came right after the UK, for the same reasons as the latter.

For project-based transactions in the voluntary market, please refer to Annex 3: The State of the Voluntary Market.

How many projects may be registered in 2012?
With the first commitment period of the Kyoto Protocol approaching its end as well as the deadline for project registration to ensure EU ETS eligibility, it is interesting to zoom in on the supply side to see how many projects will be able to make the EU ETS cut. Another question as relevant as the former is whether or not the projects making the cut will be able to sell their credits at a time when the maximum volume of offsets (e.g., supplementarity limit) allowed into the scheme is being quickly exhausted.

In fact, the reason for CERs and ERUs approaching the cap so fast is partly due to the fact that issuance picked up at impressive rates in 2011, with the CDM Executive Board (EB) successfully cleaning up old backlogs. In 2011 alone, 315 million CERs were issued, representing a 140% increase over 2010 and about 40% of all issuances until that year. In order to have those CERs issued, the EB handled over 1,500 issuance requests in the year, another substantial increase from previous years (see Figure 14).



Source: World Bank, IGES

Figure 14: CER issuance, 2005-2011

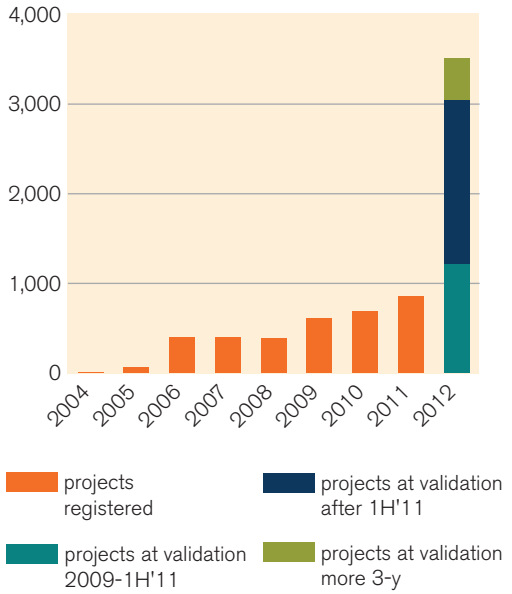
Despite of the higher CER issuance rates, out of the over 8,500 projects that have entered the CDM pipeline since 2003,[131] approximately 3,500 projects are currently in the validation process. Taking the 859 projects registered in 2011 as a sample for calculation purposes, the average validation time was 525 days. Assuming that the validation processing time will not materially change in 2012, many projects that had not started validation by the first half of 2011 will have limited chances to pass validation and request verification on time prior to 2013 when the new EU ETS restrictions on offsets take effect. About 1,800 projects are in that category. Another 500 projects initiated validation more than three years ago, and many have chronic problems that might prevent them from being validated.

The remaining 1,200 projects should be able to request registration before the end of 2012. For illustration purposes, the maximum number of

131. As of February 2012.

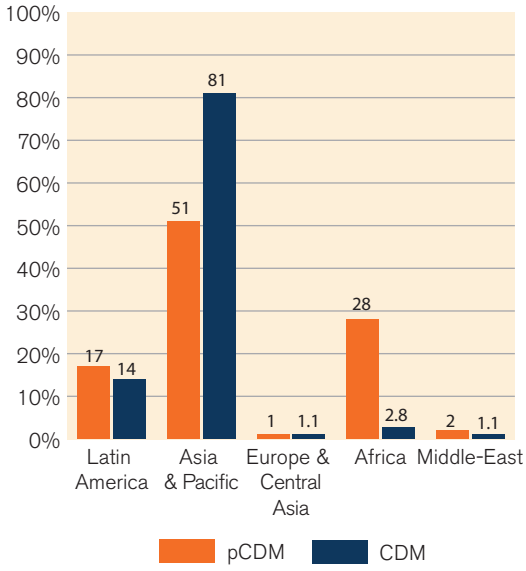
projects processed by the CDM Executive Board (EB) in a year was 859 (i.e., also an all-time high in 2011). Thus, unless the projects submitted pass the completeness check, they may not have sufficient time to make the necessary adjustments before December 2012 (see Figure 15).

Figure 15: CDM projects registered until 2011 and projects at validation in 2012



Source: World Bank, IGES

Figure 16: Regional distribution of pCDM and CDM (%)



Source: UNEP Risoe

Additional regulatory procedures may also affect those projects seeking registration in 2012. These include the introduction of last-minute changes to CDM regulation without granting grace periods beyond the end of 2012, such as the introduction of the new Validation and Verification Standard (VVS) that will become mandatory by October 2012 at the latest.

4.2.1.6 Programmes of Activities: scaling up the CDM

A Programme of Activities (PoA) is a voluntary coordinated action by a private or public entity that coordinates and implements any policy/measure or stated goal (e.g., incentive schemes and voluntary programs) that leads to anthropogenic GHG emission reductions or net anthropogenic greenhouse gas removals by sinks that are additional to any that would occur in the absence of the PoA, via an unlimited number of CDM program activities (CPAs).[132] PoAs allow to use carbon revenues as a source to fund incentive schemes and policy implementation schemes with that PoAs have the potential to substantially up-scale the CDM and to test new approaches to carbon crediting beyond a project-by-project limitation.

As of today 269 PoAs have entered the CDM cycle. The PoA pipeline provides a more diverse geographical distribution relative to standalone CDM projects, with Africa accounting for 28% of the PoAs (versus fewer than 3% in the project-based CDM).[133] This illustrates the potential of PoAs to improve regional access to the CDM (see Figure 16).

Despite the progress achieved, PoAs are still under early stage of development and the PoA regulation is far from enabling its full potential. Against this background the discussion on improving PoA regulation is expected to continue in 2012 covering, among others, the following key elements:

132. Source: EB 47. *Procedures for Registration of a Programme of Activities as a Single CDM Project Activity and Issuance of Certified Emission Reductions for a Programme of Activities*, Annex 29, May 2009.
133. Source: UNEP Risoe, PoA Pipeline, April 2012.

- Application of small-scale/micro thresholds to the units under a CPA and not to the CPA itself. This would allow to fully use the positive list approach to additionality for PoAs addressing micro scale activities and facilitate the design of corresponding incentive schemes while reducing regulatory risk without compromising on environmental integrity.
- Introduction of standardized inclusion procedures for micro-scale activities into PoAs with a potential to reduce transaction costs substantially and to facilitate PoA-operationalization.[134]
- Increase flexibility on verification requirement for PoAs without compromising environmental integrity, including by allowing a Coordinating Managing Entity (CME) to choose between one or several verifications per year and by allowing a CME to contract one or more DOEs for each verification to ensure timely completion.

PoAs have the potential to both expand the scale of CDM project activities and to simplify project preparation and registration procedures (relative to standalone CDM projects), thereby overcoming host country capacity constraints and long processing times. If the CME can also provide the underlying finance for the CPAs, the latter can overcome the investment barrier faced by standalone CDM projects (i.e., the primary reason for most project failures). In addition, a sophisticated and creditworthy CME naturally reduces the counterparty risk in an ERPA, enabling CPAs to access higher CER prices and more commercially attractive ERPA clauses. The following example (see Box 5) provides a good sense of the transformational potential of PoAs.

Box 5: Brazil integrated solid waste management and carbon finance program

The Brazil Integrated Solid Waste Management (SWM) and Carbon Finance PoA aims to support the recently enacted National Solid Waste Policy. The PoA focuses on scaling-up the implementation of carbon finance in the solid waste sector in Brazil. Caixa Econômica Federal (CAIXA)[135] will be the CME of the program. Several CPAs have already been identified, giving this PoA the potential to reduce over 30 $MtCO_2e$ in the next 15 years.[136]

Solid waste management is a sector with relatively poor records in the country, with a large number of uncontrolled waste dump sites posing significant environmental and social liabilities. This can be attributed to lack of investment in the sector, partially due to municipalities with decentralized responsibilities and limited investment capacity and access to credit for SWM services, as well as to limited private-sector interest.[137]

The recently enacted National Solid Waste Policy aims to tackle this situation by mandating that municipal and state governments prepare solid waste management plans, with the objective of eradicating garbage dumps within four years.

In this context, CAIXA aims to play a major role in the implementation of the National Solid Waste Policy and the transformation of the solid waste sector in Brazil. The entity developed a strategy to

134. Source: World Bank, *Improving efficiency and outreach of the CDM*. May 2012.
135. CAIXA is the second largest public bank in Brazil and the main financing source for municipalities in the country. CAIXA invested R$514 million (US$286 million) in clean-tech initiatives in 2011; it expects to increase that amount in the coming years, partly triggered by the possibility of blending carbon finance with traditional lending.
136. An Emission Reductions Purchase Agreement between CAIXA and the Carbon Partnership Facility of the World Bank was signed in 2011 aiming for the purchase of CERs until 2018.
137. Investment barriers associated with capital-intensive projects with low investment rates of return (IRR) has been a major reason for many low-carbon technologies not accessing adequate sources of underlying finance.

Box 5: Brazil integrated solid waste management and carbon finance program *(continued)*

cooperate with states and/or consortia of municipalities. This strategy seeks the promotion of new operations, such as regional landfills, which will make feasible both the final disposal and treatment of urban solid waste from small municipalities and the access of these municipalities to the carbon markets. As part of its strategy, CAIXA has put together an innovative financing package with the following objectives:

a. **Improving the technical capacity of municipalities on concessions.** Several municipalities in Brazil have limited capacity to prepare and conduct concession processes, deal with issues related to waste pickers, and process environmental licensing. CAIXA's program will support these processes by providing technical assistance to interested municipalities to structure their SWM operations (e.g., preparation of bidding documents for private concessions).
b. **Enabling public entities to access carbon markets through innovative financing packages in the SWM sector.** Under this program, eligible projects will benefit from financing options that integrate carbon finance revenues. CAIXA will accept the future carbon revenues as partial guarantee toward the loan. In addition, the terms, including the debt service of the loan, will be linked to the performance of the CDM project, mitigating risks and providing a strong incentive to the operator of the landfill. CAIXA will also provide technical assistance to the municipalities on the development of carbon-finance-related documentation.
c. **Supporting municipalities on the social aspects of SWM Projects.** The program will also help to develop adequate social inclusion strategies for waste pickers, a requirement under the new law.

4.2.2 Joint Implementation

4.2.2.1 A perspective for continuation

The Joint Implementation (JI) mechanism provides a common basis for countries with quantified emission targets to collaborate in the mitigation of climate change. In principle, therefore, the decision at CMP 7 to adopt a second commitment period of the Kyoto Protocol allows JI to continue. However, regulatory uncertainty remains regarding the adoption of quantified emission limitation or reduction objectives (QUELROs), the length of the second commitment period (2017 or 2020), and whether and how AAUs from the first commitment period can be transferred to the second.

The Joint Implementation Supervisory Committee (JISC) is currently revising the JI guidelines in an effort to improve the transparency and credibility of the mechanism. To this end, CMP 7 invited observer organizations to submit views on the revision of the JI guidelines by April 16, 2012.[138] The JISC's recommendations to date include merging Tracks 1 and 2 (see Box 6). It is recommended that this single, unified track be governed by a single verification supervisory body. In addition, it is proposed that the responsibility for ERU issuance be transferred from the host country to the UNFCCC.

Following the rules applicable to CERs, the EU ETS allows the surrender of ERUs generated and issued until 2012 as well as ERUs generated and issued from 2013 onward, from projects registered before 2013.[139] However, the Kyoto framework does not enable ERUs to be created from 2013 onward in the absence of new quantified

138. These views were not available when this report was written.
139. "To the extent that the levels of CER and ERU use … competent authorities shall allow operators to exchange CERs and ERUs from projects that were registered before 2013 issued in respect of emission reductions from 2013 onwards for allowances valid from 2013 onward." Source: Directive 2009/29/EC of the European Parliament and of the Council (http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2009:140:0063:0087:en:PDF), Articles 11a.2 and 3, April 23, 2009.

Box 6: Track 1 versus Track 2 JI

Track 1

- The host party verifies the emission reductions /enhancements of removals.
- The host party issues and transfers the ERUs.

Track 2

- The emission reductions /enhancements of removals are verified following the verification procedure under the JISC.
- The host party issues and transfers the ERUs.

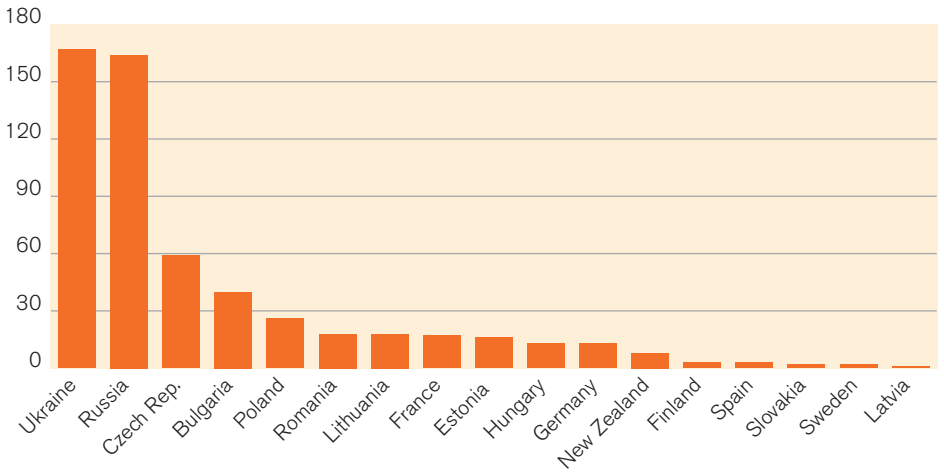
emission targets in place for host countries.[140] A mainly political question is whether emission reductions generated after 2012, based on AAUs carried over from the first commitment period (CP-1), can qualify for ERUs. This regulatory uncertainty has hindered new investment in the mechanism and can only be clarified by the UNFCCC (this is expected in 2012).

Under the Track 1 process, countries are entitled to determine the eligibility of projects unilaterally, apply their own methodologies for baseline setting, and monitor and verify emission reductions. This has raised concerns regarding consistency in the application of procedures and issuance across jurisdictions, including information provided in national languages instead of English.

4.2.2.2 Numbers: same old pattern, increased volumes

To date, there are 570 existing projects in different stages of development, in the JI pipeline. Almost 60% of this pipeline is hosted in the Ukraine and the Russian Federation (167 and 164 projects, respectively). Other active countries include the Czech Republic and Bulgaria (59 and 40 projects, respectively). France hosts the largest number of JI projects outside of Eastern Europe (26 projects) (see Figure 17).[141]

The Ukraine and the Russian Federation also monopolize ERU issuance. Until March 2012, out of the 131 million ERUs already issued, 66 million tons (50%) were generated in the Ukraine and 32 million (26%), from the Russian Federation. The disparity in issuance volumes can be attributed to the Ukraine moving ahead with issuance earlier than the Russian Federation. However, issuance has accelerated in the latter; in June 2011, the President of the Russian Federation signaled that the country needed to scale up its



Source: World Bank, UNEP Risoe

Figure 17: Number of existing projects in the JI pipeline per country

140. There are views in the market that CP-1 ERUs can still be created based on CP-1 AAUs, even for emission reductions occurring after 2012.
141. Source: UNEP Risoe, JI pipeline, April 1, 2012.

JI program to take advantage of the mechanism before the end of the first commitment period of the Kyoto Protocol. A couple of months following the announcement, Russia issued 17 million ERUs and launched a 70-million-ton tender. In September, an amendment to the Russian JI program was signed, setting the ERU issuance limit at 300 million until 2012.[142]

To date, most projects and issuances have taken place under Track 1 (see Figure 18).[143] However, the data available does not necessarily paint an accurate picture of the market in real time, as Track 1 does not require host countries to publish approved projects. Even the International Transaction Log (ITL), established and administered by the UNFCCC Secretariat, does not have the mandate to communicate or disclose data so temporary discrepancies have been reported.[144]

Primary ERU prices in 2011 averaged US$12.1 (€8.7), falling 7% from US$13.0 in 2010. Volume of primary ERUs (pERUs) contracted also fell, by 31% yoy, to 28 million tons. Thus, the total value of the primary JI market fell by 36% yoy to 339 million (€256 million) (see Table 4). ERU prices remained higher than CER prices in the primary market despite the removal of the Russian Federation's €10 floor price, because JI ERPAs were signed on projects at a more advanced stage of development than in the CDM (i.e., closer to final determination).

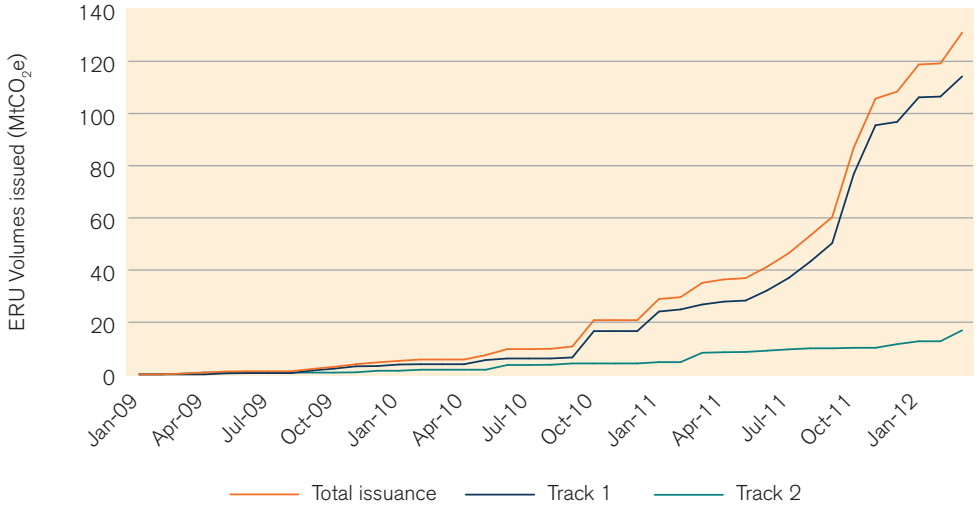
Not surprisingly, the largest volumes transacted in the primary market came from Ukraine and the Russian Federation (98% of the 28 million tons contracted in 2011). However, for the first time in five years, the Russian Federation was no longer the primary source of pERUs, accounting for 10.7 million (38%) tons versus 16.7 million (60%) from Ukraine (see Figure 19).

Table 4: Volumes and value for JI transactions, 2010-2011

2010		2011	
Volume ($MtCO_2e$)	Value (US$ million)	Volume ($MtCO_2e$)	Value (US$ million)
41	530	28	339

Source: World Bank, UNEP Risoe

Figure 18: Cumulative ERU issuance per track Q1 2009 – Q1 2012 ($MtCO_2e$)



Source: World Bank, UNEP Risoe

142. Source: CDC Climat Research. *Joint Implementation in Russia: On track to overtake Brazil as the third largest supplier of Kyoto offsets*, October of 2011.
143. Source: UNEP Risoe, JI pipeline, April 1, 2012.
144. Source: Shishlov, I., Bellassen, V., Leguet, B. *Joint Implementation: a frontier mechanism within the borders of an emissions cap (Climate Report No. 33)*, CDC Climat Research, 2012.

4.2.3 Assigned Amount Units

In 2011, AAU prices continued to decline from the €5–7 range observed at the end of 2010 to below €5, and some prices have reportedly reached as low as €1 per ton toward the end of the year. Since most of the 2011 AAU transactions were signed in the first half of the year (before prices plunged), the average AAU prices reported in 2011 was €5.1.

Contract negotiation for AAUs can take relatively lengthy periods of time depending on the level of complexity of the underlying GIS. Although prices plunged towards the end of the year, AAU deals were concluded at prices higher than prevailing market prices (i.e., prices reflecting market conditions in earlier months). Buyers honored earlier commercial terms and signed the AAU Purchase Agreements since AAU sellers are governments. A few options were also reported.

The downward trend coincided with the overall trajectory for all carbon assets, motivated primarily by lower-than-expected emissions and length in allowance supply. Other contributing factors include (i) regulatory uncertainty surrounding surplus AAUs and how they will be treated in the second commitment period of the Kyoto Protocol, and (ii) the fact that some Japanese private entities, who had been key AAU buyers since 2009, shifted their priorities elsewhere after the Fukushima incident. This fueled the downward trajectory as sellers increased and accelerated sales, even at lower prices, suppressing AAU prices further. Against this backdrop, new host countries seemed to be discouraged from entering the market, compounded by increasing pressure to launch accountable and transparent Green Investment Schemes (GIS) to reduce the "greening risk."

Following previous years' trends, Japanese private buyers still absorbed a large portion of the volumes contracted, albeit less than in previous years. As Annex 1 government buyers approach their Kyoto obligation targets, they reduce the pace of their purchases, thereby reducing AAU trading opportunities for private-sector players. Still, the faster decline in AAU prices compared to pCERs and ERUs resulted in a large spread between these assets, offering some profitable swap opportunities for private-sector firms, mostly Japanese. The same interest was reported coming from government buyers facing restricted budgets.

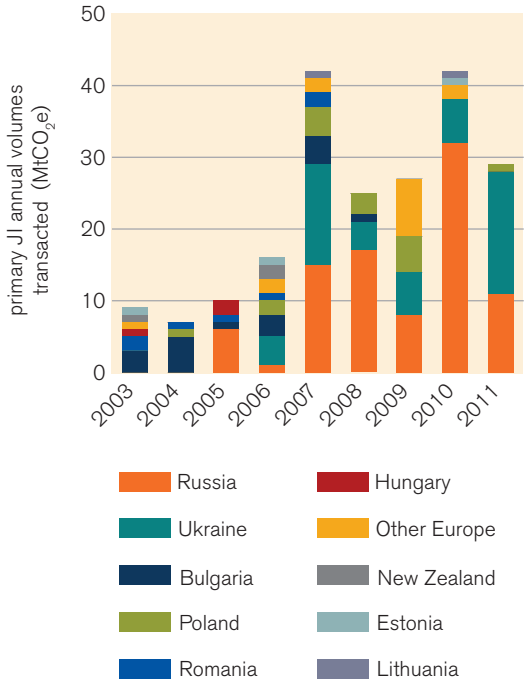


Figure 19: Annual pERUs volumes transacted per seller since 2003

Source: World Bank

Total volumes of transacted AAUs declined 23% yoy to 47 million tons. As in 2010, Estonia sold the largest number of AAUs, followed by Lithuania, which emerged as a newcomer following the development of its GIS program in 2010. Other active countries, most of which were early movers and have now commenced GIS implementation as agreed upon under previous Assigned Amount Unit Purchase Agreements (AAUPAs), include the Czech Republic, Poland, and Latvia.

In 2011, Estonia established the "Electromobility Program 2011-2013", which consists of deploying electric cars in municipalities for use by social workers. More than 500 of those

cars were bought from the proceeds of a sale of 10 million AAUs to Japanese Mitsubishi Corporation in March 2011.[145] Another sale of 1.5 million AAUs to Marubeni Corporation was approved in January 2012, and the proceeds raised will be invested into energy efficiency measures in Estonian theatres.[146]

4.2.4 Removal Units

These units can be issued by parties on the basis of land use, land-use change and forestry (LULUCF) activities such as reforestation. RMUs represent the same compliance value as other Kyoto flexibility mechanisms and can be traded among parties. The first RMUs were issued in 2011, in the National Registries of France, Australia, Russia, and Hungary. At the end of 2011, both France and Australia held 23 million RMUs in their National Registries. Russia held 4 million RMUs at the end of 2011, and was issued 462 million RMUs in February 2012.[147]

2011 witnessed the first sale of Removal Units (RMUs), coming from Hungary.[148] Hungary's forests cover around a fifth of the country after its forested area grew 13% to 19,217 square kilometers between 1990 and 2011, referring to data from the Hungarian Statistic Office. As a result, Hungary issued itself the first RMUs in 2011 after the UN finalized the country's 2008 greenhouse gas emissions data in the previous years. The country, along with Denmark, France, and Switzerland, has opted to print RMUs annually, while other Kyoto signatories will receive RMUs in 2014, two years after emissions data for the entire 2008-2012 Kyoto period is finalized.

In October 2011, the National Development Ministry of Hungary announced it had issued 3.9 million RMUs.[149,150] The country also announced that the revenue from the sale of the units would be used to support environmentally friendly investments. The sale of a certain volume was announced in December 2011. Neither the volume nor its value were confirmed; however, in a press briefing, the Hungarian government confirmed that Kyoto permit revenues in 2011 totaled HUF 2.7 billion ($11.5 million) and that it expects further HUF 1.6 billion in 2012. Since no AAU deal was announced by Hungary in 2011, it is likely that revenues came from the RMU sale. Finally, the New Zealand registry showed the transfer of 3.9 million RMUs from overseas in 2011.[151] Although not confirmed, if the volume shown in the New Zealand registry corresponds to the purchase of the Hungarian RMUs, average prices for the transaction were US$2.95 per RMU (US$11.5 million for 3.9 million RMUs).

4.3 NEW MARKET INSTRUMENTS

4.3.1 Nationally Appropriate Mitigation Actions

Over 50 developing countries have now submitted proposals to the UNFCCC[152] to limit the growth of greenhouse gas emissions by 2020. These proposals, also known as Nationally Appropriate Mitigation Actions (NAMAs), refer to a set of mitigation policies and/or actions that a developing country voluntarily undertakes in an effort to reduce its GHG emissions and report these reductions to the UNFCCC. The concept of NAMAs emerged in 2007

145. Source: Tuisk, J. Ministry of Economic Affairs and Communications of Estonia, *Estonian Electromobility Program 2011-2013*, 2011.
146. Government of Estonia, Proceeds from the sales of AAUs to Marubeni Corporation will be invested into energy efficiency in Estonian theatres, January 26, 2012.
147. Source: Thomson Reuters Point Carbon, *Outlook for 2012-2014: Entering a new phase*, February 2012.
148. Based on 2008-09 inventory data, analysts forecast 1.2 billion RMUs issued over CP-1. Source: Valentin Bellassen, *Dossier du Club Carbone Forêt-Bois n°3, Résultats nationaux des pays de l'Annexe 1*, 2011.
149. Source: Business Recorder, *Hungary pioneers sale Kyoto units-Point Carbon*, December 2011.
150. Source: http://www.bbj.hu/economy/hungary-has-about-39m-rmus-to-sell_60873.
151. Source: https://app.eur.govt.nz/eats/nz/index.cfm?fuseaction=search.nzeur_incoming_transaction_year&hc=lilOPCAK&nc=3C7EA3755D487F29CBF884FAA35537A7.
152. See a compilation of the proposals in document FCCC/AWGLCA/2011/INF.1, posted on the UNFCCC Web site.

under the UNFCCC Bali Action Plan, which called for "[the implementation of] 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." The Cancun Agreement achieved significant progress in the concept and, inter alia, set milestones for the development of a central registry of NAMAs (including those seeking international funding support) and guidelines for measuring, reporting, and verification (MRV). There is no official definition of a NAMA; therefore the proposals to date indicate a wide variety of approaches. These encompass policies, programs, and projects, as well as sectoral or national emission goals. The openness of the definition places emissions mitigation and low emissions development within the context of a nation's economic and social objectives and allows for climate change mitigation beyond the project offsetting structure of the Clean Development Mechanism (CDM).

Discussions and literature on NAMAs often refer to two types of NAMAs based on the sources of funding:

- Unilateral NAMAs, which are financed and supported entirely by the host country.
- Supported NAMAs, which will be implemented if provided with the needed international support.

For several countries, the supported NAMAs may be financed through the sale of carbon credits and have been referred to as credited NAMAs; they thus have a link to the negotiations on a new international market-based instrument.

Some guidance on NAMA was laid out in the 2010 Cancun Agreement and in the COP 17 decisions in Durban (2011). Parties agreed that supported NAMAs will be recorded in a registry to match proposed mitigation actions with international financial, technology, and capacity-building support. Accordingly, a registry prototype shall be developed by the UNFCCC Secretariat by the time of the 36th session of the Subsidiary Body for Implementation with the design to be finalized at COP 18 in December 2012. Parties also agreed that Non-Annex-I Parties shall submit National Communications every four years and Biennial Update Reports (BURs) with information on their NAMAs – as well as on their national inventories - every two years (UNFCCC 2011a). The Subsidiary Body for Scientific and Technological Advice is also to develop guidelines for domestic MRV of Unilateral NAMAs (UNFCCC 2011b). Negotiations continue on equivalent guidelines for supported NAMAs to further define the concept and its underlying assumptions as well as achieve some level of consistency and transparency so that mitigation actions are not only nationally appropriate but also meet some form of global appropriateness. While many aspects of the policy architecture around NAMAs is yet to be defined, much progress has been achieved on an operational level, particularly in Non-Annex 1 countries. These bottom-up activities are likely to provide valuable lessons for the development of the NAMA framework at the international policy level.

Many developing countries are in the process of identifying, selecting, and preparing proposals for NAMAs. By way of example, the 30 NAMAs tracked by the Ecofys NAMA database[153] as "under development" indicate that:

- Geographical distribution is weighted to Latin America (13 activities or 43%), followed by Asia, Africa and Europe. This contrasts with the CDM, which has been more highly used in Asia.

153. Source: Roser et al., 2011 and Ecofys NAMA database, September 30, 2011.

- Sectoral distribution is weighted towards transport (12 activities or 40%), followed by energy, waste, industry, buildings, forestry, and agriculture. This contrasts with the CDM, where only 0.6% percent of projects relate to transport.[154]
- Activity types are categorized as strategies/plans, policies/programs, and projects, with a relatively equal distribution amongst them. Conversely, CDM to date has been strictly project based.
- The scope is generally nation- or sector-wide. CDM PoAs share the most resemblance with NAMAs and may provide valuable insights for credited NAMA, particularly in determining baselines and associated MRV.

Implementation of NAMAs requires financing at the scale that may not be the same as those that have been most targeted by the CDM, but also offers investment opportunities. Several countries are looking at the possibility of leveraging financing through a new crediting mechanism.

The bottom-up NAMA activities that Non-Annex I countries have identified as well as existing ground work on new market instruments[155] can provide valuable experience and insights for the development of the international policy architecture. While progress continues at the operational level, negotiations continue on the form and scope of NAMAs as well as on an overarching framework to translate them into a market-based mechanism.

In several developing countries, climate change champions used to be primarily international-negotiations-oriented staff. However, Ministries of Finance and/or Planning have increasingly become engaged on this topic. The main reason is that many countries have taken voluntary commitments since Copenhagen COP, and these commitments although not binding internationally, have been reflected in the domestic climate change programs and laws – making them mandatory internally. As a result, national debates are heating up, and the Ministries of Finance and/or Planning are heavily investing in identifying the domestic instruments needed to integrate these new objectives in an efficient way consistent with national development requirements. This is a turning point in the political economy of climate change in emerging economies. In this new context, the key words are "national policies" and "domestic instruments," with NAMAs being a partial reflection of these initiatives in the international negotiations arena. NAMAs will certainly become important means to articulate domestic voluntary efforts and international support.

4.3.2 New approaches to market instruments

COP 17 represented an important step forward in defining new approaches to market instruments. Parties reached agreement that the role of these instruments is to "enhance cost-effectiveness of, and to promote, mitigation action",[156] bearing in mind the different circumstances of developed and developing countries. Among the various approaches discussed was a proposal for a framework that would enable Parties to design and implement their own approaches under decentralized governance and, on the other hand, a mechanism to be guided by the COP under centralized governance. These two approaches are discussed below.

4.3.2.1 Framework for various approaches

COP 17 recognized Parties' abilities to develop and implement their own approaches to contributing to global GHG reductions and sustainable development. Such approaches may support offsetting or crediting through bilateral or regional cooperation. The pursuit of such a flexible and decentralized mechanism is intended to allow swift implementation at low transaction costs.

154. Source: UNEP RISOE Centre, 2011.
155. Initiatives such as the World Bank's Partnership for Market Readiness (PMR).
156. Decision 2, COP 17, para 83.

"COP 17 recognized Parties' abilities to develop and implement their own approaches to contributing to global GHG reductions and sustainable development."

However, important to note that such an approach must "meet standards that delivery real, permanent, additional and verified mitigation outcomes, avoid double counting of effort, and achieve a net decrease and/or avoidance of greenhouse gas emissions." Specific issues have been proposed for elaboration, include:

- Eligibility criteria for the projects and the project selection process.
- Underlying principles of methodologies and their approval process.
- Roles of third-party certification entities and their accreditation process.
- Approaches to managing projects and credits issued (including measures to avoid double counting).
- The UNFCCC Parties will elaborate a framework for various approaches with the objective to making a recommendation to COP 18 which will take place in December 2012 in Doha.

4.3.2.2 New Market-Based Mechanism

In addition to the decentralized means of the framework for various approaches, the UNFCCC is also considering defining a new market-based mechanism (NMM) as a means to encourage mitigation efforts and financial flows at scale. Though the definition and modality for the NMM are yet to be elaborated, the UNFCCC Parties agreed that NMM should stimulate mitigation across "broad segments of economy". Specific suggestions have been proposed:

- Crediting: Emissions from a broad sector of an economy will be checked against an ex-ante agreed crediting threshold. If emissions are below this threshold, emission credits will be issued ex post, which can be sold to recover, at least partly, the cost of mitigation activities. If emissions are not below the threshold, no penalty will be applied (no-lose target).
- Trading: In accordance with an ex-ante defined absolute target for a broad sector of an economy, emissions allowances will be issued ex ante. If emissions are lower than the number of issued allowances, excess allowances can be sold to recover, at least partly, the cost of mitigation activities. If emissions are higher than the number of allowances issued, additional allowances need to be purchased on the global carbon market to comply with the target agreed for the broad segment.

Going forward, essential elements for defining a NMM include:

- Eligibility/participation requirements
- Boundaries
- Baselines and targets, including timelines
- Monitoring, reporting, and review
- Technical requirements to facilitate issuance and safe transfer of units
- Institutional requirements

Countries have provided a diverse range of submissions on the elaboration of the modalities and procedures under both approaches so that a decision can be adopted at COP 18. While the purpose of the new market approaches is to contribute to ensuring cost-efficient mitigation action globally, it remains to be seen whether they can provide an overarching framework and clear guidance as to what asset can be legitimately and transparently traded as a result of domestic mitigation activity.


SECTION
5

Outlook – 2012 demand and supply balance

THIS CHAPTER INVESTIGATES THE BALANCE BETWEEN THE DEMAND FOR THE KYOTO ASSETS, including demand from governments and private sector entities,[157] and the supply of these Kyoto assets. We have revised our estimates, and compared to last year, we found a higher residual demand of 290 million tCO_2e ($MtCO_2e$), virtually all coming from European governments. Although GHG emissions data for the first three years of the first commitment period of the Kyoto period (2008-2010) hint at larger shortfalls than previously expected, the market balance remains unchanged due to the larger oversupply of Kyoto assets, notably AAUs.

5.1 GOVERNMENT DEMAND

Demand estimates for Kyoto assets from Annex B governments were revised upward, to **574 $MtCO_2e$** from 437 $MtCO_2e$ estimated in last year's report. The EU-15 accounts for about 75% of the total and Japan for almost 17% (see Table 5).

Updated emissions projections that reflect prolonged global economic downturn show that the EU-15 and the EU as a whole continue to expect to meet and overachieve their Kyoto targets with current policies in place.[158] However, it cannot be assumed that overachievement of the collective target will enable certain member states to cover shortfalls from others. Therefore, some EU-15 members plan to use the Kyoto flexibility mechanisms to ensure that their individual Kyoto targets are met.

Estimates from the 2011 report were revised, taking into account new data on GHG emissions in non-EU ETS sectors (2010) as well as updated figures for governments' intended use of Kyoto units and sinks.[159] Declared intended use of Kyoto assets now amount to roughly 443 $MtCO_2e$ from 2008 to 2012, mainly from Spain, Italy, the Netherlands, and Austria. In addition, in our estimates it appears that several countries (Austria, Italy, and the Netherlands) show a gap between their intended purchases of Kyoto assets and their GHG emissions targets. According to our estimates, if in 2011 and 2012 their respective sinks and additional measures do not sequester

157. Those are entities covered by existing or anticipated domestic climate regulation, like the EU ETS or the NZ ETS, or participants to sectoral agreements, like the Keidanren Voluntary Action Plan in Japan. For the vast majority, they belong to the private sector; however, some public installations (like hospitals under the EU ETS) are also regulated.

158. "The EU-15 is expected to over-achieve its Kyoto target by an amount equivalent to 4.6-5.1% of base-year emissions, depending on whether the expected effects of additional measures are realized by 2012." Source: European Environment Agency, *Tracking progress towards Kyoto and 2020 targets in Europe*, October 2011.

159. Our projections are based on GHG emissions for 2008, 2009, and 2010 from National Inventory Submissions to UNFCCC (April 2012), adjusted for the economic outlook for 2011 and 2012. Emissions projections have been revised using GDP forecasts by the International Monetary Fund (Source: IMF, *World Economic Outlook* Update, April, 2012). The following figures are sourced from the European Environment Agency: annual emissions and removals from LULUCF activities, intended annual use of Kyoto mechanisms, and emissions in sectors not covered by the EU ETS, in the EU Member States, and Lichtenstein, Norway, and Switzerland. Source: European Environment Agency, *Tracking progress towards Kyoto and 2020 targets in Europe*, October 2011.

and reduce GHG emissions more than in 2008, 2009, and 2010, these countries may have to collectively purchase 75 $MtCO_2e$ in addition to their intended purchases.[160] On the other hand, we estimate that some countries may not need to buy the amount of Kyoto units initially intended. These include Spain, Belgium, Portugal, and Denmark. Based on these results and assumptions, we therefore estimate the governmental demand for Kyoto assets in the EU-15 taken as a whole at **428 $MtCO_2e$** (see Table 6), compared to the 315 $MtCO_2e$ estimated last year.

The earthquake and tsunami that struck Japan's northeast in 2011 may lead the country to use more carbon-intensive fossil fuels to compensate for the loss of nuclear capacity. Nevertheless, the increased carbon intensity of output in Japan, though will likely be offset by subdued economic growth over the coming months. As of December 2011, Japan was still unable to determine the real implication for its Kyoto achievement target.[161] In addition, Japan did not purchase carbon units in 2011, leaving cumulative acquisitions to 97.8 $MtCO_2e$ since the commencement of the buying program in 2006.[162] In this context, gross demand for Kyoto assets from the Government of Japan is maintained at **100 $MtCO_2e$**, its initial public procurement goal.

Gross demand from other Annex B governments is estimated at 46 $MtCO_2e$, mainly through Norway and Switzerland. Although Norway seems likely to meet its Kyoto target (+1%) solely through domestic policy and measures, its demand for Kyoto mechanisms stems from its long-term commitment to carbon neutrality, including an overachievement of its Kyoto target by 10%. On the contrary, we estimate that Switzerland may have to purchase 7 $MtCO_2e$

Table 5: Supply and Demand in Perspective – Kyoto Market Balance, 2008-2012

Potential Demand from Industrialized Countries *($MtCO_2e$)*		Potential Supplies *($MtCO_2e$)*		
Country or entity	**Kyoto assets demand**		**Official target***	
EU	**1,293**	**Potential GIS**	**>1,500**	
Government (EU-15)	428	Ukraine	500–700	
Private sector (EU ETS)	865	Russian Federation	200	
		Czech Republic	120	
		Other EU-10	600	
Japan	**300**			
Government	100			
Private sector	200			
Rest of Annex B	**51**	**CDM & JI**	**1,573**	**range: 1,500–1,658**
Government	46	CDM	1,273	1,250–1,301
Private sector	5	JI	300	250–357
TOTAL	**1,644**			
Government	574			
Private Sector	1,070			

* These numbers correspond to the amounts of AAUs governments intend to sell. They are much lower than the whole amount of excess AAUs, now estimated at more than 10 billion tCO_2e over the first commitment period, with Russia accounting for half, Ukraine one-quarter, and Poland one-fifth.

160. Although we used reported emissions data for 2008-2010, our estimates rely on projections for 2011 and 2012 emissions. These are only based on expected economic growth factors, and thus consider the performance of national sinks and additional measures over 2011-2012 constant from 2008-2010. If those were to outperform in the last two years of the Kyoto period, our figures would consequently need to be revised downward.

161. "On the other hand, due to many factors that are difficult to estimate those impacts after the Great East Japan Earthquake, such as operational status of nuclear power plants, electricity demand, and business activity, as well as weather forecast, it is difficult to estimate GHGs emissions for the rest of the years of the 1st KP period at this stage." Source: Global Warming Prevention Headquarters under the Cabinet of Japan, *Progress Report of the Kyoto Protocol Target Achievement Plan*, December 2011. (p3, translated from Japanese).

162. Source: Ministry of Environment of Japan, *Government Purchase of Kyoto Credit*, April 2, 2012.

more than initially intended (10 $MtCO_2e$). Australia and New Zealand continue to expect to meet their Kyoto obligations through domestic policy measures and carbon sinks.[163]

5.2 PRIVATE SECTOR DEMAND

Gross demand from private entities has been revised up 12% from last year, to **1,070 $MtCO_2e$** (see Table 5), with demand in the EU ETS accounting for 81% of the total. The main reason for this increase is the expected preferential surrender of CERs and ERUs (instead of EUAs) by EU ETS operators in response to the EC's qualitative restrictions on the eligibility of offsets in Phase III as well as low prices for Kyoto offsets since the end of 2011.

Analysts expect Phase II of the EU ETS to be oversupplied by about 1,300-1,600 $MtCO_2e$. The surplus will be banked in the form of allowances, including remaining reserves, set-asides, and unused offsets.[164] In addition, prolonged economic downturn, investment in renewable energy generation, and expected incremental energy efficiency measures in the EU have led analysts to expect the EU ETS to remain oversupplied throughout Phase III, with a 750-1,300 $MtCO_2e$ surplus in 2020 (including offsets). Thus, by contrast with the demand from governments reflecting actual shortfalls, the demand from the private sector encompasses arbitrage opportunities, even under an oversupplied scenario.

However, it is expected that some installations – primarily utilities and airlines – will be short.[165] A shortfall of 400 $MtCO_2e$ is expected for airlines until 2020. This may be supplied with CERs and ERUs (up to 63 $MtCO_2e$ throughout 2020), or with Aviation EU Allowances (see Section 3.9). Remaining demand could also come from generators that start to hedge their future exposure in Phase III as a result of tighter caps and increased auctioning. Depending on the schedule of anticipated sales or auctions of Phase III allowances, this hedging behavior could induce some volatility in the EU ETS market during the transition from Phase II to Phase III. Changes in the generation mix, brought by shifts in Germany's nuclear energy policy or overheating in global energy prices, for instance, could further push compliance demand from power sector installations.

So far, EU ETS participants have contracted approximately 1.9 billion CERs and ERUs (nominal), with CERs from HFC and adipic acid projects accounting for about 25% of that amount.[166] Despite the market being long, EU ETS operators may nonetheless seek to benefit from the price difference existing between CERs (or ERUs) and EUAs, and therefore sell or bank EUAs to use CERs (i.e., "CER/EUA swap" operation). In addition, given the ban of CERs from HFC and adipic acid projects in Phase III, it is expected that installations will actually increase their use of CERs and ERUs over the end of Phase II. In this context, last year's estimate of CDM and JI credits use over Phase II has been revised from an average 750 $MtCO_2e$ to **865 $MtCO_2e$** (see Table 6) over 2008-2012.[167]

163. Source: Department of Climate Change and Energy Efficiency of Australia, *Quarterly Update of Australia's National Greenhouse Gas Inventory*, December 2011. New Zealand estimates it will have a surplus of 23.1 $MtCO_2e$ for the Kyoto Period of 2008-2012. Source: *Ministry of Environment of New Zealand*, April 2012.

164. Sources: Deutsche Bank. *EU Energy: ETS Reform Should Not Be Set Aside*, April 12, 2012: Long position over Phase II: 677 $MtCO_2e$, use of CERs and ERUs over Phase II: 819 $MtCO_2e$. Societe Generale. *Carbon Specials*, March 20, 2012: Long position over Phase II: 486 $MtCO_2e$, use of CERs and ERUs over Phase II: 831 $MtCO_2e$. Barclays Capital. *Monthly Carbon Standard*, March 26, 2012: long position over Phase II: 675 $MtCO_2e$, use of CERs and ERUs over Phase II: 945 $MtCO_2e$.

165. Based on 90% of the verified emissions for 2011, published verified emissions for the first four years of Phase II (2008-2011) showed that the power and heat sector, which accounts for 74% of the emissions, was short by 10.3% accumulated over 2008-2011 (against free allowances), while the surplus was attributable to the remaining sectors which were long by 24.1%.. Source: Köppl, A., et al. *Views of the EU ETS, Climate Policy Brief, Austrian Institute of Economic Research*, April 2012.

166. We estimate this amount to be 828 million CERs and ERUs after adjustment for risk performance. For details on the risk-adjustment calculation, see *Methodology*.

167. The CERs and ERUs surrendered by EU ETS operators amounted to 84 $MtCO_2e$ in 2008, 81 $MtCO_2e$ in 2009, 137 $MtCO_2e$ in 2010, and 254 $MtCO_2e$ in 2011. With an estimate of 865 $MtCO_2e$ surrendered over 2008-2012, this leaves 311 $MtCO_2e$ to be surrendered in 2011 and 2012.

Private-sector companies in Japan have reportedly contracted more than 465 $MtCO_2e$ in CERs, ERUs, and AAUs (273 $MtCO_2e$ after risk adjustment) that can be surrendered under the Keidanren Voluntary Action Plan, which should amply cover their estimated needs of **200 $MtCO_2e$**. We see two explanations as to why Japanese private companies continue to purchase Kyoto units. First, power and steel companies anticipate increasing emissions from the shutdown of nuclear capacity in Japan. Although the government has yet to estimate how this will impact national emissions (as explained above), there are estimates that the shutdown of nuclear capacity in Japan could create an additional demand of 60–70 $MtCO_2e$.[168] In addition, the observed increasing purchase of AAUs versus CERs and ERUs by Japanese private companies could also be regarded as the first indications of Japanese market participants exchanging the CERs and ERUs they acquired in the primary market against AAUs in order to cash in on the price difference between those assets.[169]

Reported private-sector purchases beyond the EU and Japan (e.g., U.S, Republic of Korea) have mainly been driven by intermediaries seeking returns in selling CERs and ERUs in the secondary market. Although the New Zealand and Australia emissions trading schemes do and will accept CERs and ERUs, we did not track any primary market transaction in 2010 and 2011 intended to serve these markets. Private participants in the market indicated procurements occur through the secondary market, the liquidity of which is better hedged against the market price volatility and uncertainties over the utilization of Kyoto credits.

5.3 SUPPLY THROUGH TO 2012

About **1,270 million CERs** are expected to be issued pre-2013, of which slightly more than half should be issued to HFC and adipic acid projects.[170] Supply projections are up 10% on average since last year, reflecting primarily improved timelines for registration. First, the CMP decision in Cancun to move forward the starting date of the crediting period has the potential to add three to six months worth of CERs (or the average time from request of registration to effective registration) to a project's expected deliveries.[171] In 2011, 315 million CERs were issued, which was a 140% increase over 2010 and accounted for 40% of all issuance to-date (see Section 4.2.1.5). Second, the inflow of projects entering the CDM pipeline doubled from the start to the end of 2011, from 330 new projects in Q1 2011 up to 609 in Q4 2011. This is the highest rate ever — perhaps reflecting the fact that project developers are rushing to get projects registered before 2013 in light of EU eligibility restrictions for Phase III.[172]

Market analysts estimate that around **300 million ERUs** will be issued through 2012. This is an increase over last year's estimate (+20%), and is largely a result of Russian efforts to increase supply.[173] The supply of ERUs was roughly multiplied by five from 25 $MtCO_2e$ in December 2010 to 119 million ERUs in January 31, 2012.

The supply of AAUs remains far larger than the anticipated demand (i.e. countries have announced intentions to sell over **1,500 million**

168. Sources: Deutsche Bank. *Japan's Quake & The Implications for Commodities*. Commodities Special Report, March 14, 2011: 70 $MtCO_2e$. Barclays Capital. *Monthly Carbon Standard*, April 11, 2011: 60 $MtCO_2e$.
169. We tracked 23 $MtCO_2e$ AAUs and 0.9 $MtCO_2e$ CERs and ERUs purchased by Japanese private companies in 2011. For comparison, in 2009 we tracked 36 $MtCO_2e$ and 29 $MtCO_2e$ respectively.
170. Sources: Cormier, A., Bellassen, V. *The risks of CDM projects: how did only 30% of expected credits come through?* CDC Climat Research, 2012 and Shishlov, I., Bellassen, V., Leguet, B. *Joint Implementation: a frontier mechanism within the borders of an emissions cap*. CDC Climat Research, 2012 and Deutsche Bank. *EU Energy: ETS Reform Should Not Be Set Aside*, April 12, 2012. Thomson Reuters Point Carbon, Carbon Project Manager, April 26, 2012.
171. The CDM Executive Board was requested to revise the procedures for registration to allow the effective registration date/start of crediting period "to be the date on which a complete request of registration has been submitted by the designated operational entity where the project activity has been registered automatically."
172. 330 new projects entering the CDM pipeline in Q1 2011, 385 in Q2, 510 in Q3, and 609 in Q4. Source: World Bank, from UNEP Risoe, CDM Pipeline, February 2012.
173. The Russian increase in issuance of ERUs in 2011 came in response to an amendment to the Russian JI program, signed in September 2001, and setting up the ERU issuance limit at 300 million until 2012. Source: CDC Climat Research, Paris. Shishlov, I., Bellassen, V., Leguet, B., 2012. *Joint Implementation: A frontier mechanism within the borders of an emissions cap (Climate Report No. 33)*. CDC Climat Research.

AAUs), and the uncertainties regarding the bankability of AAUs has a fundamental role to play in the existing supply and demand imbalance and market dynamics. In addition, the first RMUs were issued in 2011 (see Section 4.2.4).

5.4 RESIDUAL DEMAND—290 $MTCO_2E$

Expected gross use of Kyoto assets now stands at 1.64 billion tCO_2e over 2008–12 (up 18% from last year), with approximately 65% of demand coming from the private sector and 35% from governments.

Adjusting the approximately 2.6 billion CERs and ERUs contracted (nominal) for risk of underdelivery, and accounting for AAU transactions as well as some secondary transactions by governments, leads to an estimated residual demand of 290 $MtCO_2e$ of Kyoto assets by the end of 2012 (up from 136 $MtCO_2e$ last year), virtually all from European governments (see Table 6).

The three Kyoto flexibility mechanisms are expected to be used by government buyers to meet their demand for Kyoto assets. Although they will be able to surrender Kyoto assets until the end of the "true-up" period running through mid-2015, most remaining purchases are expected to occur by the end of 2013 as many will use the remaining year to fine-tune purchases only (by that time, they will have a better handle on the actual gap they have to compensate for). Our estimates show that over 2008-2011, EU-15 governments bought less than 50% of the Kyoto assets they may need; following the practices seen in previous years, it is anticipated that they will favor the use of AAUs and secondary offsets to meet their residual needs. As an example, Austria announced in April 2012 that it sought to buy at least 32 million AAUs to cover its entire expected shortfall following revised GHG projections.[174]

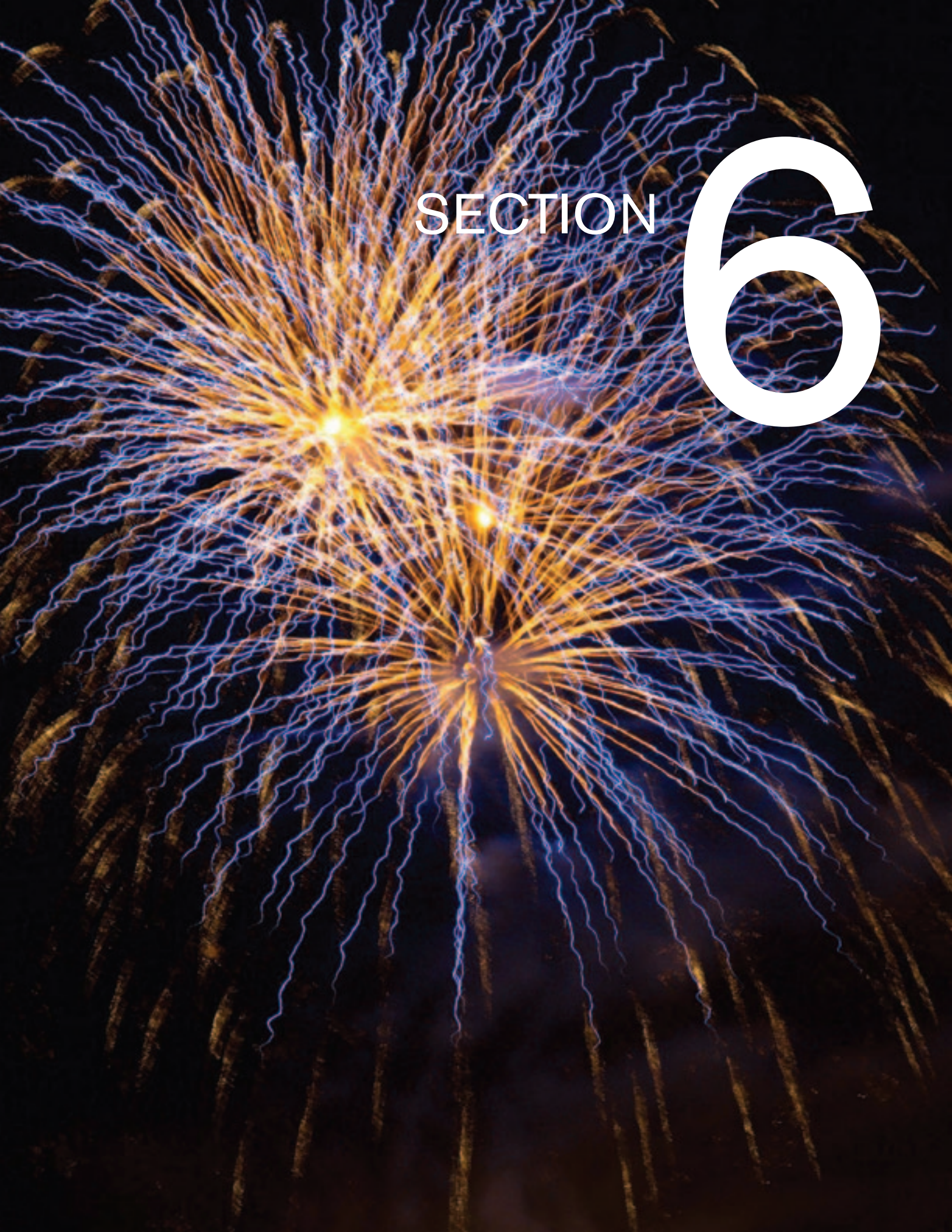
A brief exercise on supply and demand for post-2012 is provided in Box 8.

	Potential demand	Contracted CERs and ERUs		AAUs/RMUs	Residual demand
	($MtCO_2e$)	nominal ($MtCO_2e$)	Adjusted for performance ($MtCO_2e$)	($MtCO_2e$)	($MtCO_2e$)
EU	**1,293**	**2,175**	**969**	**79**	**245**
Government (EU-15)	428	259	141	79	208
Private sector (EU ETS)	865	1,916	828	0	37
Japan	**300**	**380**	**169**	**194**	**9**
Government of Japan	100	34	15	76	9
Japanese private sector	200	346	154	119	0 (-73)
Rest of Annex B and others	**51**	**29**	**13**	**4**	**35**
Government	46	24	11	0	35
Private sector	5	5	2	4	0 (-1)
Total	**1,644**	**2,584**	**1,151**	**277**	**290**
Government	574	316	167	154	253
Private sector	1,070	2,267	984	122	37

Table 6: Potential demand, contracted supply, and residual demand, 2008-2012

Note: Numbers may not add up due to rounding. Although the Government of Switzerland is included in "Rest of Annex B and others," we incorporated the CERs and ERUs contracted by private participants based in Switzerland in "Private section (EU ETS)" as we consider that those are purchased by intermediaries based in Switzerland but serving EU ETS participants and EU-15 governments.

174. Source: Thomson Reuters Point Carbon, *Austria to buy 32 mln AAUs: minister*, April 4, 2012.


SECTION
6

Emissions trading and other low-carbon initiatives around the world

SEVERAL DOMESTIC AND REGIONAL LOW-CARBON INITIATIVES, including market mechanisms, emerged in both developed and developing economies in 2011 and early 2012. The global carbon market witnessed the approval of an ambitious bill that will bring a nationwide cap-and-trade scheme to Australia by 2015 and is expected to cover roughly 60% of the country's annual GHG emissions. California's cap-and-trade regulation is set to go into effect in 2013, and by 2015 the plan is expected to cover 85% of California's annual emissions. Québec adopted its own cap-and-trade plan and is now working toward linking it with California's (within the context of the Western Climate Initiative). Both Mexico and the Republic of Korea got their comprehensive climate bills passed a few days apart in April 2012. These initiatives combined mean five new jurisdictions are adopting economy-wide cap-and-trade schemes. Now the world looks with particular attention to China, which is also among the frontrunners in the race to become a low-carbon economy. Its advanced plan to pilot several regional cap-and-trade schemes is expected to provide the foundation for a nationwide scheme in the coming years.

In addition to the new initiatives, this section also summarizes some of the regional, national, and sub-national policy and market-based initiatives that currently exist to support global climate change efforts. While the list of countries described is not exhaustive, it does illustrate the diversity of measures that are either under consideration or implementation.

> "the Australian Parliament passed the Clean Energy Legislative Package"

6.1 AUSTRALIA

6.1.1 The Clean Energy Future Package

In November 2011, the Australian Parliament passed the Clean Energy Legislative Package as part of an effort to comply with Australia's unconditional target of reducing net emissions by five percent (%) below 2000 levels by 2020.[175] The legislative package, known as the Clean Energy Future Package, includes a Carbon Price Mechanism (CPM) that is to take effect from July 2012 and link with international offset markets from July 2015, as well as includes significant

175. The "net emissions" pledge allows for Australia to use international emission reductions to help meet the target.

additional measures such as the establishment of a Clean Energy Finance Corporation (CEFC) to invest A$10 billion in renewable energy over 10 years from 2013-14 (complementing the existing Renewable Energy Target which requires that 20% of Australia's electricity be produced from renewable energy sources by 2020)[176] (see Table 7). The passage of the legislation provides business with increased policy certainty following a decade of debate on the issue. However, there is still need for further regulatory and political clarity.

The CPM will commence with a fixed price for the first three years. The price will be set at A$23/ton (€18.50) (indexed annually by 2.5%) and will operate similar to a tax. However, the Scheme will require participants to acquire and surrender permits, tradable as personal property and regulated as financial products - quite different to an ordinary levy or tax. The purpose of this initial phase is to ease the transition to a trading scheme, although business groups have raised concern that the high fixed price may result in it instead being punitive to industry and to competitiveness. During this phase, scheme participants may not surrender international units, but may surrender Kyoto-compliant Australian Carbon Credit Units (ACCUs) created under the Carbon Farming Initiative (CFI) to meet up to 5% of their obligation.

From July 2015, the domestic price will float – but be subject to a price floor and a ceiling until July 2018,[177] when the price is to float freely. The floor will be set at A$15 and the ceiling will be set at A$20 above the international price (indexed annually at 4% and 5% respectively). Throughout this stage, the number of Carbon Units (CUs)

Table 7: Australia's CPM at a glance

Indicator	Detail
Objective	• Help to lower Australia's carbon emissions by 5% by 2020 (relative to 2000 levels) and by 80% (also relative to 2000 levels) by 2050.
Commencement	• Fixed price period : July 1, 2012; • Flexible price period : July 1, 2015; and • Floating price: July 1, 2018.
Coverage	• Four Kyoto Protocol GHG gases: carbon dioxide (CO2), methane (CH4), nitrous oxide (N20), perfluorocarbons (PFCs). Sulphur hexafluoride (SF6) and hydrofluorocarbon-23 (HFC 23) will be regulated by non-trading legislation; and Broad coverage. Forestry, agriculture and some transport not covered.
Compliance basis	• Annual, based upon 30 June year-end.
Caps	• Caps will be set by May 2014 for the first five years of the flexible price period of the CPM; and • Each year thereafter a further year's cap will be determined such that there will always be caps set five years in advance. • Eligible from July 1, 2015 (up to 50% of annual obligation for liable entities);
International offsets	• Qualitative restrictions apply to some CERs; and • Subject to a 'surrender charge' during the flexible price period.
Assistance	• Households to be the largest recipients of assistance; and • The bulk of sectoral assistance will be provided primarily in the form of free permits to trade exposed industries.

176. In addition to complementary measures, the adoption of the legislation has also replaced the need for some existing measures. These include the New South Wales Greenhouse Gas Abatement Scheme (GGAS), which the state government has agreed to abandon on July 1, 2012, upon commencement of the CPM. The baseline and credit scheme has operated since 2003, targeting emission reductions primarily in the state's electricity sector but also in industry and forestry. Data relating to this scheme is included in this report as part of "Other Schemes."

177. Domestic ACCUs will not be subject to the price floor or cap.

made available by the Government will be limited by a cap which will be set by May 2014 for the first five years of the flexible price period of the CPM. Each year thereafter a further year's cap will be determined such that there will always be caps set five years in advance. The flexibility to set the fifth year cap annually contrasts with the EU ETS and is designed to ensure that the caps underpin Australia's medium- and long-term targets, taking into account a range of economic, environmental and other relevant factors. Of the CUs made available, a portion will be freely allocated to businesses to support jobs and competitiveness and to ease the transition. The remainder will be sold by the Clean Energy Regulator (the Regulator) at auction. During this period, scheme participants may also purchase international offsets to meet 50% of their obligations to 2020 in addition to ACCUs for which there will be no quantitative restriction.

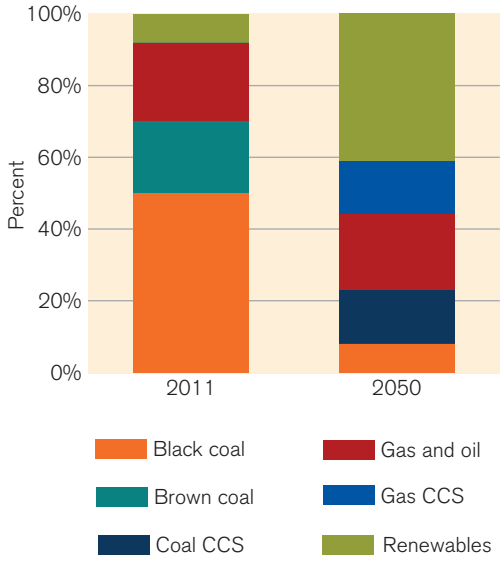


Figure 20: Estimated changes to the national generation mix in 2011 and 2050

Source: Department of Climate Change and Energy Efficiency, Australian Treasury Modeling, *Strong Growth, Low Pollution, Modeling a Carbon Price, Update (2011).*

The CPM is expected to cover approximately 500 businesses representing 60% of Australian GHG emissions from electricity generation, industrial facilities, fugitive emissions, and some landfills sectors.[178] An equivalent carbon price will be applied to some business transport emissions; big fuel users may opt into the scheme. The agricultural and land sectors will not be covered, but emission-reducing opportunities are offered through the CFI.

Figure 20 indicates the sectoral impact of the Scheme and measures to achieve Australia's mitigation target. Several sectors will receive assistance in the form of free permits: electricity generators will receive A$5.5 billion over five years; Emissions-intensive Trade-exposed (EITE) industries will receive A$8.6 billion to 2015[179] in the form of free permits set at two assistance levels (94.5% or 66%) as well as grants to increase energy efficiency. Households will be the largest recipients of assistance with over A$15.1 billion allocated to low- and middle-income households over four years.

From July 2015, scheme participants can meet up to 50% of their emissions obligation with international units. Unlike the EU ETS, there are not yet constraints on the geographic origin of international units or constraints on units from projects registered post-2012 (see Table 8). Like New Zealand, Australia may therefore be a source of demand for those CERs that will no longer be eligible in the EU ETS starting in 2013. Scheme participants may also surrender any international units which might subsequently be allowed by the Australian Government. Importantly, the Government reserves the right to disallow the use of some international units at any time to ensure the environmental integrity of the Scheme.[180] The Australian market will need to manage the risk around changing eligibility with reference to this.

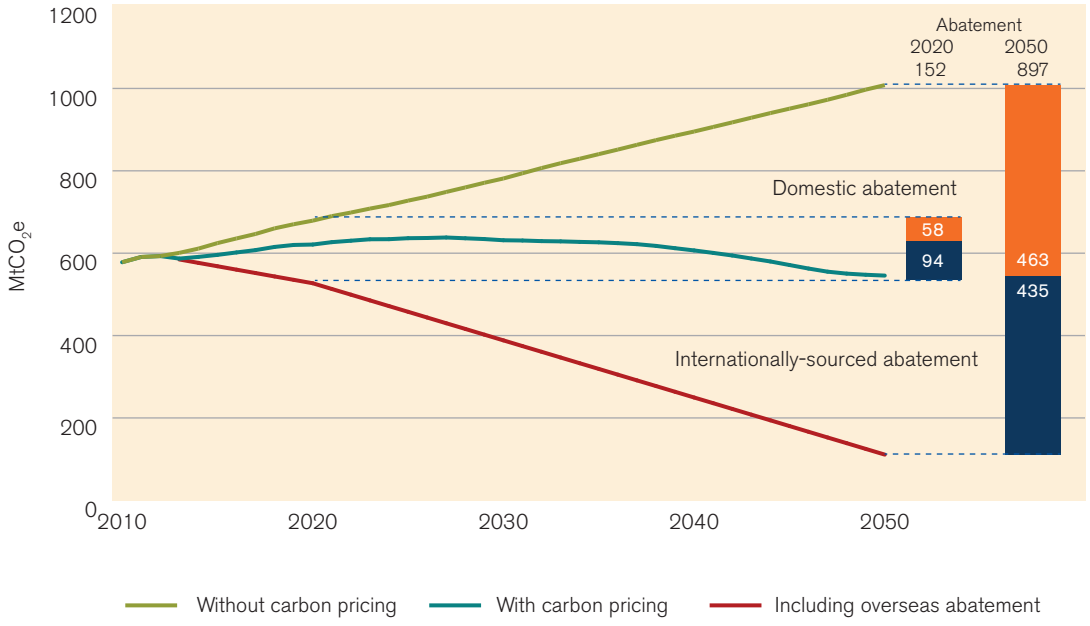
178. Source: Australian Government, Clean Energy Future Fact Sheet, *Carbon Pricing Mechanism: Who is liable?*
179. Source: Australian Government, *Mid-year Economic and Fiscal Outlook 2011-12.*
180. The Government may allow other international units by regulation where they do not compromise the CPM's environmental integrity and with advance notification to the market. For disallowed units, liable parties will be able to use such units for the compliance year in which they were disallowed, but not subsequently. This effectively represents a "grace period" of 7-19 months in case of regulatory change, compared with the EU ETS "grace period" of 6 months - 3 years from which a decision to exclude a project type may enter into force.

Table 8: Eligibility of international units in compliance markets[181]

International unit	Eligibility*		
	CPM	EU ETS	NZ ETS
CERs	✔	✔	✔
CERs – registered post 2012 and outside of LDCs	✔	✖	✔
CERs - HFC-23, adipic acid, nuclear, afforestation, reforestation and large scale hydro not compliant with World Commission on Dam guidelines	✖	✖	✖ Ex. Large hydro
ERUs	✔	✔	✔
RMUs	✔	✖	✔

*Subject to restrictions

Figure 21: Australian GHG emissions and abatement forecasts – government policy scenario



Note: Emissions without carbon pricing include CFI abatement
Source: Treasury estimates from Monash Multi-Regional Forecasting (MMRF). Note that the internationally-sourced abatement forecasts throughout the remainder of this document refer to the internationally-sourced abatement forecasts in the Strong Growth Low Pollution (SGLP) modeling forecasts of 97 $MtCO_2e$ at 2020.

Figure 21 indicates the anticipated level of Australia's net emissions (with a carbon price) to meet its commitment to a 5% reduction on 2000 emissions levels by 2020 and the anticipated extent of imports of international units.[182] The Australian Treasury estimates that these could reach 97 million tCO_2e at 2020; this assumes, amongst other things, a A$29 (€23.3) carbon price.[183] It is also estimated that roughly 350-400 $MtCO_2e$ of international units will be imported over the entire 2015-2020 period.[184] This equates to approximately 26% of covered emissions in 2020. Secondary CERs, rather than primary CERs, are likely to represent the bulk

181. Source: Australian National Registry of Emissions Units Bill 2011; New Zealand Government, *The New Zealand Emissions Trading Scheme, Guidance on the use of CERs in the NZ ETS*, February 2012; Kossoy, A. and Ambrosi, P., *State and Trends of the Carbon Market 2010*, *What lies ahead for the EU ETS* and *Annex I: Supplementarity under the EU Climate and Energy Package*, pages 17 and 63, respectively, June 2010.
182. Based on results from Australian Treasury *Modeling, SGLP, Modeling a Carbon Price, Update*, 2011.
183. Source: Australian Government Treasury, *Strong Growth, Low Pollution, Modeling a Carbon Price* - September, 2011.
184. Sources: Australian government (communication) and Thomson Reuters Point Carbon, *Carbon Market Australia-New Zealand*, October 2011.

of this abatement as these units are highly liquid and fungible and currently trade at relatively low prices, especially given the strong Australian dollar.[185] However, it is important to note that, during the flexible price period, entities that choose to surrender international permits will need to pay an additional surrender charge on top of the international permit price.[186] The Government has released a discussion paper that outlines four different ways to implement the surrender charge. The options discussed range from valuing the offset at the actual price versus the market price at the time it was purchased versus the market price at the time of surrender. The introduction of the surrender charge has been the subject of extensive discussions, including whether its implementation constrains the capacity for scheme participants to meet their obligations in a flexible, low-cost way.

Despite the scheme's liberal linking provisions and low international unit prices, purchases of these units are likely to be depressed until further clarity is provided on:

- The structure of the Government's Surrender Charge, to be clarified in forthcoming regulations.
- The level of the caps that will be set by a non-political and independent Climate Change Authority and will help to inform scheme participants of their need for offsets.
- Overall political situation, given pledges by the opposition leader to repeal the carbon price after the next election.

In the absence of international unit purchases, a range of domestic trading opportunities may arise in the medium term. These include the trade of:

> "It is also estimated that roughly 350-400 MtCO2e of international units will be imported over the entire 2015-2020 period. Secondary CERs, rather than primary CERs, are likely to represent the bulk of this abatement"

- Freely allocated CUs that may be sold to other entities or back to the government. However, in the fixed price stage, these units cannot be banked into subsequent periods.
- Auctioned CUs: The government is likely to commence advance auctions of up to 15 million CUs for each floating price year. Although the timetable has not yet been set, the government's proposal is to commence auctions in FY 2013-14, most likely in early 2014.[187,188]
- ACCUs. These credits will be an attractive option during the fixed-price period if they trade below the fixed price. However, as ACCUs are a new type of unit, there is as yet no set pricing for them.
- Exchange products. Australia's main bourse, the Australian Stock Exchange (ASX), is expected to introduce carbon futures trading, offering both CUs and A$ denominated international units.

The CPM is designed to link with other emissions trading schemes operating internationally. The Australian Government is engaged in discussions with the European Union and New Zealand regarding the possibility of linking their schemes with the CPM.

185. A question remains as to whether Australian entities may be able to use CERs if its government decides not to sign up for the second commitment period of the KP.
186. When the international price is lower than the floor price.
187. Source: Australian Government, *Legislative Instrument for auctioning carbon units in Australia's Carbon Pricing Mechanism*, February 2012. This position paper indicates that the government's preferred position is to implement a sequential ascending clock auction. Accordingly, bidders will not be permitted to increase the bid quantity as the auction progresses. This type of auction is designed to optimize price discovery and contrasts with EU trading auctions, which are mainly uniform price sealed bid auctions (price discovery is less of an objective as a liquid secondary market exists). The government is expected to finalize the auction design in the first half of 2012.
188. While auctioning CUs ahead of the next federal election may reduce the risk that the opposition party, if elected, will unwind the scheme, there is also concern that a pre-election auction would see limited demand due to perceived sovereign risk.

6.1.2 The Carbon Farming Initiative

Alongside the CPM, the Australian Government has also formally launched the first regulated program that allows abatement activities from the land sector to generate carbon offsets. ACCUs will be issued in respect of each ton of abatement achieved by:

- Reducing or avoiding emissions (e.g., capture of methane emissions from landfills, reducing emissions from savannah burning, livestock production, and fertilizer use).
- Removing carbon from the atmosphere through bio-sequestration (e.g., growing trees) or sequestration within the ground (e.g., soil carbon).

CFI abatements that count toward Australia's Kyoto Protocol target can earn Kyoto ACCUs that will be fungible in both the CPM and in the international compliance market established under the Kyoto Protocol. Eligible sources include reforestation, and reducing emissions from livestock, manure, fertilizer, and waste deposited in landfills (before July 1, 2012). Some sources of CFI abatement will not be included in Australia's national greenhouse accounts under the Kyoto Protocol. Through the CFI, these activities can earn non-Kyoto ACCUs. Eligible sources include soil carbon, feral animal management, and improved forest management.

ACCUs will also only be issued for additional abatement. This means that ACCUs will not be available for projects that are required by law (regulatory additionality), or activities that are common practice and already widely adopted. While regulatory additionality will be assessed for individual projects, activities that go beyond common practice will be assessed using a Positive List. This approach assesses additionality for activities rather than for projects and, therefore, represents a streamlined way of identifying activities that are not common practice. The CFI is one of the first carbon offset schemes to use a Positive List approach to additionality. As at February 2012, three activities have been identified as Positive List activities: vegetation and wetland restoration, legacy landfill gas, and livestock management.

ACCU supply is expected to be limited at the outset, due to the long lead-time of projects, methodological complexity and uncertainty over measuring emissions. The Government has estimated abatement from Kyoto ACCUs at 7 $MtCO_2e$ in 2020.[189] The CPM will provide demand for Kyoto ACCUs, while the Australian Government will be a direct source of demand for non-Kyoto ACCUs in order to support the development of these projects, for which it has allocated A$250m over six years from 2012-13 for this purpose. In addition, Australia's National Carbon Offset Standard[190] will be amended to recognize both Kyoto and non-Kyoto ACCUs as eligible.

While abatement opportunities are likely to be leveraged in the medium to long term, the CFI offers an important opportunity for road testing approaches to land-use offsets and additionality through positive lists. As such, the scheme has been awarded bipartisan support.

6.2 NEW ZEALAND

In its third surrender year for mandatory sectors, New Zealand's Emissions Trading Scheme (NZ ETS) closely tracked international markets given low international offset prices. A government-appointed review of the scheme was also completed; it recommended that the scheme continue, but at a slower pace. This recommendation

189. Source: Australian Treasury Modeling, *Strong Growth, Low Pollution, Modeling a Carbon Price*. Update 2011.
190. National Carbon Offset Standard – The Australian Government introduced the National Carbon Offset Standard (NCOS) on July 1, 2010 to provide national consistency and consumer confidence in the voluntary carbon market. The standard serves two primary functions – it provides guidance on what is a genuine voluntary offset and sets minimum requirements for calculating, auditing and offsetting the carbon footprint of an organization or product to achieve 'carbon neutrality'.

was on the basis that New Zealand is on track to meet its Kyoto Protocol obligations (emissions to remain at 1990 levels) as well as its conditional 10-20% reduction target by 2020 and 50% reduction target by 2050.

The independent government-appointed review of the NZ ETS, published in September 2011, considered the operation and effectiveness of the scheme since it commenced for forestry in 2008 and for energy producers, industrial processes, and transport in 2010. In view of the status of UNFCCC negotiations, and actions by its key trading partners, the Review also provided recommendations on how the scheme should operate post-2012, as follows:

- Gradually scaling up the current provision to surrender one emission unit for every two tCO_2e from 2013 to 2015 (increasing at intervals of 67% in 2013, 83% in 2014, and 100% in 2015).
- Agriculture surrenders one unit per every two tCO_2e for the first two years of its entry into the ETS in 2015.[191]
- Including the waste sector and the synthetic gas sector in 2013. This will cover methane from landfills, and hydrocarbons and perfluorocarbons for refrigeration and other uses.
- Maintaining commitments to cover agriculture from 2015 and exclude any price floors.
- Scrutinizing the eligibility of Certified Emission Reductions (CERs) generated from hydrofluorocarbon-23 (HFC 23) and nitrous oxide (N_2O) projects on the basis of environmental integrity and supply-side concerns. The government responded by regulating a ban on these credits from December 23, 2011.[192]

In April 2012, the government released a consultation paper that considers these recommendations. The paper proposes a raft of changes in an effort to improve the operation of the ETS and to create more consistent incentives for domestic abatement. Some of the key proposals include setting an absolute cap on covered emissions; limiting the use of international offset credits; maintaining the NZ$25 price ceiling beyond 2015; changing the ETS rules for pre-1990 forest-owners to bring them into line with new international forestry rules decided at COP 17 in Durban last year; and allocating allowances through auctions from 2014 or 2015. Once the public consultation phase is complete, an amendment bill is expected to follow.

In 2011, scheme participants secured enough secondary CERs to achieve compliance for the next two to three years,[193] given low CER prices, a strong New Zealand dollar, and the scheme's 100% international offset provisions. Domestic activity in the NZ ETS has been assessed based on the internal transfers[194] tracked within the New Zealand Emissions Unit Register (NZEUR). It indicates that about 27 million New Zealand units (NZUs) changed hands in 2011, representing a total value of US$351 million.[195]

The steady inflow of international offsets placed pressure on domestic emission permits, which fell from NZ$20 in May to converge close to secondary CERs, at NZ$7.00, in December 2011. While this has dampened the short-term incentive to increase forest coverage, some foresters remain present in the market and, according to brokers, have been buying back New Zealand Units (NZUs) that had been previously sold at higher prices. Prior to the slump in domestic prices, forest plantings had risen 27% in the year to April 1, 2011.[196]

191. To increase by NZ$5 each year.
192. Credits already purchased from these projects may be used for compliance in 2012 and 2013.
193. According to local brokers.
194. It is therefore conservatively assumed that most transactions are made on a spot basis, given the low level of maturity (most demand-side participants joining the ETS in July 2010) and sophistication of the market (absence of exchange-based trades).
195. Source: Prices kindly provided by Westpac.
196. Source: Thomson Reuters Point Carbon, *Carbon scheme boosts NZ tree planting*, December 20, 2011.

In addition to its liberal international linking provisions with the Kyoto Protocol's flexibility mechanisms, New Zealand is considering linking with the Australian carbon market from 2015. As in Australia, a question remains as to whether New Zealand entities will be able to access CERs if its government decides not to sign up for a second commitment period of the KP.

6.3 NORTH AMERICA[197]

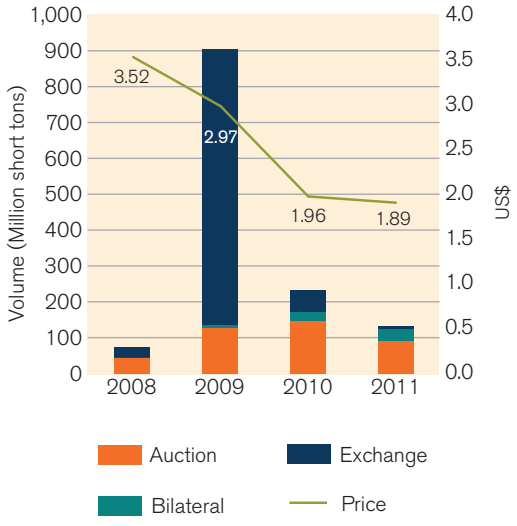
6.3.1 Regional Greenhouse Gas Initiative

In 2009, the Regional Greenhouse Gas Initiative (RGGI) was launched. It became the first mandatory Emissions Trading Scheme (ETS) in the United States, and it covers emissions from power plants in the Northeast and Mid-Atlantic States[198] through to 2018. The scheme is characterized by three compliance periods, the first of which was completed in 2011. Over the course of the first compliance period, emissions across the 10 participating states remained relatively stable, declining only 2.7 million short tons of CO_2e ($stCO_2e$)[199] from 123.7 million $stCO_2e$ ($MstCO_2e$) to 121 $MstCO_2e$. This is 36% lower than the annual cap, which was set at 188 $MstCO_2e$, based on an analysis of 2000-2004 emissions. The primary catalysts for the decline in emissions from 2005 onward include lower electricity demand due to the development of energy efficiency measures and weather conditions; fuel switching from coal and petroleum to gas triggered by lower relative natural gas prices; and increasing power generation from non-emitting sources such as nuclear and renewable energy.

The first compliance period of the scheme was therefore marked by significant over-allocation and prices that tracked the US$1.86 floor price (US$1.86 in 2010 and US$1.89 in 2011) from September 2010 onward (see Figure 22).

Coinciding with the over-allocation of permits and low prices, the share of secondary market exchange-based transactions fell from 85% in 2009 to 6% in 2011, with most transactions conducted on a bilateral spot basis. The average daily volume of RGGI futures contracts listed on the Chicago Futures Exchange (CCFE) declined by a factor of 100 over the same period, from an average daily volume of 2.7 $MstCO_2e$ in 2009 to 0.28 $MstCO_2e$ in 2011. The little difference between the average settlement price of auctions (US$1.89/$stCO_2e$) and that of bilateral transactions through the RGGI CO_2 Allowance Tracking System (RGGI COATS) (US$1.91/$stCO_2e$) in 2011 tends to show that most bilateral transactions were spot. Such a radical move may hint at a decreasing interest from compliance participants in hedging positions through derivatives contracts in the context of an over-allocated market, and/or the exit of some financial participants that used to provide liquidity onto the CCFE platform.

Figure 22: Market volumes and prices on the RGGI, 2008-2011



Source: World Bank, data from RGGI COATS, CCFE, ICE.

197. The sequence of jurisdictions follows alphabetical order.
198. Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Rhode Island, and Vermont.
199. A short ton of CO_2e is equal to 0.9072 metric tons of CO_2e. For the sake of data homogeneity with other markets, we convert volumes in metric tons in our global market figures in Chapter 1 (i.e., in 2011, 132x0.9072 = 120MtCO_2e).

As of December 31, 2011, 89% of first compliance period CO_2 allowances were sold at auction. Since commencement in September 2008, auction revenues have totaled about US$952 million[200] and have been roughly allocated across all RGGI states on an average basis as follows:[201]

- 48% to energy efficiency programs promoting new installations and retrofits in residential and commercial facilities (e.g., insulation). These measures are estimated to have generated electricity bill savings of US$1.3 billion for residential, commercial, and industrial consumers across the participating states. Savings in non-electric energy supply (natural gas, heating oil) amount to an additional US$174 million;
- 20% to states' general budgets;
- 14% to direct electricity bill assistance;
- 7% to support renewable power generation;
- 11% to various other environment related programs and outreach activities.

Although electricity generators lost US$1.6 billion in revenue over the period (2009-2011) due to lower demand caused by RGGI-funded energy efficiency investments, consumer gains and other benefits, including cash injection into the economy, led to a net economic impact of US$1.6 billion and the creation of 16,000 jobs.[202]

Only nine states will participate in the second compliance period, from 2012-2014, following New Jersey's announcement that it would withdraw from the program in 2011.[203] The annual cap for this period is set at 165 $MstCO_2e$, still far above the trend for emissions. However, in 2012, the program embarked on a comprehensive review, as specified in the 2005 memorandum of understanding establishing the RGGI. The review is expected to result in a set of recommendations for consideration in late-2012, and will be applied, following relevant rulemaking, legislative, and public processes in each participating state. The states are working with stakeholders to evaluate key program design elements, such as the redefinitions of the cap trajectory and the price floor level, the introduction of further price collars, imported electricity and associated emissions,[204] and the place of the offset program in the scheme.

6.3.2 California, Québec and the Western Climate Initiative

In 2007, the Western Climate Initiative (WCI) was launched; it now encompasses the Canadian provinces of British Columbia, Manitoba, Ontario, and Québec, as well as the U.S. State of California. Since then, all partners have been working together to develop harmonized cap-and-trade legislation, with the intention to have their laws be adopted, implemented, and regulated under each jurisdiction's authority. In November 2011, a nonprofit corporation WCI, Inc., was created to provide the partners with administrative and technical support to help them operate their programs. In 2011, California and Québec were the first two jurisdictions to adopt cap-and-trade regulations. Although some of

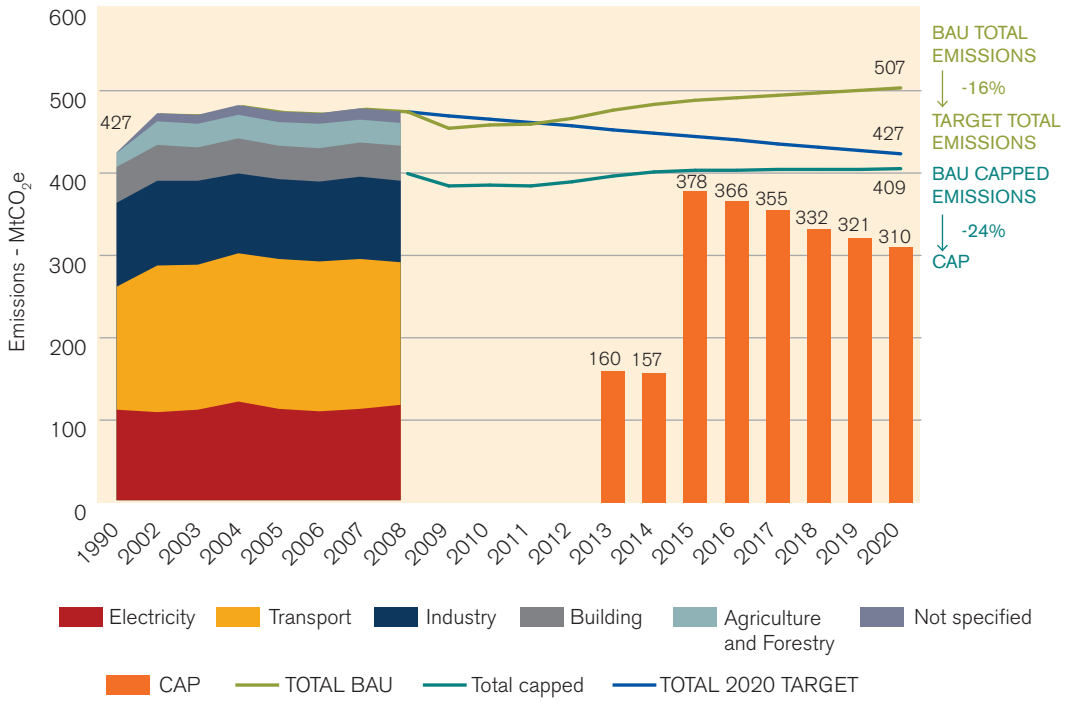
200. A total of 22% of the allowances offered at auctions were not sold. In December 2011, the states of Connecticut, Delaware, Maryland, Massachusetts, New York, Rhode Island, Vermont, and, by default, New Jersey, announced their intent to retire 93.6% of those unsold allowances from the market; the States of Maine and New Hampshire had not, as of early April, agreed to do the same..
201. Source: P. J. Hibbard, S. F. Tierney, A. M. Okie, P. G. Darling, *The Economic Impacts of the Regional Greenhouse Gas Initiative in Ten Northeast and Mid-Atlantic States*. Review of the Use of RGGI Auction Proceeds from the First Three-year Compliance Period, Analysis Group, 2011.
202. Source: P. J. Hibbard, S. F. Tierney, A. M. Okie, P. G. Darling, *The Economic Impacts of the Regional Greenhouse Gas Initiative in Ten Northeast and Mid-Atlantic States*. Review of the Use of RGGI Auction Proceeds from the First Three-year Compliance Period, Analysis Group, 2011.
203. Source: Department of Environmental Protection, State of New Jersey. Notice of withdrawal of agreement to the RGGI memorandum of understanding, November 29, 2011.
204. An econometric analysis performed by the New York Independent System Operator (the electricity grid administrator) finds no evidence of interstate leakage from 2008-2010 caused by RGGI compliance costs, but does forecast such impact with higher RGGI allowance prices. Source: A. G. Kindle, D. L. Shawhan. *An Empirical Test for Inter-State Carbon-Dioxide Emissions Leakage Resulting from the Regional Greenhouse Gas Initiative*. New York Independent System Operator Inc., and Rensselaer Polytechnic Institute, 2011.

them are reported to be facing their own political challenges,[205] the other three WCI partners continue efforts to develop and adopt their respective programs. As recommended by WCI rules,[206] California and Québec are now working toward linking from the start of their programs in January 2013.

6.3.2.1 California

The Global Warming Solutions Act of 2006 – known as Assembly Bill (AB) 32 – requires California to cut GHG emissions to 1990 levels by 2020 and directs the California Air Resources Board (CARB) to develop and adopt regulations across the state economy to provide incentives for reducing the state's dependence on fossil fuels, stimulating investment in clean and efficient technologies, and improving public health.[207] Under AB 32, a 2008 Scoping Plan was created which calls for the establishment of a broad-based cap-and-trade scheme as the core instrument of California's climate change strategy. The cap-and-trade scheme is to cover 85% of statewide GHG emissions of which transport and power accounted for 38% and 25% in 2008 respectively (see Figure 23).[208] It joins a suite of other major measures, including standards for ultra-clean cars, low-carbon fuels, and renewable electricity.[209]

Figure 23: California's historical GHG emissions, projections, and reduction targets[210]



Source: World Bank, CARB.

205. Source: Lancaster. R, *Counting Down Carbon Trading magazine*, February 2012.
206. Source: Western Climate Initiative, *Design for the WCI Regional Program*, 2010.
207. Source: State of California, *Global Warming Solutions Act of 2006*, 2006.
208. Source: California Air Resources Board, *California Greenhouse Gas Inventory for 2000-2008*, 2010.
209. The main measures in the electricity sector include the expansion of the 2002 Renewable Portfolio Standard (RPS) up to 2020, with a 33% target for the share of renewable energy in utilities' power generation or procurement, as well as energy efficiency standards for buildings and new appliances. For transport, a "Low Fuel Carbon Standard" sets a 10% carbon intensity reduction target for fuel vehicles by 2020, and a "Low Emission Vehicle" (LEV) program will further bring down existing emission standard targets for new passenger motor vehicles produced up to 2025. Source: California Air Resources Board, State of California, *Climate Change Scoping Plan*, 2008.
210. CARB's 2020 forecast includes projected reductions from existing RPS and LEV programs (38 $MtCO_2e$ in total). Cap data results from the total allowance budget minus the allowances set aside in the Price Containment Reserve (PCR, thereafter described) and Voluntary Renewable Electricity (VRE) program. The result is a 16% reduction from business-as-usual (BAU) levels in 2020 for total emissions and 24% for those under the cap. Source: California Air Resources Board, California GHG Emissions - Forecast (2008-2020), 2010.

California's cap-and-trade regulation was adopted by CARB in October 2011 and will be enforced from January 1, 2013. In the program's first compliance period (2013-2014), it will cover large stationary sources that emit at least 25,000 tCO_2e per year in the industry and electricity sectors, including out-of-state generation (i.e., imports). From 2015, distributors of transportation, residential, and commercial fuels will enter the scheme, bringing the number of covered entities to about 600. The cap is set in 2013 at about 2% below CARB's 2012 emissions level forecast, declines 2% in 2014, and then 3% annually from 2015.[211]

Allocation to industrial facilities is based on a carbon emissions efficiency benchmark specific to each manufactured product. Facilities with products too complex for product benchmarking will be given their allocations using an energy-based allocation method. From scheme commencement, they will receive most allowances for free to lessen the financial impacts of the scheme and minimize emissions leakage. For those with the least level of trade exposure and emissions leakage risks (e.g., pharmaceutical and medicine manufacturing), the share of free allowances will decline from 100% in the first compliance period (CP1) down to 50% in CP2 and 30% in CP3. In the power sector, only distributors – as opposed to generators – will be given free allowances. Private entities, referred to as Investor Owned Utilities (IOUs), are required to fully monetize them at auction; Publicly Owned Utilities (POUs) can also use them to cover compliance obligations. The California Public Utilities Commission (CPUC), which regulates IOUs, is currently looking at how to spend the resulting proceeds to maximize end-consumers' benefits on their electricity bills. Additional allowances will be accessible through quarterly auctions, the first of which is expected to be held on November 14, 2012.[212] The minimum bid is set at US$10 in 2012, and will increase 5% (plus inflation) annually. In its 2012-2013 budget, California's Department of Finance estimates it will receive US$1 billion in revenues from auctions. Half is planned to be used to cover the state's costs related to GHG mitigation activities, while the remaining half shall be invested in clean and efficient energy, low–carbon transportation, natural resource protection, and sustainable infrastructure development.[213]

Several cost-containment mechanisms will be established to limit compliance participants' exposure to high prices. A percentage of each annual allowance budget will be set aside in an Allowance Price Containment Reserve (PCR). Those allowances will be available to compliance participants from 2013, at a fixed pre-determined price and until the reserve is exhausted, if these face or expect high prices (see Annex 4: California's Cap-and-Trade Design Features). The use of offsets is limited to 8% of covered entities' compliance obligation, which amount to a maximum of 218 $MtCO_2e$ over 2013-2020.[214]

Eligible offsets can be generated through four sources:

- "Compliance Offsets Credits" issued by CARB from a project in the U.S. or its Territories, Canada, or Mexico, and developed according to a compliance offset protocol approved by CARB. As of today, four offset protocols have been approved by CARB: U.S. Forest Projects, Livestock Projects, Ozone Depleting Substances Projects, and Urban Forest Projects. The four approved protocols restrict eligible activities to the

211. The cap in Figure 23 is the annual allowance budget netted by the allowances joining the Allowance Price Containment Reserve.
212. Source: California Air Resources Board, *Testimony of Chairman Mary D. Nichols at Senate Select Committee on Environment, Economy & Climate Change*, 2012.
213. Source: Department of Finance of the State of California, *Governor's Budget 2012-2013, Environmental Protection Budget*, 2012.
214. 28.0 $MtCO_2e$ over 2013-2014 (CP1), which is 8% of the allowance budget for that period, 99.8 $MtCO_2e$ in CP2, and 90.3 $MtCO_2e$ in CP3.

U.S., which means that additional protocols would be needed for projects to be in Canada or Mexico. Additional protocols are currently under consideration.[215]

- "Early Action Offsets Credits" issued by a voluntary program approved by CARB, and generated from a U.S.-based project developed according to a CARB-approved protocol for emission reductions and/or sequestration achieved between January 2005 and December 2014. Before an Early Action Offset Credit can be transacted on CARB's tracking system and/or used for compliance, it must first undergo regulatory verification and review. CARB will then issue a Compliance Offset Credit, based on a one-to-one basis. As of today, only four Climate Action Reserve (CAR) project types can generate Early Action Offset Credits.[216] As of April 5, 2012, CAR had issued 7.5 million Climate Reserve Tons (CRTs) under those four protocols. Of these, 1.2 million CRTs have been retired for voluntary purposes, leaving approximately 5.3 million CRTs available for conversion for compliance use. CAR expects to issue 29.5 million of those by the end of CP1 in 2014.[217] Should all of them be compliance-oriented and succeed in converting to CARB-issued compliance offsets, they could support the entire demand for offsets for CP1 (i.e., 28 $MtCO_2e$).
- "Sector-Based Offset Credits" from crediting programs (including REDD) in an eligible developing country or some of its jurisdictions. Such credits are subject to a sub-limit of 2% of compliance obligation in CP1, and 4% in CP2 and CP3, which represents about 97.7 $MtCO_2e$ maximum over 2013-2020. Following the signature of a Memorandum of Understanding with the states of Acre in Brazil and Chiapas in Mexico in 2010, a "REDD Offset Working Group" was established to inform the potential inclusion of such credits. This will, however, be subject to further regulation.
- Compliance Offset Credits issued by a linked regulatory program, subject to further rulemaking.

All offset credits issued by CARB are subject to an invalidation provision, under which CARB may remove or require replacement of those credits, the generation of which has proved to result from an over-estimation of the GHG reduced and/or removed or be in breach of applicable law. This provision has attracted strong criticism from the industry as it places potential liability on buyers of the credits.[218] In April 2012, the CPUC approved rules for IOUs' carbon procurement. These require that IOUs only engage in bilateral transactions of carbon units in the secondary market through public Requests for Offers. The rules also restrict offsets procurement to spot transactions[219] and forbid the purchases of early action credits.

California's market has yet to take off, as it has been hampered by strong regulatory uncertainty; this is largely due to several legal challenges faced by the cap-and-trade scheme in the past. The absence of IOUs, whose authorization and conditions for participation have yet to be ruled by CPUC, has also restrained market liquidity. Exchange-based trading of California Carbon Allowances (CCAs) started in September 2011 with the introduction of derivatives contracts

215. Notably, some of the protocols developed by the American Carbon Registry: Emissions Reductions in Rice Management Systems, N_2O Emissions Reductions from Changes in Fertilizer Management, and Conversion of High-Bleed Pneumatic Controllers in Oil & Natural Gas Systems.
216. Several CAR protocols can be used to cover the four project types for which CARB has a compliance offset protocol. These are the Climate Action Reserve Urban Forest Project Protocol versions 1.0 through 1.1, U.S. Ozone Depleting Substances Project Protocol version 1.0, U.S. Livestock Project Protocol versions 1.0 through 3.0, and Forest Project Protocol version 2.1 and versions 3.0 through 3.2.
217. Source: Climate Action Reserve, *Projections of future CRT issuance*, April 5, 2012.
218. Source: International Emissions Trading Association, *IETA submission to CARB on AB32 program rules during first commenting period*, 2011.
219. Source: Public Utilities Commission, State of California, *Decision on System Track I and Rules Track III of the Long-Term Procurement Plan Proceeding and Approving Settlement,* April 2012.

on the ICE and the Green Exchange. A total of 3.927 million CCAs were exchanged, mostly through ICE's OTC platform.[220] In addition, Point Carbon tracked 196,000 CCAs that were exchanged bilaterally. We estimate the total value for the CCA market in 2011 at US$63 million.

In 2011, 7.375 million tons of U.S. domestic offsets subject to transactions motivated by compliance in California (US$67.7 million value) were tracked.[221] A series of contracts have emerged on the market, and as many price references, according to the risk of eligibility in the future compliance regime of the underlying assets. The "CARB guaranteed offset contract" captures the highest value, as it provides buyers with the guarantee to be delivered CARB-issued Compliance Offset Credits at expiration and guarantees that, if the credits are revoked by CARB, the seller will replace them. According to Point Carbon, the corresponding December 2013 forward contract traded at an average US$12.25 in March 2012, which was 12.5% off the CCA price (see Figure 24). This discount can be explained by the 8% offset utilization limit applied to offset credits – as opposed to CCAs, which have no offset limits and thus enjoy higher liquidity. In addition, offsets carry the invalidation risk, unique to California's market, and therefore differ from that existing between EUAs and CERs in the EU ETS. The "CARB non-guaranteed offset contact" traded at a 12% discount from the latter offset. These contracts do not provide a guaranty that a credit will be replaced in case it is revoked. A third category of contract provides delivery of credits issued by the Climate Action Reserve, the so called "Climate Reserve Tons (CRTs)", under four protocols – U.S. forest, ozone-depleting substances, livestock methane, and urban forestry – from 2005-2014, eligible to be converted into CARB Early Action Offset Credits. In March 2012, those voluntary credits, yet regarded as "pre-compliance," ranged from US$7.75 to US$8.25, which is roughly 35% below the price of CARB-guaranteed offsets. This discount therefore reflects the risk attached to the further regulatory verification and review which is necessary for eligible CRTs to be converted into compliance offset credits by CARB.

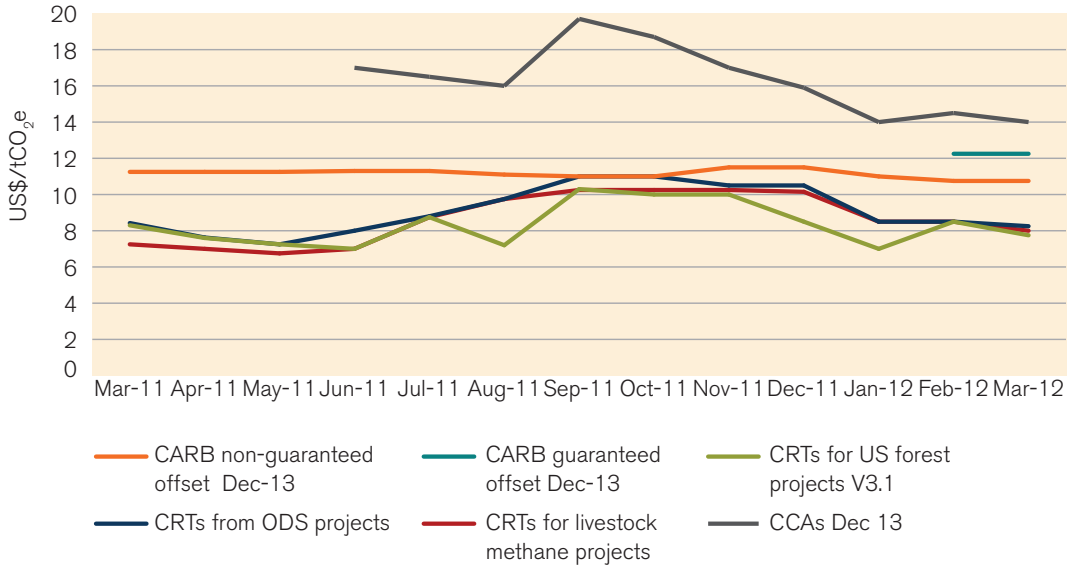


Figure 24: Pricing for CARB eligible market instruments

Source: Thomson Reuters Point Carbon

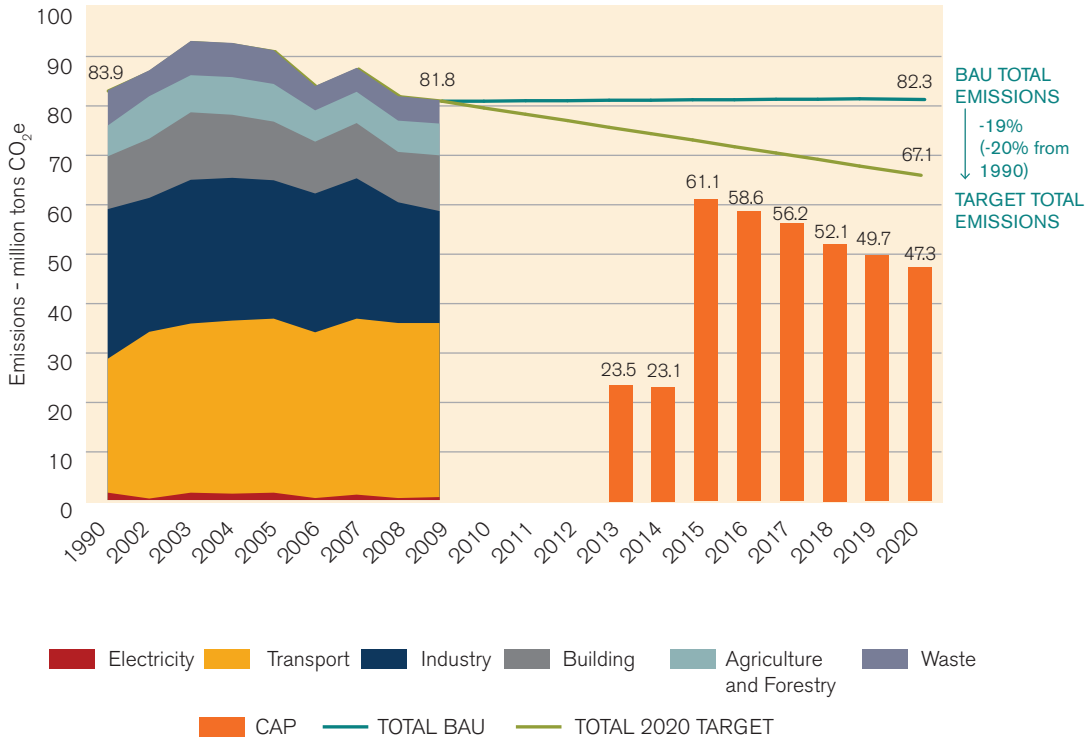
220. Green Exchange lists futures and option contracts for delivery in Decembers 2012, 2013, 2014, and 2015. 0.025 Million CCAs Futures were traded in 2011. ICE offers OTC clearing services on forward and option contracts for delivery in December 2012, 2013, 2014, and 2015. A total of 2.377 million futures and 1.525 million options were cleared on ICE in 2011.
221. Thomson Reuters Point Carbon communication.

6.3.2.2 Québec

In 2009, Québec emitted 81.8 $MtCO_2e$, accounting for 11.9% of Canada's GHG emissions.[222] The 2009 per capita GHG emissions stood at 10.4 tCO_2e, which is almost half of the nationwide figure.[223] As in California, the transport sector accounts for the largest share of GHG emissions, with 43.5% of the total; these have increased 26.6% from their 1990 level. Industry stands at 28%, buildings at 14%, agriculture at 7.9%, waste at 5.9%, and electricity generation at 0.8%. It is in the last sector that Québec differentiates itself the most from California (25% of total GHG emissions), as 97% of its electricity is sourced from hydropower plants.[224]

In November 2009, Québec adopted the target to reduce GHG emissions to 20% below 1990 levels by 2020; this is equivalent to a 19% drop by 2020 from a business-as-usual scenario (see Figure 25).[225] A key instrument to achieve the target will be a cap-and-trade program passed in December 2011[226] within the broader context of the WCI, which will start operations in January 2013. Québec joined WCI in April 2008.[227]

Figure 25: Québec's historical GHG emissions, projections, and reduction targets



Source: World Bank, Ministry of Sustainable Development, Environment and Parks of Québec.

222. GHG inventory excludes emissions from land use, land-use change, and forestry (LULUCF). Source: Ministry of Sustainable Development, Environment and Parks of Québec. *Inventaire Québécois des émissions de gaz à effet de serre en 2009 et leur évolution depuis 1990*, 2011.
223. Canada's per capita GHG emissions stood at 20.5 tCO_2e. For reference, Alberta reached 63.7 tCO_2e per capita in 2009, and California 13.1 tCO_2e per capita.
224. Source: Ministry of Natural Resources and Wildlife of Québec.
225. Projections from Québec's Ministry of Sustainable Development, Environment and Parks. Source: Ministry of Sustainable Development, Environment and Parks of Québec, *Etat des lieux de la lute contre les changements climatiques au Québec*, 2011.
226. The cap-and trade program is part of the Québec's Climate Change Plan. The first Plan covered 2006-2012 and its measures resulted in a drop of 2.5% of GHG emissions from 1990 to 2009. New measures will be defined in the upcoming Plan will cover 2013-2020. Source: Ministry of Sustainable Development, Environment and Parks of Québec, *2006–2012 Action Plan, Québec and climate change, a challenge for the future*, 2008.
227. Source: Government of Québec, *Regulation respecting a cap-and-trade system for greenhouse gas emission allowances, Environment Quality Act*, 2012.

From 2013, the cap-and-trade program will cover about 75 industrial and power facilities emitting more than 25,000 tCO_2e per year. Distributors of fuels for the transportation and building sectors will enter the scheme from 2015. Although it will cover roughly seven times less emissions than California's plan,[228] Québec's regulation features very similar design and provisions (see Annex 5: Québec's Cap-and Trade Design Features). However, it includes some notable differences: although industrials will also be allocated free allowances based on a performance benchmark, only 75% of these will be allocated every year; the remaining 25% will be set aside until the following year, and will eventually be attributed based on verified emissions. In addition, the regulator may also claim back any allowance proved to have been over-allocated. Compliance obligations are not due annually, but only the year following the end of the compliance period (i.e., 2015, 2018, and 2021). Offset provisions are similar to those of California, with a limit set at 8% of compliance obligations for each compliance period. Further detail on the use of offsets is not yet known as Québec's offset regulation is still under development and will not be presented before the summer of 2012. In addition, emitters will be issued Early Reduction Credits (ERCs) for permanent, additional, and irreversible emissions reductions achieved ahead of the program start, up to January 1, 2008.

Québec's budget for 2012-2013 provides for green investments in an amount of CN$2.7 billion, 70% higher than the previous year.[229] Almost 90% is expected to come from auctions revenues under the cap-and-trade program. Two-thirds of the funds will be allocated to the transport sector for the development of an efficient network and fleet for Québec's mass transport system. The other third will contribute to the development of energy efficiency in building and industry, renewable energy for households' heating systems, and other GHG reduction-related measures.

6.3.2.3 Linking California's and Québec's emission trading schemes

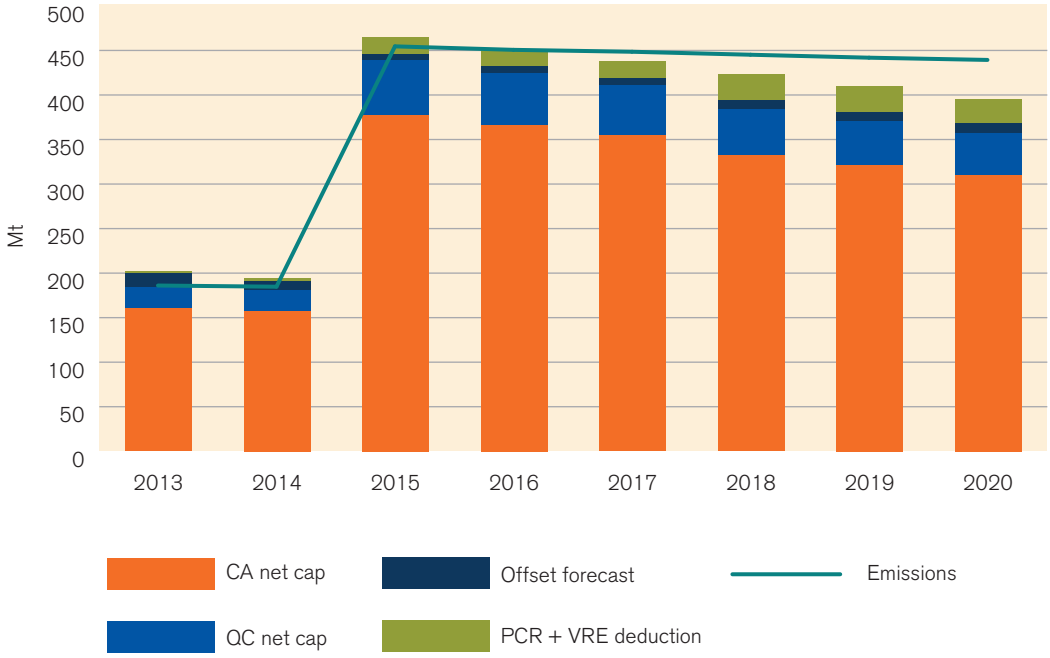
California and Québec are taking the necessary step to establish a single regional carbon market with full fungibility of each other's compliance instruments from January 1, 2013. Although both regulations were developed in accordance with WCI guidelines, further rulemaking and technical revisions are necessary to accommodate such linkage. On March 30, 2012, CARB staff published a discussion draft with proposed amendments to its cap-and-trade regulation. Those mainly relate to market infrastructures (e.g., account structure) and administration

> "California and Québec are taking the necessary step to establish a single regional carbon market with full fungibility of each other's compliance instruments from January 1, 2013."

(e.g., exchange rate management) to ensure consistent operation of a single market across jurisdictions. The proposed linkage regulation is expected to be submitted for Board consideration on June 28, 2012. It is expected that Québec will undergo the same process over 2012 and enforce necessary amendments ahead of the first auction. The first joint auction previously planned for August 2012 was postponed to November 14, 2012, with no expected impact on the start of the program or on the volume of allowances offered in 2012.[230]

228. Source: Government of Québec, *Annual caps on greenhouse gas emission units relating to the cap-and-trade system for greenhouse gas emission allowances for the 2013-2020 period, Draft Regulation, Environment Quality Act*, 2012.
229. Source: Ministry of Finance of Québec, *Budget 2012-2013, Québec and Climate Change a Greener Environment*, 2012.
230. Source: California Air Resources Board, 2012, *Testimony of Chairman Mary D. Nichols at Senate Select Committee on Environment, Economy & Climate Change.*

Figure 26: WCI annual market balance through 2020



Source: Point Carbon.

It is estimated that California's and Québec's combined GHG emissions under a business-as-usual scenario would decline from current levels through 2020, largely driven by California's complementary measures, such as the 33% Renewable Portfolio Standard (see Figure 26).[231] However, both jurisdictions feature high marginal abatement costs for power generators and limited opportunities for reductions in transport fuel consumption. It is therefore expected that offset supply availability will be the main allowance price driver in the WCI regional market. This would stand at US$12-27/tCO$_2$e in 2013 and US$60-131/tCO$_2$e in 2020, with the high end of the range in a scenario where respective offset programs would not expand beyond the four protocols approved by California.

6.3.3 Alberta

Alberta is Canada's largest greenhouse gas (GHG) emitting province, accounting for 34% of the country's total GHG emissions in 2010. This represents 235 MtCO$_2$e, a 41% increase from 1990 levels, driven primarily by increased production activity in its oil and gas sector.[232]

On July 1, 2007, Alberta launched a mandatory GHG emission intensity-based mechanism, enacting the first GHG emissions legislation in Canada. Approximately 100 entities with annual emissions exceeding 100,000 tCO$_2$e (ktCO$_2$e), are required by the legislation to reduce their emission intensity by 12% from average 2003-2005 levels.[233] Entities that do not meet reduction requirements on a given year may choose to meet these obligations by:

231. Source: Thomson Reuters Point Carbon, *WCI price forecast – the offset gap*, March 29, 2012.
232. Source: Government of Canada, *Canada's Greenhouse Gas Inventory Submission to the UN Framework Convention on Climate Change*, April 2012.
233. Source: Government of Alberta, Climate Change Emissions Management Act, 2007.

- Trading "Emissions Performance Credits" (EPC) that are awarded to covered entities that reduce emissions below their set target;
- Paying CN$15 (US$15.2) into a technology fund; and/or
- Purchasing Alberta-based offsets issued by the Alberta Offsets Registry under an approved protocol. Offset credits are only available on a "go-forward crediting" basis in accordance with changes to the regulations that took effect on January 1, 2012. Previously, producers were eligible for retroactive crediting. As per the new regulations, retroactive credits from 2002 to 2011 must be registered with the government by March 31, 2012.[234]

Although the volume of Alberta offsets retired in 2011 was not yet made public at the time of writing, it is estimated be similar to that of 2010 (see Figure 27). Thus, we estimate that the 2011 market value was roughly US$51.5 million (US$202 million since the start of the market in 2007).

6.3.4 British Columbia

The 2007 Greenhouse Gas Reduction Targets Act[235] commits the Government of British Columbia to reduce its GHG emissions by 33% from 2007 levels by 2020 and at least 80% by 2050. The regulation also directs public sector organizations – including schools, hospitals, post-secondary institutions, and core government ministries – to reach carbon neutrality from 2010 onward, using offsets for unavoidable GHG emissions. The 2008 Emission Offsets Regulation[236] gives exclusive mandate to the Pacific Carbon Trust (PCT), a Crown corporation of the Government of British Columbia,[237] to source British Columbia-based (BC) offsets, with a broader directive to stimulate the growth of the green economy in BC.

Figure 27: Alberta offsets: historic volume and prices 2007-2011

Source: World Bank, Government of Alberta,[238] Karbone.[239]

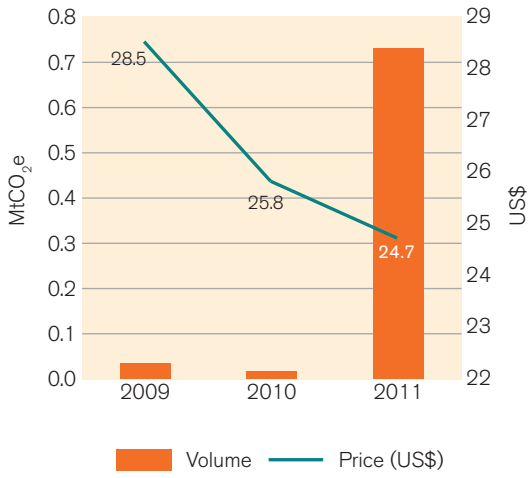


Figure 28: Purchases of BC offsets by the government of British Columbia 2009-2011

Source: World Bank, Pacific Carbon Trust.

In 2011, the Government of British Columbia bought 729,782 tCO_2e of BC offsets from PCT (US$18 million). In 2010, the British Columbia government became carbon neutral in accordance with the first year of the full carbon neutrality program. Purchases of offsets prior to this (i.e., 2009 and 2010) were used to offset government travel (see Figure 28).

234. Source: Government of Alberta, Alberta Environment and Water, N*otice of Final Deadlines for Claiming Historic Offset Credits*, December 2011.
235. Source: Government of British Columbia, Bill 44 – 2007: Greenhouse Gas Reduction Targets Act, 2007.
236. Source: Government of British Columbia, Emission Offsets Regulation, 2008.
237. Crown corporations are business enterprises established by the Government of Canada to implement public policy.
238. Source: Government of Alberta, Alberta Environment and Water, *Specified Gas Emitters Regulation Results for the 2010 Compliance Year*, May 2011.
239. Average price series also integrates sales of EPCs, which trade at similar price level to offsets. Source: Karbone Research and Advisory Group. *Alberta Specified Gas Emitters Regulation: Carbon Offset Market Overview*, April 2012.

6.3.5 Chicago Climate Exchange

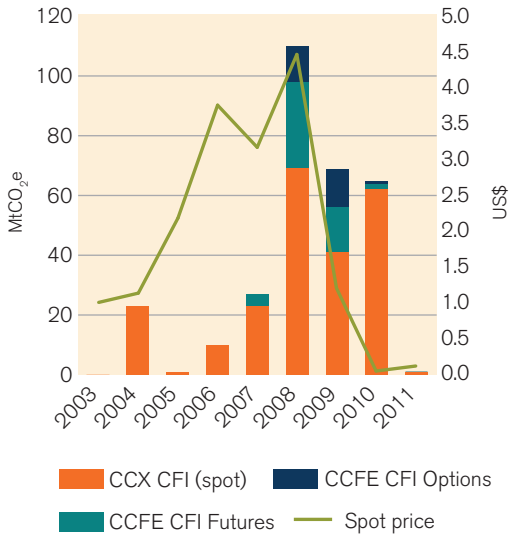
From 2003 through 2010, the Chicago Climate Exchange (CCX) operated as a voluntary cap-and-trade scheme. Its "full members" were mostly U.S-based entities that had made a commitment with the exchange to reduce GHG emissions. Each year, covered entities needed to surrender enough CCX compliance instruments – so-called Carbon Financial Instruments (CFIs) – to comply with their reductions commitments.[240] The total program baseline covered approximately 700 $MtCO_2e$.[241] Offset project developers could also participate in the scheme as "participant members" and provide the trading platform with CCX verified offsets. Once on the platform, these offsets would be recognized as CFIs, as would CCX emissions allowances that could be purchased by members or liquidity providers for compliance or other purposes.[242]

Following buyout of CCX's owner, Climate Exchange Group, the CCX program and platform was discontinued in January 2011.[243] The Chicago Climate Future Exchange (CCFE), which was the U.S. Derivatives branch of Climate Exchange Group, also delisted all contracts in February 2012;[244] it migrated some of them to ICE Futures Europe.[245] From 2003 to 2011, 745 $MtCO_2e$ of CCX compliance instruments were traded on the CCX, the CCFE, or the CCX offset registry, representing a cumulative value of US$290 million.[246] In 2011, 203,000 tCO_2e of CCX offsets were exchanged on the CCX Offset registry, representing a total value of US$64,715 (see Figure 29).[247]

6.4 REPUBLIC OF KOREA

In early 2010, the Republic of Korea enacted the Framework Act on Low Carbon and Green Growth.[248] The act establishes the legal framework to implement policies and measures set out in the country's Green Growth Strategy and its pledge to reduce GHG emissions by 30% below business-as-usual levels by 2020. It is intended that the main instrument of the national climate change policy will be the implementation of a nationwide emissions trading scheme (ETS). On May 2, 2012, after almost a year of review, the ETS Act[249] passed the Legislation and Judiciary Committee, and the National Assembly as a whole, lifting the last hurdles to ETS implementation.

Figure 29: CCX Carbon Financial Instruments (CFI) - historical volumes and price



Source: World Bank, CCX, CCFE, ICE.

240. 1 CFI=100tCO_2e
241. Source: IntercontinentalExchange, *Chicago Climate Exchange Fact Sheet*, December 2011.
242. Source: Guigon, P., Bellassen, V., Ambrosi, P, *Voluntary Carbon Markets: What the Standards Say*, CDC Climat Research, 2009.
243. Source: Chicago Climate Exchange, *CCX Advisory 2010-16*, December 2010.
244. Source: Chicago Climate Future Exchange, *CCFE Advisory 2012-04*, February 2012.
245. In its place, ICE launched a new CCX registry program in February 2011 that allowed for the issuance and OTC trading of CCX offsets to continue. The new "CCX Offset Registry Program" also allowed for OTC transactions of CCX allowances for entities formerly covered by the CCX program to close off their 2010 compliance obligations throughout 2011.
246. CCX compliance instruments refer to CFI contracts, CCX allowances, and CCX offsets. CCX offered spot trading for CFI contracts, and CCFE for Futures and Options CFI contracts. The CCX Offset Registry now allows for spot transaction of CCX allowances and offsets.
247. CCX offsets exchanged were 79.3% landfill, 11% renewable energy, 7.2% forestry, and 1.1% fuel switch, with the remaining from agricultural methane, agricultural soil, energy efficiency, and organic waste methane.
248. Source: Ministry of Government Legislation, Republic of Korea, *Framework Act and its Presidential Decree on Low Carbon and Green Growth in Korea*, 2010.
249. Republic of Korea, *Act on Allocation and Trading of GHG Emissions Allowances*, May 2, 2012.

"after almost a year of review, the ETS Act passed the National Assembly, lifting the last hurdles to ETS implementation."

In 2011 the Republic of Korea also implemented a GHG/Energy Target Management System (TMS) to support the development of the infrastructure and measuring, reporting, and verification (MRV) frameworks necessary to implement the ETS. By 2014, the TMS will mandate all entities that emit over 50,000 tCO_2e per year to meet sectoral GHG reduction targets based on the last three years of GHG emissions records.[250] The TMS will also cover other entities that do not reach the threshold but own individual facilities (e.g., industrial plants) that emit over 15,000 tCO_2e per year.[251] A total of 468 entities that collectively account for 60% of national GHG emissions are to be covered.[252]

The economy-wide ETS is set to start in 2015, including the entities and facilities covered by the TMS. The ETS will cover entities that emit above 125,000 tCO_2e per year and facilities that emit above 25,000 tCO_2e per year (see Table 9). Facilities emitting between 15,000-25,000 tCO_2e per year will remain covered by the TMS, although they will have the option to join the ETS on a voluntary basis. In response to strong opposition from industry, the ETS legislation has been softened since it was first introduced. The original proposal to start the scheme in 2013 has been deferred to 2015,[253] and most allowances are now to be allocated for free over the first (2015-2017) and second (2018-2020) phases of the scheme.

Table 9: Republic of Korea – emissions trading scheme

GHG	CO_2, CH_4, N_2O, HFCs, PFCs, SF_6.
Sectoral scope	-60% of the national total GHG emissions. -Inclusion threshold: Entities emitting more than 125,000 tCO_2e; Individual facilities emitting over 25,000 tCO_2e.
Compliance periods	-Compliance periods (CP): CP1 2015-2017, CP2 2018-2020. -CPs to last 5 years from CP3.
Allocation	-Over 95% free allowances in CP1 and CP2. -100% free for energy-intensive trade-exposed sectors. -Future allocation by Presidential decree.
Auctions	Early auctioning allowed.
Banking & borrowing	-Banking allowed over a CP and first year of the following CP. -Borrowing allowed over a CP only.
Other cost containment	A maximum of 25 % allowances will be reserved for the new entrant.
Offsets	Applicable standards (e.g. CDM and/or own standard) and utilization limit for international offsets to be specified by Presidential decree (expected in 2012)
Penalty for non-compliance	Up to 3 allowances for each allowance not surrendered (at most) with the maximum cap of 10 million Korean Won (KRW) per allowance (8,800 US$).
Linking	Considered in the future.

Source: World Bank, Presidential Committee on Green Growth.

250. A total of 372 entities in the industry and energy sectors, 46 in the building and transportation sectors, 23 in the waste sector, and 27 in the agriculture sector. Source: Taehee, K., Korea's Policy to Reduce GHGs, *Target Management System & Emission Trading Scheme, Presidential Committee on green Growth, Republic of Korea*, March 2012.
251. The inclusion threshold under the TMS progressively decreases from 125,000 tCO_2e per year for entities and 25,000 tCO_2e per year for individual facilities in 2011, to 50,000 tCO_2e per year for entities and 15,000 tCO_2e per year for individual facilities in 2014.
252. Total GHG emissions in the Republic of Korea stood at 607.6 $MtCO_2e$ in 2009 (excluding LULUCF), representing a 105% increase from 1990 levels. Source: Greenhouse Gas Inventory & Research Center of Korea, Korea's *Third National Communication Under the UNFCCC*, October 2011.
253. Source: Park, Hyoung Kun (Leo), *Development of Korean Emissions Trading Scheme*, Presidential Committee on Green Growth of the Republic of South Korea, Greenhouse Gas Market 2011, IETA, October 2011.

6.5 MEXICO

In April 2012, Mexico's Congress passed a General Law on Climate Change to support its target of reducing greenhouse gas (GHG) emissions by 30% below business-as-usual levels by 2020. The law also establishes a framework for the development of mitigation and adaptation actions. In doing so, it provides the government with a clearer mandate to act. The law complements existing initiatives, including the Public Service Electricity law that requires the consideration of externalities when evaluating the cost of electricity generation technologies and sets limits on electricity generation from fossil fuels (65% by 2024, 60% by 2035, and 50% by 2050).

"In April 2012, Mexico's Congress passed a General Law on Climate Change to support its target of reducing greenhouse gas (GHG) emissions by 30% below business-as-usual levels by 2020."

The general law on climate change provides the federal government with the authority to create programs, policies, and actions to mitigate emissions, including an emissions trading scheme (ETS). It is envisioned that these will likely be implemented in two phases: (i) a voluntary capacity-building phase, followed by (ii) the establishment of specific mitigation goals. To support its implementation, a National Emissions Registry is to be created by the Ministry of Environment. The law also prioritizes sectors that could be covered under these programs, including energy generation and use, transport, agriculture, forests and land use, waste, and industrial processes.

The new framework also defines the responsibilities of existing ministries and the three levels of government, and it allows them to explicitly allocate financial resources to climate change mitigation and adaptation. As such, it mandates the Ministry of Energy to create policies and incentives for the deployment of low-carbon technologies and the Environment, Finance, and Energy Ministries to define and create programs to incentivize emission reductions. In addition, it provides authority to the Ministry of Environment to create a voluntary emissions trading system, in which participants could perform transactions and operations linked to other international systems (e.g., through bilateral mechanisms).

Finally, the law also transforms or creates new institutions to carry out policies, strategies, and actions, including (but not limited to):

- A National Ecology and Climate Change Institute (previously the National Ecology Institute). The Institute will perform research and development activities and will advise the Ministry of Environment on technical issues. It will have greater independence and a budget of its own.
- Inter-Ministerial Commission on Climate Change. The Commission will supplant the previous Commission (created by presidential decree), and will be the main body in charge of developing climate change policy.
- Climate Change Council. The Council was established as a permanent consultation body of the Commission; it will be composed of members of civil society.

While much progress is still required to implement the activities that the law provides for, its passage is a significant step forward and signals Mexico's strong commitment to the climate change agenda.

6.6 BRAZIL[254]

In recent years, climate change policies and subsequent capital mobilization have created an enabling environment for low-carbon investment and market initiatives in Brazil. Further investment is envisioned ahead of Brazil's hosting of the Soccer World Cup in 2014 and the Olympic Games in 2016. In this context, the federal government, sub-national governments, and the private sector have pursued green infrastructure opportunities. This is likely to be showcased when Brazil hosts the Rio+20 Conference (June 20-22, 2012), which is to focus on how to build a green economy and develop an institutional framework for sustainable development.

A federal law laid out the conditions for a national carbon market. Passed in December 2009, the National Policy on Climate Change mandated a voluntary national target to reduce emissions by 36.1% to 38.9% by 2020. The provision does not specify the principles for a national carbon market, but does allow for the national stock exchanges to be integrated into the scheme.[255] An approved regulation included sectoral goals.[256] A technical working group led by the Ministry of Finance was established to make proposals for a national carbon market. In addition, sub-national jurisdictions are also moving ahead with low-carbon initiatives.[257]

Acre has been a pioneer in the development of public policies aiming at the sustainable use of natural resources. In 2010, Acre passed a law[258] establishing the State's System of Incentives for Environmental Services (SISA) to preserve and foster a forest-based, low-carbon economy. The law also establishes a comprehensive REDD+ policy. Other initiatives include: (i) the creation of the Promotion and Environmental Services Enterprise[259], a public-private partnership aiming to develop local capacity through the establishment of domestic and international networking; and (ii) the participation in the Governors' Climate and Forest Task Force.[260] Finally, in November of 2010, Acre signed a Memorandum of Understanding for environmental cooperation with the states of California (United States) and Chiapas (Mexico), which includes the possibility to provide REDD+ credits to the California cap-and-trade scheme (AB32).[261]

Two forward-looking initiatives already underway may place the state and the city of Rio de Janeiro among the front-runners of the carbon market in Brazil. An emissions trading scheme (ETS) for the State of Rio de Janeiro will have its first legally binding period for private companies starting in 2013.[262] The program will be presented during the Rio+20 Conference, with the first pilot stage ending in 2015; subsequent stages will run in three 5-year phases. The initial targets will primarily cover the oil and gas, steel, chemical, petrochemical, and cement sectors. The second activity is a partnership between the state and the city of Rio de Janeiro to create the BVRio, the Rio de Janeiro Environmental Asset Exchange. BVRio will provide a carbon market platform for companies to negotiate and trade environmental assets in the form of allowances, offsets, and other carbon-linked financial products.

In 2009, the State of Sao Paulo passed a law defining a mandatory target to reduce its economy-wide emissions by 20% by 2020 to 112 $MtCO_2e$,

254. The text benefited from the generous and thoughtful insight provided by Ludovino Lopes, Eufran Amaral, Fabio Vaz, Monica Julissa, Walter Figueiredo de Simoni, and Fabiana Ferreira Candiano.
255. Source: Law nº 12.187, December 29, 2009.
256. Source: Regulation of the National Policy by Decree Number 7.390, December 9, 2010.
257. States are intentionally listed in alphabetical order.
258. Law nº. 2.308/2010.
259. *Companhia de Fomento a Serviços Ambientais*, in Portuguese.
260. The Governors' Climate and Forest Task Force is a multi-jurisdictional collaborative effort between 16 States and provinces from Brazil, Indonesia, Mexico, Nigeria, Peru, and the U.S. focused on the development of rules and capabilities necessary to generate compliance-grade assets from REDD.
261. To implement this memorandum, the Sub-national REDD Task Force (ROW) was created.
262. Source: Thomson Reuters Point Carbon. *Rio releases ETS details, sets periods for 3 phases*, March 29, 2012.

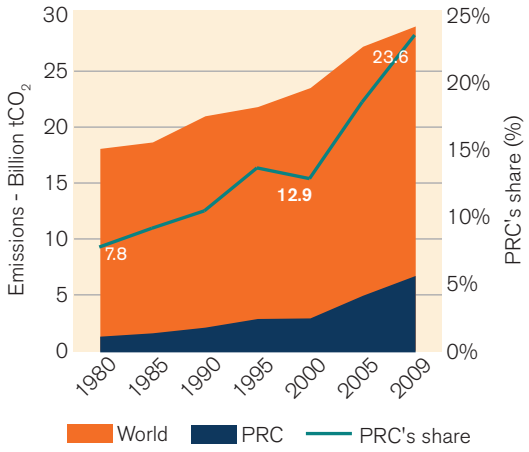
down from 140 $MtCO_2e$ in 2005.[263] Sectoral targets are yet to be defined. Although the law anticipates the creation of economic, financial and fiscal incentives to foster the development of low carbon projects, it does not include a provision for a domestic carbon market. In addition, the State's Green Economy Promotion program was created to offer credit lines for actions aiming at curbing GHG emissions.[265,265] Among the existing private-sector initiatives, the Brazilian Securities, Commodities, and Futures Exchange (BM&FBOVESPA) has played an active role in auctioning carbon credits.[266] Ahead of the game, 57 of the largest companies in the country, most of them based in Sao Paulo, have already established voluntary emission reduction plans.[267]

Despite a slow start, voluntary carbon markets are also gaining momentum. Although voluntary carbon markets in Brazil are in the early stages, they already represent 60% of the voluntary credits originated in Latin America. Two private standards have been developed: Brasil Mata Viva (BMV), a certification program for forestry projects, and the Social Carbon Standard. The Association for Standardization (ABNT) recently developed guidelines for voluntary transactions of Verified Emission Reductions (VERs) in Brazil[269] and started a capacity-building program to assist small and medium enterprises (SME) in building GHG inventories and exploring carbon opportunities.[270,271]

6.7 CHINA[272]

China has witnessed phenomenal economic growth over the last decade,[273] lifting it to become the world's second largest economy in 2010.[274] It has been accompanied by rising primary energy consumption and increasing pressure on its domestic energy supply, giving rise to a number of environmental and social challenges. China's 11th Five-Year-Plan (FYP), covering the period 2006-2010, addressed energy savings and environmental protection by establishing a series of quantitative goals and policy initiatives. Notwithstanding these efforts, China emerged as the world's largest greenhouse gas (GHG) emitter in 2008 (see Figure 30), fueling international pressure for it to further intensify domestic environmental policies and initiatives.

Figure 30: China in world's energy-related CO_2 emissions[268]



Source: World Bank, International Energy Agency.

263. Source: *Inventario de emissoes antropicas de gases de efeito estufa diretos e indiretos do Estado de Sao Paulo*, comunicacao estadual / CETESB, 2011.
264. Source: Law 13.798, November 9, 2009, regulated by decree n. 55.947, June 24, 2010.
265. Source: 1° Relatório de Referência do Estado de São Paulo de Emissões e Remoções Antrópicas de Gases de Efeito Estufa, período de 1990-2008.
266. Both initiatives are supported by the Inter-American Development Bank (IADB).
267. *Preview of Climatescope* 2012.
268. Source: International Energy Agency, *CO_2 emissions from fuel combustion*, 2011.
269. Source: ABNT NBR 15498:2011. *Voluntary carbon market – Principles, requirements, and guidelines to commercialize verified emission reductions*, April 25, 2012.
270. Both standards counted on 36 projects as of late 2011 (Presentation of PMR Expression of Interest – Brazil, http://wbcarbonfinance.org/docs/3_PA2_EoI_Presentation_Brazil.pdf accessed on 4/16/2012).
271. FUMIN apoia oportunidades de negócios na gestão de gases de efeito estufa para PME brasileiras. http://www.iadb.org/pt/noticias/comunicados-de-imprensa/2012-01-05/brasil-gestao-de-gases-do-efeito-estufa-apra-as-pme,9802.html
272. This section benefited from the generous and thoughtful insight provided by Mr. Jiang Kejun, researcher at the Energy Research Institute (ERI) of the National Development and Reform Commission (NDRC), and Ms. Wen Wang, researcher at the Climate Economics Chair (CEC) of Paris-Dauphine University and Climate Change Research Centre of the Chinese Academy of Agricultural Sciences (CAAS).
273. The Gross Domestic Product (GDP) increased 10.5% year on year according to China's National Bureau of Statistics.
274. Source: World Bank. *An Eye on East Asia and Pacific, The Role of China for Regional Prosperity*, April 2011.

The 12th FYP, which entered into force in March 2011, further strengthens these policies in response to the international climate community. As such, it calls for the deployment of innovative domestic initiatives and emissions trading designed to address the carbon intensity of its economy.

6.7.1 A look back at the 11th Five-Year Plan (2006-2010): what's in China's tool box?

Throughout the 11th FYP, China's primary energy consumption per unit of GDP dropped 19.1%, within close reach of the 20% energy intensity target for the period set by the central government, thereby reducing GHG emissions by 1.46 billion tCO_2e in absolute terms.[275]

These achievements can be attributed to strengthened regulatory framework[276] that was enforced locally (i.e., through provinces and municipalities) as well as new initiatives such as:

- The "Ten Key Energy Conservation Projects." This initiative called on the government to provide financial incentives to support the deployment of new equipment and processes in the industrial (e.g., coal-fired boilers) and building (e.g., energy-saving bulbs) sectors.
- The "Top-1000 Enterprises Energy Conservation Program." This initiative set energy-saving targets to the largest energy-consuming industries, accounting for one third of national energy consumption.[277] Covered enterprises were required to develop an energy conservation plan and perform audits to allow local authorities to monitor progress.
- The "Phasing-out of Outdated Production Capacity Program." This initiative required local authorities to assign phase-out targets to industrial companies, which were required to shut down their least efficient small plants. For example, in the cement sector, 330 million tons of cement production capacity was removed, which led to a 28.6% decline in energy consumption per ton of cement produced.

Reductions in primary energy consumption were complemented by efforts to expand clean energy through feed-in tariff and subsidy policies. From 2006-2010, renewable generation capacity more than doubled, with an additional 133 GW installed.[278]

6.7.2 12th Five-Year Plan (2011-2015): "piloting" market mechanisms

The 12th FYP targets annual GDP growth of 7% and defines 24 key indicators of economic and social development with 2015 targets. As shown in Annex 6: China: Targets and Supporting Measures under the Five-Year-Plans, energy intensity is set to decrease 16% below 2010 levels. In addition, the forest cover is aimed to increase a further 12.5 million hectares. In addition, two new indicators were specifically introduced to respond to climate change and reflect China's mitigation action pledge under the UNFCCC for the years 2013-2020.[279] First, the quantity of CO_2 emitted per unit of GDP (or the "carbon intensity" of the economy) was assigned a reduction target of 17% below 2010 levels by 2015. Second, nationwide forest stock is to increase by an additional 14.3

275. Source: National Development and Reform Commission (NDRC), *Remarkable energy saving results achieved - 11th Five-Year review of energy saving, March 10, 2011*, National Development and Reform Commission (NDRC).
276. The main pieces of legislation were the revised "Renewable Energy Promotion Law" and the "Energy Conservation Law," respectively enforced in 2006 and 2007.
277. Source: Price, L., Wang, X., Yun, J. *China's Top-1000 Energy- Consuming Enterprises Program: Reducing Energy Consumption of the 1000 Largest Industrial Enterprises in China*, 2008.
278. This is an additional 133 gigawatt (GW) of non-fossil-fuel installed capacity, which consists of +92.00GW hydro power, +32.33 GW wind, +1.30 GW solar, 2.50 GW biomass, +0.80 GW bio-ethanol, and +4.01 GW nuclear. In addition, at the end of 2010, 31.00 gigawatts of extra nuclear installed capacity was under construction.
279. On January 28th 2010, Director General of Climate Division of the National Development and Reform Commission Su Wei submitted China's climate mitigation actions under the Copenhagen Accord. China's pledges had been previously announced by President Hu Jintao at the United Nations General Assembly in September 2009, and consist of reducing China's carbon dioxide emissions by 40-45% per unit of GDP by 2020 compared to 2005 levels; increasing the share of non-fossil fuels in primary energy consumption to around 15% by 2020; and increasing forest coverage by 40 million hectares and forest stock volume by 1.3 billion cubic meters by 2020 from 2005 levels.

billion cubic meters over the 2011-2015 period. An "Energy Conservation Plan"[280] and a "GHG Control Plan"[281] were subsequently released to support the enforcement of the nationwide energy- and carbon-intensity reduction targets at the provincial and municipal levels.

The 12th FYP sustains and scales up some of the initiatives that proved to be effective under the previous FYP. For example, the "Top-1000 Enterprises Energy Conservation Program" has been expanded to become a "Top-10,000 Enterprises Energy Conservation Program"; it actually covers more than 16,000 enterprises. Various efficiency standards have also been raised. Efforts to improve enforcement and monitoring of central government policies at the local level have also been extended. In addition, the plan calls for the establishment of innovative tools, with explicit reference to carbon-trading mechanisms.

The central government's interest in market mechanisms was first evident in July 2010, when the National Development and Reform Commission (NDRC) launched "Low-carbon Pilot Development Zones" in five provinces and eight cities.[282] This program called on local authorities to implement measurement and reporting of GHG emissions data and to establish low-carbon development plans. In addition, authorities were encouraged to explore complementary policies, including market mechanisms. Explicit notice for implementation only came in October 2011, with the NDRC proposing that five cities (Beijing, Tianjin, Shanghai, Chongqing, and Shenzhen) and two provinces (namely Guangdong and Hubei) establish Pilot Emissions Trading Schemes (ETS) on a voluntary basis.[283] Local authorities were asked to determine overall targets, allocation rules, and governance systems, and to work on the development of market infrastructures. Although the notice gave no implementation timeline, some officials from the NDRC said on several occasions that the plan is to have them up and running in 2013 to inform the development of a nationwide mechanism by 2015.[284] This is, however, by no means a formal commitment or firm timetable.

6.7.3 Building emissions trading in China: who is involved?

In 2009, domestic carbon market mechanisms began to emerge through voluntary initiatives. The Panda Standard and the China Green Carbon Foundation (CGCF) were established in 2009 and 2010 respectively, to address emissions in the agriculture and forestry sectors.[285] A voluntary emission intensity-based market on heat suppliers for residential buildings was also launched in the municipality of Tianjin in 2010. Despite the regulatory uncertainties and the lack of voluntary demand that have limited their size, these initiatives have provided valuable lessons learned. Indeed, the involvement of local experts, the collection of data, and the development of the market infrastructure necessary to support early demonstration activities

280. Source: State Council of PRC, Comprehensive Working Plan for Energy Conservation and Emission Reduction under the 12th Five-Year-Plan, September 2011.
281. Source: State Council of PRC, Working Plan for GHG Control under the 12th Five-Year-Plan, January 2012.
282. Provinces of Guangdong, Hubei, Liaoning, Shaanxi and Yunnan, and cities of Baoding, Chongqing, Guiyang, Hangzhou, Nanchang, Shenzhen, Tianjin, and Xiamen. Source: National Development and Reform Commission, *Notice on low-carbon pilot development zones at the province and city levels*, 2010.
283. Source: National Development and Reform Commission notice on market mechanisms experimental work, 2011. It is important to note that this program does not prevent other local jurisdictions from establishing pilot market mechanisms. As a matter of fact, the province of Jiangsu and city of Qingdao (Shandong province) were reported to the authors as actively preparing their own pilot ETS plans, and the NDRC may call for a second batch of participants. In addition, the city of Yantai initiated an energy consumption cap-and-trade system involving the 14 counties within its administrative borders as participants. The first trade was announced between two of them in July 2011 for 50,000tce for a value of roughly US$1.5 million. Source: China Economic Net, *Inter-regional energy consumption trading*, November 2011.
284. Source: Sun Cuihua and Wang Shu, China *Organizing Framework under the World Bank's Partnership for Market Readiness*, 2011.
285. The Panda Standard is a certification scheme for domestic and forestry offset projects initiated by the China Beijing Environment Exchange, BlueNext, Winrock International, and the Asian Development Bank. The China Green Carbon Foundation was launched in 2010 by China's State Forestry Administration. Source: Wang Wen, *Linking climate finance to the agriculture and forestry sectors in China, 2011*, Climate Economics in Progress. Economica.

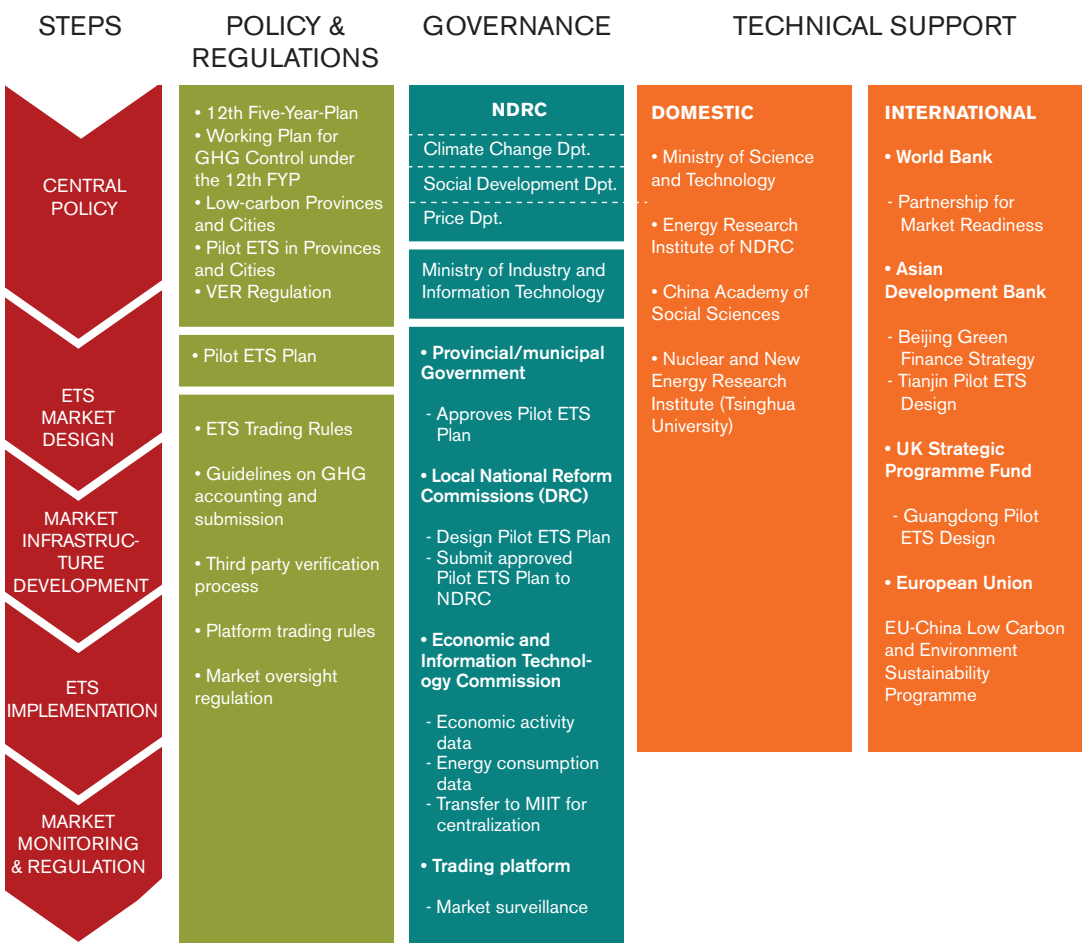


Figure 31: Building pilot emissions trading schemes in China

Source: World Bank.

has laid a foundation to support the development of domestic emissions trading. To illustrate, in 2011 a methodology to quantify carbon sequestration in bamboo sinks in China - currently not eligible under the CDM – was approved by the Panda Standard.[286] A few transactions engaging Chinese companies were also reported, with the state-owned Sinochem Group acquiring 16,800 Panda Standard credits at US$9.14/t$CO_2$e in March 2011, and some 148,000 credits from the CGCF sold to a consortium of 10 companies in November 2011 at an undisclosed price.

While encouraged by Chinese authorities, these voluntary market initiatives have seen very little involvement from these authorities. In contrast, the preparation of the pilot emissions trading schemes has begun to mobilize a range of central and local authorities (see Figure 31). The NDRC's Department of Climate Change, which directed their establishment, stands at the center of these efforts and will oversee their development. Despite the flexibility given to local authorities in the design of the emissions trading schemes, they will nonetheless have to accommodate the NDRC Department of Climate Change's requirements and guidance on measuring, reporting, and verification (MRV) issues. In addition, other departments within the NDRC will be key to the scope and success of the pilot emission trading schemes and their possible scale-up at a national level. The Department of Social Development and the Department of Industry will be in charge of impact assessments on the economy and industry

286. Source: Panda Standard. *New Methodology Form for AFOLU Projects - Forestation of degraded land using bamboo and non-bamboo trees*. 2011.

respectively. If power generation falls under the cap, the Department of Price will play a central role in deciding how to manage the cost of carbon and its fluctuations in the context of a regulated power market. Beyond the NDRC, the Ministry of Industry and Information Technology will also come into play as it centralizes economic activity and energy consumption data received from its local counterpart, the Economic and Information Technology Commission. Approval of the pilot ETS plans and operational implementation will fall under provincial or municipal governments, whose several bureaus will ultimately ensure effective operations and regulation of the pilot schemes.

Several technical assistance programs have been launched to support Chinese authorities in moving forward with the study and in the formulation and implementation of market mechanisms at both national and local levels.[287,288,289,290]

6.7.4 Current status: is it the journey or the destination?

In March 2012, the Beijing Municipal Government became the first of China's provinces and municipalities to publish a discussion draft for a planned pilot ETS.[291] The discussion draft confirms that Beijing intends to set a cap on its absolute emissions as required by the NDRC. It also sets out a draft timetable for implementation which comprises three key phases: (i) by end-2012, the Beijing Municipal Government aims to have the necessary market infrastructure and MRV regulations implemented; (ii) in January 2013, it aims to move to "initial implementation," which will consist of developing market oversight supporting regulations; and (iii) in April 2014, the "operational phase" is scheduled to commence. The sectors to be covered once the ETS is in operation are not explicitly listed, but entities that emitted above 10,000 tCO_2e per year over the 2009-2011 period are to be covered under the cap. In addition, the industrial sector, power and heat generators, and public buildings are to provide historic emissions data to the municipal government. Allowances are to be mostly allocated for free. Allocation is scheduled to start in December 2012 for 2013 allowances, and in May of each following year based on the previous year's emissions. Banking is to be authorized, but not borrowing. In addition, the Beijing Municipal Government is permitted to withdraw or auction additional allowances for cost containment purposes. Similarly, it has authorized the surrender of Chinese Certified Emission Reductions (CCERs) that meet the requirements of the "National VER Regulation" is currently being prepared by the NDRC.

Although Beijing is the first to publicly release details on its pilot ETS design, this does not necessarily mean it is the most advanced or that it will be the first to implement an operational mechanism. It has been reported to the authors that progress has also been achieved in Shanghai, Guangdong province, Shenzhen, and Tianjin. Details regarding ongoing efforts in the remaining provinces remain elusive at the time this report was written (see Table 10). In this context, it is not clear whether all of the seven jurisdictions will have operating pilot markets.

287. The World Bank's Partnership for Market Readiness (PMR) provided an initial US$350,000 grant for China's central authorities to prepare a Market Readiness Proposal (MRP) with the purpose of helping the Country to identify suitable market instruments to scale up mitigation efforts in line with their climate change mitigation goals and development objectives. If deemed eligible, China may receive additional US$3-8 million in implementation funding.

288. Through the EU-China Low Carbon and Environmental Sustainability Programme, the European Union plans to allocate €5 million by June 2012 to the realization of ETS pilot models at a provincial level. Source: European Commission, *Commission Implementing Decision of 6.12.2011 on the Annual Action Programme 2011 in favor of China to be financed under Article 19100101 of the general budget of the European Union December 2011 – Action Fiche II*, December 2011.

289. The Asian Development Bank issued a US$750,000 tender in December 2011 to advise the Tianjin Municipal Government on its pilot ETS design and support the deployment of related registry and trading infrastructure. The study is expected to start in June 2012 after the selection of international and domestic experts. Source: Asian Development Bank, *Technical Assistance Report People's Republic of China: Developing Tianjin Emission Trading System*, December 2011.

290. The UK Strategic Partnership Program (SPF). The program provides technical assistance to local institutes on ETS design for some pilots, notably in Guangdong Province.

291. Source: Beijing Development Reform Commission, *Discussion Draft on Beijing Emissions Trading*, March 2012.

The five cities and two provinces called on to establish voluntary pilot emissions trading schemes account for 18% of China's population and 28% of its national GDP. It is commonly believed that the NDRC has called for the establishment of these pilot schemes to test the use of emissions trading as a tool that could be expanded to a national scale. The implementation process has already triggered much discussion and involved

Table 10: China: pilot jurisdictions and current ETS status

Jurisdiction	Population 2010 (Mln)	GDP 2010 (Bln US$)[292]	YOY Change (%)	GDP per capita 2010 (US$)	YOY Change (%)	GDP by sector I/ II/III 2010 (%)	2015 energy int. target (% 2010)	2015 carbon int. target (% 2010)	ETS status (as of April 2012)
Beijing Municipality	20	208	+10.3	11.2	+7.8	0.9 / 24.0 / 75.1	17	18	-Pilot ETS Plan approved. -Release of the design discussion draft in March 2012.
Tianjin Municipality	13	136	+17.4	10.8	+16.7	1.6 / 52.4 / 46.0	18	19	-Pilot ETS Plan approved. -Market design study to start in June 2012.
Shanghai Municipality	23	254	+10.3	11.2	+10.0	0.7 / 42.1 / 57.2	18	19	Pilot ETS Plan approved.
Hubei Province	57	236	+14.8	4.1	+23.1	13.4 / 48.7 / 37.9	16	17	Pilot ETS Plan approved.
Chongqing Municipality	29	117	+17.1	4.1	+20.4	8.6 / 55.0 / 36.4	16	17	Pilot ETS Plan approved.
Guangdong Province	104	680	+12.4	6.6	+8.7	5.0 / 50.0 / 45.0	18	19.5	-Pilot ETS Plan approved -Kick-off meeting on market design held in September 2011.
Shenzhen Municipality[293]	9	141	+12.0	13.9	+7.60	0.1 / 47.5 / 52.4	19.5	21	Pilot ETS Plan approved.
PRC's central government	1,341	5,926	+10.3	4.4	+9.90	10.1 / 46.8 / 43.1	-16	-17	Early stage. NDRC requested the World Bank's PMR to provide support to the design of the national ETS and carry out feasibility studies on some sectors.

Source: World Bank, China Statistical Yearbook 2011, Statistical Yearbook of Guangdong Province.

292 Average US$/RMB exchange rate in 2010. Source: U.S. Federal Reserve.
293. Shenzhen is a municipality within Guangdong Province.

"the 12th Five-Year-Plan has opened large working fronts to build China's readiness in carbon markets and addressed the several challenges to their implementation"

domestic and international expertise that may inform parallel work being led by the NDRC at the national level. In addition, several other initiatives could also facilitate and catalyze the implementation of a national carbon market. For example, the "Top 1000 Enterprises" program, and its extension to 10,000 entities over the 12th FYP, may provide solid MRV foundations for a national scheme. In addition, the drafting process for the "VER Regulation" that started in 2010 with the objective of encouraging corporate social responsibility policies in China-based enterprises,[294] could support the establishment of common infrastructure and rules for a national domestic offset program. Moreover, as mentioned above, the Municipality of Beijing intends to use the offsets eligible under this regulation for its pilot ETS.

While primarily relying on command-and-control policies, the 12th Five-Year-Plan has opened large working fronts to build China's readiness in carbon markets and addressed the several challenges to their implementation, such as the deregulation of the energy market, cross-provincial governance, and/or interactions with the CDM.

6.8 INDIA

In 2008, India announced a National Action Plan on Climate Change (NAPCC). The plan prioritizes energy efficiency gains and an increased substitution of conventional fuels with renewable energy as key milestones to achieving sustainable economic growth and climate change co-benefits.[295] Two market-based mechanisms were introduced to address these goals: Renewable Energy Certificate (REC) schemes and the Perform Achieve and Trade (PAT).

Renewable Energy Certificate (REC) Schemes: In March 2011, India's REC mechanism was introduced to support the country's Renewable Purchase Obligations (RPOs) targets under the NAPCC.[296] The RPOs require that 5% of the nationwide share of electricity be sourced from renewable energy in 2010, increasing at 1% per year for ten years. In addition to taking actions, to meet the targets eligible participants may buy or trade RECs, each equivalent to one megawatt hour (MWh) of electricity generated. RECs are issued to eligible renewable energy operators and purchased at monthly auctions by any obligated entity not reaching its RPO requirements. The India Energy Exchange (IEX) and Power Exchange India Ltd (PXIL) provide the auction platforms. The mechanism seeks to promote interstate REC transactions, thereby helping those regions with high renewable energy potential overcome generation capital barriers while allowing regions with less potential to nonetheless assign more ambitious RPO targets to local obligated entities.

As of December 31, 2011, 341 renewable energy generation projects had been accredited by State Nodal Agencies across India. This represents a combined 1,890 MW[297] or 9.4% of the country's total renewable energy generation installed capacity, according to data from the Central Electricity Regulatory Commission (CERC).[298] As shown in Figure 32, 546,808 RECs were issued in India's registry in 2011, and 438,249 were

294. Source: *China's Expression of Interest and Questionnaire on Market Readiness Capacity*, Partnership for Market Readiness, World Bank, January 2011.
295. At an annual economic growth rate of 8-9%, India anticipates it will need to increase its primary energy supply and electricity generation installed capacity by four and six times, respectively, over the next 20 years. Source: Expert Group on Low Carbon Strategies for inclusive growth, Planning Commission, Government of India, *Low Carbon Strategies for Inclusive Growth, An Interim Report*, 2011.
296. Source: Central Electricity Regulatory Commission Regulations, *Terms and Conditions for Recognition and Issuance of Renewable Energy Certificate for Renewable Energy Generation*, 2010.
297. Breakdown by technology: 44.3% wind, 28.5% bio-fuel cogeneration, 22.6% biomass, 4.2% small hydro, and 0.4% solar.
298. As of December 31, 2011, renewable energy accounted for 10.8% of India's total installed power generation capacity. Source: Central Electricity Authority, Ministry of Power, Government of India, *Installed capacity of power utilities as of December 31*, 2011, 2011.

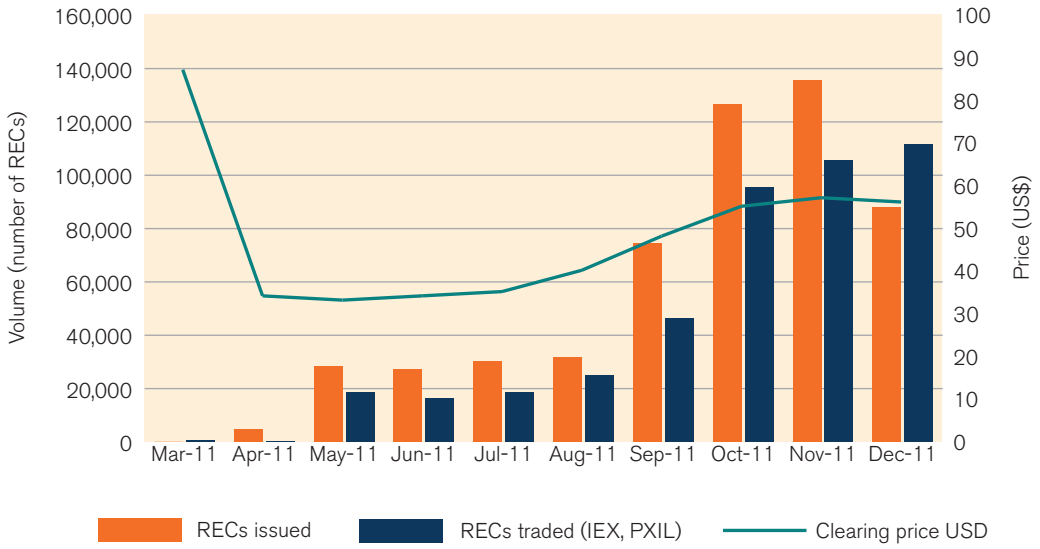


Figure 32: Renewable Energy Certificates – traded volumes and clearing prices

Source: World Bank, data from IEX, PXIL, and India REC Registry.

purchased on exchanges[299] and subsequently retired for compliance. The resulting 2011 market value was US$22.6 million.[300] Since April 2012, the CERC has fixed new floor and ceiling prices for non-solar and solar RECs which will remain valid for a period of five years.[301] The floor and ceiling prices are intended to provide market participants with longer-term visibility and a competitive alternative to the Clean Development Mechanism (CDM) given current weak prices.[302]

Perform Achieve and Trade (PAT): On April 1, 2012, the PAT was introduced, covering eight industrial sectors out of the 15 energy-intensive sectors identified in the NAPCC's National Mission on Enhanced Energy Efficiency (NNEEE). The scheme mandates specific energy consumption reduction targets to designated consumers (DCs) that collectively account for 25% of national GDP and about 45% of its commercial energy use.[303] Those DCs that over-achieve on their benchmarks are issued Energy Efficiency Certificates (ESCerts) to be traded bilaterally or through the two national power exchanges. The Bureau of Energy Efficiency at India's Power Ministry has issued the rules and procedures pertaining to measuring, reporting, and verification (MRV).[304] It is expected to announce the trading infrastructure rules in the near term, with trading of ESCerts to commence thereafter. For further details on PAT please refer to Annex 7: India PAT: Market Design and Governance Elements.

The PAT is projected to avoid 19,000 MW of additional generation capacity, save 6.6 million tons oil equivalent (toe), and reduce GHG emissions by 26.21 $MtCO_2e$ by the end of the first compliance period (March 31, 2015).[305] Using support provided through the World Bank's Partnership for Market Readiness, India has plans to expand the PAT by deepening the scope of coverage in existing sectors and extending it to new sectors.

299. IEX accounts for 92% of traded volumes in 2011.
300. The average clearing price for Indian REC in 2011 was INR2575 per unit (US$55.2). 2011 exchange rate US$1=INR47.
301. Source: Central Electricity Regulatory Commission, 2011, *Determination of Forbearance and Floor Price for the REC framework to be applicable from April 1*, 2012.
302. Applying the 2012-2017 price floor for non-solar RECs (INR1500), and an emission factor in India's grid of $0.93tCO_2/MWh$, the generation of renewable energy generates revenues of REC=US$32/MWh under the REC scheme and US$10.3/MWh under the CDM, according to our average 2011 price for primary CERs, and all things being equal.
303. Source: Bureau of Energy Efficiency, Government of India, 2011, www.bee-india.nic.in.
304. The rules and procedures pertaining to the MRV and trading aspects of the scheme are available at www.bee-india.nic.in.
305. Source: the Bureau of Energy Efficiency in Sengupta, A., Kumar, S., *Roadmap for India in energy efficiency*, The Atlantic Energy Efficiency Policy Briefs, 2011.

6.9 JAPAN *by Yuji Mizuno, PhD, Senior Planning Officer, Office of Market Mechanisms*[306]

The Japanese carbon market can be broadly divided into four parts.

- First, Japan commits to reduce greenhouse gas emissions by 6% compared with 1990 levels during the first commitment period of the Kyoto Protocol. To achieve this target, the Japanese government plans to acquire Kyoto credits by using the Kyoto mechanisms to cover the shortfall remaining after domestic reduction efforts have been implemented. This is in accordance with the Kyoto Protocol Target Achievement Plan (formulated April 2005, revised March 2008). Purchase agreements were signed for 31 million tons in Financial Year (FY) 2008, 41.5 million tons in FY 2009, 4 million tons in FY 2010, and no purchase agreements were signed in FY 2011. This brought the cumulative total that was contracted to around 98 million tons. In addition to that, the electric power industry has announced plans to acquire 260 million tons and the steel industry is to acquire 53 million tons of Kyoto credits in the Keidanren Voluntary Action Plan.
- Second, the Tokyo cap-and-trade scheme has been launched as a local emissions trading scheme. This covers major facilities and buildings located within the Tokyo metropolitan area, with the first compliance period running from FY 2010 to FY 2014 and the second from FY 2015 to FY 2019. Targets have been set at a 6% reduction compared to base-year emissions levels (average emissions levels during any three consecutive years between FY 2002 and FY 2007) in the first compliance period and a reduction of 17% (planned) in the second compliance period. This scheme also permits offsets to achieve these targets.[307]
- Third, on the national level, the Japan Voluntary Emissions Trading Scheme (JVETS) was launched in FY 2005 by the Ministry of the Environment. Under the JVETS, the participating organizations must commit CO_2 emission reduction targets, and they can reduce emissions by purchasing subsidized equipment as well as by undertaking emissions trading. Kyoto credits can be used in the JVETS. A total of 389 organizations have taken part as participants that have adopted targets, and so far reductions of 1.89 million tons have been achieved.[308]
- Fourth, two voluntary crediting schemes are operating in parallel to the national level. The first is a Domestic Credit Scheme introduced in October 2008. In this scheme, major companies provide technology, funding or other assistance to small and medium-sized companies, civil society (businesses and households), transport, and other sectors, and authorize greenhouse gas emission reductions achieved as credits. Major companies can use those credits to meet the targets set by the Keidanren Voluntary Action Plan.[309]

In addition, the Japan Verified Emission Reduction (J-VER) Scheme was established by the Ministry of the Environment of Japan in November 2008. It is a verification scheme for credits generated through the reduction/removal of greenhouse gases carried out by domestic projects.[310]

306. The Climate Change Policy Division of the Ministry of the Environment in Japan.
307. Eligible offsets are credits from small and medium-sized business within Tokyo, renewable energy (electricity or heat) credits, and credits from large business premises outside Tokyo; Kyoto credits are not included at this point. As of December 2011, 2,132 tons had been issued as renewable energy credits and 360 tons were traded.
308. Approximately 260,000 tons were traded from FY 2006 to FY 2010 at an average price of around ¥750–1,250 (US$9-16) per ton. This is the most active trading to have taken place in a domestic Japanese scheme to date. In addition to this scheme, an experimental ETS was launched in October 2008 (scheduled to run until FY 2012). A total of 152 companies had set targets for FY 2010, including absolute emissions targets and intensity targets.
309. This is a government-wide initiative, with a secretariat composed of the Ministry of Economy, Trade and Industry, the Ministry of the Environment, and the Ministry of Agriculture, Forestry and Fisheries. As of December 2011, a total of 574 projects for domestic credits had been authorized for around 313,000 tons.
310. As of the end of January 2012, 184 projects were registered, and the amount of total certified J-VER credit was around 161,000 tons. The median asking trading price for credits from the emissions reduction is around ¥4,000 (US$50) per ton; the price for those from forest sinks is around ¥10,000 (US$125) per ton.

Following the end of the first commitment period of the Kyoto Protocol, it was decided to set a second commitment period at the COP17 meeting held in Durban. Japan will not participate in the second commitment period, but will continue its efforts to reduce GHG emissions in accordance with the Cancun agreements. Japan is proposing the bilateral offset credit mechanism (BOCM) as a practical new market mechanism to complement the CDM, with the aim of contributing to global emissions reductions and carbon sinks. The BOCM is designed to further promote low-carbon investment on a global scale by means of the appropriate evaluation of emission reductions through the introduction of advanced low-carbon technology and products in developing countries.[311]

The future of the Japanese carbon market will be greatly affected by mid-term targets for greenhouse gas emission reductions. At this point, the conditional target is for a 25% reduction in 2020 compared with 1990 levels. In response to the changed situation, due to the earthquake and the nuclear power plant accident in March 2011, the government of Japan is aiming to present a number of options for a unified energy and environmental strategy. This strategy will be presented to advisory councils to the government in the spring, following the formulation of basic proposals on options for nuclear power policy, energy strategy, and mitigating policy to climate change based on the fundamental direction set out by the government's Energy and Environment Council. The aim is to finalize a mid-term target for greenhouse gas emission reductions by the summer.

6.10 SWITZERLAND

In 1997, the Swiss administration (Federal Council) presented a federal law to reduce CO_2 emissions, proposing a 10% reduction target by 2010 (midway through the period 2008 to 2012) as compared to 1990 levels. The target was to be achieved primarily through voluntary measures, with the introduction of a CO_2 incentive tax if the target could not be achieved on a voluntary basis.[112] The so-called CO_2 Act was adopted by the Swiss parliament in 1999[313] and entered into effect on May 1, 2000; it represents the central pillar of Swiss climate policy.[314] The act also introduced separate sectoral targets. In particular, emissions from the burning of fossil fuels for heating and transportation[315] purposes were set to be reduced by 15% and 8% respectively, thus also contributing toward Switzerland's KP target of 8%.[316]

Forecasting a significant shortfall in achieving the targets for transportation fuel, the government began to introduce a number of additional measures. As such, on March 23, 2005, the Federal Council adopted the application of a CO_2 tax for heating fuels,[317] which took effect on January 1, 2008. It also introduced the "climate cent"

311. The intention to consider introducing the BOCM has already been stated in joint declarations with the heads of state of Vietnam and the countries of the Mekong region (October 2010). An intergovernmental document with Indonesia in November 2011 also states cooperation for the BOCM. In addition, a memorandum between the Ministry of Nature, Environment, and Tourism of Mongolia and the Japanese Ministry of the Environment regarding cooperation between the two countries, including the BOCM, was signed in December 2011. A feasibility study for the BOCM was carried out by the Ministry of Economy, Trade and Industry and the Ministry of the Environment, and 79 studies were adopted in FY 2011. The Ministry of the Environment commissioned experts to conduct capacity building for the implementation of the BOCM in 33 countries in Asia, Latin America, Africa, and elsewhere.
312. The CO_2 law also envisioned separate targets for heating oils and motor fuels, respectively. Source: Swiss Federal Department of the Environment, Transport, Energy and Communications (DETEC), March 17, 1997. (http://www.uvek.admin.ch/dokumentation/00474/00492/index.html?lang=en&msg-id=3156).
313. Loi fédérale sur la réduction des émissions de CO_2, October 8, 1999 (http://www.admin.ch/ch/f/rs/6/641.71.fr.pdf).
314. The Swiss Federal Office for the Environment (FOEN) is responsible for the CO_2 Act, which is being implemented jointly by the FOEN and the Swiss Federal Office of Energy (SFOE), with the aid of the Swiss Energy program. Source: DETEC (http://www.bfe.admin.ch/themen/00526/00531/index.html?lang=en).
315. Kerosene used for international flights is not included.
316. Switzerland ratified the Kyoto Protocol (KP) in 2003, thereby committing to reduce GHG emissions by 8% below 1990 levels for 2008-2012.
317. At a rate of 0.03 CHF/l for fuel oil and 0.025 CHFs/cubic meter for gas.

for transportation fuels, which took effect on January 1, 2006. The Climate Cent Foundation (CCF), funded by a tax on gasoline and diesel, invests in environmental measures.[318]

On February 20, 2008, the Federal Council decided to revise its CO_2 law after 2012. Switzerland fixed targets comparable to those of the EU, namely a minimum GHG reduction target of 20% below 1990 levels by 2020 (see Box 7).

6.11 OTHER INITIATIVES

Several other countries and regions have started to develop the domestic capacity to establish market mechanisms relating to carbon, renewable energy, and energy efficiency. Table 11 provides an overview of these instruments as well as some of the readiness programs designed to support them.

Box 7: The Swiss policy measures to reduce GHG emissions
By Mr. Marco Berg, Managing Director of the Climate Cent Foundation (CCF)

The Climate Cent Foundation (CCF) was founded in 2005 by four major Swiss business organizations. Its purpose was to prevent a lawfully looming levy on transport fuels by making use of the flexible mechanisms of the Kyoto Protocol. To this end, CCF was committed to surrendering 17 million credits, at least 2 million domestic, to the Swiss government in 2013. To date, 14.5 million Certified Emission Reductions (CERs) and Emission Reduction Units (ERUs), as well as 2.5 million domestic credits, have been purchased, or secured, to offset or reduce excess emissions in Switzerland in the 2008-12 period. The funds required for this (i.e., 700 million CHF) were generated by a charge levied on petrol and diesel imports (at a rate of 0.015 CHF per liter).

As the sole source of demand for domestic offsets and with no experiences to build on, CCF had to establish the rules and programs to define and procure domestic offsets. In one program, CCF gave direct financial support to owners of existing buildings who invested in a refurbishment of the building envelope beyond mandatory energy standards. Emission reductions were calculated compared to a standardized baseline. More than 8,000 projects were included in what worked like a Program of Activity under the Clean Development Mechanism (CDM), although that concept did not exist in 2005.

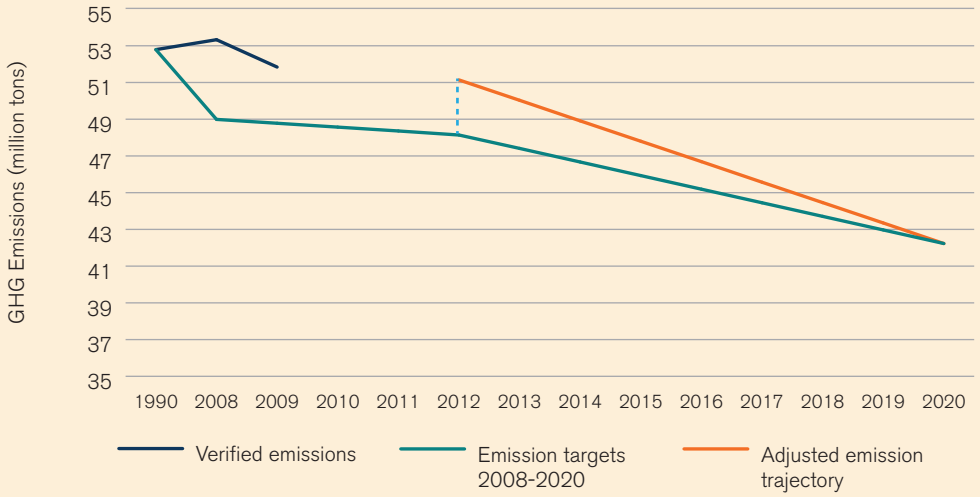
A second program addressed renewable energy and energy efficiency projects that reduced fossil fuel use. The 150 projects under contract, generally small-scale, typically involve the use of wood, waste heat, or biofuels. They are credited along standard CDM rules by CCF, which took the risk that the government might deem them to be unacceptable upon examination. Project owners had to participate in one of ten rounds of auctions by making a bid stating volume of credits offered and price per credit. A given volume of funds in was auctioned in each round, which determined the cut-off for the highest bid considered.

A third program addressed industrial emitters, who had voluntarily opted-in for the Swiss Emissions Trading Scheme (ETS) to get exempt from the levy on heating fuels, as well as small to medium enterprises (SMEs), who had committed to intensive emission reduction targets with the government. CCF conducted three rounds of auctions where companies were to offer different volumes of credits in a given range of prices per credit. Here the auctioned volume of funds determined the equilibrium price for each participant who made a bid at that price. On average, the price of the domestic credits was reduced at CHF100 /tCO_2.

318. Source: Biofuels Platform (http://www.biofuels-platform.ch/en/infos/ch-lco2.php#note1).

Box 7: The Swiss policy measures to reduce GHG emissions *(continued)*

Despite the fact that in December 2011 a national climate law for the period up to 2020 was passed,[319] many uncertainties about future demand remain. Lawmakers want domestic emissions in 2020 to be at 80% of their 1990 level, seemingly without using international offsets. However, Switzerland starts with a surplus of of three million tons of emissions in 2012 – the amount of international offsets used to comply with the KP. Therefore, the reduction path had Switzerland fulfilled its Kyoto target domestically is merely hypothetical. Realistically, the reduction path will need to be steeper (see Figure). One way of reducing the burden on the Swiss would be to allow for the triangle area between the two reduction paths, roughly 10.5 million tons, to be offset internationally. The government is expected to make a decision on this in 2012.



COUNTRY / REGION	DOMESTIC MARKET MECHANISMS ENVISAGED AND SECTORS COVERED (IF KNOWN)	SUPPORTING PROGRAM(S)*
Belarus	Emissions Trading Scheme (ETS).	**European Union:** "Clima East"[320]
Chile	Crediting mechanism and/or ETS: the energy, agriculture, forestry, and transport sectors are considered.	**World Bank:** Partnership for Market Readiness (PMR)[321]
Colombia	Crediting mechanism in the transport sector.	**World Bank:** PMR
Costa Rica	Crediting mechanism: transport, energy, mining sectors are considered.	**World Bank:** PMR
East Asia Pacific	Fuel security certificate market mechanism: implementation of pilots in 2 or 3 cities yet to be selected across the East Asia Pacific region.	**Asian Development Bank:** Sustainable Transport Initiative [322]
Indonesia	Crediting mechanism.	**World Bank:** PMR
Jordan	Crediting mechanism: energy and waste management sectors (considered).	**World Bank:** PMR

Table 11: Emerging domestic initiatives and supporting readiness programs (non-exhaustive)

319. Source: L'Assemblée fédérale de la Confédération suisse, Loi fédérale sur la réduction des émissions de CO_2, December 23, 2011.
320. Source: European Union, *Clima East: support to climate change mitigation and adaptation in Russia and eastern neighbourhood countries Eastern Partnership Integrated Border Management Programme: Strengthening Surveillance Capacity on the "Green" and "Blue" Border between the Republic of Belarus and Ukraine*, 2011.
321. Source: PMR Implementing Country Participants' Organizing Frameworks for Scoping of PMR Activities and updates (www.wbcarbonfinance.org/pmr). These proposed activities are tentative and may be modified. Some of the countries listed are yet to submit an organizing framework in 2012.
322. Source: Asian Development Bank, *Beyond Carbon: Fuel Security as a New Market Mechanism*, June 2011.

Table 11: Emerging domestic initiatives and supporting readiness programs (non-exhaustive) *(continued)*

COUNTRY / REGION	DOMESTIC MARKET MECHANISMS ENVISAGED AND SECTORS COVERED (IF KNOWN)	SUPPORTING PROGRAM(S)*
Kazakhstan	ETS: implementation of a pilot over 2013-2015.	**European Bank for Reconstruction and Development (EBRD):** Preparedness for Emissions Trading in the EBRD Region (PETER)[323]
Morocco	Crediting mechanism: electricity, cement production, phosphate extraction and processing (considered).	**World Bank:** PMR
South Africa	Carbon tax to be possibly converted into a domestic ETS.	**World Bank:** PMR
Thailand	Crediting mechanism and/or ETS: industry sector (urban areas).	**World Bank:** PMR
Turkey	Infrastructure for market readiness.	**World Bank:** PMR **EBRD** - Sustainable Energy Initiative III
Ukraine	ETS: energy and iron & steel sectors.	**World Bank:** PMR **EBRD:** PETER **European Union:** "Clima East"
Vietnam	Crediting mechanism and/or ETS: steel, solid waste management, transport, power, and agricultural process sectors (considered).	**World Bank:** PMR

*Several bilateral programs also support capacity building in carbon markets in these countries.
Source: World Bank.

Box 8: Will there be demand for emission reductions after 2012?

Despite the recent confirmation of several initiatives looking beyond 2012, the overall demand for international credits remains uncertain. Their key features such as import limits and eligible crediting mechanisms still require further rule making, and may likely be influenced by the outcomes of the ongoing international negotiations.

Table 12: Scenario of potential demand for offsets in non-Annex I Countries 2013–20 ($MtCO_2e$)

Country (group of)	Assumptions	Potential demand ($MtCO_2e$)
Australia	Carbon Price Mechanism, cap in line with target of 5% below 2000.	348
EU-27, Iceland, Liechtenstein, and Norway	20%below 1990, with differentiation EU ETS and effort sharing.	1,635†
Japan	Between 25% and 0% below 1990.	≤539
New Zealand	NZ ETS: 10% below 1990.	77
North America	Western Climate Initiative (WCI): limited to California and Québec, with international offsets allowed in California only.	94
Switzerland	20%below 1990, with ETS and other measures.	2.3 -12.8
TOTAL		**≤2,706**

Notes: For detailed assumptions see Annex 8: Assumptions for Estimates of Potential Demand for Offsets from non-Annex I Countries.
†: Already accounts for an inflow in the EU ETS of 865 million CERs and ERUs during Phase II.

323. Source: European Bank for Reconstruction and Development, *Regional (TCS 33506): Preparedness for Emissions Trading in the EBRD Region (PETER)*, December 2011.

Box 8: Will there be demand for emission reductions after 2012? *(continued)*

We estimate that demand for emission reductions generated in developing countries could range from 2,156 to 2,706 billion tCO_2e over 2013–2020 (see Table 12). Such demand may be met through offsets generated from CDM and JI projects, as well as new market approaches under the UNFCCC or agreements concluded outside of the multilateral process:

- The EU Climate and Energy Package remains the main driver of post-2012 demand for international offsets, with a total of 1,635 $MtCO_2e$ over 2013-2020 absorbed by the EU ETS and EU internal burden sharing (60-76% of the total). If the EU moved from 20% to 30% GHG emissions target below 1990 level by 2020, we estimate such demand will reach roughly 2,435 $MtCO_2e$.
- In addition, Australia's Carbon Price Mechanism, which allows scheme participants to use international offsets to meet up to 50% of their liability from 2015, is expected to import another 348 $MtCO_2e$ from overseas until 2020.
- In North America, potential demand currently only comes from California, with 94 $MtCO_2e$ maximum over 2013-2020 of sector-based offset credits. However, if Québec and the other three WCI partners adopted similar provisions, we estimate the collective demand for such credits could amount to roughly 200 $MtCO_2e$.
- Although Japan will not participate in the Kyoto Protocol's Second Commitment period, it intends to remain in the Protocol and to rely on Kyoto Mechanisms to achieve its post-2012 target.[324] Japan is also preparing a Bilateral Offsetting Credit Mechanism (BOCM) that is intended to complement its use of Kyoto Mechanisms.[325] We estimate Japan may represent a maximum demand of 539 $MtCO_2e$ for both credits types by 2020.
- Based on current targets, New Zealand could add 77 $MtCO_2e$ to the total demand.
- Based on current targets, Switzerland could add 2.3 to 12.8 $MtCO_2e$, depending on on-going policy ruling.

As detailed in earlier in the Section, there are also several non-Annex I countries–such as Brazil, Chile, China, or the Republic of Korea–that already moved forward emissions trading, and which may, at some point, generate possible demand for domestic and international offsets. However, it is still impossible to provide any estimate of this demand and thus we do not consider it here.

Estimates of supply for international offsets are forecasts for CDM and JI only (see Table 13). About 2.3 to 4.8 billion offsets could be generated post-2012. The lower end of this range does not account for new projects possibly entering the CDM pipeline after April 2012 and for possible renewal of crediting period for already registered projects. The upper end of the range assumes full crediting renewal of the projects. We expect limited unused pre-2013 credits to come in addition to this supply. One can conclude that the supply of existing current Kyoto mechanisms, i.e. CDM and JI, may be sufficient alone to serve global demand for international offsets over 2013-2020. Beyond 2012, the lack of demand for international offsets and uncertainties over their utilization in the current initiatives are the main constraints to the carbon market. This provides no further encouragement to build up a substantial and credible supply based on innovative mechanisms. For both developed and developing countries, this could be a missed opportunity to benefit from market instruments to mobilize resources and engage the private sector in climate action.

324. Source: Japan's Ministry of Foreign Affairs, Ministry of Economy, Trade and Industry, Ministry of the Environment, Japan's initiatives on the Bilateral Offset Credit Mechanism (BOCM) and other activities for developing countries, April 14, 2012.
325. Over 2010-2011, 50 projects over more than 18 countries were selected by the Government, in order to perform feasibility studies. The mechanism is expected to start operations in 2013.

Box 8: Will there be demand for emission reductions after 2012? *(continued)*

Table 13: Estimates of potential supply under the CDM and JI up to 2020 ($MtCO_2e$)

	pre-2013	post-2012	Cummulative (up to 2020)
Point Carbon			
CDM-EU ETS eligible	1,250	2,138	3,388
CDM-other	-	554	554
ERU	296	51	347
Total	**1,546**	**2,743**	**4,289**
*Deutsche Bank**			
CDM-EU ETS eligible	1,301	1,847	3,149
CDM-other	2	468	470
ERU	250	-	250
Total	**1,553**	**2,315**	**3,869**
*CDC Climat***			
CDM-EU ETS eligible	1,269	3,381	4,651
CDM-other	2	1,415	1,417
ERU	357	-	357
Total	**1,628**	**4,797**	**6,425**

* Secured supply from the first crediting period of projects registered of April 2012.
** Risk-adjusted issuance and full crediting renewal of projects in the CDM pipeline.

Annex 1: International reaction to aviation in the EU ETS

On December 16, 2009, the Air Transport Association of America (currently called Airlines for America or A4A), together with American Airlines, Continental Airlines, and United Airlines, filed a lawsuit contesting the measures. They contended that the directive (i) infringes on the Chicago Convention, the Kyoto Protocol,[326] and the Open Skies Agreement[327] because it imposes a form of tax on fuel consumption; and (ii) infringes on certain principles of customary international law in that it seeks to apply the allowance trading scheme beyond the EU's territorial jurisdiction.[328]

On October 6, 2011, the Advocate General of the Court of Justice of the EU (ECJ) issued a preliminary opinion supporting the decision to include non-EU airlines in the EU ETS. On December 21, 2011, the ECJ ruled that the EU decision to include the aviation sector in its Emission Trading Scheme (ETS) from 2012 is lawful under international law, thereby providing that all airlines – including those of third countries – will have to acquire and surrender emission allowances for their flights departing from and arriving at European airports.[329] On March 27, 2012, A4A announced it was dropping its private lawsuit against the ETS, but urged the U.S. government "to accelerate its work to reverse this unilateral tax."[330]

The International Air Transport Association (IATA), whose 230 members carry more than 93% of scheduled international air traffic, has claimed the ETS will cost airlines 1.2 billion Euros ($1.6 billion) this year, rising to an estimated 9 billion Euros ($11.8 billion) in 2020; it has forecast a 29% drop in the industry's profit in 2012.[331] Other analyses produced by the European Commission[332] and MIT[333] differ.

Studies show that while the inclusion of aviation in the EU ETS is being implemented in a way that limits distortion of competition, some changes in competitiveness may occur. Hub airports just outside the EU, along with the non-EU airlines that serve these airports, may become more competitive for some routes. Thus, some carbon leakage is likely to take place, meaning that the reduction of aviation emissions within the EU is partly compensated for by an increase of emissions outside of the EU ETS. Still, the impact of this shift in air traffic is deemed to be limited.[334]

326. Regarding the principle of common but differentiated responsibilities between Annex 1 and non Annex 1 countries enshrined in the Framework Convention.
327. Air Transport Agreement between the United States of America, of the one part, and the European Community and its Member States, of the other part, concluded on April 25-30, 2007.
328. Source: Court of Justice of the EU, Press Release No 139/11, Luxembourg, December 21, 2011, on Judgment in Case C-366/10: Air Transport Association of America and Others v Secretary of State for Energy and Climate Change.
329. Source: Judgment of the Court (Grand Chamber), December 21, 2011, reference for a preliminary ruling from the High Court of Justice of England and Wales, made by decision of July 8, 2010; InfoCuria. http://curia.europa.eu/juris/document/document.jsf?text=&docid=117193&pageIndex=0&doclang=en&mode=req&dir=&occ=first&part=1&cid=5925.
330. Source: Carbon Finance Online, *EU aviation dispute to fade, as U.S. association drops lawsuit*, March 28, 2012.
331. Source: Thomson Reuters Point Carbon, *Carbon Market News*, January 4, 2012.
332. Source: European Commission. *Questions & Answers on the benchmark for free allocation to airlines and on the inclusion of aviation in the EU's Emission Trading System (EU ETS)*, September, 2011.
333. Source: Journal of Air Transport Management. *The impact of the European Union Emissions Trading Scheme on US aviation*. December, 2011.
334. Source: Faber, J., Brinke, L., *The Inclusion of Aviation in the EU Emissions Trading System*, September 2011.

A sequence of recent international reactions is provided below:

- Reacting to the letters sent by major airlines to several government officials in Europe, including France, on March 22, 2012, the French Prime Minister sent a letter to EC President Jose Manuel Barroso urging the Commission to "make all the necessary efforts" to find a solution acceptable to countries outside the region, as "this situation is causing strong concerns among companies."[335]
- On March 22, 2012, Indian officials directed its airlines not to report their emissions or submit emissions monitoring plan to the EU authorities. They also indicated that a "basket of measures" was available to the Indian government to counter the scheme.[336]
- Also on March 22, 2012, the South African Tourism Minister urged the EU to suspend the inclusion of aviation in the EU ETS for two years to allow time for a global agreement on carbon tax at the United Nations.[337]
- On March 12, 2012, Airbus and other major airlines wrote to Europe's leaders warning about the economic consequences of the ETS on the aviation sector. They called on governments to find an unspecified "compromise solution" to the growing dispute over the extension of the EU Emissions Trading System to the sector: claims have been made that US$12 billion worth of Airbus orders have been suspended in China. Airbus estimates this will jeopardize more than 1,000 Airbus jobs in Europe and a further 1,000 in the supply chain.[338] A few days later, in addition to the previously suspended purchase of 10 Airbus A380 super-jumbos and 35 A330s worth $12 billion, China delayed the purchase of an additional 10 Airbus long-haul jets. This brings to US$14 billion the value of the purchases halted.[339]
- On February 14, 2012, the U.S. enacted the "FAA Modernization and Reform Act of 2012," which includes a clear congressional statement opposing the extraterritorial reach of the EU ETS and advising the government to use "all political, diplomatic, and legal tools" at its disposal to ensure the scheme is not applied to U.S. registered aircraft or to the operators of such aircraft.[340]
- On February 6, 2012, the Civil Aviation Administration of China reportedly ordered Chinese airlines not to comply with the EU ETS and prohibited companies from charging customers with the cost of reducing emissions under the scheme. At the same time, China's State Council, or cabinet, reportedly said that all domestic airlines were banned from taking part in the EU ETS unless given government approval. Following that news, on February 7, the Chinese Foreign Ministry spokesman confirmed: "China will consider taking necessary steps in accordance with the way things develop to protect the rights of our nationals and our companies …"; "we hope that the EU ... can pay attention to China's concerns and take a practical and constructive attitude to increase communication and coordination with all sides to find an appropriate solution that all sides can accept."[341]

335. Source: Thomson Reuters Point Carbon, *France urges EU to solve airlines carbon payment row, Carbon Market Daily*, April 5, 2012.
336. Source: Thomson Reuters Point Carbon, *After China, India asks airlines to boycott EU carbon scheme, Carbon Market Daily*, March 22, 2012.
337. This came from Pretoria's tourism minister, Marthinus van Schalkwyk, at the Air Transport Action Group (ATAG) Aviation & Environment Summit 2012 in Geneva conference. Source: Climate Connect News, March 22, 2012.
338. In a letter to UK Prime Minister David Cameron and high-level members of the EC, the CEOs of British Airways (BA), Virgin Atlantic, and Airbus warned that threatened retaliatory measures over the extension of the EU ETS to aviation "are now becoming very real and are being translated into concrete action, which is starting to have serious consequences on the European aviation business." Similar letters were sent to the leaders of France, Germany, and Spain by carriers Air France, Iberia, Air Berlin, and Lufthansa, and equipment manufacturers Safran and MTU Aero Engines. Source: Carbon Finance Online, *Aviation industry urges compromise solution to EU ETS dispute*, March 13, 2012.
339. Source: Thomson Reuters Point Carbon, *Carbon Market Daily*, March 15, 2012.
340. Source: Clifford Chance, *Turbulence in the EU ETS – a practical overview of the EU ETS for aircraft lessors and lenders*, Briefing Note, February, 2012.
341. Source: Thomson Reuters Point Carbon, *Carbon Market Daily*, February 7, 2012.

- On December 16, 2011 (i.e., 5 days prior to the ECJ's decision), in a letter sent by the U.S. administration to EU officials, the U.S. Secretaries of State and Transportation wrote: "we strongly urge the EU and its Member States within their respective competences to reconsider this current course; halt or, at a minimum, delay or suspend application of this Directive," also saying, "Absent such willingness on the part of the EU, we will be compelled to take appropriate action." The letter also included a list of 43 countries[342] that publicly opposed the application of the directive to non-European airlines.[343] A reply was sent on January 16, signed by Siim Kallas (Vice President of European Commission) and Connie Hedegaard (Climate Action Commissioner).
- On October 24, 2011, the House of Representatives in the U.S. Congress passed a bill (H.R. 2594) that would make it illegal for U.S. airlines to comply with their obligations under the EU ETS. In order to become U.S. law, a similar bill would have to be adopted by the U.S. Senate; this is considered unlikely by market analysts. U.S. airlines are expected to continue to comply with their EU ETS obligations.
- CATA, which represents China's four major airlines (flag-carrier Air China Ltd, China Southern Airlines, China Eastern Airlines, and Hainan Airlines), refuses to accept the resolution and declared Chinese airlines would consider legal action against the EU in response to its charges for carbon emissions. In addition, China has reportedly blocked a $3.8 billion aircraft purchase by Hong Kong Airlines from France-based Airbus at the Paris air show in June.[344]
- Australia's Qantas Airways has said it is also considering legal action against the scheme.
- Facing a sluggish economy and weak cargo demand, Hong Kong-based Cathay Pacific Airways, Ltd, and some other Asian airlines have said they might impose surcharges or increase airfares to counter the ETS impact.
- The director general of the Association of Asia Pacific Airlines said: "The EU has painted itself into a corner, by stubbornly refusing to recognize the legitimacy of the concerns repeatedly voiced by foreign governments on this issue…." "We urge the EU to scrap plans to include foreign airlines within the EU ETS, rethink its position and reengage with the international community."
- In early 2012, low-budget Malaysian airline AirAsia X said it is withdrawing two services to Europe partly in response to the airline being regulated under the EU ETS.

342. Countries include Brazil, Canada, China, India, Japan, Mexico, Republic of Korea, Russian Federation, South Africa, and the United States.
343. Source: http://images.politico.com/global/2011/12/scan_letter_hillary_clinton.pdf.
344. Source: Thomson Reuters Point Carbon, *Carbon Market Daily*, September 30, 2011.

Annex 2: Land-use carbon

Land-use greenhouse gas mitigation activities have long remained on the fringe of global carbon markets.[345] Limited in scope for generating credits that are not eligible in the main compliance regimes, land-use carbon has been mostly restricted to the much-smaller voluntary market.[346] The latter has, however, provided interesting ground for innovation and helped project developers address new types of land-use activities and develop specific carbon accounting tools.[347] The on-the-ground experience acquired, has informed and enhanced the discussion on land-use carbon, both domestically and internationally. The year 2011 saw long-term land-use efforts begin to bear fruit and was therefore a transitional year for the market. First, the prospect of scaled-up demand for land-use assets materialized with the emergence of new carbon markets – such as in Australia and California.[348] These markets have set out plans to tap into domestic forest and soil sinks to generate compliance offsets. At an international level, Durban recognized that market-based approaches may be developed in the coming years to finance REDD+ activities.[349] It also opened the door for expanding the scope of CDM land-use activities beyond reforestation and afforestation. The supply of land-use carbon offsets also became tangible with the issuance of the first REDD voluntary credits in February 2011. These credits were generated from a Kenyan carbon project. In addition, the first forestry credits under the Kyoto Protocol were issued in April 2012, generated from a reforestation project in Brazil that was granted 4 million temporary CERs (tCERs).

While mostly relying on public financing until recently, and despite lingering uncertainties on the size and timeline for compliance demand, land-use carbon is gradually gaining traction from a more diversified set of investors. In 2011 and 2012, several funds emerged and joined the first few pioneers (see Table 14). Although far from their full capitalization targets, these funds are estimated to collectively raise about US$530-550 million (€402-417 million) by the end of 2012 for investment in land-use carbon offsets.[350] The funds that have emerged have a range of investment strategies, markets, and scope of investors, as described below.

Most of the funds listed in Table 14 invest in carbon offsets through off-take agreements with project developers. Once the credits are issued, the fund managers may directly monetize them in the secondary market and return the proceeds to their participants (yield-driven funds). The credits can also be delivered to participants who either seek monetization or use them for their own compliance or voluntary offsetting. In the specific case of equity funds, investors seek returns from the dividends of their shareholdings

345. In this section, land-use carbon broadly refers to carbon offsets sourced from forestry and agricultural soil management activities that reduce and/or sequester greenhouse gases.
346. In 2011, the voluntary carbon market accounted for roughly 0.2% of global carbon markets volumes (see Executive summary).
347. Source: Guigon, P., *Voluntary Carbon Market, How Can they Serve Climate Policies*, 2011. OECD.
348. Carbon Farming Initiative (CFI) in Australia, and cap and trade program in California.
349. REDD-plus refers to incentives for reducing greenhouse gas emissions from deforestation and forest degradation and for promoting forest conservation, sustainable forest management, and enhancement of forest carbon stocks.
350. This figure is an estimate based on either public information (if available) or confidential information (bilateral interviews), and represents the financial commitments that the funds listed have collectively secured as of April 2012, and/or should have secured by the end of 2012. This estimate does not account for one fund, for which such information could not be obtained. Although these funds intend to primarily address land-use carbon, some may also source credits from rural energy use projects. The "targeted financial commitments" featured only derive from publicly accessible sources (e.g., presentation, advertisement support). Exchange rate used €1 = US$1.32. Source: European Central Bank, as at April 20, 2012.

in project enterprises earning income from the sale of production outputs (e.g., carbon offsets, timber, or various agricultural commodities).

Although some funds specifically address compliance markets (e.g., Kyoto Protocol, California), most of them still invest in voluntary assets. However, those often bet on enhanced returns from potential grandfathering of their assets in future compliance markets, such as under an international or bilateral REDD+ agreement.

The wide range of land-use activities covered by the funds exemplifies the different markets that they address, as well as the availability of carbon accounting methodologies. In California, for example, the forestry protocols currently approved under the compliance offset program involve tree planting and forest management activities in both rural and urban areas.[351] A number of methodologies approved under the Verified Carbon Standard (VCS) address both forest and agricultural land (for the latter, the first methodology was approved in December 2011) and may ultimately supply the generation of future compliance regimes.[352] Although most of the funds invest in standalone land-use projects, some are seeking scale through a more integrated approach, using landscape accounting[353] or even crediting against national baselines.

Table 14: Investment funds and land-use carbon

	Launch year	Targeted commitment (million US$)	Manager	Investors (non-exhaustive)	Investment strategy	Scope	Targeted carbon market
Althelia Climate Fund	2011	325	Althelia Ecosphere	Dutch Development Finance Institution, industrial corporate(s), institutional investor(s)	**Assets:** carbon credits, sustainable commodities , and Payments for Ecosystem Services. **Yield-driven:** credits monetization and delivery.	**Activities:** forest (REDD, landscape). **Scale:** project, at scale.	Voluntary.
BioCarbon	2011	25	BioCarbon Group	Macquarie Group, International Finance Corporation (World Bank), Global Forest Partners.	**Assets:** carbon credits. **Yield-driven:** monetization.	**Activities:** forest (REDD), soil **Scale:** project	Voluntary. Pre-compliance: post-Kyoto, bilateral.
BioCarbon Fund (I ,II, III)	2004 (I) 2007 (II) 2012 (III)	90 (closed) 60 (open)	World Bank	Spain, Japan Petroleum Exploration, Tokyo Electric Power, Agence Française de Développement, Ireland.[354]	**Assets:** credits. **Not yield-driven:** credits delivery.	**Activities:** forest (diverse), soil, landscape (rural energy also envisaged.) **Scale:** Project, at scale	Compliance: Kyoto Voluntary.

351. Source: California Air Resources Board, *Compliance Offset Protocol for U.S. Forest Projects*, 2011.
352. The methodologies approved under the VCS are available at http://www.v-c-s.org/methodologies/what-methodology.
353. Landscape carbon accounting is an integrated approach which consists of crediting for a variety of greenhouse gas emission reduction activities (e.g., land-use and rural energy activities) within a defined large-scale boundary. It therefore differs from classic silos where activities are addressed separately. Source: World Bank, BioCarbon Fund Tranche 3, Concept note, March 2012.
354. For the full list of participants, refer to the website of the Carbon Finance Unit of the World Bank.

Table 14: Investment funds and land-use carbon *(continued)*

	Launch year	Targeted commitment (million US$)	Manager	Investors (non-exhaustive)	Investment strategy	Scope	Targeted carbon market
Carbon Fund for Forests	2011	132	CDC Climat Asset Management	CDC Climat, Orbeo, institutional investors.	**Assets:** carbon credits. **Yield-driven:** monetization.	**Activities:** forest (diverse) **Size:** project.	Compliance: North America Voluntary. Pre-compliance: post-Kyoto, bilateral.
EKO Green Carbon Fund	2011	5-10	EKO Asset Management Partners	BP Alternative Energy, institutional investors, family offices.	**Assets:** carbon credits. **Yield-driven:** monetization.	**Activities:** forest (diverse), soil **Scale:** project.	Compliance: North America
FCPF Carbon Fund	2011	215	World Bank	Norway, Germany, UK, Australia, USA, European Commission, CDC Climat, BP Alternative Energy, The Nature Conservancy, Switzerland, Canada.	**Assets:** emission reductions, with the potential of becoming credits. . **Not yield-driven:** delivery.	**Activities:** forest (REDD) **Scale:** jurisdiction (subnational, national).	Voluntary. Pre-compliance: post-Kyoto, bilateral.
Forest Carbon Partners	2012	Not disclosed	New Forests	Not disclosed.	**Assets:** carbon credits. **Yield-driven:** monetization.	**Activities:** forest (diverse), soil. **Scale:** project.	Compliance: North America.
Livelihoods Fund	2011	40-66	Livelihood Venture	CDC Climat, Credit Agricole, Danone, Schneider Electric.	**Assets:** carbon credits (100% up-front finance in exchange for carbon credits). **Not yield-driven:** delivery.	**Activities:** forest (diverse), soil (rural energy also envisaged). **Scale:** project.	Voluntary.
Moringa Fund	2012	132	Compagnie Benjamin de Rothschild (CBR), ONFI	Development Finance Institutions, , institutional investors, family offices.	**Assets:** equity (investment in project companies). **Yield-driven:** dividends based on sales of timber & agro products with an upside coming from carbon credits.	**Activities:** agroforestry (outputs: timber, soft commodities carbon & other environmental externalities). **Scale:** project.	Voluntary.
Terra Bella Fund	2011	150	Terra Global Investment Management	The U.S. Overseas Private Investment Corporation, institutional investors.	**Assets:** carbon credits, equity Yield-driven: monetization, dividends.	**Activities:** forest (REDD), agriculture. **Scale:** project.	Voluntary. Pre-compliance: post-Kyoto, bilateral.

Annex 3: The state of the voluntary market

By Forest Trends-Ecosystem Marketplace

In 2011, activity in the voluntary carbon market (VCM) stabilized to contract 79 million tons (Mt) for immediate or future delivery. Overall transaction volumes decreased 39% from 2010. However, excluding one low-priced, high volume outlier from the 2010 market, this represents a 14% increase over 2010 levels.

The value of the voluntary OTC marketplace increased by 35% to US$573 million as the average offset price jumped from US$6/ton in 2010 to US$7.3/ton in 2011. As always, prices were highly stratified according to standard, location and technology, ranging from a low US$0.1/ton to over US$100/ton.

Renewable energy projects generated around 56 Mt of all transacted reductions – roughly the size of the entire 2009 VCM OTC market. Of this volume, wind projects blew away other technologies to transact over 20 Mt.

For projects that reduce emissions from deforestation and forest degradation (REDD), 2011 launched with optimism with progress around REDD+ at the UNFCCC's 2010 16th Conference of Parties in Cancun – as well as project developer Wildlife Works' fast-moving Kenyan REDD project that brought the first verified VCS REDD credits to market.

As the year progressed, however, only one other REDD project achieved verification, as project developers and third-party standards continued to navigate REDD projects' unique political and technical challenges. REDD projects contracted 7.7 Mt representing 60 percent less volume than in 2010 – but nonetheless remained a popular project type.

As a result of voluntary buyers' renewed interest in clean energy projects, Asia emerged as the top location for offset supply – taking the lead from the United States, which was the leading credit source in 2009 and 2010. Demand for credits from Asian renewables was reflective of the CDM's historic influence on the VCM. Last year, market players followed the CDM market into Africa to transact the highest ever volume of credits from the region (7.4 Mt). Africa-based projects benefited both from the CDM's intensified post-2012 focus on credits from LDC's, as

Market	Average Price (US$/tCO$_2$e)		Volume (MtCO$_2$e)		Value (US$ million)	
	2010	2011	2010	2011	2010	2011
Voluntary OTC Market	6	6.5	69*	87	414	569
Of which Verified Carbon Standard	5	4.4	28	43	142	191
Of which Gold Standard	11.3	10.4	6.5	8	73	86
Of which Climate Action Reserve	6	7.3	13	9	79	65
Of which American Carbon Registry	1.6	5.7	1.5	4	2.5	24

*129Mt with single large CCX outlier transaction of 59Mt.

well as innovative cook stove, forestry and water purification projects that emerged from the pipeline in 2011 after years of capacity building and methodology development.

The U.S. retained its standing as the largest single country supplier of offsets, however – and also the largest buyer for both voluntary purposes and to prepare for regulation in the emerging California cap-and-trade market.

Worldwide, suppliers reported that 80% of credits were transacted by voluntary buyers with the intent to retire credits – and over half of all voluntary buyers were based in Europe. Buyers from the energy, manufacturing and financial sectors picked up the lion's share of purely voluntary offsets. Purchases were motivated by the aim of meeting and communicating their corporate GHG targets (59%). Another 6% of buyers worldwide purchased offsets to green their supply chains.

Third party standards continued to launch new methodologies and in cases such as the Climate Action Reserve, are becoming increasingly relevant to regulators. Overall, the Verified Carbon Standard (VCS) maintained its lead in contracted volume.

Annex 4: California's cap-and-trade design features

Gases	CH_4, CO_2, HFCs, NF_3, N_2O, PFCs, SF_6.
Sectoral scope	-Coverage: 85% of California's GHG emissions -From 2012: stationary facilities emitting at least 25,000 tCO_2e per year, in industry and power generation (including imports). -From 2015: distribution (including imports) of fuels for combustion in the transportation and building sectors, whose combustion emits more than 25,000 tCO_2e per year. Including threshold for power imports drops to $0tCO_2e$ per year.
Compliance periods	-Three compliance periods: 2013-2014 (CP1), 2015-2017 (CP2) and 2018-2020 (CP3). -Annual compliance: 30% of the compliance obligations of a year is due no later than 1 November of the following calendar year. -Triennial compliance: the balance of compliance obligations for the whole compliance period is due no later than 1 November of the year following the end of the compliance period (i.e. 2015, 2018, and 2021).
Cap	-Target: -9% from 2005 levels, or 0% from 1990 levels.

YEAR	2013	2014	2015	2016	2017	2018	2019	2020
Allowance budget (million units)	162.8	159.7	394.5	382.4	370.4	358.3	346.3	334.2
CAP (net PCR and VRE*)	160.4	157.3	337.7	366.1	354.7	332.3	321.2	310.0

*Under the Voluntary Renewable Electricity (VRE) program, ARB sets aside allowances (0.5% in CP1, and 0.25% in CP2 and CP3) to be retired on behalf of uncovered entities purchasing renewable electricity.

Regulator	California Air Resources Board (CARB).
Compliance units	-Emissions allowance issued by CARB. -Offset credit issued by CARB. -Early action offset credit issued by ARB following regulatory verification and review of an offset from an eligible program. -Compliance instrument issued by another GHG linked program.
Allocation	-Free allocation to eligible industrial facilities based on 1) a product-specific greenhouse gas emissions benchmark, and 2) an assistance factor based on exposure to leakage, which declines over time for some industries. -Free allocation to electricity distributors: Investor Owned Utilities (IOU) are required to auction all free allowances, Publicly Owned Utility (POU) can either auction free allowances or use them for compliance.
Auctions	-Quarterly auctions. First auction on November 14, 2012. -Uniform price, single round, sealed bids, and proportional allocation for tied bids. *All bids converted to a single currency using the exchange rate by the Auction Administrator on the day of the auction prior to bidding window.* -Market share limit: only applicable to auctions taking place until 2014. 15% of the offered allowances for a compliance participant (40% for an electrical distribution utility - *removed in draft linked amended regulation*), and 4% for a non compliance participant. -Reserve price set at US$10/unit in 2012, increasing 5% per year plus inflation rate to be specified. *Reserve price in Canadian dollars (CN$) is that of the previous year increased by 5 percent plus as adjusted in Financial Administration Act of Québec. Auction Reserve Price is reset on day of auction as the higher of the California and Québec auction reserve price when converted to a single currency.* *-US$/CN$ exchange rate as specified by the Auction Administrator.*

Banking & borrowing	-Unlimited banking (but subject to holding limit). -No borrowing stricto sensu, but advance auctions (on year N auctions of 10% of the allowances from future budget year N+3), and an allowance price containment reserve (see below).
Offsets	-Utilization Limit: 8% of compliance obligations for each compliance period (i.e. 218 $MtCO_2e$ maximum). -Unused offset capacity cannot be banked across CPs. -Four sources: 1) Compliance Offset Credits issued by CARB. 2) Early Action Offset Credits issued by CARB. 3) Compliance Offset Credits issued by a linked regulatory program (subject to further rule-making). 4) Sector-Based Offset Credits from crediting program (subject to further rule-making). Applicable sub-limit of 2% of compliance obligations in CP1, and 4% in CP2 and CP3 (i.e. 94 $MtCO_2e$ maximum). -Invalidation provision: CARB can remove from its holder's account or require its replacement, within a timeframe of 8 years, or 3 years if the project has been reviewed by a second verifier within 3 years.
Allowance Price Containment Reserve (PCR)	-Share of total allowance budget feeding the reserve: 1% in 2013-2014, 4% in 2015-2017, 7% in 2018-2020. -First sale on March 8, 2013, and six weeks after each auction for the following ones. -Sales only open to compliance participants. -Reserve divided in three equal-sized tiers according three fixed price categories: 40USD, 45USD, and US$50 per unit in 2013, increasing 5% per year plus inflation rate to be specified. *-Draft linking amended regulation defines that entities from another GHG linked program are not eligible to purchase allowances from the reserve.*
Holding limit	-Limit in the number of California allowances that any entity or group of affiliated entities can hold on its account. -Calculation formula: Holding Limit = 0.1 * base + 0.025 * (Compliance Period Budget – Base). E.g., 5.945 million allowances in 2013. -Draft linking amended regulation include allowances from other external linked programs in the calculation of the holding limit, and defines a holding limit for each allowance vintage year.
Penalty for non-compliance	Four allowances for each missing one.

Source: World Bank, California Air Resources Board.

The text in italic reflects some of the amendments to the cap-and-trade regulation proposed by CARB staff in a discussion draft published on March 30, 2012. Source: California Air Resources Board, *Discussion Draft - March 30, 2012 Amendments to the California Cap on Greenhouse Gas Emissions and Market-Based Compliance Mechanisms to Allow for the Use of Compliance Instruments Issued by Linked Jurisdictions*, March 2012.

Annex 5: Québec's cap-and trade design features

Gases	CH_4, CO_2, HFCs, NF_3, N_2O, PFCs, SF_6.
Sectoral scope	-From 2012: stationary facilities emitting at least 25,000 tCO_2e per year, in industry and power generation (including imports, i.e. out-of-state generation). -From 2015: distribution (including imports) of fuels for combustion in the transportation (excluding aviation and shipping) and building sectors.
Compliance periods	-Three compliance periods: 2013-2014 (CP1), 2015-2017 (CP2) and 2018-2020 (CP3). -Compliance obligations no later than 1 October of the year following the end of the compliance period (triennial compliance).
Cap	

YEAR	2013	2014	2015	2016	2017	2018	2019	2020
Allowance budget (million)	23.7	23.3	63.6	61	58.5	56	53.4	50.9
CAP (net PCR)	23.463	23.067	61.056	58.56	56.16	52.08	49.662	47.337

Regulator	Ministry of Sustainable Development, Environment and Parks.
Compliance units	-Emissions allowance issued by Québec. -Early reduction credit issued by Québec. -Compliance instrument issued by a government under official agreement with Québec. -Offset credit issued by Québec.
Allocation	-Free allocation to eligible emitters, based on performance benchmarks. -75% of the free allowances allocated in January of each year. -Remaining 25% is put aside until September of the following for adjustment based on annual verified emissions. -Regulator to claim back surplus if any after adjustment.
Auctions	-Quarterly auctions (at most). -Uniform price, single round, sealed bids. -Market share limit: 15% for a compliance participant, and 4% for a non compliance participant for 2013 and 2014 units, and 25% for any bidder for 2015. -Reserve price set at CN$10/unit in 2012, increasing 5% per year plus as adjusted in Financial Administration Act of Québec.
Holding limit	-Limit in the number of allowances that any entity or group of affiliated entities can hold on its account. -Calculation formula: Holding Limit = 0.1 * base + 0.025 * (Compliance Period Budget – Base).(e.g., 0.875 million allowances in 2013).
Banking & borrowing	-Unlimited banking (subject to holding limit). -No borrowing stricto sensu, but an allowance price containment reserve (see below).
Offsets	-Issued by the Regulator. -Limit of 8% of compliance obligations (for each compliance period): 34 $MtCO_2e$ maximum (4.1 $MtCO_2e$ in CP1, 15.9 $MtCO_2e$ in CP2, 13.9 in $MtCO_2e$ CP3)
Allowance Price Containment Reserve (PCR)	-Share of total allowance feeding the reserve: 1% in 2013-2014, 4% in 2015-2017, and 7% in 2018-2020. -Sales according to three price categories: CN$40, CN$45, and CN$50 per unit in 2013, increasing 5% per year plus as adjusted in Financial Administration Act of Québec.
Early Reduction Credits	-Issued for reductions made by covered entities over 2008-2011 and measured against 2005-2007 emissions. -Must be permanent, additional, and irreversible.
Penalty for non-compliance	-Three allowances for each missing allowance. -30-day notice before preemption over the next allocation.

Source: World Bank, Government of Québec.

Annex 6: China: targets and supporting measures under the Five-Year Plans

Global goals	Key indicators	11th FYP (2006-2010) 2010 targets (from 2005 levels)	Results	Supporting tools and measures	12th FYP (2011-2015) 2015 target (from 2010 levels)	Additional supporting tools and measures	Existing pilot market initiatives
Decreasing emissions of carbon and other pollutants with energy conservation and clean energy	Energy consumption intensity	-20%	-19.06% (-630 million tce, -1.46 billion tCO_2e)	-Elimination of backward production capacity -"Ten Key Energy Conservation Projects" -"Top-1000 Enterprises Energy Conservation Program" -"Energy-efficient products for the benefit of people" -Installation of flue-gas desulfurization systems on coal plants -Energy Management Companies (ESCOs) [355]	8.7 tce/thousand yuan from 10.3 (-16%)	Market mechanisms: -Voluntary market -Pilot ETS -Low carbon city plans -Energy Management Companies (ESCOs) Existing initiatives are maintained or expanded in scope (e.g., Top 1000 to 10,000 Enterprises), higher standards are set	-Pilot energy efficiency scheme in Tianjin Municipality -SO2 trading in Jiangsu
	Emissions of major pollutants	-10% SO2 (15.49 from 22.95 million tons) -10% COD (12.73 from 14.14 million tons)	-14.29% SO2 -12.45% COD		-8% SO2 -8% COD -10% NOX -10% NH3		
	CO_2 emission intensity	New to 12th FYP			-17%		
	Share of non-fossil fuels in primary energy consumption	Up at 10% from 7.5%	8.3% (up 3.1%)	-Feed-in tariffs -Indicative tariffs. -"Mandated market share" (similar to Renewable Portfolio Standard)	No official target to date	Continuation of the same supporting measures (higher standards)	None
Increasing carbon sequestration	Forest cover	Up to 20% from 18.2%	20.36% (+25.29 million ha)	-Afforestation programs -Forest conservation -Restoration of desertified lands	21.66% (+12.5 million ha)	Continuation of the same supporting measures	-Panda standard (AFOLU offset certification scheme) -China Green Carbon Fund by the State Forestry Administration
	Forest stock	New to 12th FYP			14.3 from 13.7 billion m^3		

Source: World Bank, PRC State Council, NDRC.

355. Energy management companies, known as ESCOs, help industries identify and implement energy efficiency projects by bringing upfront finance for investments in new technologies or renovated equipment. Industries incur no net cash costs, as they reimburse ESCOs with regular payments from the cost savings made until their investment is recovered.

Annex 7: India PAT: market design and governance elements

	COMMENTS
ESTABLISHING LEGISLATION	Energy Conservation Act 2001, modified by the Energy Conservation Amendment Act 2010, Article 14 (August 2010).
REGULATOR	Bureau of Energy Efficiency (BEE) of India's Ministry of Power, under supervisions of the Central Electricity Regulatory Commission.
ADMINISTRATOR	BEE.
COVERAGE	-Selected DCs in 8 energy intensive sectors (478 DCs): Thermal Power plants, Iron & Steel, Cement, Fertilizer, Aluminum, Textile, Pulp & Paper, Chlor alkali. -Possible sectoral extension in the second compliance periods.
COMPLIANCE PERIOD	-First PAT cycle going from April 1, 2012 to March 31, 2015. -Fulfillment of compliance obligations subsequent to first cycle termination.
BASELINE	-Defined as the average total energy input per production unit over 2007-2010. -All energy sources are considered and converted in metric ton of oil equivalent (MTOE).
TARGET	-Specific energy consumption (SEC) target assigned to each DC, in percentage of the baseline. -Overall reduction of 4.2%, equivalent to 6.6 million MTOE. -Revision in each subsequent PAT cycle.
MONITORING AND VERIFICATION	-Based on a "Baseline Energy Audit" (BEA). -Performed by "Designated Energy Auditors" (DENA) accredited by BEE. -First BEA at the end of the first PAT cycle (2014), possible annual BEA thereafter.
ENFORCEMENT	Penalty of 10 lakhs (US$20,000) in addition to the value of compliance.
TRADING	- ESCert issued to any DC exceeding own SEC target. -Bilateral transactions or cleared through the two national power exchanges, i.e. Power Exchange India, India Energy Exchange. -Market design elements (e.g., banking) under consideration.
MARKET READINESS	-Target setting by March 2012 (completed). -Rules and procedures completed.[356] -Trading infrastructures and rules to be announced soon (ongoing).

Source: World Bank, Bureau of Energy Efficiency.

356. Rules and procedures are available at www.bee-india.nic.in.

Annex 8: Assumptions for estimates of potential demand for offsets from non-Annex I Countries

EU: Under the EU Climate and Energy Package, the EU commits to cut its GHG emissions by 20 percent below 1990 levels, possibly tightening to 30 percent depending on developments in climate negotiations. For the EU ETS, this translates into further tightening of the cap from an average 6 percent below 2005 levels over 2008–20 to 21 percent by 2020 (or more in the 30 percent scenario), with a corresponding shortfall of about 2,500 $MtCO_2e$ over 2013–20 in the 20 percent scenario (resp. 3,500 $MtCO_2e$ in the 30 percent scenario).[357]

The total amount of offsets that can be used over 2008–20 is estimated at 1,700 $MtCO_2e$ in the 20 percent scenario (2,200 $MtCO_2e$ in the 30 percent scenario). On aggregate, the amount of offsets that can be surrendered during Phase III corresponds to the difference between the overall amount allowed over Phases II and III jointly minus what has been already surrendered during Phase II. The following qualitative restrictions apply with regard to the use of CERs/ERUs against Phase III obligations:

- CERs from project activities targeting the destruction of HFC-23 and N_2O from adipic acid production are banned from the EU ETS. CP-1 offsets will still be allowed until the end of April 2013 against Phase II obligations.
- CP-1 offsets (including ERUs) from eligible project types can be banked and surrendered.
- Offsets generated post-2012 must come either from a project registered before end of 2012 or from a project based in an LDC if registered after 2013.

For non-ETS covered sectors, the Climate and Energy Package translates into cuts of 10 percent (or more) below 2005 levels by 2020. Offsets can be used to cover about one-third of the effort in the 20 percent scenario, estimated to represent about 800 $MtCO_2e$ over 2013–20. In the 30 percent scenario, offsets can in principle be used to cover half of the additional effort, leading to a total demand of about 1,100 $MtCO_2e$. No restriction applies so far to the use of offsets.

New Zealand: The NZ ETS continues to expand its coverage, with synthetic gases and waste joining in 2013 and agriculture in 2015. The cap of the scheme is set in line with the country international commitment—to reduce emissions by 10 percent below 1990 levels by 2020 or, if a comprehensive global agreement is reached, by 20 percent. This could translate into a shortfall of 75 to 105 million tons over 2013–20, accounting for a limited uptake of forestry.[358]

Australia: Under Australia's Carbon Price Mechanism (CPM), operators will be able to meet up to 50% of their compliance obligations with international offsets from 2015. If the cap is set in line with Australia's target of 5 percent below 2000 levels by 2020 (unconditional pledge under the Copenhagen Accord), the CPM participants could therefore theoretically source almost 1 billion tCO_2e overseas (maximum),

357. This includes also aviation. Source: Barclays Capital. *Monthly Carbon Standard*, April 11, 2011.
358. Source: own calculation based on New Zealand Fifth National Communication.

i.e. up to 50% of their cumulative liability under the CPM over 2015-2020.[359] However, this figure disregards the costs of domestic abatements in covered and non-covered sectors (i.e. Carbon Farming Initiative). Taking these into account, the Australian Government models that Australian businesses would source 348 $MtCO_2e$ of abatement overseas by 2020.[360]

Japan: As plans for a mandatory ETS in Japan are delayed, one simply assumes here that offsets could be used up to 50 percent to fill the gap to the -25% conditional pledge. Accounting for sinks, this could correspond to a cumulative demand for offsets of 540 $MtCO_2e$ over 2013–2020.[361]

Switzerland: As its main additional climate policies and measures, Switzerland implements an ETS similar in design to the EU ETS. This could result in a cumulative demand for offsets from covered entities over 2013–20 of 2.3 $MtCO_2e$ in the 20 percent scenario, reaching 4 $MtCO_2e$ in the 30 percent scenario. In addition, a national law was passed in December 2011 and set for the country's GHG emissions a 2020 target of 20% below their level of 1990. Although no decision was made as of the time of writing, lawmakers may allow the use international offsets, which would generate a demand of 10 million international offsets (see Box 7). Last year, we accounted for a third source of demand for offsets stems from the obligation for producers and importers of fossil fuels to offset 25–30 percent of CO_2 emissions in the 20 percent scenario (gearing up to 40-45 percent in the 30 percent scenario). We estimated that this measure could generate a demand of 25 to 50 $MtCO_2e$ of international offsets.[362] However, this measure was over-rules by the national law passed in December 2011, and this demand is restricted to domestic offsets.

Northern America: As of today, California is the only cap and trade program in Northern America to accept international credits. These are "Sector-Based Offset Credits" for which we estimate a demand of 94 $MtCO_2e$ maximum over 2013-2020 (see Section 6.3.2.1). Québec has yet to release its offset program as of the time of writing the report. May all the other three WCI partners, i.e. British Columbia, Manitoba, and Ontario start operating their own cap and trade in 2015, with similar international offsets provisions as California, a collective demand of roughly 200 $MtCO_2e$ international credits could be generated over 2013-2020 across the five WCI jurisdictions.[363] Although RGGI is currently under review process, we do not expect it will generate demand for international offsets.

359. Own calculation based on Department of Climate Change and Energy Efficiency, *Australia's emissions projections*, 2010.
360. Source: Government of Australia, Treasury, *Strong Growth, Low Pollution, Modeling a carbon price, update*, 2011.
361. Assuming Japan's emissions grow in line with projections by the U.S. DoE Energy Information Administration's International Energy Outlook 2010 (High oil price case). Carbon sinks are maintained at 20 $MtCO_2e$ (that is, their planned use under the Kyoto Protocol), though they could decrease. Source: Ministry of the Environment, Japan, *National Greenhouse Gas Inventory Report of JAPAN*, April 2012.
362. Own calculation based on Switzerland Fifth National Communication.
363. Own calculation based on GHG emissions projections of British Columbia, California, Manitoba, Ontario, and Québec.

Methodology

In the *State and Trends of the Carbon Market Report of 2011*, the size of the global carbon market in 2010 derived from the growth rate between 2009 and 2010 of each market segment (for example, primary Certified Emission Reduction (CER), other project-based markets, Assigned Amount Units (AAUs), European Union Allowances (EUAs), and other allowance markets), drawing on information obtained primarily from Thomson Reuters Point Carbon and Bloomberg New Energy Finance. The value of the voluntary transactions was obtained from data provided by Ecosystem Marketplace. Since the original information from Thomson Reuters Point Carbon and Bloomberg New Energy Finance was provided in Euros, the impact of the US$/Euro exchange rate in the same period was eliminated and the US$ results were applied to the values of each market segment, as calculated by the World Bank in 2009. When applicable, the unweighted average from the sources was used, although some adjustments were made as deemed appropriate.

Instead of using external data, however, in 2012 the authors calculated the volumes and values for 2010 (following the methodology described below). The calculation resulted in higher volumes and values, particularly for EUA and secondary CER transactions. Instead of the global carbon market of US$142 billion reported in 2010, the revised calculations resulted in a global carbon market that is greater by about US$17 billion year on year (yoy). A higher value in the EUA market accounted for about US$14 billion, or 80% of the difference. This year's calculation also resulted in a secondary CER market greater by US$2 billion in 2010 yoy. The remaining difference is explained by the value of the post-2012 CER transactions, not reported last year, which reached over US$1 billion in 2010.

Monitoring the activity of the primary project market is a challenging task given the number of transactions and the diversity of participants. In addition, prices and contract structures are confidential in an increasingly competitive market.

The authors surveyed major carbon-industry publications[364] and conducted approximately 150 interviews with a broad range of market players: analysts and intelligence providers, project developers and aggregators, exchanges and trading platforms, financial institutions and brokers, regulators, managers of carbon purchasing funds and facilities, including public procurement programs and carbon portfolios of companies facing compliance obligations. This report focuses on regulatory compliance; therefore its coverage of the voluntary market is not exhaustive. The information on the voluntary market (including pre-compliance activity in North America) has been kindly provided by Forest Trends-New Energy Finance and Ecosystem Marketplace.

Only signed ERPAs are included in the project-based transaction database. Although they received a high level of cooperation from market players during their research, the authors were not able to obtain comprehensive information

364. Including online sources such as Carbon Finance (www.carbon-financeonline.com), Joint Implementation Quarterly (www.jiqweb.org), Thomson Reuters Point Carbon (www.pointcarbon.com) as well as Carbon Positive (www.carbonpositive.net), CDC Climat Research (www.cdcclimat.com), IISD Reporting Services (www.iisd.ca), IDEAcarbon (www.ideacarbon.com), Forest Trends-Ecosystem Marketplace (www.ecosystemmarketplace.com), and Thomson Reuters, the CDM and JI pipeline databases and analyses maintained by UNEP Risoe, and IGES, and Web sites of market players (DNAs, DOEs, project developers and aggregators, exchanges and trading platforms, financial institutions and brokers, regulators, carbon purchasing funds and facilities, public procurement programs, and companies facing compliance obligations). One should also mention other resources, including reports prepared by financial institutions, such as analyses by Barclays Capital, Deutsche Bank, Orbeo, and Société Générale, that have been kindly made available to the authors.

for all reported transactions. The authors are relatively confident that the database captures most transactions entered into by governments and a representative proportion of the activity of private-sector buyers in the primary market. In between the periodic reports in this series, the authors have occasionally become aware of unrecorded transactions from previous years as well as of the cancelation or postponement of previously recorded transactions. Adjustments have been made in the database, explaining why data for former years may be slightly different from previous publications in this series.

Data for transactions on the so-called secondary Clean Development Mechanism (CDM) and Joint Implementation (JI) market, including spot transactions[365] and forward transactions with delivery guarantees from a creditworthy seller (commonly financial institutions in Europe), were obtained from exchanges, clearing houses, and brokers.[366] This is also the case for transactions of EUAs and derivatives.[367] The authors have also obtained detailed information on transactions conducted under Alberta, British Columbia, California, Chicago Climate Exchange (CCX), New Zealand Emissions Trading Scheme (NZ ETS), and the Regional Greenhouse Gas Initiative (RGGI), as well as aggregate information on transactions under the New South Wales Greenhouse Gas Reduction Scheme (NSW GGAS).[368] With regard to Removal Units (RMUs) and AAU transactions, several sources have been used and cross-checked: public announcements, interviews with some buyers and sellers, and examination of Kyoto Parties' registries when possible.

To estimate the volume of "pure" bilateral transactions of EUAs and CERs (i.e., those deals that are not closed through brokers or exchanges – including those cleared over the counter (OTC), the authors surveyed several market players. The answers varied depending on respondents (financials or naturals), with an average of 15% of volumes transacted or cleared through exchanges. Taking into account all inputs, this coefficient is applied to volumes and values of spot and forward transactions to compute the entire value of the EUA and secondary CER markets in 2010. In 2011, inputs led the authors to increase the percentage to 25% applied to spot volumes transacted or cleared through exchanges, for both EUA and secondary CER markets.

In consultation with several market players, the options market in this report was valued at total volumes times strike price, assuming that the bulk of transactions are at-the-money options where the strike price is similar to prevailing market prices.

Prices and values are primarily expressed in nominal US$ per tCO_2e, unless indicated otherwise.[369] Average annual exchanges of €1 = US$1.327 for 2010 and €1 = US$1.392 for 2011 were applied, unless data were available with a finer granularity, in which case an average exchange rate over the period considered (e.g., Q1'11, June 2011) is applied. The cut-off date for information is April 20, 2012. A ton (abbreviated as "t") refers to a metric ton (1,000 kg).

365. Some of these spot transactions relate to sales of issued CERs directly by project sponsors, either those who have chosen to develop their projects unilaterally or those who have been issued more CERs than they had sold through forward transactions. These spot transactions could arguably be considered to be primary transactions, although commercial conditions, including prices, are aligned with the secondary market. It is not possible, however, to extract those from the broader secondary market activity.
366. For 2010 and 2011, such exchanges, clearinghouses, and brokers were: BlueNext, Climex, Chicago Climate Futures Exchanges (CCFE), Energy Exchange Austria (EXAA), European Energy Exchange (EEX), Gestore del Mercato Elettrico (GME). Green Exchange, Green Market, LCH Clearnet, IntercontinentalExchange (ICE), London Energy Brokers Association (LEBA), and Nordpool.
367. Data on EUA transactions in 2010 and 2011 (spot, futures, and options) were obtained from the following sources: BlueNext, Climex, Energy Exchange Austria (EXAA), European Energy Exchange (EEX), Gestore del Mercato Elettrico (GME). Green Exchange, Green Market, LCH Clearnet, IntercontinentalExchange (ICE), London Energy Brokers Association (LEBA), and Nordpool.
378. For Alberta, sources are Government of Alberta (volumes) and Karbone (prices). For British Columbia, the source is the Pacific Carbon Trust. For California, sources are ICE and Green Exchange (exchange-based volumes et prices), and Thomson Reuters Point Carbon (offset volumes and prices). For Chicago Climate Exchange (CCX), sources are CCX, CCFE, and ICE. For NZ ETS, sources are New Zealand Emission Unit Register (volumes of internal transfers) and Westpac (prices). For RGGI, data come from RGGI Inc., RGGI CO_2 Allowance Tracking System, CCFE, ICE, Green Exchange. For NSW GGAS, data come from the Registry (volumes) as well as from Nextgen (prices).
369. Exchange rates from European Central Bank (www.ecb.int), and U.S Federal Reserve (www.federalreserve.gov).

The report has written contributions kindly provided by Forest Trends-Ecosystem Marketplace (voluntary and pre-compliance activities), Air France (Aviation), Ministry of the Environment in Japan (Japan), Orbeo (EU ETS), Reed Smith (EU ETS), and Climate Cent (Switzerland).

In order to estimate the likely supply of pre-2013 credits in the section 5, the authors applied a delivery cut to the nominal volumes contracted (i.e., a risk-adjusted supply). The delivery cut aims to reflect underdelivery caused by both regulatory and operational issues. In order to refine the estimate, the authors also adopted two different delivery cuts according to a project's regulatory status, as projects in a more advanced stage of development in the regulatory process have higher chances to have their credits issued before 2013.

Based on the UNEP Risoe CDM Pipeline, the nominal volume of 2,17 billion CERs from registered projects should deliver about 1,13 billion tons by the end of 2012,[370] or a 52% risk-adjusted rate. On the other hand, a much lower success rate of 6% is seen for projects at an earlier stage in the regulatory process.[371] To date, the cumulative nominal volume of credits contracted has reached 2.58 billion tons. Applying the 6% risk-adjusted delivery over the 0.42 billion tons newly contracted and in early stage of development (i.e., the difference between 2.58 billion and 2.17 billion), early-stage projects shall deliver 25 million tons. All in all, 1.15 billion tons shall become available for buyers until the end of 2012 (i.e., 1.13 + 0.025).

370. To date, 895 $MtCO_2e$ have been issued.
371. As of April 2012.

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Glossary

Accredited Independent Entity (AIE): Accredited independent entities (AIEs) are independent auditors that assess whether a potential project meets all the eligibility requirements of the JI (determination) and whether the project has achieved greenhouse gas emission reductions (verification).

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.

Afforestation: The process of establishing and growing forests on bare or cultivated land that has not been forested in recent history.

Annex I (Parties): The industrialized countries listed in Annex I to the UNFCCC were committed to return their greenhouse gas emissions to 1990 levels by 2000. They currently include Australia, Austria, Belarus, Belgium, Bulgaria, Canada, Croatia, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Japan, Latvia, Liechtenstein, Lithuania, Luxembourg, 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 Economic Community. All but Turkey are listed in Annex B.

Annex B (Parties): The 39 industrialized countries (including the European Economic Community) listed in Annex B to the Kyoto Protocol have committed to country-specific targets that collectively reduce their GHG emissions by at least 5.2 percent below 1990 levels on average over 2008–12.

Assigned Amount Unit (AAU): Annex I Parties are issued AAUs up to the level of their assigned amount, corresponding to the quantity of greenhouse gases they can release in accordance with the Kyoto Protocol (Article 3), during the first commitment period of that protocol (2008–12). One AAU represents the right to emit one metric ton of carbon dioxide equivalent.

Backwardation: A downward sloping forward curve (i.e., the price of the future is less than the spot price of underlying commodity). Antonym: contango.

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 percent of the assigned amount of each party.

Baseline: The emission of greenhouse gases that would occur without the policy intervention or project activity under consideration.

Biomass Fuel: Combustible fuel composed of a biological material (for example, wood or wood by-products, rice husks, or cow dung).

California Global Warming Solution Act AB32 (AB32): The passage of Assembly Bill 32 (California Global Warming Solution Act AB32) in August 2006 sets economy-wide GHG emissions targets as follows: Bring down emissions to 1990 levels by 2020 (considered to be at least a 25 percent reduction below business-as-usual) and to 80 percent of 1990 levels by 2050. Covering about 85 percent of GHG emissions, a cap-and-trade scheme (still under design) would be a major instrument, along with renewable energy standards, energy efficiency standards for buildings and appliances as well as vehicle emissions standards.

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 greenhouse gas emission reductions that a project is able to generate and sell.

Carbon Finance: Resources provided to activities generating (or expected to generate) greenhouse gas (or carbon) emission reductions through the transaction of such emission reductions.

Carbon Dioxide Equivalent (CO_2e): The universal unit of measurement used to indicate the global warming potential of each of the six greenhouse gases 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 greenhouse gases are measured, using their global warming potential.

Certified Emission Reductions (CERs): A unit of greenhouse gas 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 greenhouse gas emissions of one metric ton of carbon dioxide equivalent.

Chicago Climate Exchange (CCX): Members to the Chicago Climate Exchange make a voluntary but legally binding commitment to reduce GHG emissions. By the end of Phase I (December 2006), all members will have reduced direct emissions four percent below a baseline period of 1998-2001. Phase II, which extends the CCX reduction program through 2010, will require all members to ultimately reduce GHG emissions six percent below baseline. Among the members are companies from North America as well as municipalities, U.S. states, and universities. As new regional initiatives began to take shape in the U.S., membership in the CCX grew from 127 members in January 2006 to 237 members by the end of the year; new participants expressed their interest in familiarizing themselves with emissions trading.

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 U.S.-based offsets program that establishes regulatory quality standards for the development, quantification, and verification of greenhouse gas (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.

Community Independent Transaction Log (CITL): The Community Independent Transaction Log (CITL) conducts "supplementary checks" to those done by the ITL for transactions involving registries of at least one EU member state, such as the issuance, transfer, cancellation, retirement, and banking of EUAs.

Conference of Parties (COP): The supreme body of the Convention. It currently meets once a year to review the Convention'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 Convention'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 Convention and the Protocol.

Contango: A term used in the futures market to describe an upward sloping forward curve (i.e., futures prices are above spot prices). Antonym: backwardation.

Crediting period: The crediting period is the duration of time during which a registered, determined, or approved project can generate emission reductions. For CDM projects, the crediting period can be either seven years (renewable twice) or ten years (non-renewable).

Designated Focal Point (DFP): Parties participating in the Joint Implementation (JI) mechanism are required to nominate a Designated Focal Point (DFP) for approving projects.

Designated National Authority (DNA): An office, ministry, or other official entity appointed by a party to the Kyoto Protocol to review and give national approval to projects proposed under the Clean Development Mechanism.

Designated Operational Entities (DOEs): Designated operational entities are independent auditors that assess whether a potential project meets all the eligibility requirements of the CDM (validation) and whether the project has achieved greenhouse gas emission reductions (verification and certification).

Determination: Determination is the process of evaluation by an independent entity accredited by the host country (JI Track 1) or by the Joint Implementation Supervisory Committee (JI Track 2) of whether a project and the ensuing reductions of anthropogenic emissions by sources or enhancements of anthropogenic removals by sinks meet all applicable requirements of Article 6 of the Kyoto Protocol and the JI guidelines.

Eligibility Requirements: There are six Eligibility Requirements for Participating in Emissions Trading (Article 17) for Annex I Parties. These are: (i) being a party to the Kyoto Protocol; (ii) having calculated and recorded one's Assigned Amount; (iii) having in place a national system for inventory; (iv) having in place a national registry; (v) having submitted an annual inventory and; and (vi) having submitted supplementary information on one's Assigned Amount. An Annex I party will automatically become eligible after 16 months have elapsed since the submission of its report on calculation of its assigned amount. Then, this party and any entity having opened an account in the registry can participate in emissions trading. However, a party could lose its eligibility if the Enforcement Branch of the Compliance Committee has determined the party is noncompliant with the eligibility requirements.

Emission Reductions (ERs): The measurable reduction of release of greenhouse gases into the atmosphere from a specified activity, and a specified period of time.

Emission Reductions Purchase Agreement (ERPA): Agreement which governs the transaction of emission reductions.

Emission Reduction Units (ERUs): 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.

EU-10: Bulgaria, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia, and Slovenia.

EU-15: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden, and the United Kingdom.

European Union Allowances (EUAs): The allowances in use under the EU ETS. An EUA unit is equal to one metric ton of carbon dioxide equivalent.

European Union Emission Trading Scheme (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). Over 2008–2012, emissions from mandated installations (about 40 percent of EU emissions) are capped on average at 6 percent below 2005 levels. Participants can internally reduce emissions, purchase EUAs, or acquire CERs and ERUs (within a 13.4 percent average limit of their allocation over 2008–12). The EU ETS will continue beyond 2012, with further cuts in emissions (by 21 percent below 2005 levels in 2020 or more, depending on progress in reaching an ambitious international agreement on climate change).

First Commitment Period: The five-year period, from 2008 to 2012, during which industrialized countries have committed to collectively reduce their greenhouse gas (or "carbon") emissions by an average of 5.2 percent compared with 1990 emissions under the Kyoto Protocol.

Green Investment Scheme (GIS): A voluntary mechanism through which proceeds from AAU transactions will contribute to contractually agreed environment- and climate-friendly projects and programs both by 2012 and beyond.

Greenhouse Gases (GHGs): Both natural and anthropogenic, greenhouse gases 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 greenhouse gases. The emission of greenhouse gases 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. 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).

Global Warming Potential (GWP): An index representing the combined effect of the differing times greenhouse gases remain in the atmosphere and their relative effectiveness in absorbing outgoing infrared radiation.

Internal rate of return: The annual return that would make the present value of future cash flows from an investment (including its residual market value) equal the current market price of the investment. In other words, the discount rate at which an investment has zero net present value.

International Transaction Log (ITL): The ITL links together the national registries and the CDM registry and is in charge of verifying the validity of transactions (issuance, transfer, and acquisition between registries, cancellation, expiration, and replacement, retirement and carryover). It is the central piece of the emissions trading under the Kyoto Protocol.

Japan-Voluntary Emissions Trading Scheme (J-VETS): Under the J-VETS, 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 J-VETS has contributed to the development of an MRV system, third-party verification system, and the registry system. The J-VETS 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 in return.

Kyoto Mechanisms (KMs): 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 Protocol: Adopted at the Third Conference of the Parties to the United Nations Convention on Climate Change held in Kyoto, Japan, in December 1997, the Kyoto Protocol commits industrialized country signatories to collectively reduce their greenhouse gas emissions by at least 5.2 percent 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.

Nationally Appropriate Mitigation Actions (NAMAs): 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 emerged in 2007 under the UNFCCC Bali Action Plan, which called for "[the implementation of] 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." Through international negotiations within the UNFCCC, NAMAs have been steadily refined. The Cancun Agreement of last December achieved significant progress in the concept of NAMAs and, inter alia, set milestones for the development of a central registry of NAMAs (including NAMAs seeking international funding support) and guidelines for measuring, reporting, and verification. Definitions on these elements are expected by the end of this year.

National Allocation Plans (NAPs): The documents, established by each member state and reviewed by the European Commission, that 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).

New South Wales Greenhouse Gas Reduction Scheme (NSW GGAS): Operational since January 1, 2003 (to last at least until 2012), the NSW Greenhouse Gas Abatement Scheme aims at reducing GHG emissions from the power sector. NSW and ACT (since January 1, 2005) retailers and large electricity customers have thus to comply with mandatory (intensity) targets for reducing or offsetting the emissions of GHG that arise from the production of electricity they supply or use. They can meet their targets by purchasing certificates (NSW Greenhouse Abatement Certificates or NGACs) that are generated through project activities.

New Zealand Emissions Trading Scheme (NZ ETS): The NZ ETS will progressively regulate emissions of the six Kyoto gases 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. The government recently announced, however, that full implementation could be delayed if adequate progress is not made in establishing similar regulations in other developed countries.

Offsets: Offsets designate the emission reductions from project-based activities that can be used to meet compliance or corporate citizenship objectives vis-à-vis greenhouse gas mitigation.

Primary transaction: A transaction between the original owner (or issuer) of the carbon asset and a buyer.

Project Design Document (PDD): A central document of project-based mechanisms, the PDD notably describes the project activity (including environmental impacts and stakeholders consultations), the baseline methodology and how the project is additional, and the monitoring plan.

Project Idea Note (PIN): A note prepared by a project proponent presenting briefly the project activity (for example, sector, location, financials, estimated amount of ERs, and so forth).

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, 10 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. During the first and second compliance periods (2009–2011 and 2012–2014) the cap on about 225 installations is set at 171 $MtCO_2e$ (or 188 M short ton CO_2e). This is followed by a 2.5% per year decrease in the cap during the third compliance period (2015–18).

Reforestation: This process increases the capacity of the land to sequester carbon by replanting forest biomass in areas where forests have been previously harvested.

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.

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. While assessing the NAPs, the European Commission considered that the use of CDM and JI offsets could not exceeded 50% of the effort by each member state to achieve its commitment. Supplementarity limits may thus affect demand for some categories of offsets.

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 greenhouse gas emissions at levels that would prevent dangerous manmade 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 Reductions (VERs): A unit of greenhouse gas 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, a determined JI project (or a project approved under another standard) during the verification period.

Voluntary market: The voluntary 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 WCI covers a group of seven U.S. states (Arizona, California, Montana, New Mexico, Oregon, Utah, and Washington) and four Canadian provinces (British Columbia, Manitoba, Ontario, and Quebec), with an aggregate emissions target of 15% below 2005 levels by 2020. Other U.S. and Mexican states and Canadian provinces have joined as observers.

NOTES

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