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State and Trends of the Carbon Market 2009

Washington, D.C. ♻️ May 2009

STATE AND TRENDS OF THE CARBON MARKET 2009

Karan Capoor
Sustainable Development Operations, World Bank*

Philippe Ambrosi
Climate Change Team, World Bank*

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This report is not intended to form the basis of an investment decision.

ACKNOWLEDGMENTS

WE WOULD LIKE TO acknowledge the input and insight provided by Evolution Markets Inc. We are grateful to our many colleagues in the carbon market for their cooperation and assistance in preparing this report. Special thanks are due to Anita Gordon, Alexandre Kossoy, Sidney Nakahodo, Sara Pais, Monali Ranade and Johannes Woelcke, Richard Zechter.

We wish to also extend our thanks to Edwin Aalders, Imtiaz Ahmad, Ellysar Baroudy, Noreen Beg, Abhishek Bhaskar, Martina Bosi, Marcos Castro, Michelle Caulfield, Charles Cormier, Karen Degouve, Jane Ebinger, Emmanuel Fages, Anita Gordon, Isabel Hagbrink, Kate Hamilton, Olivia Hartridge, Johannes Heister, Takashi Hongo, Nathalie Johnson, Anya Kareena, Abyd Karmali, Keith Kozloff, Nuno Lacasta, Aditi Maheshwari, Marco Monroy, Lucy Mortimer, Ken Newcombe, Shahyar Niakan, John O'Brien, Alexandrina Platonova-Oquab, Neeraj Prasad, Venkata Ramana Putti, Rama Chandra Reddy, Kirtan Sahoo, Laurent Segalen, Chandra Shekhar Sinha, Marc Stuart, Nicholas Tatrallyay, Nuyi Tao, Bruce Usher, Jari Väyrynen, Xueman Wang as well as numerous other colleagues choosing to remain unnamed from various firms and governments around the world as well as Regional Operations and Carbon Finance Unit staff at the World Bank.

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I EXECUTIVE SUMMARY

A YEAR OF SIGNIFICANT GLOBAL CHANGES
 Over the past year, the global economy has cooled significantly, a far cry from the boom just a year ago in various countries and across markets. At the same time, the scientific community communicated the heightened urgency of taking action on climate change. Policymakers at national, regional and international levels have put forward proposals to respond to the climate challenge. The most concrete of these is the adopted EU Climate & Energy package (20% below 1990 levels by 2020), which guarantees a level of carbon market continuity beyond 2012. The EU package, along with proposals from the U.S. and Australia, tries to address the key issues of ambition, flexibility, scope and competitiveness. Taken together, the proposals tabled by the major industrialized countries do not match the aggregate level of Annex I ambition called for by the Intergovernmental Panel on Climate Change, or IPCC (25-40% reductions below 1990).¹ Setting targets in line with the science will send the right market signal to stimulate greater cooperation with developing countries to scale up mitigation.

Table 1: Carbon Market at a Glance, Volumes & Values in 2007-08

| | 2007 | | 2008 | |
|-----------------------------------|---------------------------------|------------------|---------------------------------|------------------|
| | Volume (MtCO ₂ e) | Value (MUS\$) | Volume (MtCO ₂ e) | Value (MUS\$) |
| Project-based Transactions | | | | |
| Primary CDM | 552 | 7,433 | 389 | 6,519 |
| JJ | 41 | 499 | 20 | 294 |
| Voluntary market | 43 | 263 | 54 | 397 |
| Sub total | 636 | 8,195 | 463 | 7,210 |
| Secondary CDM | | | | |
| Sub total | 240 | 5,451 | 1,072 | 26,277 |
| Allowances Markets | | | | |
| EU ETS | 2,060 | 49,065 | 3,093 | 91,910 |
| New South Wales | 25 | 224 | 31 | 183 |
| Chicago Climate Exchange | 23 | 72 | 69 | 309 |
| RGGI | na | na | 65 | 246 |
| AAUs | na | na | 18 | 211 |
| Sub total | 2,108 | 49,361 | 3,276 | 92,859 |
| TOTAL | 2,984 | 63,007 | 4,811 | 126,345 |

Overall Market Grows

The overall carbon market continued to grow in 2008, reaching a total value transacted of about US\$126 billion (€86 billion) at the end of the year, double its 2007 value (Table 1). Approximately US\$92 billion (€63 billion) of this overall value is accounted for by transactions of allowances and

¹ See Box 13.7 in *Climate Change 2007: Mitigation. Contribution of Working Group III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*

derivatives under the EU Emissions Trading Scheme (EU ETS) for compliance, risk management, arbitrage, raising cash and profit-taking purposes. The second largest segment of the carbon market was the secondary market for Certified Emission Reductions (sCERs), which is a financial market with spot, futures and options transactions in excess of US\$26 billion, or €18 billion, representing a five-fold increase in both value and volume over 2007. These trades do not directly give rise to emission reductions unlike transactions in the primary market.

Cashing in on Carbon During the Credit Crunch

Like other markets, prices in the European carbon markets started to decline late last summer from their highs of July 2008, on the back of lower oil and energy prices and a deteriorating economic outlook. Demand for carbon allowances fell sharply in late 2008 and early 2009 as the recession reduced economic output, resulting in much lower emissions than had been expected. A large European Union Allowances (EUAs) sell-off started in September 2008, as companies realized that the allowances they had received at no charge were valuable assets, particularly in the midst of the financial credit crunch. The EUA sell-off, mostly on the spot market, was followed by a discernible increase in trading of EUA options (more calls than puts, on average), showing the intent of some installations to hedge any anticipated 2008-12 compliance exposure.

EUA Decline Squeezes Primary CER Markets

The price spread between EUAs and secondary CERs, which had remained in the range of €9-11 until July 2008, started to narrow until it completely disappeared in February 2009. The primary CER (i.e., CERs purchased directly from entities in developing countries or pCERs) market was initially more resilient, until the spread between sCER prices and pCER prices narrowed so much that buyers had moved away from the primary market. Market data in this time-frame confirm a strong preference for option and futures contracts for guaranteed assets in the EUA and sCER markets and away from pCER and spot markets for issued CERs. In recent days, carbon prices across the board have recovered considerably and spreads have begun to widen again, despite the expectation of some analysts that the 2008-12 market appears to be net long overall.

Project-based Market Faces Challenges

Confirmed transactions for pCERs declined nearly 30% to around 389 million CERs from 552 million CERs in 2007 (Table 1). The corresponding value of these pCER transactions declined 12% to around US\$6.5 billion in 2008 (€4.5 billion), compared to US\$7.4 billion reported in 2007 (€5.4 billion). Confirmed transactions for Joint Implementation (JI) also declined 41% in value to about US\$294 million (€201 million) for about 20 MtCO₂e transacted in 2008. The supply of Clean Development Mechanism (CDM) and JI in 2008 and early 2009 continued to be constrained by regulatory delays in registration and issuance and the financial crisis made project financing extremely difficult to obtain.

To further complicate matters for CDM demand, 2008 and early 2009 also saw several pioneering transactions of about 90 million Assigned Amount Units (AAUs) with related Green Investment Schemes (GIS) at various stages of elaboration. The economic blues also affected the voluntary market, which saw transactions of 54 MtCO₂e in 2008 (up 26% over 2007) for a value of US\$397 million, or €271 million (up 51%), but still fell short of the exponential growth of previous years.

Potential CDM Demand Remains but is Largely Unrealized

On the supply side, analysts revised downward their expectations for real (risk-adjusted) CDM supply to between 1,300 and 1,700 MtCO₂e due to a combination of regulatory delays, the difficulty in obtaining financing for projects in a challenging global financial environment, and the renegotiation or cancellation of some carbon contracts. CDM had nominally contracted much of the maximum allowable limits in the 2008-12 phase of the EU ETS, although not yet the nominal revised higher EU ETS Phase III limits.

On the demand side, some potential demand for Kyoto Mechanism units remains despite the economic slowdown. In Japan, for example, the economic tsunami has brought the level of effort required to meet Kyoto targets within reach with the help of CDM and, in particular, recent AAU/GIS transactions. Several countries, such as Austria, Belgium, Denmark, Finland, Italy, Norway, Portugal, Spain and Switzerland, are also continuing with existing plans for carbon purchases in 2009. European utilities express concern about post-2012 CDM contracting due to continuing lack of clarity about EU rules post-2012.

In this uncertain climate, one could expect that credits from projects in Least Developed Countries (LDCs) could have an edge for post-2012 contracting, if the projects could obtain underlying financing and emerge from the CDM regulatory process more quickly.

Project Aggregators get Unexpected Relief

Lower CER prices unexpectedly brought some good news for project aggregation companies as well, which had previously sold forward more CERs for guaranteed delivery than had been issued by the CDM Executive Board. Some were able to either reschedule or cancel their deliveries by mutual consent of their secondary buyers. Companies that had previously hedged their portfolios by buying put options on the secondary markets at high prices, chose to exercise these options. Some even booked significant first-time profits by buying and delivering lower priced spot CERs. Many companies were shifting their focus – and their staffing needs – away from the relentless origination of new ERPA's toward maintaining and maximizing “production” from their existing project portfolios.

The U.S. is Back at the Table...and the World Pays Attention

The most significant change in the policy landscape over the past years is the re-emergence of the United States in the climate change debate. The Waxman-Markey (“W-M”) bill has reached the full House of Representatives. At the time of this writing, it calls for reductions in GHG emissions of 17% below 2005 levels by 2020.

IGEM, a model used by the U.S. Environmental Protection Agency (US EPA) to analyze the W-M bill, relies on the latest U.S. Energy Information Agency (EIA) scenario,² and projects that U.S. GHG emissions will likely remain below 2005 levels until about 2020, even in the absence of new climate policy. It anticipates that the projected level of effort by covered U.S. entities gradually increases to 3,291 MtCO₂e over the 2012-20 period, for an annualized estimated gap-to-target of 366 MtCO₂e. However, this estimate is uncertain and the gap-to-effort may change substantially depending on the timing and pace of resumed economic growth in the U.S.

² Annual Energy Outlook (2009 revised) by Energy Information Agency, U.S. Department of Energy. Based on an EPA analysis of the Waxman-Markey draft using the ADAGE model, CO₂ emissions from energy use are projected to represent an average of 80% of overall US GHG emissions and 96% of the GHG emissions of entities covered under the scope of the original Waxman-Markey draft of March 31, 2009.

New Direction Likely for Project-based Emission Reduction Activities

The W-M bill, which does not automatically accept all CDM-certified credits, however provides generous allowable limits of two billion tons annually from domestic and international offsets, and international allowance trading. The EU has indicated that if there is a satisfactory international agreement, then it will adopt a stronger target of 30% below 1990 levels by 2020, creating an additional demand of about 300 MtCO₂e per year over 2013-2020. The demand from the U.S. and EU combined will create an opportunity for developing countries to scale-up their supply of emission reduction credits.

This, in turn, will require that the CDM evolve to meet this challenge. In its best year, it has so far seen no more than 430 projects registered with expected emission reductions of about 80 million CERs per year. Proposals contained in the EU package and in draft U.S. anticipate a CDM very different from the one we know today. The European Commission (EC) has proposed that the project-based mechanism of today be limited to LDCs in the future, and that major emerging economies be able to transact credits generated from additional reductions beyond an agreed benchmark for sectors e.g., steel, cement and power. Market experience has shown that stimulating offset supply will need a sufficient price signal, a wide range of eligible offset types, sufficient lead time for project development and an efficient offset approval process. Expanding the scope and scale of offsets and credits (to include, for example, international mitigation activities in agriculture, such as soil-based sequestration and through programmatic approaches) will be important to expand the participation of developing countries and should, in turn, encourage more ambitious targets from industrialized countries.

Cycle-proof Regulation

There have been calls for market intervention following recent volatility in the EU-ETS market. The general approach of establishing medium-term targets with flexibility across compliance periods, as proposed in the draft U.S. bill and integral to the design of the EU-ETS, provides a built-in cushion to accommodate the ebb and flow of economic cycles. This should provide further comfort to policymakers that more ambitious reductions can be accommodated with such a design. There may be additional ways to smooth the effect of inevitable economic cycles on emissions markets, without distorting their proper functioning, and this year's report discusses some practical approaches for policymakers to consider (Section 2.4).

Complexity and the Quest for Clarity

It is good news for the global environment that the EU, U.S. and others are seriously engaged in climate policy. Even a seasoned observer might struggle with the complexity of the numerous proposed emissions trading policies and packages. This calls for greater simplicity, comparability of targets and transparency of underlying assumptions (including for provisions to preserve competitiveness). In addition to the CDM, there are now over a dozen carbon certification standards that compete with each other for market acceptance. Competition and choice is good for the market; however consolidation of the most attractive features across regimes and standards could help reduce complexity and enable closer linkage across markets.

II ALLOWANCE-BASED MARKETS

A NUMBER OF national and sub-regional carbon market initiatives in Annex I Parties, including the EU and the U.S., are either already underway, seriously under discussion, or actively being revised. If designed compatibly with science-based mitigation targets, they will have the potential to create significant value and opportunities for harvesting low cost mitigation opportunities through the market by addressing key issues of ambition, flexibility, scope and competitiveness.

Table 2: Annual Volumes and Values of Transactions on the Main Allowances Markets (2007-08)

| | 2007 | | 2008 | |
|---------------------------------|---------------------------------|------------------|---------------------------------|------------------|
| | Volume (MtCO ₂ e) | Value (MUS\$) | Volume (MtCO ₂ e) | Value (MUS\$) |
| EU ETS | 2,060 | 49,065 | 3,093 | 91,910 |
| New South Wales | 25 | 224 | 31 | 183 |
| Chicago Climate Exchange | 23 | 72 | 69 | 309 |
| RGGI | Na | na | 65 | 246 |
| AAUs | Na | na | 18 | 211 |
| TOTAL | 2,108 | 49,361 | 3,276 | 92,859 |

2.1 EU ETS

High Growth, Liquid and Volatile

EU ETS continued to dominate the global carbon market in 2008, with transactions valued at US\$92 billion (€63 billion), which represented an 87% year-on-year growth over 2007 (Table 2). Over three billion EUA spot, future and option contracts traded for a variety of purposes, including compliance, risk management, arbitrage and profit-taking.

A highly volatile market, spot EUA prices (currently trading in the band of €10-15) declined nearly 75% over a period of 7-8 months, from a record-high of €28.73 in July 2008 down to as low as €7.96 on February 12, 2009.³ Similar declines occurred in prices of futures contracts for EUAs and secondary CERs (Figure 1).⁴ Trading activity picked up dramatically in the second half of 2008, peaking in early 2009, during a particularly strong EUA sell-off by industrials looking for liquidity in a tighter credit environment. They sold mostly on the spot market – which saw a dramatic increase in activity and broke daily and monthly records for traded volumes during that period. This is reflected in market data which shows that spot transactions accounted for only 1% of all transactions in the first half of 2008, rising to 7% in the third quarter and 19% in the fourth quarter (and accounting for 36% of all transactions in December 2008 alone).

The options market, used as a tool to hedge against price volatility and volume risk, also continued to grow briskly. To illustrate, options volume on the European Climate Exchange (ECX) grew five-fold to 240 MtCO₂e between 2007 and 2008. Based on observed growth rate during the period January to April 2009, it could be on track to more than double in 2009. In late 2008, the options market for

³ Data from Bluenext.

⁴ After a volatile year, any number of factors could explain the most recent run-up in EUA prices. As in the oil markets or stock markets, some analysts believe that they could be indicators of market perceptions of the resumption of economic growth. Prices of carbon allowances typically show sensitivity to the supply-demand gap in the system, which, in turn, are influenced by the ambition of targets, allocation of allowances, rate of economic growth, weather conditions, fuel price differentials, level of abatement, system flexibility and the availability and cost of offsets.

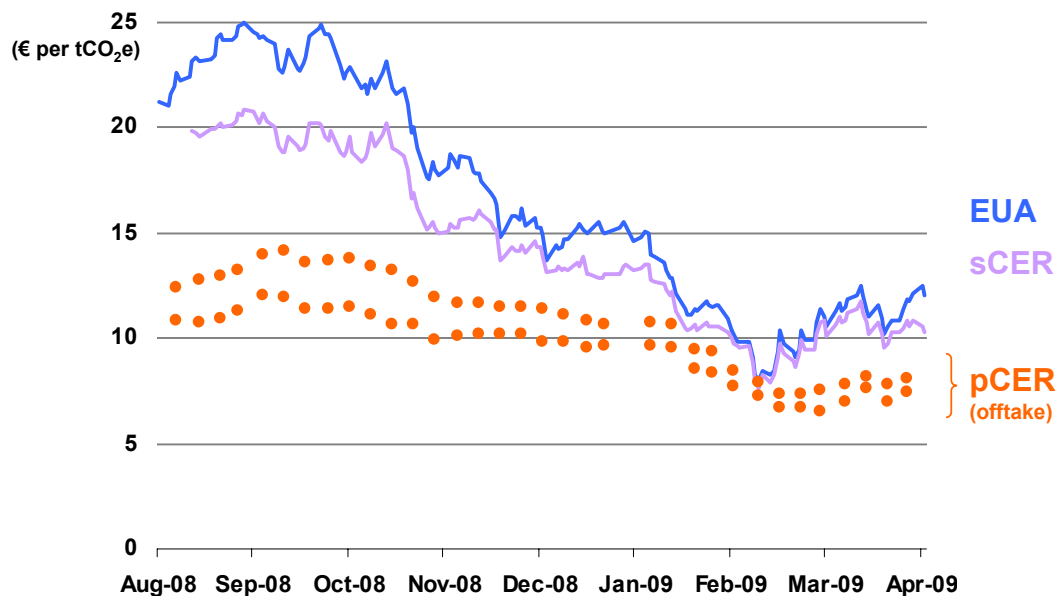
EUAs started transacting not just for Dec-09 compliance but also for Dec-10. By January 2009, there was significant option interest across all vintages, including Dec-11 and Dec-12 vintages as traders began to hedge their potential volume risk arising out of any over-selling in the earlier months.

2.1.1 Carbon Hit by Recession

Cashing in on Carbon during the Carbon Crunch

Economic slowdown in Europe and elsewhere led to lower demand for housing and cement, automobiles and steel, and so on. As demand and commodity prices collapsed, cement and steel companies substantially cut back their production and power consumption. Emissions were lower as was their need to purchase any carbon because they were granted free allocations prior to Phase II when the economy was healthy, global demand for commodities was strong and their actual emissions were higher.

Figure 1: Carbon Prices Respond to the Recession



Source: Spot EUA and sCER (closing price): Bluenext; primary CER (average price for categories b and c): IDEA Carbon.

Companies holding substantially more free allowances than they needed for compliance (typically industrials such as steel and cement sectors) chose to sell EUAs on the market to raise cheap cash in a difficult credit environment. Trading activity spiked sharply with record-breaking daily and monthly volumes on the spot market, in particular. Higher supply and lower demand for allowances brought substantially lower prices for EUAs. This inclination to sell the EUAs in their possession was greatly boosted by the fact that companies did not have to pay to obtain these allowances in the first place, but rather they were granted them for free.

The EUA sell-off was further amplified by the overlap in holding allowances between the time 2008 allowances were to be surrendered (April 30 2009) and the time that 2009 allowances were issued (February 2009). This enabled operators to sell 2008 allowances, knowing that they could use the 2009 allowances to cover any shortfall for 2008. Many operators sold their 2008 allowances for cash, and hedged their expected future exposure by purchasing later maturity options and futures at an

attractive price, netting them, in effect, a discount-priced loan at a time when obtaining credit was expensive, if not impossible.

EMISSIONS DECLINED BUT ETS WAS NET SHORT IN 2008

On April 1, 2009, the European Commission posted verified 2008 emissions data for EU ETS installations. Analysts had anticipated an overall short EU ETS in 2008, and the 2008 preliminary verified emissions data showed indeed that despite the economic downturn, ETS was still net short in 2008. As a result, the release of verified emissions data did not cause significant market movement.

In emissions trading, policymakers establish the emissions limits and regulated entities are to comply by remaining within those limits. Regulators are to periodically release emissions data which can help analysts to determine the quantity of emissions-to-cap balance in the market. When disclosed on April 1, 2009, 2008 emissions of ETS installations amounted to 1,981 MtCO₂e or just over 90% of 2007 verified emissions. Unfortunately, the released data is not directly comparable to 2007 verified emissions since all installations had not reported their emissions and the scope of the ETS had changed between Phase II and Phase III.

Analysis is further complicated by the fact that the exact cap (amount of allowances in circulation) for 2008 is not known with accuracy, despite efforts by the EC to collect information from some Member States on final allocations made on the installation-level. Some Member States also did not clearly communicate their intentions regarding auctioning. Finally, little is known about how much of the New Entrants Reserve (NER) has been released to new entrants. This underscores the critical importance of having full, transparent and comparable information and reporting about emissions-related data.⁵

To illustrate, on April 8, 2009, the EU indicated that 2008 verified emissions data (including Liechtenstein and Norway) amounted to 2,031 MtCO₂e for the 10,085 installations which reported. Comparing 2007 and 2008 emissions for installations that reported for both years, it appears that year-on-year emissions from these sources dropped on average by 4.6% in 2008.⁶

The above number for overall allocation does not, however, include 50 million EUAs that were auctioned in Germany and the UK, nor Norway's plans to auction about 7 MtCO₂e per year. Assuming that all planned auctioning had occurred, and extrapolating missing 2008 data for installations from their 2007 data, analysts may conclude that the 2008 shortfall is really the difference between 2,127 MtCO₂e (2008 emissions) and 2,083 MtCO₂e (Phase II average cap), or a shortfall of 40-50 MtCO₂e. If Member States had not auctioned all they intended to, or if they had drawn less from their NERs than planned, then the actual shortfall would be greater. Without having access to this information on a timely basis, the market can only guess at the overall shortfall or length of the market.

Investors (i.e., not compliance players) also off-loaded their long positions to raise cash in a falling market. These actions combined resulted in bringing a large supply of EUAs to the market with insufficient matching demand, bringing prices down dramatically.⁷ Although there was more buying and higher prices again at the end of April 2009, this could be attributed to the need of some compliance buyers to close their positions for 2008 compliance.

⁵ Data were still missing when the installation-level compliance data for 2008 were unveiled on May 15, 2009.

⁶ Analyst New Carbon Finance credits carbon regulation in Europe for contributing 30% of this emissions drop, while recession and power diversification accounted for 40% and 30% respectively.

⁷ At this time, the strong correlation between EUAs' price and oil price, that could have been observed through 2008 (in its June heydays as in its slump through H2'08), temporarily broke in early 2009.

2.1.2 What to Expect for the Remainder of Phase II?

A reasonable question is what to expect of the remainder of the Phase II market. The shortfall of EU ETS for Phase II is clearly expected to be much smaller than one year ago. Several analysts even project that the 2008-12 market is probably net long (Table 3), even though power producers in Germany and UK will probably still be short. Much of this shortfall can largely be addressed through surrendering of CERs and Emission Reduction Units (ERUs) and from cheap abatement measures. Banking of carbon assets from Phase II to Phase III (which is supposed to have tougher targets with an increased level of auctioning and benchmarking) could encourage market participants to buy “excess” or “surplus” EUAs and bank those for Phase III. The bankability of CERs (and ERUs) to Phase III also gives an incentive to acquire and bank those assets, if there are expectations for a truly tight Phase III market, and if the EU rules clarify eligibility of project types and countries of origin.

Barring a swift economic recovery in 2009, the prospects of high carbon prices over the next year or two are relatively low. It is the view of the authors that the continuing economic slump in Europe and elsewhere will likely result in more length in the market over the coming year and consequently lower EUA prices. This may present an opportunity for those with a longer-term outlook beyond 2012 in the ETS and with a view to supplying linked schemes in the U.S. and Australia.

Table 3: A View on Analysts’ Expectations for EU ETS Phase II&III

| | Projections for Phase II | | | | | Projections for Phase III (20% target) | | | |
|------------------|--|---------------------------------|----------------------------------|---|--|---|---------------------------------|---|--|
| | position (+ short/-long) (MtCO ₂ e) | CDM/JI (MtCO ₂ e) | banking (MtCO ₂ e) | sCER price (€/tCO ₂ e) | EUA price (€/tCO ₂ e) | position (+short/-long) (MtCO ₂ e) | CDM/JI (MtCO ₂ e) | sCER price (€/tCO ₂ e) | EUA price (€/tCO ₂ e) |
| Barclays | -67 | 400 | 467 | 10-17 | 11-20 | 3,596 | 1,900 | 30 | 40 |
| Cheuvreux | 439 | 893 | 454 | 12-23 | 10-21 | | | 20 | 30-35 |
| Orbeo | 345 | 875 | 530 | 13.7-18 | 11.5-20 | 3,855 | 880 | 23-38 | |

Source: Barclays Capital. Monthly Carbon Standard, May 2009; Cheuvreux. Carbon Research, March 2009; Société Générale. Carbon Specials, May 2009.

2.1.3 20-20-20 by 2020: the Climate and Energy Package is Adopted

The European Parliament adopted the Climate and Energy Package on December 17, 2008, making carbon market continuity beyond 2012 more concrete. Strengthening and expanding the EU ETS is central to the EU’s strategy to and beyond 2020, and this is a core element of the package, whose main objectives are:⁸

- to reduce overall GHG emissions to 20% below 1990 levels by 2020 (possibly scaling up to 30% in the event of a satisfactory international agreement being reached);
- to increase the share of renewable energy sources to 20% by 2020; and,

⁸ The package also includes the following additional components:

- binding, but differentiated, targets for Member States on renewable energy to achieve the EU target of 20% share of renewable energy in 2020, including provision for Member States to count renewable energy imported from new facilities in non-Member States (e.g. Concentrated Solar Power in North Africa);
- a new tradable “Guarantee of Origin” (GoO) label that would allow energy customers to purchase electricity with information about which renewable source it was generated from, which technology, the dates and places of production, and in the case of hydroelectric installations, indicate the capacity;
- binding, undifferentiated 10% target for renewables in transport (assorted with criteria for biofuel sustainability);
- regulatory framework to enable the deployment of carbon capture and storage (CCS) – with public support for demonstration projects using part of the revenues from the sale or auction of EUAs (including a dedicated lot of 300 million EUAs available up until 2015 – considered to address the needs of up to 12 projects);
- binding targets for emissions from fleets of new cars to an average of 120 gCO₂/km and a longer-term goal of 95 gCO₂/km by 2020, along with complementary measures such as the fuel quality directive.

- to improve energy efficiency by 20% by 2020.

Spanning less than one year, discussions and negotiations on the proposed package focused around issues reflecting the differentiation of Member States on issues such as:

- auctioning of allowances and its implications for the power sector in each Member State;
- concerns regarding competitiveness and the potential risk of carbon leakage;
- differentiation of mitigation commitments across Member States; and,
- transition or “compensation” schemes.

The EU package was finally adopted with compromises primarily concerning provisions for auctioning while the emissions targets were confirmed. Next steps include technical implementation of the agreement, and, in particular developing rules for auctioning, benchmarking for free allocation, identification of sectors subject to leakage, and defining the scope of offsets use.

EU ETS Phase III

Ambition

The EU target of 20% below 1990 levels corresponds to a 14% reduction below 2005 levels by 2020. Taken together with EC actions since 1990, this is to date the most ambitious target put forward in the run-up to Copenhagen. However the EC package falls short of IPCC findings that call for 25-40% reductions by 2020 by industrialized countries in order to stabilize atmospheric concentrations at 450 ppm. Proposals by other industrialized countries are even less ambitious over the same time horizon since they tend to consider stabilization of emissions at 1990 levels, or less stringent objectives, before bringing down reductions in the later years.

INDICATIVE SCIENCE-BASED TARGET RANGES

It is very helpful for policymakers to provide the market with an early indication of likely future carbon constraints. This need for advance indication of future constraints should be informed by, and should accommodate, the latest scientific information on climate change and technology options for mitigation. Setting Phase III allocations a decade prior to 2020 and Phase IV allocations potentially even more years in advance, could make it difficult to adjust future commitments based on the latest science.

One approach to balancing these concerns (and consistent with the Australian ETS proposal that is currently undergoing revisions) could be to set a longer-term signal of the range of possible carbon constraints. Policymakers could announce future expected reductions in a range, with the higher end of the range reflecting the best scientific information at that time. In this way, the market would not be surprised if policymakers reacted to the latest science by adjusting the cap downward no more than a year or two before the start of the next applicable compliance phase.

Gradually Deeper Emissions Cuts by 2020

Gradually requiring tighter caps and providing an indicative cap that goes out to 2020 increases the planning horizon for investment in long-lived capital stock. A single EU-wide cap will be implemented, which is a sign of increased harmonization for Phase III.⁹ For sectors included in the ETS, the cap on emissions is expected to decrease at 1.74% per year rate with the 2010 allocation as a reference. Based on Phase II coverage and allocation (2,080 million EUAs per year, on average), this would correspond to an EU-wide allocation of 1,974 million EUAs by 2013, decreasing to 1,720 million EUAs by 2020. The final annual emissions cap for Phase III will be announced by September 30, 2010 (accounting for new entrants in already covered sectors and new sectors, such as chemical

⁹ Other elements of increased harmonization include: a sole EU-wide New Entrants Reserve (5% of the entire amount of allowances), centralized allocation rules for installations and for auctioning, as well as a proposed single EU registry.

and aluminum industries, bringing new GHGs – nitrous oxide (N₂O) and perfluorocarbons (PFCs) - under the scheme), a full 10 years ahead of 2020, the final year of Phase III.

To achieve the 20% reduction goal, sectors already covered by the EU ETS assume a larger share of the effort, with required reductions of 21% below 2005 levels,¹⁰ while other sectors (transport, building, agriculture and waste, which account for about 60% of EU GHG emissions) take on a target of 10% below 2005 levels. This target is differentiated among Member States (with criteria reflecting, among other things, GDP per capita) leading to national targets ranging from -20% to 20% below 2005 levels. This differentiation is one of the so-called “compensation” mechanisms across Member States in the package, together with provisions concerning auctioning of EUAs to power sector installations and distribution of allowances among Member States.

Auctioning: At least 50% of EUAs to be Auctioned by 2013

Auctioning is one area where major revisions have been made to the January 2008 European Commission proposal, resulting in a more gradual phasing-in than had previously been expected.¹¹ As a whole, it is estimated that about half of allowances will be auctioned, increasing with time until 70-80% are auctioned by 2020, which is a significant departure from 4-5% auctioning on average during Phase II (mainly by Germany and the U.K.). Rules for auctioning are to be adopted by June 30, 2010. Allowances are to be auctioned by Member States, with national shares largely reflecting Phase I emissions.¹² As opposed to granting free allocation under grandfathering (the major mode of allocation under EU ETS in Phases I and II), auctioning is likely to make the allocation process much more efficient. In addition, because regulated companies will have to pay for allowances in the first place, auctioning will make it less likely that companies will have a strong incentive to sell allocations as a source of corporate finance or receive windfall profits.

Auctioning for Electricity Producers

Full auctioning will start in 2013 for electricity producers, with concessions made to some Member States, taking into account the status of the electricity sector and GDP per capita. These Member States will have the option to start auctioning at least at 30% by 2013 reaching 100% by 2020 for existing power plants (not applicable to new entrants in the sector).¹³ Auctioning, along with unlimited banking to Phase III, should encourage power utilities to bank excess allowances from Phase II.

Auctioning for Industry and Other Sectors

EU-wide rules for free allocation will be adopted by December 31, 2010, with the intent of harmonizing these rules across Member States.

- For industry not exposed to global competition, auctioning will be phased in gradually, starting with a modest 20% in 2013 and increasing to 70% by 2020 (with a view to finally reaching full auctioning by 2027).

¹⁰ For the record, the average cap for Phase II has been set at -6% below 2005 levels.

¹¹ The proposal tabled on full auctioning starting 2013 for sectors able to pass through costs (such as power sector) and gradual auctioning (from 20% in 2013 to 100% in 2020) for those sectors exposed to international competition and thus at risk of carbon leakage.

¹² For solidarity purposes, 12% of allowances are to be redistributed across Member States, reflecting differences in GDP per capita (10%) and achievements under the Kyoto Protocol (2%).

¹³ In addition, should this option be elected, those Member States have to undertake measures to green their electricity sector for an amount to the extent possible equal to market value of free allocation.

- For those sectors exposed to global competition, the aggregate number of free allowances for this group will be set in proportion to their historical share of emissions during Phase I and will decline annually in proportion to the overall Phase III cap.¹⁴
- “To the extent possible”, free allocation to individual installations in both industry categories (above) will be based on benchmarking to best available technology¹⁵. The intent is that free allocation rewards efficient installations more than less efficient installations in any sector.

The sectors and sub-sectors exposed to global competition (and those that are not), will be determined by December 31, 2009, based on an assessment of projected increases in production costs as a result of carbon regulation and degree of openness. The exposure of installations to international competition will be assessed in depth by June 30, 2010, and additional measures to protect these industries may be proposed, as needed.

Proceeds of Auctioning

Auctioning has the potential, not unnoticed by governments, to raise revenues. Depending on the ultimate level of ambition, the extent of banking from Phase II and prevailing market prices during Phase III, the EU ETS could see an average 1.3 billion EUAs being auctioned each year, potentially raising €25-40 billion annually. The EU package makes provision for at least 50% of the revenues to be used for low-carbon and climate-resilient growth, both within and outside the EU. It is envisaged that part of the revenues from the sale or auction of allowances would support climate action in developing countries; another part would support a program including 12 demonstration plants showcasing carbon capture and storage (CCS) applications.¹⁶

The Politics of Auctioning

As an aside, the discussions on auctioning provide a fascinating glimpse into comparative politics and policymaking in different countries. In the U.S., negotiations on how to allocate and spend the proceeds from auctions of allowances are underway and are thought to be key to passage of the draft legislation. In Australia, all auction revenues under the CPRS are to be spent domestically. The EC and Member States, while indicating how 50% of auction resources will be spent, are silent on how the remaining 50% auction revenues will be treated (at least in part, presumably, to protect trade-exposed and non-exposed industries as designated above).

¹⁴ The sectors and sub-sectors exposed to global competition will be determined by 31 December 2009, based on assessment of increase in production costs as a result of carbon regulation and degree of openness. The exposure of installations exposed to international competition will be assessed in depth by June 30, 2010, and additional measures to protect these industries may be proposed, as needed.

¹⁵ Allocation will be determined on the basis of emissions of the top 15% most efficient plants in the industry.

¹⁶ Up to 300 million allowances from the New Entrants Reserve (NER) are available until 31 December 2015 to support a dozen carbon capture and storage power plants and demonstration projects using innovative renewable energy technologies that are not yet commercially viable.

AVIATION BELOW THE CAP, STARTING IN 2012

On July 8, 2008, the European Parliament voted to include emissions from aviation in the EU ETS from all flights taking off and landing in the EU starting in 2012. The result of a compromise between the European Commission, Parliament and Council, this decision came about 18 months after the initial proposal by the Commission and was approved on October 2008 by the EU Council. The scheme could target close to 100 airlines, one-third headquartered outside EU. The EU's decision may be challenged by airlines originating outside the EU because it seeks to regulate emissions from their fleets.

EU-based aviation emissions currently represent about 3% of EU emissions but they are growing rapidly (they have almost doubled since 1990). Estimated at about 218 MtCO₂e on average during 2004-06, they could increase to 340 MtCO₂e by 2015 and 400 MtCO₂e by 2020 (nearly doubling within 15 years). Emissions are to be capped at 97% of a 2004-06 baseline in 2012, further declining to 95% from 2013 onward with possible revisions at a later date. Specific Aviation Allowances will be issued, with 85% handed over for free, with that number possibly decreasing beyond 2012.

CERs and ERUs can be surrendered for compliance up to a 15% limit of emissions (to be reviewed beyond 2012; see below). Estimates for Phase III indicate a potential annual shortfall of 160 MtCO₂e per year, with a maximum potential demand for emission reductions at about 60 MtCO₂e per year.¹⁷ Policies and measures, such as better air traffic management, could also contribute to reducing emissions from the sector.

Emissions from international transport by air or sea are not regulated under a global climate change agreement and the EU decision in this respect is certainly a first. However, only a global agreement could appropriately address any concerns about the potential impact of such regulation on international competitiveness. Accordingly, the EU has been calling for the inclusion of these GHG sources under an international agreement. Should an international agreement fail to materialize, the EU could also choose to unilaterally regulate maritime transport.

More Room for Offsets

The EU ETS 20-20-20 package results in an increase of 20%, or approximately 300 MtCO₂e, in additional allowed volumes of credits from projects compared to the proposal made in January 2008. This results in a new estimated maximum demand of about 1,700 MtCO₂e over the entire 2008-20 period.¹⁸ For existing installations, the volume of credits from projects allowed in the ETS Phases II and III combined is the higher of either the volume of CERs and ERUs allowed during Phase II¹⁹ or a specific percentage of Phase II allocation (not less than 11%). There will be new special provisions for installations such as power plants in the UK (which have a smaller provision for offsets and already face auctioning). Using information enclosed in National Allocation Plans for Phase II, this could result in an additional 155 MtCO₂e credits from projects allowed between 2012-2020. For new entrants and new sectors, the volume of CERs and ERUs allowed during Phase III is to be no less than 4.5% of annual verified emissions (1.5% for aviation). This could lead to an additional increase in demand for credits from projects by 80-100 MtCO₂e over Phase III. The exact amount of maximum allowed volumes will be determined through a consultation process ("comitology") led by the Commission.

¹⁷ All background data from

<http://www.reutersinteractive.com/Carbon/pages/print/posts/?bid=02de22c9-0867-47a0-a32c-e6eb977a4b50&mode=Full>.

¹⁸ This number corresponds to an average supplementarity limit of about 6% (or less than half the average supplementarity limit of Phase II alone).

¹⁹ The average supplementarity limit for Phase II is at 13.4% of allocation, or about 280 million tCO₂e per year.

For non-ETS sectors, credits from projects up to a level of 3% of 2005 emissions (one-third of the commitment) may be surrendered, as was proposed in January 2008. In addition, a group of Member States meeting certain conditions²⁰ can use an additional 1% of credits from projects with additional restrictions.²¹ On average, this translates into a maximum demand of 700-800 MtCO₂e between 2013-20 (or about 90-100 MtCO₂e annually). This is roughly comparable to the most recent estimates of annual demand for Kyoto Mechanisms from EU-15 governments under the burden-sharing agreement.

Banking of CERs from Phase II to Phase III

The adopted text describes rules for banking or carry-over of unused CERs and ERUs issued before 2013, which will be valid for exchange with Phase III allowances until March 31, 2015.

Satisfactory International Agreement

In the event of an international agreement, and consistent with the resulting stricter EU-wide emission reductions, additional credits from projects up to 50% of the incremental reductions could be utilized, implying a further additional demand of 1,200-1,300 MtCO₂e over 2013-2020, for a total of 1,500-1,600 MtCO₂e (almost 200 MtCO₂e annually over 2013-2020) and a maximum demand of 3,000 MtCO₂e over 2008-2020. Although higher than the January 2008 proposal, the maximum allowable EU demand is significantly below the corresponding number of international offsets allowed in the draft U.S. legislation (1,000 MtCO₂e annually). It is unclear to what extent the EU limits will integrate credits from projects alone (i.e., offsets) or also allow credits from programmatic or sectoral initiatives in developing countries. The biggest uncertainty is what criteria will be used by the Commission to determine if any international agreement reached is “satisfactory” or not. It is also not clear what happens if some agreement is announced in Copenhagen but does not deal comprehensively with all the subjects of relevance to the timely adoption of a more ambitious EU target.

Additional Limits on Credits from Projects

The adopted package regulates type and origin of credits from projects for Phase III. Only credits from project types allowed during Phase II in the EU ETS will be accepted during Phase III, although new potential restrictions to their use may be introduced starting January 2013. Limitations including total bans or discounts could be applied by the Commission to certain project types (perhaps including CERs from HFC projects) and changes to their eligibility could be announced with a lead time of between six months and three years.

LULUCF Remains Sidelined

The EC continues to insist on its intent to exclude CDM credits from land use, land use change and forestry (LULUCF) projects from the EU ETS,²² citing concerns with non-permanence, monitoring and reporting requirements, and potential price impact. In this segment, it is likely to leave the field alone for buyers from the U.S. market, where land-based offsets could be welcomed.

Credits from LDCs Attractive for Post-2012 Compliance

Rules governing the use of credits beyond 2012 make CERs and ERUs issued before 2012 particularly attractive, as nothing except the supplementarity limit would restrict their use. CERs and ERUs issued after 2013 from projects that were registered before 2012 would also likely be a safe bet (except LULUCF and possibly industrial gases). Finally, CERs issued from new projects in LDCs registered after 2012 would also be attractive for post-2012 compliance. All of these would of course still be subject to overall use being below the supplementarity limit.

²⁰ Austria, Finland, Denmark, Italy, Spain, Belgium, Luxembourg, Portugal, Ireland, Slovenia, Cyprus and Sweden

²¹ Allowed credits can be sourced only in LDCs and Small Island States and are not bankable nor transferable.

²² Member States however can continue to use such credits under the effort sharing decision.

Part of likely EU Negotiation Strategy

If an international agreement is concluded by December 31, 2009, the Commission notes that additional access to credits could be allowed for “additional types of project credits *or other mechanisms created under the international agreement.*” However, only credits from countries that have ratified the international agreement will be accepted beyond 2012. This is the first time that the concept of “other mechanisms created under the international agreement” is introduced.

If, however, an international agreement is “not concluded by December 31, 2009” then credits from projects “*or other emission reducing activities* may be used in accordance with agreements concluded with *third countries, specifying levels of use.*” The Directive here gives the first indication that bilateral agreements will seek credits not from projects alone, but from more amorphous “emission reducing activities.” The language also suggests that there may be some limits placed on the use of credits from any one country but does not elaborate on this.

Finally, the Directive suggests that “any such agreement may also provide for the use of credits [from projects] *where the baseline used is below the level of free allocation.*” This language implies that credits might only be issued to activities in developing countries that would reduce emissions beyond a European industry emissions benchmark (rather than a host country emissions benchmark). The biggest unknown, again, is what criteria will be used by the Commission to determine if any international agreement reached is satisfactory. It is also not clear what happens if a framework agreement is announced in Copenhagen, but it does not deal comprehensively with all the subjects relevant to the timely adoption of a more ambitious EU target.

Price Control Mechanisms

Increased price volatility in the carbon market revived the debate on the need for market intervention (section 2.4). The Commission has consistently maintained that a well-designed and properly implemented scheme should not require price intervention. It has, however, included in the final text one provision allowing quantitative intervention in the market, to be triggered in the case of extremely high price levels. If, for more than six consecutive months, the allowance price is more than three times the average price of allowances during the two preceding years on the European market, the Commission will convene a meeting with Member States. If it is found that the price evolution does not correspond to market fundamentals, the Commission may either allow Member States to bring forward the auctioning of a part of the quantity to be auctioned, or allow them to auction up to 25% of the remaining allowances in the New Entrant Reserve.

2.2 THE U.S. IS BACK AT THE TABLE

On May 15, 2009, U.S. Representatives Henry Waxman and Ed Markey formally introduced the Clean Energy and Security Act (HR 2454), a legislative proposal to establish a national renewable energy standard and an economy-wide cap and trade program. The proposal underwent a spirited debate and several revisions in the House Committee on Energy and Commerce and the Subcommittee of Energy and Environment, before reaching the full House of Representatives. The bill, which is referred to in this report as the Waxman-Markey Draft Bill (“W-M” or “Draft” or “bill”) is expected to come for a vote before the full House of Representatives by the time this report is published. There are changes expected to specific language during the mark-up and the reader is cautioned to use the information that follows as indicative only.

LIKELY IMPACTS OF FEDERAL REGULATION ON EXISTING AND UPCOMING STATE-BASED AND REGIONAL INITIATIVES

A number of state-based and regional initiatives have emerged in North America over the past few years, with the goals of implementing emissions trading programs and influencing any federal scheme. The future of these schemes – and interest in carbon instruments issued by them – will largely depend on their treatment in upcoming legislation at the Federal level.

RGGI MARKET

Market activity in the Regional Greenhouse Gas Initiative (RGGI) gathered steam in 2008 in preparation for the official 2009 start of operations, and interest has grown significantly during the first half of this year.²³ Prices of RGGI Allowances (RGGAs) is now reported around US\$3.90 per short tCO₂e (€3 per short tCO₂e) in a market that is likely to be long emissions in its first years. Analysts consider that likely fungibility of RGGI Allowances into the federal system,²⁴ along with the possibility of banking to later RGGI phases, has possibly helped keep price above the US\$1.86 auction reserve price.

CHICAGO CLIMATE EXCHANGE (CCX)

Members of the Chicago Climate Exchange (CCX) had made voluntary, but firm commitments to reduce GHG emissions by 6% below a baseline period of 1998-2001 by 2010. CCX continued to see record-breaking activity in 2008, tripling transacted volumes at 69 MtCO₂e for a value of US\$309 million (€211 million), more than quadrupling 2007 values. America's Climate Security Act, sponsored by Senators Lieberman and Warner,²⁵ was introduced in October 2007 and reported by Committee in December 2008 before a cloture vote blocked further debate on the bill. The sharp rise in 2008 values is related to particularly high prices in the first part of the year, following a perception that passage of the bill would result in favorable treatment. The Chicago Climate Exchange Carbon Financial Instrument (CCX-CFI) skirted above US\$7.00 per tCO₂e in early May 2008 before plunging to less than US\$2 by mid-September, when it became clear that the Lieberman-Warner bill would not become law. The CCX-CFI is currently trading in the US\$1-2 price band, as the market perceives that a U.S. federal market is unlikely to recognize the value of CCX-CFIs.²⁶

CALIFORNIA GLOBAL WARMING SOLUTIONS ACT

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% reduction below business-as-usual) and to 80% of 1990 levels by 2050. Covering about 85% 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. Allowances issued by California and other states before 2012 could also be exchanged for Federal carbon allowances under the proposed W-M draft legislation.

CALIFORNIA CLIMATE ACTION RESERVE

The prospect of fungibility with federal law, among other reasons, has stimulated a domestic offset market, through the California Climate Action Registry (now known as the Climate Action Reserve). This new market generates Climate Reserve Ton (CRT) units, which currently comprise project types from livestock and landfills across the U.S. and forestry project offsets in California. Early transactions for one to 10 year terms forward have been reported with prices ranging between US\$5.00 and US\$14.00 depending on the location, project type and volume of supply guaranteed in contracts. The primary buyers of these CRTs have been pre-compliance buyers with an eye to California's law AB32, the emerging Western Climate Initiative (WCI), and a potential Federal U.S. program.

²³ See *Report on the Secondary Market for RGGI CO₂ Allowances*, May 2009. http://rggi.org/docs/Secondary_Market_Report_May_2009.pdf

²⁴ The W-M Draft provides for "compensation" for held allowances equal to a weighted average price based on the auction clearing price for that vintage year.

²⁵ See *State and Trends of the Carbon Market 2008*.

²⁶ Additionally, pure voluntary buyers appeared to favor VCS and Climate Action Reserve CRTs to meet their needs as these two latter standards are project specific as opposed to purchasing generic CFI's directly off of the CCX.

WESTERN CLIMATE INITIATIVE

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. Cap and trade would here again be a major instrument, and transition modalities to a federal cap and trade scheme are now considered under the W-M draft bill.

2.2.1 Energy, Climate...and Trade/Competitiveness

The W-M Draft Bill has four major sections, referred to as Titles. In addition to the cap-and-trade provisions contained in Title III, the Draft contains provisions for a range of policies and measures such as a federal Renewable Electricity Standard (RES); a higher emissions standard for new coal-fired power plants and a program and fund for CCS deployment; a fund to manage federal financial assistance to states related to clean energy, e.g., for weatherization assistance, and encouragement for deployment of a smart grid; and authorization for federal agencies to sign long-term (up to 30 year) contracts for the purchase of renewable energy. There are also related initiatives included in programs on energy efficiency (in buildings, lighting, appliances); for industry; transportation systems; electricity and gas distribution systems; smart grids) and transition to a clean energy economy (including CCS). There are also provisions that seek to protect trade sensitive sectors from international competition and provisions to help states transition toward a cleaner investment future.

TITLE I: CLEAN ENERGY

The Draft's Renewable Electricity Standard requires that the share of renewable energy sold by electric utilities²⁷ is to rise from 6% in 2012 and to 15% by 2020. This is part of a combined program with an energy efficiency resource standard (5%), for a combined target of 20% by 2020. Some applications (e.g., electricity generation from distributed energy resources, such as solar photovoltaic, will receive triple credit under the program. RES provides for compliance flexibility in that it allows utilities to meet their obligations by buying, selling and trading federal Renewable Energy Certificates (RECs). The Draft also allows individual state-level renewable portfolio standards to co-exist along with the federal program.

TITLE II: ENERGY EFFICIENCY

The bill calls for a 30% improvement of model energy codes for new commercial buildings (ASHRAE) and homes (IECC) and 50% improvement after 2016. It allows states to implement nationally-consistent energy retrofit programs for residential and commercial buildings. Both programs would be performance-based, i.e., greater energy savings would gain larger monetary rewards. A rebate program is also proposed in order to purchase and destroy manufactured housing built before 1976 and replace it with Energy Star manufactured homes.

The bill sets efficiency standards for outdoor lighting and portable light fixtures, and for water dispensers, hot food cabinets, and spas. "Cash for clunkers"-type payments have been proposed for the early retirement of household appliances such as refrigerators and washing machines and "golden carrot"-type incentives proposed for best-in-class, highly-efficient appliances. There are also efforts to change the long-term direction of transportation planning; to increase requirements for gas and electric utilities to produce energy savings, including both demand- and supply-side efficiencies; and provide grants for innovative energy savings in industrial motors and through changes in process engineering.

²⁷ The RES mandate would apply to larger utilities (those selling at least 1 million megawatt-hours of electricity annually).

2.2.2 Title III: Reducing Global Warming Pollution²⁸

The Draft bill requires U.S. economy-wide emissions to be a modest 3% below 2005 levels by 2012 and 17% below 2005 levels by 2020. It also creates an emissions trading scheme covering about 85% of 2005 U.S. emissions, with the same GHG emission reduction targets as the economy-wide ones. The W-M Draft gradually expands its coverage and tightens annual emission targets each year after 2012, requiring emission reductions of 17% below 2005 levels by 2020.

Emission allowances would be allocated by the EPA in 2012 to all electricity generators, liquid fuel refiners and blenders, and fluorinated gas. Large industrial sources are covered starting with emissions in 2014. Local distribution companies that deliver natural gas are covered starting with emissions in 2016, extending the cap to entities currently responsible for approximately 85% of GHG emissions in the U.S.

The Lost Eight Years: Long-term Emission Reductions Trajectory

The economy-wide target in the bill is equivalent to 4% below 1990 levels in 2020, which is less ambitious than the U.S.'s negotiated Kyoto target. It is also significantly less ambitious than the 25-40% reductions below 1990 levels called for by the IPCC.²⁹ Over time, required emission reductions in the U.S. under the W-M Draft increase steadily to 32% below 1990 in 2030 (42% below 2005 levels) and 80% below 1990 (83% below 2005) in 2050. The longer-term targets in 2050 are consistent with proposals from other developed countries. The most important long-term contribution of the bill is that, if adopted, it sets the trajectory of U.S. emissions in the right direction and creates an expectation of tightening carbon constraints over time, giving ample time for the economy to adjust, plan and invest capital as needed.

Ambition Matters...

It is important to examine the likely shortfall in the U.S. emissions trading market based on the W-M bill's call for 17% reductions by 2020 from a 2005 baseline. However, making this estimate is not an easy task, given that the cap is phased in over the first few years of the program, and additional sectors are added over time with the level of reductions increasing over time. In the wake of the recession and the resulting change in expectations of market shortfall in the EU ETS Phase III, it is especially important to take into account the latest information based on data that accounts for the known impacts of the recession and on expectations of economic recovery.³⁰

Using the ADAGE model, the projected shortfall in the emissions trading scheme proposed under the W-M proposal, using the latest EPA projections (with data that includes the current known impact of the recession) is 1,054 MtCO₂e in 2020. The projected shortfall using the IGEM model is 959 MtCO₂e in 2020, for a cumulative projected shortfall in 2020 of 3,291 MtCO₂e, with annualized

²⁸ There have been several excellent analyses of the cap-and-trade provisions of the W-M Draft by several organizations and the authors have gratefully drawn from several of them, in addition to doing their own analysis of the Draft.

²⁹ In comparison, Europe has adopted a target of 20% below 1990 levels in 2020, and has indicated its willingness to achieve a 30% reduction target below 1990 levels, provided there is a credible, international effort to reduce emissions. In addition to the reductions described above, the Draft U.S. Bill calls for "supplemental" Reductions from Deforestation (RED). As this report came close to publication date, the U.S. Government proposed an ambitious national program to raise the corporate average fleet economy of cars and light trucks to an average mileage standard of 39 miles per gallon for cars and 30 mpg for trucks by 2016 – a jump from the current average for all vehicles of 25 miles per gallon.

³⁰ See http://switchboard.nrdc.org/blogs/ddoniger/degree_of_difficulty_how_to_ju.html, a NRDC weblog where David Doniger and Daniel Lashof explain:

"The Energy Information Administration produces a baseline emissions forecast each year - the Annual Energy Outlook (AEO) - with projections of emissions through 2020 and beyond based on forecasts of economic growth, the price and mix of fuels, trends in the introduction of new energy production and use technologies, and the effect of already adopted energy and environmental policies. This baseline forecast determines how much additional emission reduction is needed to meet any given carbon target. Here's the key point: with each successive Annual Energy Outlook, the Energy Information Administration has been lowering its baseline forecast. Projected 2020 emissions were lower in AEO 2008 than AEO 2007, and they are lower still in AEO 2009, and the most recent forecast, AEO 2009 with ARRA, which is a revised forecast accounting for the clean energy investments in the stimulus bill.

average reduction of 366 MtCO₂e (IGEM). Expectations of shortfall will drive demand for reductions, including offsets, and consequently projected market prices.³¹ Unless projections for the resumption of economic growth change substantially, this level of foreseen reductions should be easily achieved, if covered entities begin to acquire eligible offsets and international allowances early, and start banking them for later use.

RGGI DESIGN FEATURES

Certain design features of RGGI may be worthy of consideration for the U.S. federal scheme under discussion, or for that matter, for the EU ETS in Phase III. It is the view of the authors that the ambition and performance of emission reduction schemes can be increased with the use of flexibility mechanisms.

Under RGGI, 10 Northeast and Mid-Atlantic states aim to reduce power sector CO₂ emissions by 10% below 2009 levels in 2019.³² The level of ambition is low relative to the baseline. The recent recession and trend of emissions suggest that RGGI could be over-allocated for some time. Within this 10-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 MtCO₂e (or 188 M short ton CO₂e). This is followed by a 2.5% per year decrease in cap during the third compliance period (2015-2018). Full banking across compliance periods is allowed, maintaining incentives for environmental performance. This design reconciles medium-term visibility with regular checks-and-balances as well as incentives for environmental performance. Borrowing across compliance periods is not allowed and this reduces compliance flexibility and may contribute to volatility in the market.

RGGI is the first carbon cap and trade scheme to distribute nearly all allowances (95%) through quarterly auctions, and early experience suggests that auctioning works. There were two “pre-compliance” auctions in September and December 2008, where 12.6 and 31.5 million RGGI were auctioned. This accounted for a large part of market activity in 2008, estimated at 65 MtCO₂e transacted for a value of US\$246 million. A third auction occurred in March 2009 and saw 33.7 million RGGI transacted for US\$106 million.

RGGI applies a reserve price for auctions, which was set at US\$1.86 per RGGI at the first auction,³³ and at the higher of that price (adjusted for inflation) or 80% of the current market price of the allowance vintage being auctioned. Another interesting design feature of RGGI auctions is that RGGI-participating states retains the right to retire any unsold allowances: At the end of the first compliance period (or to offer allowances for auctioning during the second compliance period).

Installations can use offsets to meet up to 3.3 % of their compliance obligations (potentially increasing if prices rise above a trigger). Due to the over-allocation of the market and low price levels, offset development has been extremely limited and this is not expected to change anytime soon.

³¹ It is helpful to recall that an effort to generously grant emission allowances in Phase I of the EU ETS resulted in a near-collapse of the carbon price in 2006 and a generous initial allocation of RGGI, similarly, led to limited liquidity on that market. There are, of course, important differences in other design elements of emissions trading under W-M, notably unlimited banking, which should prevent the same outcome as in Phase I.

³² As is: roughly stabilization around today levels by 2014 (171 MtCO₂e or 188 M short ton CO₂e) followed by a 2.5% per year decrease in cap over 2015-2018.

³³ Or 80% of the official price forecast of US\$2.32 per RGGI according to modeling work by ICF International.

Flexibility

The bill creates a comprehensive architecture of flexibility for compliance that can readily accommodate science-based targets over time. The provisions for flexibility include:

- unlimited banking of allowances for use during future compliance years as an incentive for early mitigation action;
- firm-level borrowing,³⁴ either free from the next compliance year or with 8% annual penalty for borrowing from subsequent vintages;
- system borrowing through an Allowance Reserve, triggered when allowance prices double. Additional allowances are created by taking away from future year allowances;³⁵
- emissions trading with comparable international programs and offsets, both domestic and international.

Many of these flexibility measures are well-designed features of the legislative proposal and should encourage the adoption of a target closer in line with the latest IPCC science.

Offsets

The US EPA analysis assumes that relatively inexpensive domestic and international offsets (as well as international allowance trading and internal abatement) will supply significant volumes of required emission reductions under the W-M policy. The W-M bill allows compliance to be met from offsets up to approximately two billion tons annually, split equally between international and domestic offsets, significantly more than the projected annualized reductions.³⁶ In comparison, the current European 20-20-20 proposal allows for 1.6-1.7 billion tons for the entire period (2008-2020). The question about sufficient international offset supply only arises if the EU raises the level of its ambition to 30% below 1990 levels. Even with HFC and other industrial gas offsets, the CDM has never contracted much more than 600 MtCO₂e in a single year or brought forward more than 80 MtCO₂e in annual emission reductions expected from projects registered in any year. This higher level of demand will require a serious analysis of how to scale up the possibility of offsets and credits from developing countries.

International UNFCCC or successor agreement credits can be accepted into the U.S. trading scheme only if equal or better quality credits are available than those certified by the EPA program. It is considered likely by U.S. analysts that other credible and independent certification processes that meet the EPA's criteria, e.g., the California Action Reserve (C-CAR) offset protocols and the Voluntary Carbon Standard (VCS), will also likely be deemed acceptable for U.S. compliance. If this is true, it means that the CDM will have real competition from other credible certification regimes.

Reducing Emissions from Deforestation (RED)

Private sector purchases of RED(D) compliance will be subject to overall limits on offsets and quality rules, including discounting. To participate, developing countries will need to have the capacity to implement and monitor national deforestation reduction activities, and sub-national RED(D) activities are to be credited only from countries that have adopted a national deforestation baseline.

In addition to RED(D) reductions for eligible for compliance, the Draft includes provisions for the U.S. Government to purchase additional annual emission reductions from RED(D) projects

³⁵ There are two types of firm-level borrowing allowed under the Draft. The first is a two-year rolling compliance, where entities can borrow emissions from the year ahead without any penalties or "interest". The second allows regulated entities to meet up to 15% of their compliance obligations by submitting emission allowances with vintage years two to five years in the future, but it is not free and they must pay an 8% premium in allowances to do so.

³⁶ There is some question whether the scope of allowable domestic offsets and international offsets will be the same e.g. would offsets from agricultural and forestry sectors be allowed both domestically and internationally and under the same rules? It would seem desirable that the offset classes of similar quality should receive equal treatment under the law, regardless of country of origin.

equivalent to 10% of 2005 U.S. levels. Intended to be funded by the proceeds of 5% of total emission allowances, the U.S. government can procure RED(D) credits from national and sub-national activities and from governments and non-governmental entities.

Strategic Reserve to Relieve Price Pressure

A pool of emission allowances is established under the draft bill to address the potential for spikes in carbon prices. Allowances are to be auctioned from the strategic reserve if allowances prices reach double the value predicted by EPA in the early years, or double their historical price once the program has been in operation for three years. The strategic reserve pool would be funded using 1% of allowances from 2012-2019, 2% from 2020-2029, and 3% thereafter. There would be limits on how much of the reserve pool can be drawn down in any one year. If the reserve is used, RED(D) offset credits may be bought by the government to replenish the reserve and these RED(D) credits will be converted to allowances. Replenishing the reserve with converted RED(D) credits is a strong design element which will help to maintain the environmental integrity of the cap in the design of the scheme. To the extent that price caps are used at all, the authors consider it important that the reserve be triggered relative to real, historical market prices, as in RGGI.

MANAGING FOR LOWER VOLATILITY

Some cap-and-trade proposals, including in the House Ways & Means Committee favor greater price certainty via a managed price approach, which would be a hybrid of cap and trade and carbon tax. One legislative proposal, the Doggett-Cooper Safe Markets Approach, seeks to follow approaches used by central banks to manage interest rates through changes in monetary policy in its effort to remove incentives for manipulation and excess speculation. Under this approach, there would be attempts to construct a predictable pathway for prices in 2012-19 to achieve a hard 2020 emission cap. Price paths would be updated annually to keep emissions close to goals; cumulative emission goals would be achieved through provisions that enable a catch-up with any compliance gaps in the 2012-20 period within a subsequent period.

Carbon Market Oversight

A major issue that came up during executive and congressional deliberations on the Draft bill is which agency or agencies will oversee what could become trillion-dollar markets for trading in emissions allowances and offsets, and related financial products. The Waxman-Markey bill would put the Federal Energy Regulatory Commission in charge of emissions allowance and offset markets. But it leaves it up to an interagency working group to decide where jurisdiction over the larger derivatives market will lie.

*Other Provisions Outside of Cap-and-Trade**HFC Regulation*

Separate from the coverage and schedules contained in the cap and trade package, the Draft regulates the production and consumption of HFCs. HFC consumption will be phased down to 15% of the baseline by 2039. Offset credits can be obtained through the destruction of chlorofluorocarbons (CFCs). Allowances are to be distributed through a combination of annual auctions and non-auction sales based on the auction price.

Black Carbon

The Draft directs the EPA Administrator to report on existing efforts to reduce domestic black carbon pollution and, if necessary, to use existing authority to achieve further reductions. It also directs the EPA Administrator, in coordination with the Secretary of State, to report to Congress on current and potential future assistance to foreign nations to help reduce black carbon pollution.

Political Economy of U.S. Energy and Climate Change Package

Passage of a U.S. climate bill will require complex negotiation, give-and-take and compromise in order to get climate legislation through for the signature of the U.S. President. Important elements of the U.S. emissions trading package that will determine passage of the bill include the extent of auctioning; measures to level competition in sectors with globally traded goods; the level of transition assistance to coal states (including CCS); and any flexibility mechanisms designed to contain costs. The details of most of these key provisions were left out of the 648-page Draft bill that entered Committee on March 31, 2009, clearly indicating that the devil will be in the details, within which an acceptable political compromise will be adopted. The 900 page proposal that came out of Committee on May 15 had many of these blanks filled in. The only thing certain about the mark-up period in the U.S. House is that Representatives will modify some of the details in the coming days.

PROPOSED ALLOCATIONS UNDER WAXMAN-MARKEY

Proposed allocations in the Waxman-Markey bill address three stated goals: Protecting consumers from energy price increases; assisting industry in the transition to a clean energy economy; and spurring energy efficiency through the development and deployment of clean energy technology. In addition, a small amount of allowances will also be allocated to prevent deforestation and support national and international adaptation efforts, and for other purposes.

PROTECTING CONSUMERS

It is proposed that 30 % of the allowance will be given away to electricity retailers and 9% to natural gas retailers. These local utilities are regulated by state agencies and are required to use the value of the allowances they receive for the benefit of their customers. This approach potentially avoids the risk of large windfall profits as seen in Europe when electricity generators were given allowances for free but raised their prices anyway, reflecting the market value of the allowances to cover their emissions. The proposal requires natural gas distributors to use at least one-third of the value of the allowances they receive to invest in cost-effective, energy efficiency measures, but appears to exempt electricity distributors from such a requirement. An additional 15% of allowances will be auctioned and the revenue returned through tax credits and other benefits to low- and moderate-income households to protect them from the indirect costs of the program.

PROTECTING ENERGY INTENSIVE INDUSTRIES

Two percent of allowances would go to steel, cement, and other energy-intensive manufacturers who argued that increased cost of production from rising energy prices could cause them to shift production to countries without similar programs, thereby exporting both jobs and emissions. The proposal sets aside 15% of allowances for this sector and each firm would receive allowances equivalent to 100% of average emissions per unit of output for each sector. Some analysts have noted that this proposal is “more generous than necessary” since firms can “pass some of their increased costs along to their customers” and other countries adopt comparable programs for those sectors³⁷.

PROMOTING ENERGY EFFICIENCY AND ADVANCED TECHNOLOGY DEPLOYMENT

Five to ten percent of allowances (depending on the year) would go to states to promote investments in energy efficiency and renewable energy production. Additional allowances are set aside for promoting carbon capture and sequestration, advanced vehicle deployment, clean energy job training, and university-based energy research.

REDUCING DEFORESTATION AND FACILITATING ADAPTATION

Five percent of the allocation is reserved for activities to reduce tropical deforestation with the goal of achieving emission reductions equal to at least 10% below U.S. emissions in 2005. The program will produce emission reductions over and above those generated by the cap itself.

Two percent of the allowances from 2012-2021, rising to four percent in 2022 and eight percent in 2027, would go to facilitate climate change adaptation domestically, and similar levels to fund international adaptation and clean technology transfers.

Auctioning Allowances vs. Giving them away

Most economists would strongly suggest their preference for maximizing the level of auctioning of emission allowances as early as possible for efficiency in allocation, to reduce political gaming of the allocation process and for rational price discovery. To the extent that some sectors are granted allowances in the political process, good practice would suggest that those free allocations should be benchmarked to the emissions associated with the “best-in-class” technology in the sector and not grandfathered based on historic emissions. This choice (as reflected in part, at least in the aspirations of the EU ETS Phase III package) would provide the largest support to the most efficient entities in

³⁷ Dan Lashof and David Doniger, National Resources Defense Council, http://switchboard.nrdc.org/blogs/ddoniger/degree_of_difficulty_how_to_ju.html

the sector and would not provide the biggest reward to the biggest emitters (as reflected in Australia's ETS proposal).³⁸

Likely final form of bill

A final bill will likely have a combination of free allocations for some sectors ("cap and protect"); some auctioning with part of the proceeds invested in green stimulus and infrastructure ("cap and invest"); some auctioning with rebate of some of the proceeds to consumers ("cap and dividend"); or rebate to taxpayers ("middle class tax relief"). If the bill is enacted, its most meaningful legacy will be to set a long-term direction for carbon constraints and send a message that long-term investments need to factor in a long-term price for carbon.

TITLE IV: TRANSITIONING TO A CLEAN ENERGY ECONOMY

The Draft proposes transitional programs to be funded by allowance allocations and auction revenues as rebates to energy-intensive manufacturing facilities that make basic commodity products that are subject to strong international competition. The objective is to balance the incentive to shift production, jobs and emissions to countries that do not have carbon reduction programs in those sectors. Proposed rebates cover both direct (e.g., process-related) and indirect (e.g., electricity-related) emissions and use a formula based on an industry benchmark emissions rate and facility-specific output data. If, by 2017, negative impacts are found on these industries, then U.S. importers of competing products must purchase specially created allowances to cover the emissions associated with the imports.³⁹

The Draft bill also sets out a program of worker training, education, and transition to support the growth of green jobs and the new energy economy. It provides export assistance for exporting clean technologies to developing countries – to projects that achieve substantial reductions in greenhouse gas emissions through deployment of low- or zero-carbon technologies. Only developing countries that have ratified an international treaty and undertaken substantial greenhouse gas reductions are eligible. It establishes an International Clean Technology Fund in the Treasury Department.

On climate adaptation, the draft requires the National Oceanic and Atmospheric Administration (NOAA) to perform a nation-wide vulnerability assessment, evaluating regional vulnerabilities to climate change impacts on human health, natural resources, and infrastructure. The legislation would provide funding for state, local, and tribal projects to assist communities with adapting to climate change. The draft also creates an International Climate Change Adaptation Program within the U.S. Agency for International Development (USAID) to help the most vulnerable developing countries adapt to climate change. The draft identifies eligible activities and projects, including promotion of renewable and efficient energy technologies; development of national and regional adaptation plans; and protection and rehabilitation of natural ecosystems.

2.3 ALLOWANCES MARKETS IN AUSTRALASIA: LIKELY DELAYS

2.3.1 Japan: Trial ETS Starts; 2020 Target(s) Under Discussion

Japan finally dipped its toe into emissions trading in October 2008, with the launch of a trial domestic scheme based on voluntary participation. Depending on the experience, the trial may be scaled up

³⁸ The experience of the auto industry in the United States also suggests that despite receiving subsidies to research and develop more efficient products for years, industries can and still do remain globally uncompetitive. As such, any transition allocations and/or cash grants to industries or regions should be phased out completely after a finite number of years not exceeding the length of the first commitment period.

³⁹ These include border adjustment measures in case international negotiations do not result in an adequate agreement. Products from least developed countries and countries responsible for less than a half percent of world GHG emissions are exempted. It is not clear how Covered Entities that face negative impacts due to their own lack of innovation or poor management will be treated.

and followed by a full-blown scheme requiring mandatory participation. This is a major shift in Japan's climate policy which to date had mainly focused on policies and measures other than market instruments under the Kyoto Target Achievement Plan (KTAP). KTAP largely articulated the Keidanren Voluntary Action Plan (VAP), a long-standing voluntary commitment by major industries to stabilize CO₂ emissions from fuel combustion and industrial processes at 1990 levels by 2010. On April 17, 2009, six mid-term targets proposed by the government were opened for public comment. They range from a 4% increase to a 25% reduction from 1990 levels by 2020 and have met with various degrees of support. Japan's target is expected to be announced by June.

The trial scheme aims to bring together several existing initiatives, such as the VAP, plans for a domestic offsets scheme and the Japan-Voluntary Emissions Trading Scheme (J-VETS), which targets smaller emitters.⁴⁰ Potential participants voluntarily apply to participate, submitting their own emission reductions targets (either absolute or intensity-based) for review. In addition to their own internal abatement efforts, participants can meet their compliance objectives using domestic allowances, offsets from domestic projects or Kyoto Mechanisms. By December 2008, fewer than 500 participants with targets joined the scheme,⁴¹ considerably below the expectations of thousands joining. Emissions coverage is relatively large (similar to EU ETS)⁴² although target or effort is not known yet – making it challenging to assess whether the trial scheme could generate any significant demand for international offsets, in addition to estimated demand from Keidanren companies and the Japanese government.

The Municipality of Tokyo announced its intent to reduce emissions by 25% below 2000 levels in 2020 with a mandatory ETS as a key measure. In this broad context, infrastructure for emissions trading is developing: the Japan Electric Power Exchange launched carbon credits trading last November and the Tokyo Stock Exchange announced similar intentions.

2.3.2 *Australia: Slower Start and Stronger Finish?*

Plans for the Australian Carbon Pollution Reduction Scheme (CPRS), an emissions trading scheme, moved forward with draft legislation released in March 2009. In response to criticisms from both ends of the political spectrum,⁴³ Prime Minister Rudd announced on May 4, 2009, that the proposed start of the CPRS would be delayed by one year until July 1, 2011, and would set a fixed price of AU\$10 (about US\$7) for its first year of operation. Additional assistance to industries has been proposed, under a Global Recession Buffer, mostly by increasing the scope for free allocation.⁴⁴ Finally, the possibility of deeper reductions by 2020 has been left open, with a proposed 25% target below 1990 levels in the context of an international agreement (consistent with a path to stabilization

⁴⁰ Under the J-VETS, companies receive subsidies to implement mitigation activities in line with voluntary commitments and can resort to emissions trading (incl. offsets) to meet their commitments with more flexibility. Though growing, impact remains limited: over the first two years of the scheme, participants (over 60 companies during second year) have reduced their emissions by about 660 ktCO₂e. Emissions trading is estimated at 130 ktCO₂e over the same period.

⁴¹ There were 446 participants with targets, 50 trading participants and five other participants (domestic offsets). By March 2009, another seven domestic offset projects were seeking approval. Together these 12 projects aim at reducing emissions by 11,500 tCO₂e per year.

⁴² Coverage from applicants is estimated at more than 50% of CO₂ emissions from Japan in FY07 and about 70% of CO₂ emissions from industry in FY07.

⁴³ Some believed that the proposed CPRS would not send appropriate incentives, stating, in particular, that the mid-term target was not ambitious enough and could be further undermined by the price cap provision. They stated that unlimited use of Kyoto units and limited auctioning could delay adoption of meaningful domestic action. Others believed that the proposed CPRS would negatively impact the economy and there have been calls to postpone the introduction of the scheme to after the recovery from the economic downturn. It is clear to the authors that the usual compromises of the political process are likely to be struck since the Government wants the legislation passed before Copenhagen to give the Australian delegation a firm mandate for negotiations.

⁴⁴ Under the Global Recession Buffer, emissions-intensive trade-exposed industries would receive additional assistance for the first five years of the Scheme, as is: depending on categories (with more assistance to most-carbon intensive polluters), 95% free allocation (instead of 90%) and 66% (instead of 60%) in the first year, declining at 1.3 % per year.

at 450 ppm). It will still be a rocky ride for the bill and it may undergo several changes before it becomes law. The analysis below relates to the draft bill and points out interesting features (that have been and still may be revised), in the context of international negotiations and other proposed or existing ETS.

Scope

The sector scope of the proposed CPRS is quite comprehensive, making the CPRS the overarching instrument to manage GHG emissions.⁴⁵ GHGs included under the Kyoto Protocol from industrial processes, stationary energy, transport (upstream point of obligation), waste and fugitive emissions would be covered while agriculture could be phased-in in 2015. Reforestation activities could be opted-in on a voluntary basis while emissions from deforestation (consistently declining) will most likely be addressed through other incentives. The CPRS perimeter (excluding agriculture) corresponds to about 80% of Australia's GHG emissions (including LULUCF),⁴⁶ with approximately 1,000 entities regulated. In this context, there is little scope for domestic offsets.⁴⁷

Ambition

The cap of the CPRS is to be consistent with a long-term GHG reduction goal of 60% or more below 2000 levels by 2050 and a mid-term target corresponding to a reduction in emissions of 5 to 15% below 2000 levels by 2020 (equivalent to 11 to 21% below 2005 levels by 2020 or 1 to 13% above 1990 levels by 2020). 5% represents Australia's minimum commitment, which could be scaled-up to 15% in the context of a global agreement whereby all major economies commit to substantially restrain their emissions and advanced emerging economies take on reductions comparable to Australia. Following Australia's projections, 2020 emissions (factoring existing measures but the CPRS) would be well 20% above 2000 level – meaning CPRS installations could likely be short.⁴⁸

Caps set as a Range

Caps would be set five years in advance with proposed ranges (or gateways) up to 10 years, taking into account the progress in international negotiations. This could also give the regulator the option to adjust the cap within the gateway depending on economic prospects for regulated entities. Caps for the first five years and first gateways will be announced by early 2010 (and should be in line, up to 2012, with Australia's target under the Kyoto Protocol). This approach of providing ranges and the option of adjusting caps within the given ranges, is a useful innovation, and can provide society with an opportunity to adjust the level of effort based on scientific advice and technological progress.

Auctioning versus Granting Allowances

Allowances had been largely expected to be auctioned, with specific assistance provisions for Emissions-Intensive Trade-Exposed (EITE) activities and coal-fired electricity generators.⁴⁹ To "reduce risk of carbon leakage" (i.e., to protect industries exposed to global competition), EITE industries (including new entrants), would receive a large share of the allowances needed to cover their liabilities for free, based on carbon intensity of output. This implies that initially either 60% or

⁴⁵ The CPRS will however be complemented by other measures such as the Renewable Energy Target (RET) scheme, to achieve a 20% share of electricity supply from renewable energy sources by 2020 (or a doubling of its current level), and a number of targeted funds. The RET scheme will be phased out between 2020 and 2030 as the CPRS matures.

⁴⁶ Australia's 2006 GHG emissions (at the CPRS perimeter – excluding agriculture) amounted to 446 MtCO₂e or 77% of national emissions (including LULUCF). Following projections of *Tracking the Kyoto Target 2007*, the perimeter of the CPRS (excluding agriculture) would represent slightly more than 80% of Australia's emissions (including LULUCF) by 2020.

⁴⁷ The Government will consider the scope for domestic offsets in 2013 when it makes final decisions on coverage of agriculture. The Scheme will not include domestic offsets from agricultural emissions in the period prior to coverage of these emissions.

⁴⁸ Barclays estimates a likely shortfall in between 20 to 40 MtCO₂e per year during the first three years of the scheme, and increasing to 130-170 MtCO₂e by 2020 (depending on target). This could lead to a 95 MtCO₂e demand for CERs (or external allowances) over 2010-13 and 750-925 MtCO₂e up to 2020. Source: Trevor Sikorski. Verifiably long, *Monthly Carbon Standard*, Barclays Capital, April 9, 2009.

⁴⁹ Reforestation activities that have voluntarily opted-in into the CPRS will also receive free allowances (some way to create a domestic offset scheme, in fact) as well as synthetic GHG destruction activities (provided those are not covered by other regulations).

90% of baseline emissions set against average recent historical trends would be granted, with the level of that free grant declining over time. Assistance would also address the likely impact of increased electricity prices from carbon regulation on EITE production costs. The assistance program could be adjusted, to reflect among others, progress in reaching an international agreement or existence of broadly similar carbon constraints internationally.

Transition Assistance

Coal-fired electricity generators (considered to be the sole “strongly affected” industries) would also receive transitional assistance, in the form of free allowances distributed over the first five years of the CPRS (130.7 million allowances) on the basis of output and carbon intensity of production process to facilities in operation (or under design) in 2007.⁵⁰ Those generators benefiting from assistance would be subject to a windfall review (with possible withholding of two years of assistance if windfall profits are likely).

Taking into account specific transitional assistance provisions, about 70% of allowances would be auctioned at the outset of the scheme, decreasing later to 55% (as the proportion of permits allocated for free to EITE entities is expected to increase). Auctioning is estimated to raise around AU\$23.5 billion over the first two years at an assumed permit price of AU\$25. Revenues from auctioning will be spent domestically to assist households and businesses to adjust to the scheme and to invest in the transition to a low carbon economy. This can take the form of direct cash assistance or transfer through fiscal adjustments, for instance, over the first three years of the scheme, the “cent by cent” reduction in fuel tax to offset higher fuel costs from the scheme. A Climate Change Action Fund (AU\$2.15 billion over five years) would also smooth the transition, beyond the assistance provided to EITE activities and coal-fired electricity generators, by focusing on information and awareness-raising on low-emission practices; supporting investment in energy efficiency and low-carbon technologies; providing specific assistance to workers and communities particularly affected by the CPRS and; targeting coal sector adjustment (fugitive emissions from coal mines).

Flexibility Mechanisms for Cost Control

A number of cost-control mechanisms are proposed:

- unlimited banking and limited borrowing (to 5% of liability using units from the following year, which is much more stringent than the full roll-over allowed so far under EU ETS);
- introduction of a price cap, set at AU\$40 per allowance (or almost twice Australian Treasury’s projections for the initial price of permits) and rising in real terms at 5% annually. The price-cap does not exempt non-compliant entities from paying a penalty and make good for their shortfall. At today’s exchange rates, this cap would start at €22 and reach €30, which is much higher than the price of primary CERs experienced in the current market, but not that different from prices the carbon market has seen for secondary CERs or EUAs or projected for those markets post-2012. At this level, the price cap could definitely make linking with other schemes more difficult.
- unlimited imports of eligible international units (while export of Australian permits is not allowed for the initial years). This is initially restricted to Kyoto units, including CERs (except t/ICERs), ERUs and removal units (RMUs) but so far, no AAUs. Kyoto units and non-Kyoto units can be made eligible, in particular in the context of linking with other regimes. Recently (especially as prices of sCERs came down sharply), Australian buyers have been reported to be more active than before in the sCERs market (while early trades of AEUs were reported in the AU\$20-24 range for early vintages (US\$14-17/€11-13)).⁵¹ Depending on their relative prices, one of the following options could be the main driver of AEUs prices if the CPRS is short: allowances from a regime linked to CPRS (produced at marginal abatement cost), primary CERs, secondary CERs, or a price cap.

⁵⁰ Emissions from electricity production from coal were about 170 MtCO₂e in 2006.

⁵¹ First trades of AEUs were reported by Spring '08.

Federal and State Schemes

As a part of transition, the New South Wales GHG Abatement Scheme (GGAS), is expected to end upon the commencement of the CPRS. It is now clear that certificates under the GGAS will not be converted into Australia Emissions Units or AEU (although some kind of compensation/assistance could be envisaged for certain categories of projects while forestry projects are encouraged to opt-in into the CPRS). In addition, data from the registry indicate that out of over 88 million certificates created, more than 20 million have not yet been surrendered, which could be enough to accommodate remaining residual demand in the last few months of the scheme. In this context, there should be limited interest for certificates in the future. Through 2008, about 31 million certificates⁵² were traded for a value estimated at US\$183 million (€122 million) and spot price consistently declined from AU\$7-8 in early autumn 2008 to AU\$3 as of recently. Only the “Energy Efficiency” scope of the scheme would continue (with a new class of energy efficiency certificates), as the Energy Saving Scheme (ESS) in the proposed new federal scheme.

2.3.3 New Zealand: Options under Review

There was a decision in November 2008 by the new government to suspend the barely started New Zealand ETS⁵³ and to formally review New Zealand’s climate change policy. The New Zealand ETS is under Select Committee Review and it is expected that it will be amended later in the year. This led to some lack of clarity within the emerging New Zealand carbon market and foresters, the first sector to be covered, reported losses.

Some analysts see this as another step back for New Zealand, since the country’s climate change policy has been under review much of the past nine years or so. Possible changes to the ETS include the introduction of a low level carbon tax as a transitory measure, the delay of the entry of certain sectors into the scheme, and possible changes to the treatment of certain sectors. There is a view in government that it makes sense to harmonize the New Zealand Emissions Trading Scheme as closely as possible with the Australian Government’s CPRS. A working group is to examine possibilities, while very divergent emission profiles between the two countries⁵⁴ (as well as the existence of a price cap in Australia) could create additional difficulties for harmonization and linkage.

There was continuing interest in JI projects from New Zealand in 2008. Approximately three million ERUs mainly from wind and landfill projects representing a market value of over US\$30 million dollars have been sold forward to carbon buyers in Europe and Japan under the New Zealand Government’s Projects to Reduce Emissions (PRE) mechanism. Some 10 million ERUs were allocated to companies in New Zealand under the PRE scheme to over 40 projects. Not all of these ERUs will end up being issued due to the fact that not all of the projects were implemented (or applied to JI certification).

AAUs issued to forestry owners have reportedly received interest from foreign buyers. The first forward sale of AAUs took place in New Zealand in March 2009 with the sale of 50,000 AAUs from New Zealand to a Japanese buyer at a price of approximately €8 per credit. The forestry owners in New Zealand are expected to receive at least eight million AAUs into their accounts in mid-2009 creating a new market in New Zealand and internationally for AAUs (with demand mainly from Japanese buyers).

⁵² These numbers correspond to movements of certificates in the registry. Future contracts (for instance with expiry in 2010) are thus not taken into account, leading to a potential under-estimation of market activity.

⁵³ Bill has been passed by Parliament on September 10, 2008. The ETS would have covered all sectors of the economy with progressive phasing in by 2013 (agriculture being the last one), starting with forestry in 2008.

⁵⁴ Australia produces the majority of its GHGs from coal fired energy generation, compared with agriculture, which accounts for 50% of New Zealand’s emissions.

The voluntary market in New Zealand in 2008 remained small with several hundred thousand tons transacted with a total market size estimated at no more than US\$5 million dollars. From 2009 on, due to the double-counting issue this market can be expected to get even smaller and companies in New Zealand wanting to go carbon neutral will be able to do so by retiring AAUs.

2.4 MARKET PERSPECTIVES

Market Intervention: To be or not to be?

With the contraction of their economic output in a grim economy, many European installations found themselves sitting on an unexpectedly valuable treasure trove of carbon allowances that they had received free of charge from their governments. Since the most carbon-intensive industries are the largest beneficiaries of the profit-taking from the sale of surplus granted allowances in the current downturn, this raised questions earlier this year about free allocation and the setting of allocation levels. Memories of a long EU ETS Phase I returned and the debate on market intervention was reopened. This discussion has relevance to the current U.S. deliberations for the Waxman-Markey bill, where the projected shortfall in 2020 is highly sensitive to assumptions of economic growth.

Level of Market Prices

There are those that point to generally lower EUA prices in the second half of 2008 and early 2009 as evidence that the carbon market is not working since there is an insufficiently low price signal to promote abatement.⁵⁵ Sustained high prices certainly would send a signal to the market to invest urgently in abatement. In volatile markets, including oil, gas and other energy markets, players are known to take a long-term view about their expectations into the future and factor that view into their investment and business decisions. There is no reason to expect that carbon is any different from other markets in this regard.

Others point to the low prices and suggest that there is no better evidence that the market mechanism is working logically because of the demand-supply imbalance caused by the recession.⁵⁶ In other words, the market has shown that it has worked logically so far and it will deliver the overall level of reductions mandated by policymakers. They also argue that it is a strength of the design of emissions trading that ensures that more effort is required in a boom cycle in good economic times with higher emissions and, conversely, that less effort is required in a bust cycle with lower emissions when political will is focused on restoring economic growth.

Concerns about Competitiveness

Policymakers on both sides of the Atlantic have been prepared to give away a high proportion of free emission allowances, in their efforts to cobble together enough political support to put a proposal on the table. The May 15 U.S. proposal to grant most allowances on the basis of historical emissions rather than on a sector benchmark would, if adopted, miss an opportunity to encourage all domestic covered entities to catch up with the cleanest companies in the sector. Fewer allowances to auction and a smaller scarcity of allowances will also likely result in lower auction proceeds for activities identified for funding under the W-M bill.

⁵⁵ Deutsche Bank. "The ETS Review: Unfinished Business." *Market Update*, February 23, 2009; Friends of the Earth, *Subprime Carbon? Re-thinking the World's Largest New Derivatives Market*, March 2009, among others.

⁵⁶ Barclays Capital. *Monthly Carbon Standard*, April 2009; May 2009; Deutsche Bank. "The ETS Review: Unfinished Business." *Market Update*, February 23, 2009

CYCLE-PROOF REGULATION

Cycle-proof regulation is an illusionary goal and many prominent economists have struggled and continue to struggle with the concept. That said, there are some elements of the design of emissions trading schemes such as the EU ETS, the U.S. RGGI and the “on again-off again” Australian CPRS that may be worth considering:

LENGTH OF COMMITMENT PERIODS

There is no reason why longer commitment periods (e.g., 8 or 10 years) cannot also co-exist with shorter phases (e.g., two or three years), as in RGGI. Indicative allocations, perhaps expressed in a range indicated by the latest requirements of science, can be formalized prior to the start of every phase.

CHOICE OF BASE YEARS

A particular base year may not be representative of the carbon profile of a given country over time. Rather than stipulating a specific year as a base year for action (e.g., 1990 or 2005), it may be worth considering average emissions over a specified three to five years under a future international agreement.

TREATMENT OF UNUSED NEW ENTRANT RESERVES

There has not been much use for New Entrant Reserves (NERs) within the EU ETS and there could be temptation to use NERs in the course of a commitment period for other reasons. At the end of 2012, the Commission is supposed to auction any remaining NERs. It may be worth considering whether it may be possible for the Commission to simply cancel unused NERs at the end of every compliance period.⁵⁷

AUCTIONING ALLOWANCES

Auctioning allowances, rather than giving them away for free creates less of an incentive for the kind of sell-off witnessed recently in the EU ETS. With greater auctioning, there will always be an intrinsic price associated with a greater proportion of allowances.

MARKET-BASED AUCTION RESERVE PRICE:

An approach different from having a regulator set an arbitrary minimum reserve price for auctions would be to allow the market itself to establish a market-based reserve price based on a rolling average of previous auctions. To illustrate, let us imagine that there are monthly auctions, where the reserve price is determined by the average clearing price of the preceding three auctions. Allowances unsold would be retired every three months (or retained in a Strategic Reserve similar to the proposal in the U.S. Waxman-Markey Draft).

Longer-term Trend of Emissions is Key

At the end of the day, it is not the year-to-year emissions, but rather the overall lower downward trend of emissions that is relevant to prevent dangerous climate change. The value of emissions trading as a policy tool is what it helps to deliver the desired environmental outcome over the commitment period (even if it does not guarantee that explicit environmental efforts helped to achieve that goal). The most important role of policy-makers and regulators in a cap-and-trade system is therefore to determine and proclaim the quantity of emissions deemed desirable to prevent global warming in light of the best available science.

Price versus Quantity Intervention

The European Commission (EC) has consistently resisted including formal price control mechanisms into the design of the scheme,⁵⁸ and there is a lot of economic literature that counsels against creating

⁵⁷ The US Waxman-Markey Draft legislation creates the concept of a Strategic Reserve, which is triggered to release allowances when the market price for allowances reaches a pre-determined level over a pre-determined time period. (double prevailing prices over a predeter) It is not clear how many allowances from the Strategic reserve will be released, although a pre-determined ratio of Offset credits from RED would replace the released allowances in the Strategic Reserve.

⁵⁸ A last minute provision, to deal with market volatility (see above).

any such market distortions. Intervention described in the Commission’s package (or for that matter in the Waxman-Markey Draft’s Strategic Reserve proposal) appears to be geared only toward “high price” volatility. A policy of increasing quantities of allowed emissions because of “high” prices would only tend to discourage the required level of early environmental action to achieve the desired environmental outcome. The EC package relies on Member States to determine whether market prices correspond to market evolution, not the market itself. The W-M draft, on the other hand, described triggering the Strategic Reserve when market prices surge more than twice the prices in a specified prior time period.

It should be noted that neither proposal attempts to address the flip side of volatility, i.e., “low price” volatility, where a consistent application of market intervention policy might suggest that low market prices could similarly trigger a policy of reducing the quantity of allowed emissions. Arbitrary or casual changes to the quantity of allocations for installations should not be made because of normal business cycles and only should be considered if compelling scientific information requires a reduction of allowances in favor of protecting the environment.⁵⁹

AVERAGE EMISSION TARGETS AND AVERAGE BASE YEARS

At a time when carbon traders and lobbyists have mushroomed overnight in capital cities and a multitude of overnight climate “experts” are found everywhere (including, we might add, at multilateral institutions), it is helpful to review the historical context for the inclusion of certain policy elements of the UNFCCC and the Kyoto Protocol. Some of these elements were designed to promote both greater flexibility of compliance as well as to promote lower market volatility over time, and were relevant to the design of the EU ETS.

The 1992 UNFCCC incorporated both a single point target and a single point base year (“aim to return 2000 emissions to 1990 levels”). At Kyoto, policymakers recognized (and the economic collapse of the former Soviet Union demonstrated) that emissions in any one year may rise or fall due to economic cycles (e.g., the current decline of emissions in a recession). Other factors influencing emissions in a particular year or two include weather conditions (sufficient or insufficient precipitation impacting generation and dispatch of hydropower) or geopolitics (e.g., access to natural gas).

This recognition gave rise to the concept of “average emissions/targets” and the five year commitment periods that were agreed at Kyoto (although a ten year commitment period with shorter phases was also seriously considered). The longer target time-frames were also considered helpful as a meaningful horizon for investment, as well as long enough to accommodate the turning over of capital stock of varying vintages in more mature economies. Shorter target time-frames are important if policymakers need to make quick adjustments based on the latest science and availability of mitigation technology.

Similarly, a particular base year may not be representative of the carbon profile of a given country but may be selected because of particularly high emissions.⁶⁰ Rather than stipulating a specific year (e.g., 1990 or 2005) as a base year for action, it may be worth considering average emissions over a specified three to five years under a future international agreement.

⁵⁹ We are all cognizant of the fact that climate science has been becoming stronger and demands more urgent action. This suggests that flexibility to adjust and reduce allowed emission quantities within the 2012-2020 timeframe would be a desirable design element. If intervention is necessary at all, it should only be done to reduce the risk of global warming by reducing the quantities available. There are those that would argue that this would also be distortionary to the market. The authors agree, but point out that the only defense of such a distortion could be that at least it is aligned toward reducing emissions to prevent dangerous anthropogenic change, the *raison d’être* of establishing a market in the first place.

⁶⁰ A good example is the recent choice of 2005 as a base year for U.S. emission reduction proposals. U.S. GHG emissions in recent years peaked in 2005, and started to decline even before the onset of recession in 2008. Even in the absence of climate policy, U.S. emissions are not projected to reach 2005 emissions again until around 2020.

III PROJECT-BASED MARKETS

3.1 LOSING MOMENTUM?

THE PRIMARY MARKET for project-based emission reductions weakened considerably in the second half of 2008 (Table 4 and Figure 2) under the weight of the financial downturn and amid lingering questions about the rules of post-2012 eligibility. Many of the policy initiatives addressing post-2012 credits are still at the proposal stage and are likely to be influenced by the outcome of international climate negotiations.

Table 4: Annual Volumes and Values (2007-08) for Project-based Transactions

| | 2007 | | 2008 | |
|-------------------------|---------------------------------|------------------|---------------------------------|------------------|
| | Volume (MtCO ₂ e) | Value (MUS\$) | Volume (MtCO ₂ e) | Value (MUS\$) |
| Primary CDM | 552 | 7,433 | 389 | 6,519 |
| JI | 41 | 499 | 20 | 294 |
| Voluntary market | 43 | 263 | 54 | 397 |
| Sub-total | 636 | 8,195 | 463 | 7,210 |
| Secondary CDM | 240 | 5,451 | 1,072 | 26,277 |
| TOTAL | 876 | 13,646 | 1,535 | 33,487 |

Project-based Market Slows Down

Forward primary CDM transactions accounted for the largest share of activity in the primary market, with overall confirmed transaction volumes of 389 MtCO₂e (down nearly 30%, from 552 MtCO₂e in 2007). Although primary CER prices in 2008 were an average of 16% higher at €11.46 (US\$16.78), the value of transactions decreased by 12% from 2007 levels to US\$6.5 billion (€4.5 billion).⁶¹ The 2008 average price reflects higher prices paid prior to the financial meltdown, compared to much lower prices in the handful of transactions in the remainder of 2008.

The JI market experienced a similar slowdown, closing the year with just 20 MtCO₂e in confirmed transactions for US\$294 million (€201 million), equal to just half of volumes transacted in 2007 and slightly less than half of corresponding value, at an average price reported of about €9.95 (US\$14.56). The economic blues also impacted the voluntary market, which grew 26% in transaction volumes and 51% in value for a total of US\$397 million in 2008 (€271 million), but did not experience the trebling and quadrupling in volumes and corresponding value that it did in between 2006 and 2007.

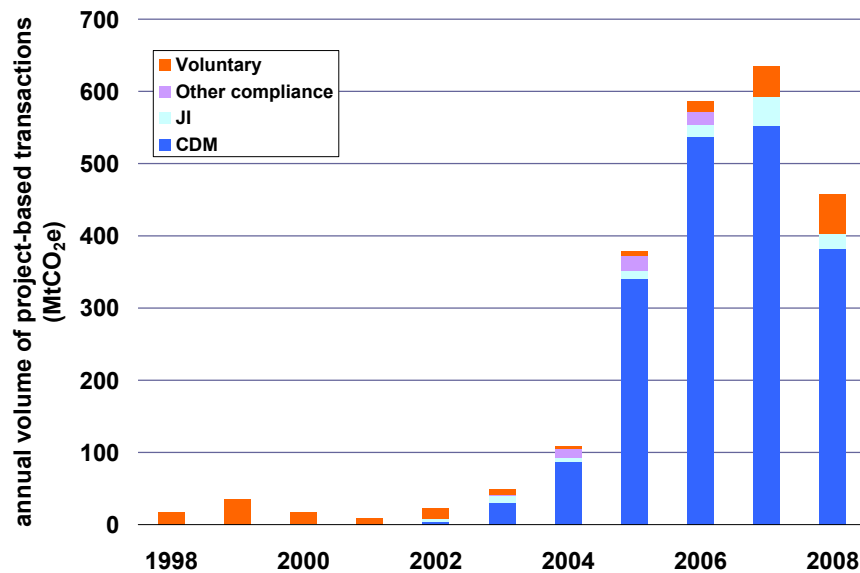
In stark contrast, the secondary market for CERs continued to grow exponentially, for a total volume of more than one billion sCER transacted for a value of US\$26.3 billion (€18.0 billion). This amount represents more than a 350% increase in both volumes and values, the largest growth rates across all segments of the volatile carbon market. A market for options on CERs started to emerge in the second half of 2008, with hedging, profit-taking, raising cash and arbitrage as the main drivers of this market segment.

⁶¹ This figure does not imply that financial flows of the same amount to developing countries have actually occurred through the carbon market in 2008. This figure is an estimate of the value of all ERPA closed in 2008. A vast majority of these ERPA are forward purchase agreements with payment on delivery of ERs. Depending on project registration and performance, amount and schedule of payments may prove quite different.

CDM Redux?

After several years of continuous growth, the primary CDM market contracted in 2008, reflecting the impact of the economic downturn, continued frustration with CDM regulatory delays and transaction costs as well as the overall vacuum regarding post-2012 policy. The economic slowdown and financial credit crunch which has reduced global European and Japanese demand for compliance assets has also led to numerous projects (including several registered projects) failing to receive sufficient financing to be commissioned. Ironically, the impact of the global downturn on demand and the continued post-2012 uncertainty has somewhat masked the urgency of regulatory delays for compliance.

Figure 2: Annual Volumes (MtCO₂e) of Project-Based Emission Reductions Transactions (vintage up to 2012)



Other possible reasons, although less important, also contributed somewhat to the decline of the primary CDM market:

- ❖ *Competition between CDM/JI and AAU/GIS:* The first significant transactions for AAU/GIS occurred over the past year, as Governments looking to meet their remaining demand began to turn to AAU/GIS as an alternative compliance instrument that would deliver large volumes with minimal risk;
- ❖ *Temporary diversion to the secondary market:* Toward the end of 2008, as the price spread between primary CERs and secondary CERs narrowed, many buyers determined that it made more sense for them on a risk-adjusted basis to simply buy guaranteed CERs on the secondary market rather than non-guaranteed CERs/ERUs through time-consuming forward transactions. Sellers on the secondary market froze their origination activities in the primary market as the spread between purchase price on the primary market and selling price for firm delivery in the secondary market did not reward the risk any longer;⁶²

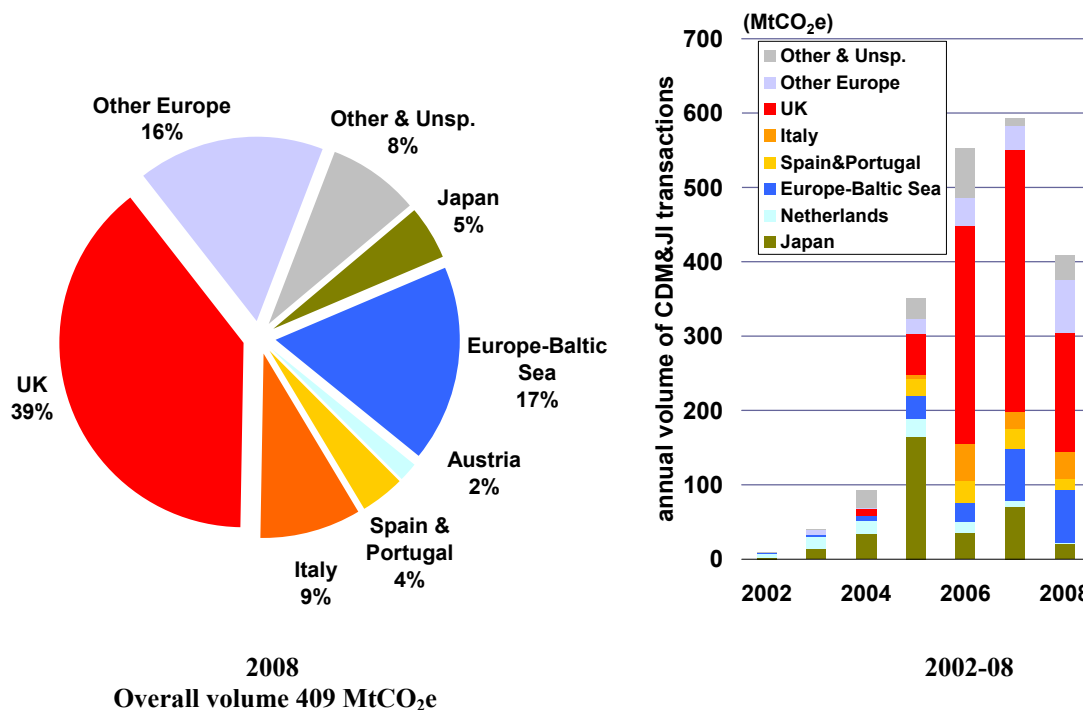
⁶² The spread between the Chinese floor price and secondary CERs even became negative over a couple of days in February 2009. It has partially recovered at this time.

❖ *Direct investment in companies and projects became more important:* There were also fewer pure carbon off-take ERPAs, which may have contributed to the lower volume of transactions reported and recorded in the World Bank's database of 2008 transactions. 25 out of 84 carbon investment vehicles reported that they were seeking to place their capital (or about 27% of the total capitalization secured of nearly US\$13.2 billion, or €8.90 billion) into investments with carbon being one form of potential return.⁶³ Another example of such a non-ERPA transaction is the loan from one company to another company, where the repayment of the loan was linked to the supply of a certain volume of CERs.⁶⁴

3.2 EUROPEAN PRIVATE SECTOR DOMINATES AS BUYER

For the third consecutive year, European buyers continued to dominate the CDM and JI markets for compliance (Figure 3), with a combined market share of over 80% (similar to 2007). Private sector companies have been the most active buyers, with slightly less than 90% of volumes contracted, including JI purchases. Even now, in the midst of the economic downturn, European utilities were, and still are, reported as active, if price-sensitive buyers. They are purchasing primary CERs with an eye to their Phase III future compliance needs as well as on making small profits from trading.

Figure 3: Primary CDM&JI Buyers (as shares of volumes purchased, vintages up to 2012)⁶⁵



Project aggregators report that they are mainly originating volumes of CERs in the form of either forward CERs from high quality projects, non-China projects and non-industrial gas projects or spot issued CERs from projects that are either over-performing or who had previously sold forward only a fraction of total expected volumes. Financial institutions and investors also gradually returned to the

⁶³ N. Kozlecka and J. Paulou (2009). *Carbon Funds Outlook*, ICF International (UK).

⁶⁴ See, for instance, Trading Emissions PLC Interim Report (March 2009): <http://www.tradingemissionsplc.com/TEP%20Reports%20and%20Accounts%20for%20Dec%202008.pdf>

⁶⁵ Purchases by the World Bank-managed family of funds have been attributed to the fund participants' countries pro rata. Europe-Baltic Sea refers to Finland, Sweden, Norway, Germany, Denmark and Iceland; Unsp. refers to purchases where we could not verify the origin of the buyers.

primary market, although at a much lower level than before the financial meltdown. Pension funds are reported to be exploring potential investment in carbon procurement vehicles. Finally, there is anecdotal evidence of transactions of early compliance buyers from the U.S. and Australia.

The market share of European governments remained stable at about 10% of volumes transacted from 2007 to 2008. Public buyers are reported to be active in the market and are finding reasonable prices for CERs and ERUs, backed by the assurance that they will have sufficient AAU/GIS to call on, should CER deliveries continue to disappoint. The Government of Japan, which was virtually absent in the primary project-based market in 2008, focused its Kyoto Mechanisms (KM) Credit Acquisition Program on AAU/GIS, which now represent about 70% of all planned and announced purchases. Japan's KM program has almost reached its target, having contracted for 95 MtCO_{2e} out of the Government's previously announced 100 MtCO_{2e} demand. It is unclear whether a decision will be made to increase public contracting in order to account for anticipated non-delivery of CDM and JI.

Market Focus Changes as New Opportunities Emerge

Lower CER prices unexpectedly brought some good news for project aggregators, many of whom had long sold forward more CERs for guaranteed delivery than had been issued by the CDM Executive Board. Some were able to either reschedule or cancel their deliveries by mutual consent of their secondary buyers. Companies that had previously hedged their portfolios by buying put options on the secondary markets at high prices chose to exercise these options. Some even booked significant first-time profits, by buying and delivering lower-priced spot CERs. Many companies reported shifting their focus – and their staff skills profile, away from the relentless origination of new ERPAs and toward maintaining and maximizing “production” from their existing project portfolios and actively managing projects under contract along the project cycle toward issuance.

3.3 CHINA CONTINUES TO DOMINATE AS A SELLER

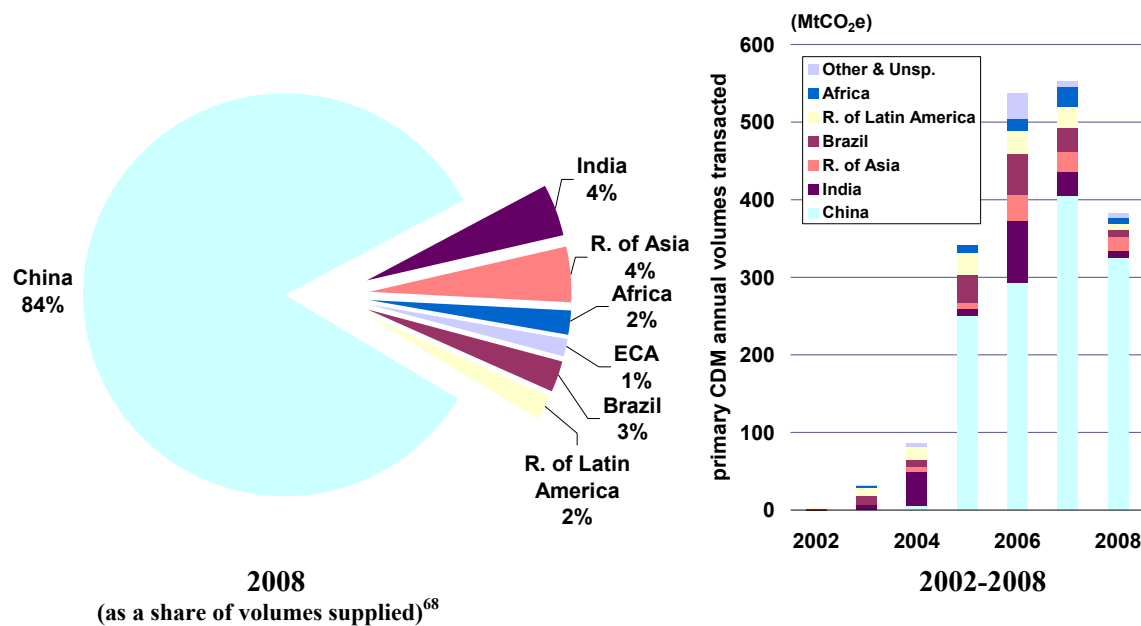
China, with an 84% market share in 2008, accounted for the lion's share of confirmed transactions in the primary CDM market (Figure 4). Over the period 2002-08, China accounted for 66% of all contracted CDM supply in the market. From January 2008 to March 2009, the CDM pipeline in China grew steadily to about 1730 projects: 800 Chinese projects entered the pipeline since January 2008, with the largest volumes of annual emission reductions coming from hydro and wind projects while a handful of supercritical coal projects emerged.

The first part of 2008 was a robust market for CDM transactions in China. However, transactions in the second part of the year were bogged down by an acute DOE bottleneck. This, combined with the narrowing price spread between the primary and secondary markets, led to difficult market conditions, hampering the process of securing transactions. There were some reports by market participants, officially denied by China, that the recommended floor price for CERs had dropped to €8 for all project types.⁶⁶ Wind projects in China, in particular, faced increasing questions regarding additionality, and in recent months have not been able to attract buyers at the recommended floor price for wind projects.⁶⁷

⁶⁶ The National Development and Reform Commission (NDRC) reportedly used to recommend different floor prices for different category of projects, e.g. CER floor price of €10 for wind project, €8 for large hydro, etc. Various arrangements regarding compensating the cost of asset creation (i.e., PDD, validation, due diligence, etc), various consulting services or underlying finance may lead to an actual net CER price that is lower than the recommended corresponding floor price.

⁶⁷ It is reported that wind projects in China are not currently attracting the recommended floor price of €10. China has adopted a renewable portfolio standard of 10% by 2015, raising some questions about additionality – especially in the context of post-2012 rules.

Figure 4: Location of CDM Projects



India and Brazil Come in Strong

With 4% and 3% market share each, India and Brazil rank second and third, respectively, on the list of sellers in terms of volumes transacted. On a cumulative basis, Brazil accounts for about 8% of primary CERs contracted cumulatively over 2002-2008 (somewhat in line with its 6.5% nominal share of the 2012 CDM volume). India, on the other hand, accounts for 9% of CERs contracted cumulatively over 2002-2008, which is much lower than its 16% share of non risk-adjusted 2012 CER deliveries.

In 2008, India transacted 15.8 million CERs and Brazil, 10.1 million CERs. The India numbers confirm the sense of market participants that most Indian project developers continued to be optimistic about carbon prices in 2008. Many preferred to hold on to their CERs until issuance, and then enter into spot transactions. A major Indian spot seller told the authors that this kind of approach was reflective of the “conservative” culture of many Indian companies, who prefer to transact once they know that their supply volumes are completely secured. In February and March 2009, buyers reported a greater willingness of Indian sellers to enter into forward sales with a combination of fixed and indexed pricing. Another reason that may help explain the large gap between the potential supply of CERs and actual transaction volumes in India relates to the challenges associated with obtaining financing for projects, especially in the energy sector. After renewable energy, energy efficiency projects are a strong component of India’s CDM pipeline.⁶⁹

⁶⁸ Numbers may not add up to 100% due to rounding-up.

⁶⁹ Renewable energy, mostly through wind, hydro and biomass projects, accounts for the largest numbers of projects and annual emission reductions in India’s pipeline. While renewable projects were the most successful CDM projects from India last year, we have seen a slowdown in the number of biomass projects (largely due to issues raised with additionality). Small hydro, solar, and wind have long lead times, essentially delaying the commissioning of these projects throughout much of 2008. Credits derived from renewable energy will however continue to remain a significant portion of India’s portfolio. It is expected that 150,000 MW will be added in the next 15 years of which 10% will come from renewables. The number of energy efficiency projects entering the pipeline annually reached over 90 in 2007 and in 2008 (a sharp increase over previous years), and those entering in 2008 brought an estimated annual emission reductions potential of almost 13 MtCO₂e (representing 1/3 of potential CDM supply entering the pipeline this year).

BARRIERS FOR FINANCING ENERGY EFFICIENCY PROJECTS IN INDIA

Many energy efficiency projects in India originate in the SME cluster, where companies often lack strong balance sheets or creditworthiness. In tight credit markets, accessing financing through traditional routes (such as banks) has become more difficult and has had a strong negative impact on project origination and implementation. Alternative models such as Energy Service Companies (ESCOs) are still relatively new concepts in India, although several new ESCOs were formed in India just this past year and are, perhaps, a sign of things to come. Innovative financing mechanisms are needed to finance the deals that are being envisaged through India's National Action Plan.

The announcement of national level programs such as the *Bachat Lamp Yojana*, a programmatic national level project to replace incandescent lamps with CFLs using CDM as a project mechanism, showed the level of increased interest in energy efficiency marketing in India. Other examples of national programs recently announced include solar water heating in one million households, deployment of five million solar lanterns and two million home solar lighting systems.

India is reportedly considering a trading scheme centered on energy efficiency certificates (that could expand to renewable energy) consistent with national climate change policy. The Government is setting up energy benchmarks for industry sectors and those companies that do not meet the benchmark could buy the certificates under a reward and penalty system. It hopes to reduce energy consumption by at least 25% in energy-intensive sectors such as power and cement.⁷⁰

New Kids on the Block

At the other end of the spectrum, a number of new countries entered the CDM pipeline in 2008 and early 2009. Most of these were in Sub-Saharan Africa, including Tanzania and Senegal,⁷¹ which experienced their first transactions. New transactions were reported in the Middle East, including in Yemen and in Jordan. Several countries entering the CDM pipeline reported to be preparing Programmes of Activities (PoA), which had been expected in the next phase of the project-based market. Asian countries other than China and India, many of which had contracted to sell carbon for the first time in 2007, were able to maintain their market share in 2008 during a challenging year for primary transactions.

JI Joys and Sorrows

Through 2008, the JI market continued to concentrate on Russia, with a 68% market share of transacted volumes and Ukraine, with an 18% market share. The pipeline of projects in Russia grew the most in the period January 2008-March 2009, with nearly half the number of projects (95 out of 197) representing up to two-thirds of 2012 ERU volumes (198 million out of 324 million expected).

Although Russia's institutional framework has been ready since March 2008, not a single project has received approval. Ukraine, on the other hand, which accounts for 20% of potential 2012 ERU supply, now has 9 determined projects, of which only one (a Coal Mine Methane project), has been issued 651,000 ERUs, for a 100% success rate.

⁷⁰ "India says readying energy efficiency trade policy", *Reuters*, March 16, 2009.

⁷¹ Over the period January 2008 to March 2009, 13 countries entered the pipeline: Albania, Cameroon, Congo DR, Ethiopia, Iran, Liberia, Macedonia, Madagascar, Rwanda, Swaziland, Syria, United Arab Emirates, Zambia.

CAN CARBON FINANCE REALLY MAKE A DIFFERENCE IN AFRICA?

A major new report on infrastructure in Africa, (implemented by the World Bank on behalf of a committee led by the African Union, key regional institutions and donors) has found that the countries of Sub-Saharan Africa face infrastructure needs of around US\$93 billion a year or some 15% of the region's GDP.⁷² Most investment needs in the region are met by public budgets, while Official Development Assistance (ODA), private investors, and non-OECD financiers contribute just around US\$4 billion a year. Even with these contributions, the overall funding gap is close to \$50 billion a year, with power accounting for about 60% of this gap. Although African countries grew an average of 4% over 2001-05, infrastructure bottlenecks are a major constraint on development.⁷³

Infrastructure, economic growth and human development

Infrastructure not only contributes to economic growth, but is a key input to human development. Over 40% of the investment need is associated with electricity, which powers health and education services and boosts the productivity of small businesses in a region where 30 countries face regular power shortages.⁷⁴

- 47 Sub-Saharan Africa countries, with 800 million people, generate the same power as Spain, with 45 million inhabitants.
- Many countries rely on small diesel generation that can cost up to US\$0.40 per kWh in operating costs alone, about three times higher than in countries with large power systems (typically >500 MW hydro).
- Power consumption, at 124 kWh per capita per year *and falling*, is only 10% of levels in other *developing countries*, barely enough to power a 100W light bulb per person for three hours a day.
- A comparison with South Asia – with similar per capita income – is striking. In 1970, Sub-Saharan Africa had almost three times the generating capacity per million people as South Asia. In 2000 South Asia had left Sub-Saharan Africa far behind – with almost twice the generation capacity per million people.

Abundant water resources

Africa's water resources are abundant, but they are grossly underused because of an absence of water storage and distribution infrastructure. The continent experiences high hydrological variability –likely to increase with climate change – with huge swings in precipitation across areas, seasons and time. The cost of expanding water storage is extremely high relative to the size of Africa's economies. Water needs to be distributed for agricultural use: only six million hectares (representing 5% of Africa's cultivated areas) are equipped for irrigation and these produce 20% of agricultural output. Twenty-two million additional hectares could be economically viable for irrigation, through large multipurpose dams or smaller schemes, but only to the extent that the bulk of storage costs can be covered by other uses, such as power generation.

Regional integration and economies of scale

Most African countries are too small to develop infrastructure cost-effectively on their own: 21 countries have national power systems below the minimum efficient scale of a single power plant. Regional trade can reduce electricity costs by \$2 billion a year by sharing large-scale energy resources across countries. Regional integration holds the key to reducing infrastructure costs by allowing countries to capture economies of scale; however, there are very few cross-border inter-connectors to support regional power trade.

Despite the economic case for regional integration, the political obstacles and barriers can be considerable. Regional infrastructure involves a high level of trust between countries, because of the implied dependence

⁷² The Africa Infrastructure Country Diagnostic (AICD) Flagship Report is implemented by the World Bank on behalf of a steering committee chaired by the African Union and comprising representation from the African Development Bank, NEPAD, Africa's regional economic communities, and major donors. This and other papers analyzing key infrastructure topics, as well as the underlying data sources described above, will be available for download from www.infrastructureafrica.org.

⁷³ Simulations conducted for the AICD suggest that if all African countries were to catch up with Mauritius – the regional leader in infrastructure – per capita growth in the region could increase by 2.2 percentage points a year. Catching up with Korea would increase per capita growth by 2.6 percentage points a year. In Côte d'Ivoire, the Democratic Republic of Congo, and Senegal, the impact would be even greater. Africa's firms lose 5% of their sales due to outages – a figure that rises to 20% for informal firms unable to afford backup generation. Overall, the economic costs of outages can easily rise to 1-2 % of GDP.

on neighbors for key resources such as energy and water. For example, if regional power trade were pursued to its fullest extent, 16 African countries would import more than half their power needs; with a large share of this potential power coming from just three countries, namely the Democratic Republic of Congo, Ethiopia and Guinea, each endowed with vast water resources.

Role of carbon finance

Carbon finance has a huge potential to contribute to development in Africa.⁷⁵ Clear and concise rules to encourage access to carbon markets through environmentally and socially responsible development of hydro resources⁷⁶ and regional interconnections in Africa can increase the potential economic dividend from regional integration to make all participating countries better off.⁷⁷ Rules to include credit for carbon sequestration in soils can improve productivity in the agricultural sector and can encourage income generation for poor farmers as well as more sustainable land-use management, leading to better resilience of local communities to climate change.

3.4 SECONDARY MARKET: COMPLIANCE, PROFIT-TAKING AND RISK MANAGEMENT

Secondary CER (sCER) contracts have become more standardized, prices are more transparent and trading is significantly more liquid. More than one billion sCERs were traded on various exchanges and platforms in 2008⁷⁸ for a value of US\$26.3 billion (€18.0 billion), representing the largest growth rate of all segments in the carbon market with more than a 350% increase in traded volumes and values over the previous year. These trades do not directly give rise to emission reductions unlike transactions in the primary market.

Futures trading on ECX in the first three months of 2009 topped more than 230 million sCERs, putting the market on track for a 40% increase in futures contract trading volume. Exchange-based spot trading also grew with the increase in CER issuance and the launch of a CER spot contract on Bluenext in August 2008 and on ECX in March 2009. Bluenext reported close to 20 million spot CERs traded in the period August 2008-April 2009, with 72% of these in 2009 alone. This sharp growth came at a time that EU ETS compliance buyers approached the date for 2008 true-up, which required them to balance their carbon positions following the major EUA sell-off. Finally, a market for options on CERs started to emerge in the second half of 2008. It was dominated by over the counter (OTC) transactions and is more difficult to analyze, but anecdotal evidence suggests that much of this was intended to hedge price risk in the face of continued uncertainty in the project market.

Largely Financial Market Tracks EUA Values

Tracking EUA prices, albeit at a discount ranging from between €1.00 and €10.00, sCERs for guaranteed delivery saw prices near-historic lows at the end of 2008 and the beginning of 2009 (Figure 5). Since then, sCER prices have begun to trend upward again in the last two months, tracking EUA prices, with the rally initially sparked by the need of operators to balance their carbon positions

⁷⁵ An estimated technical potential of more than 3,200 CDM projects (including 361 PoAs) exists for clean energy in Sub-Saharan Africa. If realized, this could provide more than 170 GW of additional power-generation capacity, which is more than twice the region's current installed capacity. C. de Gouvello, F.B. Dayo and M. Thioye (2008). *Low-carbon Energy Projects for Development in Sub-Saharan Africa: Unveiling the Potential, Addressing Barriers*. The World Bank.

⁷⁶ Private banks follow the Equator Principles for their lending, with environmental standards that are based on IFC (World Bank Group) performance standards. Since the guideline from the World Commission on Dams (WCD) for the development of hydroelectric dams are expressed as goals rather than compliance procedures, the European Commission recently issued a compliance report template which the banks are following and which at least three DOEs currently validate. This is an important step to promote economic development in Africa in a socially and environmentally responsible way.

⁷⁷ Benefit-sharing was pioneered through international river basin treaties, such as that for the Senegal River basin, and could be applied to regional infrastructure more broadly.

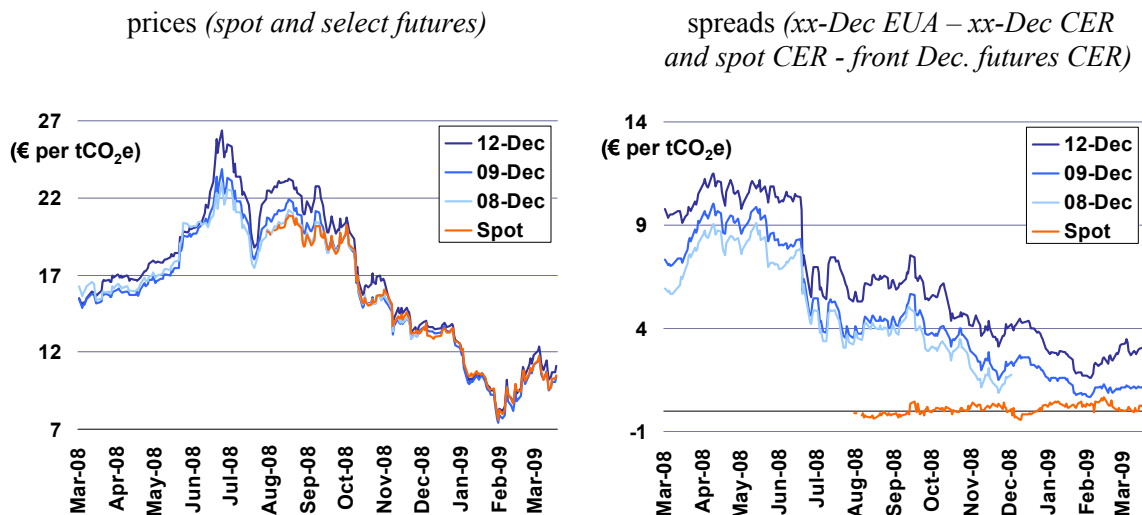
⁷⁸ This includes spot, futures and options.

prior to the true-up date for 2008 compliance. There appears to be an implicit expectation of a minimum spread (currently 20-25%) between sCERs and pCERs before buyers resume origination in the primary market.

Price and Delivery Risk

Contractual provisions for the delivery of sCERs affect price. There is a price premium for sCER transactions containing a delivery guarantee versus transactions without such guarantees. The discount for non-guaranteed sCER transactions reflect perceived country risk, counterparty risk, and regulatory (i.e., CDM) risk. In 2007, 2008 and in early 2009, project aggregators sold project portfolios to secondary buyers. Several portfolios were sold as back-to-back transactions with no guarantees and at a small premium to the price for primary projects. In other cases (and typically before the credit crunch), some portfolios were sold to investors with the senior-most tranche guaranteeing a certain volume for delivery; the middle tranche of investors receiving an agreed percentage of overall volumes delivered; and a third tranche of investors that would receive any additional deliveries. These latter transactions are quite complex and are not seen much in the market, especially following the financial crisis.

Figure 5: sCERs in the Carbon Market: Prices and Spreads



Price Premium in the Secondary Market

Secondary CERs can be sold with or without guarantees for firm delivery. Guaranteed sCERs are priced independently of project risk and command a premium price over sCERs that are sold without guarantees for firm delivery. In this latter segment, some project types or projects from certain countries can command a premium in the secondary market relative to others. Some buyers, for example, reported that they were willing to pay more for credits from wind projects, which have shown an ability to move quickly through the Executive Board, but not for hydro projects with additional environmental externalities or other project types that have had difficulty negotiating the regulatory process. Other secondary transactions have occurred when owners of primary CERs have transacted significant chunks of their project portfolios in order to diversify their country exposure, e.g., toward countries other than China.

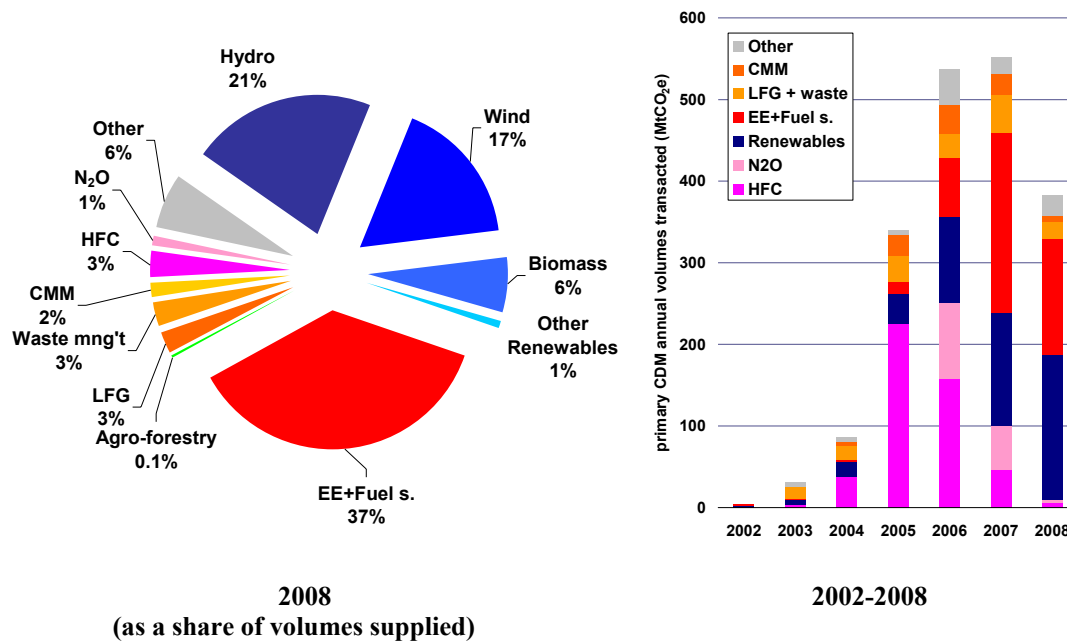
Who Trades in the Secondary Market and Why?

The sCER market continues to be dominated by European traders, mostly financials and energy marketers. Market players use secondary markets to hedge their exposure to price or volume risks in primary markets. ECX data over most of the past year shows a higher proportion of put options on

guaranteed sCERs, indicating that in this market concerns about price risk predominate.⁷⁹ To illustrate, a trader with an inventory of CERs from non-guaranteed primary projects or portfolio, would seek to buy a put option for guaranteed sCERs (or EUAs) in order to hedge price risk, i.e., preserve a minimum selling price for his CERs. Likewise, sophisticated project developers buy puts to hedge the price risk of their already contracted future CER streams, if they wish to manage concerns about the ability or willingness of primary buyers to fulfill their contractual commitments to purchase pCERs at agreed prices. Conversely, a trader or developer selling a forward stream of CERs for firm delivery, would seek to buy a call option in order to secure a minimal volume of delivery, if they perceive regulatory risk to predominate price risk.

As market liquidity has increased, there has also been significant participation in secondary markets by funds and U.S. financials, including some speculators and hedge funds. Some traders constantly observe the implied volatility and spread between sCERs and EUAs and may buy one and sell the other, if they believe that one is temporarily mis-priced. Although their ultimate motivations are difficult to understand, some of these players also provide liquidity in the form of speculative trading in other global environmental markets, such as U.S. emissions markets and U.S. renewable energy certificates markets.

Figure 6: CDM Project Types



3.5 PROJECT TYPES

CDM continued to leverage clean energy investments in 2008 through projects in renewable energy, fuel switching and energy efficiency (Figure 6). Transacted volumes in these three broad project categories alone totaled 323MtCO₂e (slightly down from 359 MtCO₂e in 2007), accounting for 82% of volumes contracted in 2008. Hydro, wind, biomass energy and energy efficiency of power generation at large industrial facilities led the growth of the CDM pipeline and accounted for 70% of the number of projects and 65% of the volumes that entered the pipeline from January 2008 to March 2009. Hydro projects alone accounted for over a quarter of all projects and volumes entering the pipeline in this period. The number of projects in the pipeline targeting demand side management

⁷⁹ This is the opposite for options on EUAs, where calls account for the larger share of volumes, indicating hedging volume exposure (likely from compliance buyers) dominates.

(e.g., efficient lighting) doubled to 14 over the same period; as did the number of solar projects. Some earned an extra transaction price premium because of their Gold Standard certification.

Leverage for Clean Energy Investments

An estimated US\$41 billion (€28 billion) of investment in clean energy projects stands to potentially benefit from primary CDM transactions in 2008 alone. Renewable energy, energy efficiency and fuel switching projects have accounted for a larger share of CDM transactions over time and the 2008 number represents 43% out of the nearly US\$95 billion (€68 billion) of estimated clean energy investment leveraged since 2002.⁸⁰ Every year closer to 2012 also results in lower expected CER revenues relative to the underlying investments, resulting in a much higher “leverage ratio” every year.⁸¹

These notional amounts of leveraged investment dwarf ODA support for clean energy policy and projects (about US\$20 billion or €16 billion over 2000-06),⁸² and are comparable to estimates of total investment in sustainable energy in developing countries (US\$41 billion or €30 billion in the period 2002-2007).⁸³ In an uncertain global economic environment, financing for clean energy has been hit hard by the global financial and economic crisis.⁸⁴ It remains to be seen how much of the potential investment will eventually materialize given the impact both of the financial crisis and of CDM regulatory delays.

Whither HFCs?

Transactions of HFC destruction projects are now virtually absent from the primary market, with the exception of a handful of spot sales of un-contracted issued CERs from previously registered projects. These numbers reflect the exhaustion of opportunities under existing approved methodologies.⁸⁵ It is unclear what their fate in the carbon market will be post-2012, although the trading of similar offsets will be permitted in a segment of the U.S. market as proposed in the Draft Waxman-Markey bill. Persistent questions remain: Will emission reductions from industrial gas projects be dealt with through the carbon market or under a related agreement? Will the crediting period of ongoing projects be renewed? Will they be discounted against offsets from other project types? Comparing pipeline expectations and transacted volumes, there are still additional volumes of N₂O assets left un-contracted, which could find their way through the market at registration and issuance, mainly through the spot market as in the case of HFC assets.

LULUCF Assets Remain Marginalized

At less than 1% of the volumes transacted this year, LULUCF assets continued to be marginal in the carbon market. Concerns about permanence of reductions, accuracy of monitoring and about

⁸⁰ The CDM has potentially benefited about US\$106 billion (€75 billion) of overall 2002-08 investment in projects that reduce GHG emissions for an average leverage ratio of 4.6. If industrial gas transactions are not considered, there is a much higher global leverage ratio at 6.5.

⁸¹ Methodology (and caveat) for computation of investment and leverage factors is presented in the 2007 edition of the *State and Trends*.

⁸² See J. T. Roberts, K. Starr, T. Jones and D. Abdel-Fattah (2008). “The Reality of Official Climate Aid”, Oxford Energy and Environment Comment (November 2008). Oxford Institute for Energy Studies, at http://www.oxfordenergy.org/pdfs/comment_1108-1.pdf

⁸³ Source: UNEP-SEFI and New Energy Finance (2008). Global Trends in Sustainable Energy Investment 2008 Report, at <http://sefi.unep.org/english/globaltrends.html>

⁸⁴ Although it grew 15% to US\$97.4 billion (€66 billion) between 2007 and 2008, new investment in sustainable energy slowed down in the second half of 2008 and collapsed to US\$11.5 billion (€7.8 billion) in Q1'09, its lowest value since Q3'06. Source: S. Fritz-Morgenthal, C. Greenwood, C. Menzel, M. Mironjuk and V. Sonntag-O'Brien (2009). *The global financial crisis and its impact on renewable energy finance*, at http://sefi.unep.org/fileadmin/media/sefi/docs/publications/Study_Financial_Crisis_impact_on_RE.pdf

⁸⁵ Only four projects entered the pipeline in 2008, bringing their number to 23 and adding only 1% to the total expected CER supply from these projects (479 million).

“flooding the market” continued to keep LULUCF assets outside the EU ETS, as well as the proposed AU ETS and NZ ETS. Meanwhile, even governments, which have the ability to use a limited amount of LULUCF, have barely acquired any of these assets. These assets will enjoy a new relevance and value should they be accepted into a future U.S. scheme.

Continued Complexity of Asset Creation

Much of the supply constraint can be attributed to the complexity of asset creation under the CDM methodology, including the less-than-satisfactory way that the issue of permanence was addressed by the creation of “temporary crediting”. The CDM could reduce the complexity of its methods for LULUCF asset creation, by observing how new methodologies under the California Climate Action Reserve (C-CAR) or the Voluntary Carbon Standard (VCS) seek to address the issues of permanence in carbon sequestration in soils and biomass. In particular, the buffer approach developed by the VCS, where projects create a “buffer” to protect against hazard events, has gained considerable interest as it offers a simpler yet credible alternative to temporary crediting. Provided that buffering is conservative, adopting a similar approach under the CDM could increase the credibility of LULUCF assets and remove the remaining barriers to their adoption and eligibility into a number of emissions trading schemes. It may also be time to consider how buffering and similar techniques could be applied to a wider swathe of land-based mitigation opportunities, including carbon sequestration in agricultural soils.

HARVESTING AGRICULTURAL SOIL CARBON

The greenhouse gas (GHG) mitigation potential in the agricultural sector is significant. Agriculture accounts for an estimated 12% of total global anthropogenic emissions of GHGs. Taking into consideration that agriculture is the primary driver of land use change and deforestation, an additional 18% of total human-induced GHG emissions can be attributed to agricultural landscapes. Due to population growth and changing diets, it can be expected that emissions from agriculture further increase. At the same time, the sector can significantly contribute to GHG mitigation. According to the IPCC the global biophysical agricultural GHG mitigation potential is estimated to be ~ 5,500 – 6,000 MtCO₂e per year by 2030, soil carbon sequestration being the main mechanism.

Many agricultural mitigation opportunities use current technologies and can be implemented immediately. Opportunities for reducing GHGs in agriculture include: cropland management, grazing land management, management of organic soils, restoration of degraded land and livestock management. Still, further development and scaling up of testing and application of emerging technologies to support reduced emissions and enhanced adaptation in agricultural landscapes and monitoring is both achievable and necessary.⁸⁶

Agricultural GHG mitigation options are cost-competitive. The potential gains from soil sequestration are less well known than those, for example in the forestry sector, but could be globally of the same order of magnitude. Assuming a price of less than \$20 per ton of carbon dioxide, the global economic mitigation potential in the agricultural sector is close to 2,000 MtCO₂e per year by 2030. This potential is comparable to, or even above, the economic potential of other sectors, such as energy supply, transport, industry, and forestry (Figure below). Other studies, for example McKinsey (2009) confirm low abatement costs of soil carbon sequestration.⁸⁷

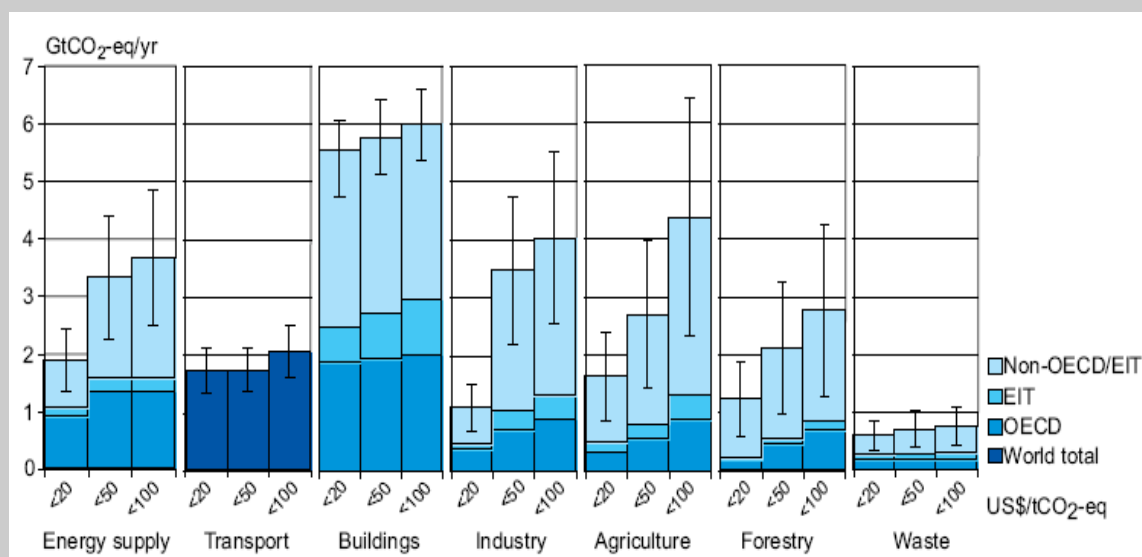
Under the Clean Development Mechanism (CDM) of the Kyoto Protocol agricultural land management is not eligible (as a stand alone). Only emission reductions of methane and nitrous oxides from activities other than agricultural land use are eligible under the CDM. Therefore agricultural soil carbon, which accounts for 90% of the total biophysical mitigation potential in the agricultural sector, cannot be traded within the Kyoto compliance market. This exclusion prohibits farmers in developing

⁸⁶ Get REEAL - Investing now for a Productive and Resilient Future. Agriculture & Rural Development (ARD) Policy Note, Sustainable Development Network, the World Bank (in press).

⁸⁷ Mc Kinsey (2009). *Pathways to a low-carbon economy: Version 2 of the Global Greenhouse Gas Abatement Cost Curve*, at <http://globalghgcostcurve.bymckinsey.com/>

countries, and other regions, from accessing emerging carbon markets and from benefiting from significant payments for emission reductions.

Global Economic Mitigation Potential for Different Sectors in 2030



Source: IPCC 2007.

Agricultural land management is the “missing link” to establish functional landscape level mitigation projects. Afforestation and reforestation are currently the only land uses eligible under the Kyoto Protocol. Reduced Emissions from Deforestation and Forest Degradation (REDD) is being considered for inclusion in a future climate regime. Agricultural land management (including grassland management) is the “missing link” to avoid carbon leakage due to land-use changes within the landscape, to supplement maximize incomes for farmers (in particular in developing countries), reduce transaction costs and release pressure on natural forests.

Agricultural carbon sequestration can help to increase agricultural productivity and enhance farmers’ capacity to adapt to climate change. Carbon is an integral part of sustainable land, water and biodiversity management. Increased soil carbon improves soil structure, with corresponding reduction in soil erosion and nutrient depletion. Soils with increased carbon stocks have better retention of water, thereby improving the resilience of agricultural systems to drought. These positive biophysical impacts of soil carbon sequestration lead directly to increased crop, forage and plantation yields and land productivity.

Agriculture could deliver charismatic carbon assets, in particular if this asset class is included in future compliance markets. Carbon payments could provide incentives for producers to adopt productivity-enhancing practices and technologies and thereby help in particular poor smallholder farmers in developing countries to realize co-benefits of increased crop yields and climate resilience. Given the key role agriculture plays for livelihoods and economies in developing countries, carbon revenues could be an additional trigger for sustainable rural development. Capacity building and research and development can help farmers to overcome technical and institutional barriers to benefit from carbon payments.

3.6 INSIGHTS ON MARKET PRICES AND CONTRACT PROVISIONS

The average price of a CER in 2008 was €11.46 (US\$16.78), reflecting a 16% increase over 2007 average price. This average price reflects high prices paid in the first part of the year prior to the financial meltdown, compared to much lower prices in the mere handful of transactions in the remainder of 2008.

A Tale of Two Markets

Prior to October 2008, prices ranged in between €8-16, based on the underlying project's progress from both a regulatory and operational perspective. The lower end of that range did not increase much over 2007, unlike the top end of the range reflecting strong competition among buyers amid expectations of a short EU ETS and residual demand from governments. Projects at the validation stage transacted in a range of €8-12, with a handful of higher bids (€13+) in the case of Chinese tenders. More advanced projects (i.e., those with registered and issued CERs) attracted higher prices, just below secondary market prices for guaranteed CERs and close to prices of spot CERs (see below).

The description above applies to the time before the financial crisis hit. Following the crisis, financial institutions and investors largely exited the market as they were caught in the spiral of the financial meltdown. To date, very few have resumed origination (and if they have, it has been at a much lower level) and they have to comply with more stringent internal credit requirements. Compliance buyers also stepped away temporarily as they were striving to evaluate the implications of the financial and economic crisis on their obligations. There are now indications that the largest among them are coming back to the market. Prices however may not fully have recovered as buyers have more negotiating power than they had during the first half of 2008. Prices today are reported to range between €6-8 for projects at an early stage to as high as 80-95% of spot or secondary CERs for registered and operational projects.

Market Premium and Market Discount

In the last couple of months, premia or discounts have been reported for pre-2012 assets of specific project types or origin. There is talk in the market about "green" and "grey" CERs, the latter group reportedly bundling together HFCs and other industrial gases and even some large hydros. Through our interviews, we heard of premia for "green" CERs, usually above €0.60 and sometimes even higher than €1. Market players also reported receiving quotes for issued CERs from non-India and non-China projects asking for a premium in the range of €0.10 to 0.25. Premia for pre-2012 vintages from "green" and "non-China-non-India" projects may reflect current perceptions of future rules governing the likely use of offsets in a post-2012 world.⁸⁸ This indicates that the market is already entering into transactions with an eye on what could be used without a shadow of a doubt for post-2012 compliance. The added flexibility for likely future compliance provides option value to buyers.

There are consistently confirmed reports of increasing interest in post-2012 vintages, in particular from large compliance EU ETS buyers, although it is hard to confirm the volume of transactions actually concluded. Some compliance players expressed their concern that continued uncertainty about eligibility rules post-2012 prevented them from trading against a forward curve. In many cases, a post-2012 component was included as part of a pre-2012 transaction and market participants consequently reported a range of contractual terms, from fixed price contracts to contracts indexed to a spot market price at delivery as well as a large number of option contracts. Contracts in the €7-8.50 range were written for firm volumes post-2012 with fixed prices. Given the huge regulatory risk that governs the post-2012 market across many anticipated regimes, buyers are relatively careful with the projects they want to commit to. One way used by some buyers to mitigate post-2012 risk was to

⁸⁸ Some are also clearly motivated to diversify their China-heavy portfolios.

include specific contract provisions that would allow them to cancel the ERPA should the project not be eligible for compliance under EU ETS Phase III.

Spot Market for CERs

Bluenext launched its spot CERs contract by mid-August 2008, giving the market an additional benchmark for a rational peg for primary CER prices. Spot CER prices are increasingly reported to be used for indexation in primary CER off-take contracts. Although spot CER volumes are relatively thin compared to secondary CERs, some consider that it makes more sense to index the price to pay on delivery for a forward-contracted primary CER to the spot price instead of a futures price, as would be the case with a secondary CER.

Trading on Bluenext increased rapidly at the end of 2008 and about six million CERs were traded on the spot market in 2008. Over this period, the average price for spot CERs gradually declined from €19.90 in August to €13.30 in December, tracking EUA prices. Anecdotal evidences from OTC transactions involving issued CERs indicate similar or slightly higher prices.

3.7 CONTRIBUTION OF THE CDM SO FAR AND WAYS TO IMPROVE IT

Greater Annex I Ambition + Flexibility = Better Climate + More Resources for Development

This report has consistently pointed out the link between the level of ambition in emission reduction targets of Annex I countries and the level of flexibility built into the architecture of the compliance system, including international offsets from project-based mechanisms. More ambitious targets are called for by the latest IPCC assessments. When combined with strong and efficient flexibility mechanisms and with a greater share of allowances auctioned, ambitious targets could lead to the generation of a higher level of financial resources and technology transfer opportunities for developing countries in climate mitigation and adaptation.

More Countries Participate in the CDM⁸⁹

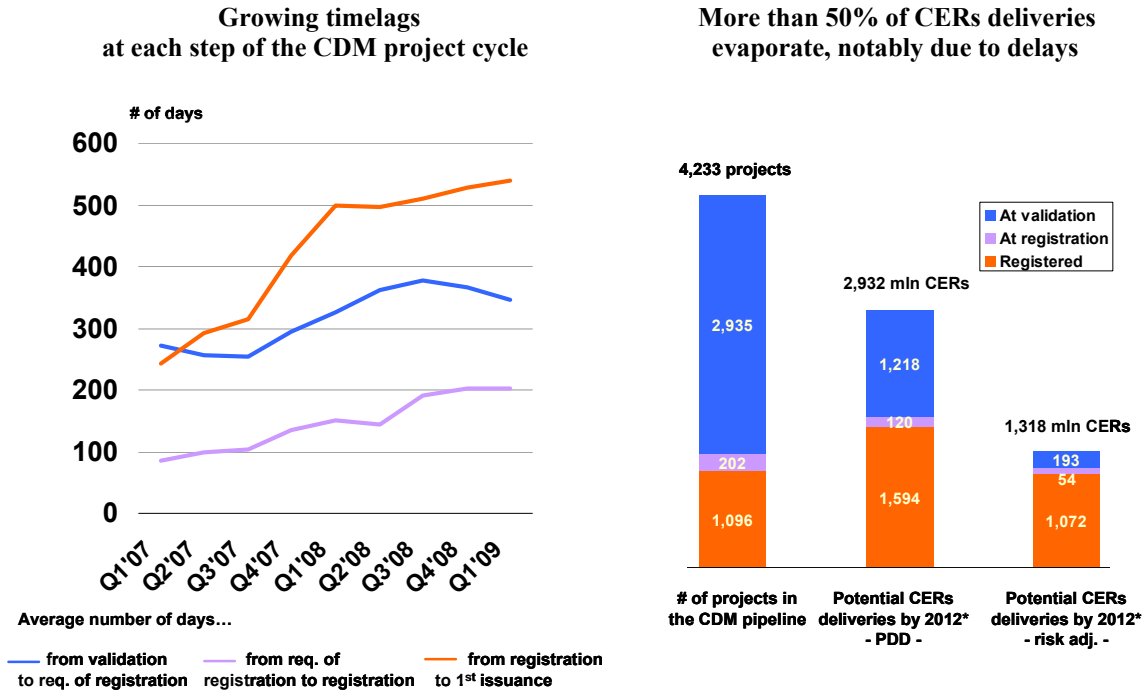
The CDM pipeline now consists of over 4,500 projects in about 80 countries, with an increasing number from countries in Sub-Saharan Africa. The biggest contribution of CDM has been to capture the imagination and ingenuity of governments and companies in developing countries to view climate change mitigation as an opportunity instead of a constraint to growth. Its other important contribution has been to provide experience and lessons on what has worked well and what could improve if such market mechanisms are to be relied on in the future to provide mitigation on the scale required by the latest IPCC advice.

Status of CDM Registration Process

Only one-third of the projects in the pipeline have been registered and by some projections, only about half of the potential CDM supply is expected to materialize by 2012 (Figure 7). There is continuing frustration regarding the regulatory process, not just from private project developers but also from state-owned developers and developing country governments who have been waiting for their expected revenue streams to flow. Delays and inefficiencies along the project cycle have continued, leading to higher transaction costs, losses in CER volumes and lower market values.

⁸⁹ The good news is that more countries experienced the CDM process. The bad news is that the countries that have entered the pipeline later tend to be poorer and face longer waits, reviews and rejections than those that went before, with a lower expected success rate.

Figure 7: Long Delays Halve the Prospects of 2012 CER Deliveries

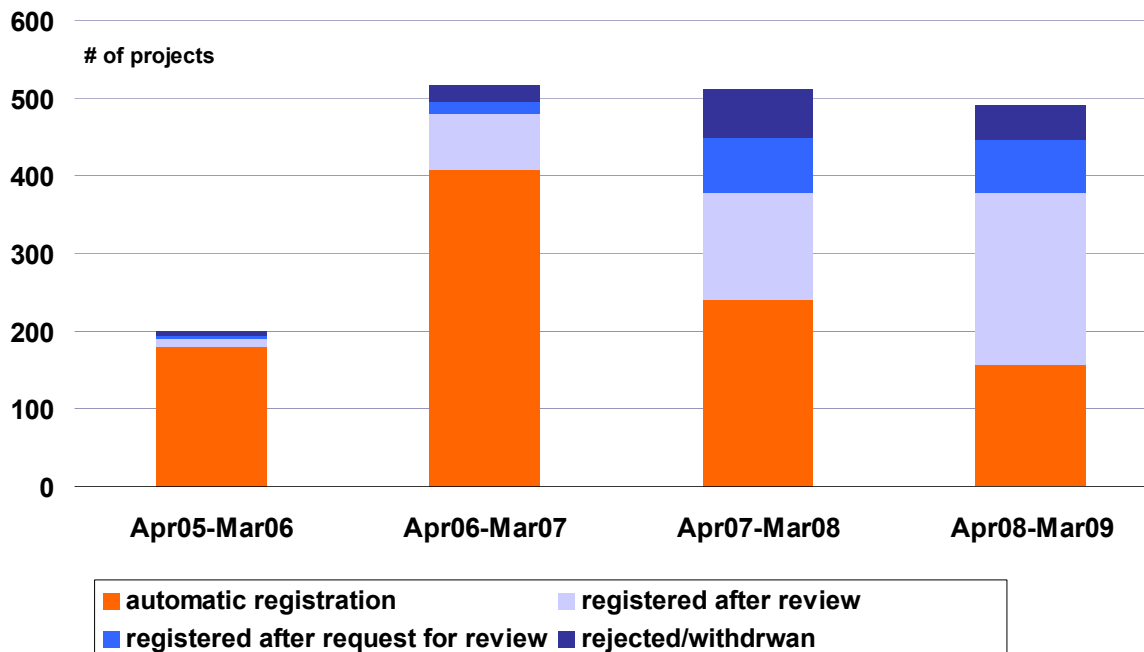


Source: UNEP/RISOE CDM pipeline, data up to end of Mar 09

*: does not include potential new projects entering the pipeline after Mar 09

Note: Average number of days from validation to request of registration is computed as the average number of days for all projects requesting registration in a given quarter. This is computed from the start of the public comment period at the validation stage to the request of registration; and so on to obtain the average number of days from request of registration to registration and the average number of days from registration to first issuance.

Figure 8: Increased Scrutiny by the CDM EB at Registration



Source: UNFCCC.

Over the past 12 months (Figure 8), about 9% of the projects requesting registration were rejected or withdrawn; 14% of projects requesting registration were registered following a review, while another 45% were registered after a request for review was initiated, further slowing down the registration process. Since April 2007, slightly more than 300 projects underwent review for registration, with hydro, waste gas/heat utilization, biomass energy and wind being the most frequently reviewed in that order (about three-quarters of the reviewed projects). In the same period, biomass energy, energy efficiency, waste gas/heat utilization and hydropower projects were the most frequently rejected in that order, accounting for about three-quarters of the 90 projects that were rejected. Although there are fewer cement projects in the pipeline, they were rejected at a much higher rate than other projects. The most frequently cited reason for rejection was that the project developer did not demonstrate additionality convincingly enough. In addition to reviews and rejection at registration, there were also 57 cases for review at issuance in the last two years, leading to seven rejections of issuance for about 500,000 CERs.

Streamlining the process of registration and issuance is an important immediate objective of CDM reform. Since about the spring of 2007, the CDM Executive Board (EB) has intensified its scrutiny at the stage of registration and again at the stage of issuance, with the stated goal of maintaining the credibility of the CDM as a standard supporting real, monitorable and verifiable emission reductions. Despite good intentions and sincere efforts, these delays have compounded and contributed to a higher rate of project rejection and/or withdrawal as well as generated further delays in the process of registration and issuance.

Short-term Tactics and Long-term Strategies

One can appreciate the concern that the CDM EB has for both the Mechanism's reputation and for its future applicability beyond 2012. However, this concern is applied in a manner that has the undesired consequence of slowing down the process. EB's efforts, however, do not sufficiently address the issues of re-casting the additionality debate, which is core to the *raison d'être* of the CDM and also the main reason why projects get reviewed for registration. Addressing additionality concerns will not only reduce the short-term delays, but can also help preserve and expand the credibility of the CDM.

The effect of the delays in the regulatory process go beyond just the supply losses of CER production and the monetary losses of CER revenues. Equally pernicious is the time and energy that the process saps from project participants (especially smaller entities with limited capacity) because it impairs the motivation of developing country entities to participate in mitigation activities over the long term. Once the EB has dealt with these urgent challenges satisfactorily, then it can credibly focus on the broader strategic issues facing the CDM, especially at a time that it may itself face competition from other standards. The Draft W-M legislation in the U.S., for example, calls on the U.S. EPA to develop its own process for approving offset projects and does not automatically accept all CDM approved activities.

WHY IS REFORM URGENTLY NEEDED NOW?

Some of these reforms, such as opening the scope of the CDM to new sectors and project types or scaling up to sector-based approaches, properly belong to a broader re-think of the CDM under discussions for the post-2012 period.⁹⁰ Poorer developing countries are likely to continue to use project-based CDM post-2012, as more advanced emerging economies consider the use of programmatic and sector-based approaches. There should be simplified procedures for poorer countries to leverage the widest possible range of project types through the carbon market, to support critically needed investment, such as hydro infrastructure as well as opportunities to help increase agricultural productivity and land resilience.

The urgent need to create a more effective and efficient CDM now cannot be over-emphasized. Project-based approaches are still the most prominent instrument to support low-carbon investment in developing countries (Section 3.5). Many countries, especially poorer countries, are still learning the ropes of the CDM instrument and have only just seen their first transactions with projects entering the pipeline over the past year or so. It is inequitable that these projects in poorer countries face the longest pipeline delays and inefficiencies that eat into their resources. It is critical that these countries, in particular, are not further hobbled in their access to the market because of persistent inefficiencies and high transaction costs.

Proposals to Improve the CDM

The issues raised by a broad range of stakeholders about the CDM regulatory process has led to an array of proposals on how to enhance, expand or evolve the mechanism in order to improve the participation of the private sector in climate change mitigation.⁹¹ Together, these proposals can be classified into three main issues: strengthening governance; improving the efficiency of the CDM process; and, broadening the scope of the mechanism. The COP/MOP Decision 2/CMP 4 (*Further guidance related to the Clean Development Mechanism*) recognized some of these issues and urged the CDM Executive Board to take effective action and address the pressing concerns linked to the CDM process. The EB, with the help of the UNFCCC Secretariat, has sought inputs from the public as part of its efforts to improve the regulatory process. Efforts to ameliorate some problems could already be observed in early 2009, with the intention of targeting some of the bottlenecks along the project cycle as well as to improve the quality, relevance and consistency of information flows. These include:

Tackling the CDM Bottlenecks

A key area of EB effort has been to try and foster increased competition among independent, third party validators and verifiers, and enhance their capacity. Over the past year, the number of accredited DOEs has doubled from a year or so ago, with some based in East Asia. More competition, in general, could certainly encourage a service provider to strive for continuous improvement in the quality of its service, maintain control on costs and keep reasonable service standards on timelines for turnaround. The EB is reportedly considering a service standard of 180 days to bring a project from the start of the public comment period to the request for registration (from a current average of 347 days) and a service standard of 90 days to go through the next step to

⁹⁰ Many other suggestions have been proposed and should be considered by the COP/MOP and the EB. These include: engagement of a professional, full-time staff for the CDM EB and consideration of how to make it more representative of practitioners; development of ways to increase accountability for the process, including possibly an appeal mechanism to provide an opportunity for project participants to appeal EB decisions.

⁹¹ See for instance IETA's *State of the CDM 2008: Facilitating a Smooth Transition into a Mature Environmental Financing Mechanism*; UNEP's *A Reformed CDM - Including New Mechanisms For Sustainable Development* (2008) or for a recent review, Figueres and Streck (2008). "Great Expectations: Enhanced Financial Mechanisms for Post 2012 Mitigation", background paper for World Development Report 2009, World Bank. Also, "Emissions trading and the project-based mechanisms: Draft conclusions proposed by the Chair" provides an excellent summary of the richness of proposals put forward under the climate negotiations (FCCC/KP/AWG/2009/L.2).

registration (from a current average of 203 days). These are welcome steps and need to be implemented if the process is to improve its recent record (Figure 7).

Quality of Service

Improving the quality of service is often, at least in part, a function of DOEs being able to recruit and/or train an expanded pool of skilled and qualified staff. Simply increasing the number of accredited DOEs will not solve this problem overnight. One way to expand the pool of qualified individuals is to offer a training and certification program for individuals (similar to the qualification criteria for environmental auditors under the ISO 14012 standard). The EB has announced that along with the accreditation of more DOEs, it also intends to step up the number of spot checks on the validation and verification process. Spot checks in a system that has sufficient capacity to simply and promptly process the projects requiring third party validation and verification is important to maintain quality. However, in a system with ongoing backlogs, the critical path should be to first clear up the backlog and simplify the process before requiring spot checks over time.

Improving Two-way Information Flows

The CDM EB has been trying to find ways to improve the quality, relevance and consistency of information flows with, between and among the CDM community. Information in the field is complex, fast-changing and ambiguous and communication about the information is often ineffective. To illustrate, the CDM regulatory process issues Guidance, Decisions and Clarifications with no clear established hierarchy among them. Unfortunately, complexity combined with unclear communication, contribute to increasing the likelihood of errors made in applying methodologies and monitoring projects. Avoidable errors translate into delays that impact the timing of registration and issuance, jeopardize timely project financing and implementation and deplete the market value of projects.

Possible Immediate Approaches and Solutions

Fortunately, some of the possible approaches and solutions do not have to be expensive to be implemented and a little bit of well-placed upfront investment can pay off big returns relatively quickly. In particular, it is time for the CDM community to expand alternative, conservative and simpler approaches to demonstrate additionality. A good example is Methodology AM0070 “Manufacturing of energy efficient domestic refrigerators”, which considers the use of benchmarks to define baseline and to demonstrate additionality. Approaches such as benchmarks, deemed savings and a positive list of specific desired activities should be explored further to streamline project preparation and monitoring. They might also avoid endless debates on baselines and additionality that have plagued the regulatory process. These approaches are also relevant in the context of PoAs.

Other immediate approaches worth considering include:

- use of modern information technology tools such as wikis and weblogs to open regular channels of communication with DOEs, project developers and other members of the mitigation community;
- prominently post both the completeness check template as a checklist for project participants and the clarification note regarding hierarchy of Guidance, Decisions and Clarifications on the UNFCCC website;
- develop web-based and spreadsheet tools to support the application of methodologies and guidance tools and to simplify monitoring, calculation and reporting.

Proposals to increase the transparency of the approval process are being considered, including wider dissemination of the proceedings of the EB meetings and webcasts. The EB is also preparing to delegate additional roles to the Secretariat for project types where there exists clear guidance.

PLACING DEVELOPMENT FRONT-AND-CENTER IN THE CDM

CDM projects are expected to reduce emissions in a manner that contributes to the host country's sustainable development objectives. There have always been questions about the ability of CDM projects to value both carbon and sustainable development equally. The regulatory tools that have been developed by the CDM (e.g. baseline and monitoring methodologies, additionality assessment etc.) have focused single-mindedly on the carbon side of this equation by trying to precisely account for every ton of emission reductions. The potential to contribute to sustainable development, however, does not receive the same level of consideration.

There are many projects that could contribute significantly to improving the basic needs of people in poorer countries or sub-regions. However, the CDM's armory of tools does not internalize the development aspirations of those currently trapped in poverty. To illustrate, consider a proposed program to expand rural electrification in a poor country or region:

The Government is seeking resources for a program to expand overall access to electricity from X% to Y% over the next 15 years by connecting people who subsist using whatever little kerosene or diesel that they can afford. A baseline survey of potential beneficiaries would indicate that the current use of kerosene and diesel by local people is low because of their level of poverty and the high cost of kerosene and diesel relative to their income. It would be pointed out that once the beneficiaries receive access to reliable electricity services, they are likely to increase their overall consumption of electricity ("suppressed demand"), thereby also increasing their emissions. This limits the CDM's ability to support the program.

Providing access to such essential services is intended to improve quality of life and incomes as desired development outcomes. The logic of "suppressed demand" when applied to other development priorities would have the effect of limiting the opportunity for poor people to enjoy the dignity offered by basic services like low-cost housing, education and health, and waste and water management, to name a few. Encouraging the fulfillment of these basic needs with minimal carbon impact on the environment should be central to the goal of the CDM.

This will require the development of new tools which do not assume that the carbon baseline is static and that it should remain at the current level in perpetuity. Rather, the new tools should assert a dynamic baseline that incorporates development aspirations based on a set of indicators (such as the Millennium Development Goals and/or other regional or national indicators). This would allow the provision of basic services to be internalized in the baseline scenario.

One way to make this approach operational would be to create an indicative list of eligible development activities. A country could choose, for example, to expand electricity access by expanding generation and extending its national grid. Perhaps it could combine the access expansion with a program to encourage the use of energy efficient lighting or other appliances. In addition, it could also choose to combine these efforts with an initiative to develop decentralized renewable energy sources. A country choosing to do all three could accrue a progressively higher carbon benefit with greater access to development opportunities.

Is PoA Dead on Arrival (DoA)?

In an effort to scale up CDM activities and reduce transaction costs, the EB at its 32nd meeting in June 2007, adopted procedures for the registration of Programme of Activities (PoAs) as a single CDM project activity. However, at the time of this writing, efforts to promote Programmatic CDM as a means of scaling up CDM activities with reduced transaction costs have not yet resulted in a single registered PoA. Many CDM projects, and programmatic activities in particular, can be complex and require lead time and elaborate implementation arrangements. In some ways, PoAs are reminiscent of the first-ever CDM projects in that they reflect the ingenuity and enthusiasm of leaders in the public

and private sectors alike to scale up climate mitigation. Their efforts risk losing their momentum unless the first PoAs get swift CDM approval and encourage other similar efforts.⁹²

Start Date of Activities

In August 2008, a new definition of the start date of the CDM Programme Activity (CPA) was introduced, stating that the start date of a CPA cannot be before the date of registration of the PoA. This came as a big blow to early movers, who found that the rules of the game were changing even before the first projects were approved. Many of the first pilots that were later aggregated to give rise to the concept of PoAs were originally conceived at a time that they would have qualified as a CDM project activity or bundled activities according to the rules prevailing at that time. To complicate matters further, the new definition contradicts the requirements laid down in the procedures for registration of the PoAs, which requires that at least one CPA be submitted while requesting a PoA registration. This confusion has put a needless question mark on the development of new PoAs.

Program promoters and developers in the public and private sectors have worked quickly to define a programme on the basis of approved procedures. They then proceeded to identify and execute projects, with the expectation that registration is imminent. The CDM benefits were considered in terms of their financial contributions and decisions were made on the identification and execution of activities. Early movers in PoA, especially those that have made it to the validation stage, have communicated that the EB consider either reversing the start date requirement; or permit project proponents to justify the start of the CPA based on a set of criteria (e.g., documentary evidence linking the implementation/investment decision for CPA with the POA); or providing a grace period to the early movers.

Liability of the DOEs

In an attempt to hold the DOEs accountable for their work, the procedures for PoA impose certain liabilities on DOEs. As a result, it appears that many DOEs have made corporate decisions that the risks of validating PoAs outweigh the benefits, as the cost of the liabilities is perceived to outweigh the potential earnings. This issue has caught the attention of the CDM EB with the DOEs discussing these issues in open forums.

Communications with the EB

There are several interpretations on the question of whether agencies other than the Coordinating and Managing Entity (CME) can play the role of focal point in communications with the CDM EB. While the Modalities of Communications (MoC) clearly state that any agency can play the role of focal point, the procedures for PoA require the CME only to play the role of focal point. In discussions, CMEs of several of the PoAs currently under validation revealed that they would prefer to delegate the role of focal point to an agency with greater capacity to deal with the EB, while they keep their focus on coordinating the implementation of the CPAs.

Prototype for the New and Improved CDM

: PoA is a powerful potential tool for scaling up investments in CDM activities. It has already caused a significant shift in thinking in the CDM community with governments and the private sector actively engaged in developing PoAs in many parts of the world, especially in smaller and poorer countries, where individual project opportunities are too small to otherwise access the carbon market. Getting PoAs right will send an important signal to policymakers that the CDM is serious about scaling up emission reductions and doing so efficiently and cost-effectively.

⁹² As of April 2009, there are nine PoAs at validation – hosted in nine countries (Bangladesh, Brazil, Honduras, Mexico, Senegal, South Africa, South Korea, Tunisia and Uganda). These PoAs explore, among others, efficient lighting, solar heating and waste management potentials.

Longer-term Opportunities for Reform

Proposals from the European Commission and the U.S. climate bill make it clear that new ways to scale up mitigation opportunities are being considered, including programmatic and sector-based approaches. There is no automatic assumption that the current CDM business model will be eligible for U.S. compliance. Meanwhile, other certification standards such as VCS and C-CAR are getting market recognition. This is an opportunity for the CDM to consider reform in a manner that can deliver high quality and large-scale emission reductions with low transaction costs.

Competition, Choice and Quality: Broadening the Reach of the Carbon Market

Voluntary standards such as the VCS and C-CAR have been competing to develop innovative and cost-effective approaches to offer choice and quality, potentially rewarding activities in sectors and countries that have been barely explored by the larger compliance carbon market. Given the significant potential new demand for offsets it could generate, it is encouraging to see that such approaches are being considered for under the proposed Waxman-Markey draft bill. Expanded choices for project developers and competition among different certification standards can only add to the quality of emission reductions and expand opportunities for mitigation.

As a step toward integration of carbon markets on both sides of the Atlantic, it is important to consider how the major carbon trading schemes plan to harmonize their vision regarding international offsets. One way to do this is through a process of consolidation, drawing upon attractive features of the best performing standards for each project type. This could contribute to deepening the reach of carbon finance across a wide range of mitigation opportunities in developing countries and can also contribute to greater efficiency in the market.

IV OUTLOOK

4.1 DEMAND SUPPLY BALANCE IN RECESSIONARY TIMES

THE GLOBAL ECONOMIC DOWNTURN has led to lower overall emissions and an easier path to Kyoto compliance for Annex B Parties. It has also resulted in a smaller expected shortfall within the EU ETS, and has reduced the need of EU installations to contract CERs and ERUs for 2008-12 compliance at a time of insufficient clarity for them to start buying and banking large volumes of post-2012 credits. As a result of the financial credit crunch, not only are CDM and JI projects finding it more challenging to receive financing, but banks and financial players are also less likely to engage in meaningful levels of project origination. It is still too early to see significant engagement of U.S. and Australian buyers beyond a handful of exploratory trades. To complete the perfect storm for CDM and JI, the first set of significant AAU transactions has occurred, further eroding any residual 2012 demand. This suggests that 2009 is shaping to be a lean year for the primary project-based market, with weakening pre-2012 demand and lack of traction on the post-2012 front.

4.1.1 Likely Demand for Kyoto Mechanisms (KMs) from Governments

As the overall global economy shrank, so did the required level of effort to meet Kyoto commitments for the industrialized countries that constitute Annex B to the Kyoto Protocol, notably EU and Japan. Likely demand for KMs from Governments is estimated at about 570 MtCO_{2e} over 2008-12:

- ❖ Last year, the EU-15 Member States announced that they intended to purchase about 640 MtCO_{2e} (approximately half of their Kyoto shortfall) through the Kyoto Mechanisms (CDM, JI and AAU); they have already contracted about 200 MtCO_{2e} (nominal). EU-15 GHG emissions are likely to contract by 3.5% on average over 2008-12, and after factoring in the likely impact of policies and measures (including EU ETS) and adjustments for sinks, the new likely government demand for KMs is estimated to be about 450 MtCO_{2e}.
- ❖ As Japan's economy saw a massive contraction in the fourth quarter of 2008, GHG emissions in that country are also likely to decrease over 2008-12, reducing its projected overall Kyoto shortfall by about 250 MtCO_{2e} to just over 500 MtCO_{2e}. As of 31 March 2009, the Government of Japan has announced that about 95 MtCO_{2e} (out of its planned purchases of 100 MtCO_{2e}) had been secured, including two GIS transactions of 70 MtCO_{2e}.
- ❖ Among other major industrialized Annex B countries, demand from governments for KMs should remain limited at an estimated 20 MtCO_{2e}:
 - Australia should be able to bridge its Kyoto gap through domestic policies and measures, largely due to a significant contribution of forest and land-use activities.
 - New Zealand switched from a net short Kyoto position (with an estimated deficit of 21.7 MtCO_{2e}) to a net long Kyoto position (with a surplus now estimated to be 9.6 MtCO_{2e}), following updated projections published April 2009.⁹³ This change is attributed to lower emissions from the agriculture sector and increased removals from forests.
 - Norway requires less than 10 MtCO_{2e} to cover its revised Kyoto gap. In line with its long-term commitment to carbon neutrality, it has appropriated about €600 million to secure an estimated 30 to 35 MtCO_{2e} from CDM and JI for delivery over 2008-12.

⁹³ <http://www.mfe.govt.nz/issues/climate/greenhouse-gas-emissions/net-position.html>

- Switzerland decided earlier in 2009 to increase its procurement program by three MtCO₂e, to 12 MtCO₂e (2 MtCO₂e of which would be offset domestically). The Climate Cent Foundation has been extremely active in the market and has contracted 9.4 MtCO₂e from CDM and JI projects and 2.2 MtCO₂e from domestic projects.

4.1.2 Private Sector Compliance Demand

As both EU ETS and Japanese companies have smaller compliance needs, the likely private sector demand CDM and JI for 2008-12 compliance is down 40% to about 1,065 MtCO₂e, from an estimated 1,775 MtCO₂e last year.

- ❖ *EU ETS demand estimates down dramatically:*⁹⁴ Over the last few months, analysts have revised their projections of the overall EU ETS position, reflecting a grim outlook for economic activity in the region, along with substantially lower preliminary verified 2008 emissions. Some analysts see Phase II as being potentially long (i.e., projected 2008-12 emissions lower than the 2008-12 cap), possibly even pushing some length well into Phase III. This will directly impact demand for CERs and ERUs for compliance in 2008-12 as well as beyond (Table 3).

However, European private buyers, who have already contracted an estimated 1,370 MtCO₂e (nominal), may choose to surrender as many KM units as possible during Phase II with the intention of banking EUAs for Phase III. This is likely if they believe that tighter Phase III caps along with auctioning and benchmarking may pose a stiff future compliance challenge. In addition, the continuing lack of clarity about EU ETS provisions for the import of CERs and ERUs during Phase III may persuade some buyers to frontload some of their future purchases during Phase II itself.

Likely KM demand will vary based also on views about the pace of economic recovery, the treatment of unused NER at the end of Phase II and the compliance strategy of operators at a time when cash is less readily available.⁹⁵ Analyst expectations for CER and ERU demand, including Phase III banking, from the EU private sector range from 400 to 900 MtCO₂e, with an average of analyst expectations of 750MtCO₂e during Phase II. In contrast, analyst expectations of demand for Phase II-only compliance are in the range of 0 to 440 MtCO₂e max).⁹⁶

- ❖ *Japan still in the game:* Although hit hard by the economic downturn, Japanese private sector companies may still need to acquire credits through the KMs (CERs/ ERUs and AAUs) to comply with their commitments under the Keidanren Voluntary Action Plan (VAP). Estimated demand from Japanese companies, taking into account the downturn, is about 300 MtCO₂e. So far, Japanese companies have contracted about 300 MtCO₂e (nominal) from CDM and JI, including recent purchases of about 190 MtCO₂e by the electric power industry and 60 MtCO₂e from the steel industry. These numbers underscore the challenges for compliance that Japanese companies and the Government of Japan would have faced absent a downturn.
- ❖ *Australia-NZ private demand still tepid:* Exploratory demand from installations covered by the on again-off-again proposed Australian CPRS,⁹⁷ the suspended New Zealand ETS, the Switzerland ETS as well as from Canadian companies under the *Turning the corner* Climate

⁹⁴ Situation of aviation and installations under the Norway ETS is also considered in this section.

⁹⁵ In our interviews, we learned that some compliance buyers reported a willingness to buy primary CERs, provided the costs are “manageable”, which they said was “no more than about €7”.

⁹⁶ Barclays Capital. *Monthly Carbon Standard*, April 2009; Cheuvreux. *Carbon Research*, March 2009; Société Générale. *Global Commodities Special*, May 14, 2009.

⁹⁷ A fixed price of AU\$10 (approx. US\$7.70) for compliance assets during the first year of the CPRS (2011-12) might not make CERs attractive.

Action Plan,⁹⁸ could reach 15 MtCO₂e. Post-2012 reductions, of course, will add to the potential of more demand from the KMs.

4.1.3 Pulling the Demand Picture Together

Expected demand for Kyoto mechanisms is now expected at 1,635 MtCO₂e over 2008-12, with approximately 65% coming from the private sector (Table 5). Most of this number will likely be met through CDM and JI, provided they can deliver as contracted.

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

| Potential Demand from Industrialized Countries (MtCO ₂ e) | | Potential Supplies (MtCO ₂ e) | | |
|--|--------------|--|--------------|--------------------|
| Country or entity | KMs demand | | Likely | Max |
| EU | 1,200 | Potential GIS | 990 | 1,910 |
| <i>Government (EU-15)</i> | 450 | Russian Fed. | ?? | ?? |
| <i>Private sector (EU ETS)</i> | 750 | Ukraine | 500 | 1,000 |
| <i>Possible addt'l demand</i> | 125 | EU-8+2 | 490 | 910 |
| | | Other EITs | - | - |
| Japan | 400 | | | |
| <i>Government of Japan</i> | 100 | | | |
| <i>Japanese private sector</i> | 300 | | | |
| <i>Possible addt'l demand</i> | 125 | | | |
| | | | | |
| Rest of Annex B | 35 | CDM+JI | 1,671 | 1,430-1,974 |
| <i>Government</i> | 20 | CDM | 1,489 | 1,330 to 1,724 |
| <i>Private sector</i> | 15 | JI | 172 | 100-250 |
| | | | | |
| TOTAL | 1,635 | | | |
| <i>Government</i> | 570 | | | |
| <i>Private sector</i> | 1,065 | | | |
| <i>Possible Addt'l demand</i> | 250 | | | |

Governments have not yet made clear the volume of AAUs they intend to purchase for Kyoto compliance. The flurry of AAU/GIS transactions announced in recent months demonstrates the appetite of both buyers and sellers to transact at a mutually acceptable price. One could realistically, expect AAU demand to the order of 250-300 MtCO₂e (or less than half of announced governments demand for KMs). Those are conservative estimates as lower than anticipated performance of domestic policies and measures and disappointing deliveries from CDM and JI procurement programs could ultimately lead to governmental demand for AAU/GIS of an additional 250 MtCO₂e (equally between EU-15 and Japan).

⁹⁸ An initiative aimed at bringing Canada's GHG emissions down to 20% below 2006 levels by 2020 is likely to initially stimulate a demand for domestic offsets.

AAUs, GREEN INVESTMENT SCHEMES (GIS) AND INTERNATIONAL EMISSIONS TRADING

International Emissions Trading (IET), the third flexibility mechanism under the Kyoto Protocol, came to life in 2008 and early 2009 with announced AAU transactions of nearly 100 MtCO_{2e} for a value of US\$1.2 billion (€0.91 billion). Japan was a prominent buyer while the Czech Republic and Ukraine dominated on the sell side. The first actual transfers of AAUs have been reported in 2009 and a few more transactions are expected over the next few months. Many JI projects in the past also included so called 'early crediting' where pre-2008 emission reductions are to be transferred in the form of AAUs.

Reported AAUs deals

| | Seller | Buyer | Indicative volume (MtCO_{2e}) | Indicative price (€/AAU) | Indicative value (US\$ mln) |
|--|---------------------|--------------|--|---|--|
| | 2006 | Slovakia | Japan (private) | 0.2 | n.a. |
| | 2008 | Hungary | Belgium | 2.0 | 14-15 |
| | 2008 | Hungary | Spain | 6.0 | 14-15 |
| | 2008 | Slovakia | US (private) | 10.0 | 6.05 |
| | total'08 | | | 18.0 | 212 |
| | 2009 | Czech Rep. | Japan (gov't) | 40.0 | 9.8 |
| | 2009 | Ukraine | Japan (gov't) | 30.0 | 9.8 |
| | 2009 | Latvia | Netherlands | 3.0 | 10 |
| | 2009 | Latvia | Austria | 2.0 | 10 |
| | 2009 | N. Zealand | Japan (private) | 0.05 | 8 |
| | total'09-t-d | | | 75.0 | 983 |
| | TOTAL | | | 93.0 | 1,194 |

Greening Surplus AAUs

Most of the surplus AAUs lie with the former Eastern Bloc countries: Russia accounts for about 50% of the potential supply, Ukraine 25% and EU-10 20%. These assets (more than three times the expected KM demand) are perceived by some as insufficiently additional, since they were created not by environmental intent, but by historical economic events. It is unlikely that this whole supply will reach the market, and the portion that does, will require to be "greened" under a Green Investment Scheme (GIS) in order to become attractive to buyers.

A GIS is a voluntary mechanism established by a seller to provide assurance to buyers that proceeds from AAU transactions will contribute to contractually agreed environment- and climate- friendly projects and programs both by 2012 and beyond. There need not be a systematic one-to-one match between AAUs transacted and actual emission reductions. A sub-nomenclature of "greening" activities has developed, that includes:

- ❖ hard-greening, where AAU revenues are invested in activities leading to measurable and verifiable emission reductions; and,
- ❖ soft-greening, where AAU revenues support activities contributing to the broader achievement of sustainable development goals, including, for example, institution building and public education campaigns.

So far, buyers seem to favor hard-greened AAUs and even appear to be willing to pay a premium for such transactions, although there is no commonly accepted definition for hard greening. AAU/GIS are reported to trade on average around €10, within a €6-14 price range. Trades in the higher end of that range are reported for "hard-greened" AAUs, with degree and credibility of greening a central determinant of price. As is the case with the primary project-based market, very little public information is available on the price and structure of transactions in the nascent AAU market. A proposed auction by Czech Republic would

certainly be an improvement in this regard, except that it has been regularly postponed, apparently for technical reasons.

A key element in a successful GIS is the credibility of the host country to transparently implement the agreed upon activities. In this regard, a recent decision by Hungary to allocate part of its AAU revenues to budgetary priorities other than GIS implementation raised some eyebrows before Hungary clarified its intent.

With relatively large financial flows upfront, GIS can be an opportunity to innovate and pilot approaches through which carbon finance can provide upfront payments to support larger scale programs and policies to encourage fuel-switching activities, diversification of energy supply towards renewable energy sources, energy efficiency improvements etc. It also has the potential to catalyze investment in sectors such as housing that are not readily reached by more traditional project-based mechanisms and to promote technology transfer (as between Japan and Ukraine).

At about 1,000 MtCO₂e (possibly twice more depending on Poland and Ukraine), estimates of the likely supply of AAU/GIS are much lower than the overall expected surplus of AAUs, primarily because Russia has not shown sustained interest in developing a GIS. Anticipated demand from interested entities such as Austria, Ireland, Italy, Netherlands, Portugal, Spain and Japan (including private sector), has been estimated at 250-300 MtCO₂e, and possibly more, up to 500 +MtCO₂e, depending upon the performance of domestic policies and measures and actual deliveries from CDM and JI procurement programs.

Under current circumstances, this huge imbalance is not expected to have a large impact on carbon market prices as sellers will not likely accept low prices, and may rather choose to bank AAUs without restriction beyond 2012. The interest of buyers and sellers to engage in the market (including Russia) could increase dramatically depending on the progress of international climate negotiations, where bankability of AAUs could play a role in determining the ambition of future commitments of the Parties.

4.1.4 Likely Supply Side Position

Despite the economic slowdown, each of the Kyoto Mechanisms (and, in particular, AAUs and CDM) will likely be needed to bridge the Kyoto Gap.

- ❖ *How much will the CDM deliver?* As of March 2009, there are more than 4,500 projects in the CDM pipeline, which have the theoretical potential of delivering about 2.9 billion CERs by 2012. However, the continued growth and viability of the CDM pipeline has slowed down in an environment where securing project financing becomes more difficult and clarity is still lacking on the post-2012 front. Analysts have been revising downward their projections of expected CER deliveries by 2012 to reflect both the lower inflow of new projects into the pipeline as well as the bottlenecks along the project cycle. These include the regulatory delays caused by the greater scrutiny of the CDM EB, which has led to a higher rate of project rejection. These delays, in the broader context of financial crisis, have led to further delays or even cancellations in the financing and/or commissioning of projects, some of whom are truly “stranded assets”.

The pipeline also shows a shift in project type by technology, away from the so-called industrial gases that provide predictable and certain reductions and toward other types of projects with lower output in lean economic times. Accordingly, analyst expectations for expected CER deliveries range from 1.33 to 1.72 billion CERs with lower CER generation that may also have lower output with an average of analyst expectations of 1.49 billion CERs.⁹⁹ The authors’ own expectations have consistently been relatively low and in the range of 1.1-1.3 billion.

⁹⁹ Barclays Capital. *Monthly Carbon Standard*, May 2009: 1.46 billion CERs and 150 million ERUs over 2008-12; Cheuvreux. *Carbon Research*, March 2009: 1.33 billion CERs and 100 million ERUs over 2008-12; Point Carbon. “The Kyoto and credit balances: saved by the recession?”, *Carbon Market Analyst*, 12 March 2009 – updated April 30, 2009: 1.59 billion CERs and 205 million ERUs over 2008-12; UNEP Risoe CDM/JI Pipeline Analysis and Database, May 1, 2009: 1.34 billion CERs and 153 million ERUs over 2008-12;

- ❖ Joint Implementation has still not performed up to its potential. Hampered by regulatory uncertainties and institutional bottlenecks, the JI pipeline as of March 2009 grew to 193 projects with the potential to deliver up to 322 million ERUs by 2012. Of these, 33 projects are “determined” and only one project has been issued ERUs so far.¹⁰⁰ A major uncertainty for JI is project approval in Russia, where no project has yet been approved,¹⁰¹ effectively freezing about 60% of volumes in the JI pipeline. Thirty-six projects have entered the approval process in Russia, seven of which (with over 40 million ERUs) have reached the final stage. Depending on their views on developments in Russia, analyst expectations of eventual 2008-12 JI supply range from 100 to 250 million ERUs with an average of analyst expectations of 172 million ERUs.
- ❖ AAUs and Green Investment Scheme (GIS) came to life in 2008 and early 2009 with announced AAU transactions of close to 100 MtCO₂e for a value of US\$1.2 billion (€0.91 billion). Anticipated demand is smaller than the likely supply of about 1,000 MtCO₂e (50% from Ukraine). Interest of buyers and sellers (including Russia) could increase dramatically depending on progress on negotiations on future commitments under an international agreement on climate change, where bankability of AAUs could play a role in determining the ambition of future commitments of the Parties.

| | GIS supply (MtCO ₂ e) | |
|--------------|----------------------------------|--------------|
| | likely | Max |
| Bulgaria | 0 | 20 |
| Czech Rep. | 100 | 100 |
| Hungary | 100 | 100 |
| Latvia | 40 | 40 |
| Poland | 100 | 500 |
| Romania | 100 | 100 |
| Russia | ?? | ?? |
| Slovakia | 50 | 50 |
| Ukraine | 500 | 1,000 |
| TOTAL | 990 | 1,910 |

4.1.5 Any Residual Demand Left?

There may be some limited residual demand, given the estimates for what has been contracted so far under CDM, JI and AAUs, even after adjusting CDM and JI deliveries for performance (Table 6).

50% Success Factor

Any estimate of residual demand is largely dependent on estimates of CDM and JI performance in relation to their potential demand. In the table above, we applied a 50% success factor to already contracted volumes to adjust for performance, broadly in line with the ratio between potential supply of CERs by 2012 (volume as of Project Design Document, or PDD) and expected deliveries by 2012, accounting for delays, rejections and withdrawals as well as intrinsic project performance. This gives an adjusted supply estimate of 1,017 MtCO₂e, leaving an estimated residual demand of 525 MtCO₂e mostly from governments (70%) with the remainder from private sector (largely EU-based private sector).

Société Générale. *Carbon Drivers*, May 18, 2009: 1.72 billion CERs and 250 million ERUs over 2008-12.

¹⁰⁰ Issuance under JI Track 1 has been higher, notably with projects from New Zealand.

¹⁰¹ Typically, there are persisting uncertainties on the additionality and eligibility of projects reducing fugitive emissions from gas distribution networks, (accounting for over 75 million ERUs – about 40% of potential Russian JI supply).

Table 6: Potential Demand, Contracted Supply and Residual Demand 2008-12

| | Potential demand (MtCO ₂ e) | CDM&JI Contracted | | AAUs (MtCO ₂ e) | Residual demand (MtCO ₂ e) |
|--------------|---|-------------------------------------|---|-------------------------------|--|
| | | unadjusted (MtCO ₂ e) | adjusted for performance (MtCO ₂ e) | | |
| Total | 1,635 | 2,034 | 1,017 | 93 | 525 |
| gov't | 570 | 242 | 121 | 83 | 366 |
| private | 1,065 | 1,792 | 896 | 10 | 159 |

Different Success Factors

The actual success factor could be higher or lower than the 50% rate assumed above. A refinement to the estimate above might disaggregate early entrants into the pipeline from more recent entrants. One way to do that is to assume that all volumes from registered projects have been contracted.¹⁰² The nominal PDD volume of registered projects is currently 1,594 MtCO₂e. The expected success rate of registered projects is higher (67%) than that of all projects in the pipeline combined (50%). Applying the 68% success factor to 1,594 MtCO₂e provides an adjusted supply estimate of 1,076 MtCO₂e from registered projects (of which 282 MtCO₂e have been issued so far).

We then examined all the newly contracted projects, which is the difference between the nominal contracted volume from the World Bank database (2,034 MtCO₂e) and the registered volumes (1,594 MtCO₂e) or 440 MtCO₂e. The expected success rate of recently contracted projects that are at an earlier stage of the CDM process is much lower (18%) than that of all projects in the pipeline combined (50%) or all registered projects (68%). Applying the 18% success rate to the 440 MtCO₂e provides an adjusted supply estimate of 79.2 MtCO₂e from recently contracted projects.

Taken together, a weighted average success rate of 57% applied to nominal volumes from both newly contracted and long contracted projects gives us an adjusted supply estimate of 1,155 MtCO₂e. This implies that the residual demand using this more refined estimate is only 387 MtCO₂e.

Implications of Low Residual Demand

This low level of residual demand exists in an environment where there is neither a sufficient policy signal nor a price signal that can stimulate a pipeline of new investments in project-based emission reductions in developing countries for delivery beyond 2012. The vast majority of post-2012 transactions are so far either exploratory transactions in the U.S. and elsewhere, or options on forward vintages of existing projects.

With weakening demand pre-2012 and lack of traction so far on the post-2012 front, 2009 is shaping up to be a lean year for the primary project-based market, with limited activity and downward pressure on prices. CDM projects that are contracted today will not be able to deliver large and predictable volumes before 2012, and even government buyers may be inclined to purchase AAUs in order to meet their volume needs for compliance at a fair price agreed with a seller (or even consider JI, where retroactive-crediting over 2008-12 is possible).

Although likely volumes contracted through AAU/GIS are not comparable to what has been contracted under CDM and JI over time, they may well eat into remaining demand in the project-

¹⁰² The authors assume that the un-contracted supply from unilateral projects will eventually reach the market; these numbers are also accounted for in the analysis.

based market. Thirty percent of residual demand is expected to come from European companies, who have an eye on EU ETS Phase III compliance. There is a risk that these companies may choose to wait and see or spread their purchases over several years, or ask for lower prices, putting at risk the momentum of the project-based market over the coming year(s).

4.2 COMPLEXITY AND THE NEED FOR CLARITY

Risking the momentum of the project-based market at this time is particularly disappointing because it comes at a time that preliminary estimates of potential demand over 2012-20 for international offsets (notably from EU ETS installations and U.S. covered entities) suggest that future demand for a project-based market is significantly larger than what the market has seen so far. Project developers need, above all, a price signal and signs of robust demand before they start to invest resources to build a pipeline that requires a lead time and considerable tending and attention before it bears fruit.

A number of other lingering regulatory uncertainties might deter project development, such as eligible types of activities, limits on geographic origin or certain certification standards and fungibility across regimes. It should be recalled that it took several years before contracted volumes in the CDM and JI market took off and reached the current 500-600 MtCO₂e a year mark. Going beyond that level of offsets and credits is a potentially huge opportunity for developing countries to support their development priorities with climate benefits. It is our hope and expectation that domestic policy developments as well as progress in international climate negotiations will help clarify some of these issues sooner rather than later.¹⁰³

The Link between Ambition and Financing

This is a critical year for climate change policy and the state and trends of the carbon market indicate that decisions are needed now in order to shape the future: The prospect of meeting potential future demand at the level of GHG reductions called for by scientists, rests on the importance of building a credible supply at scale. So far, the CDM has seen no more than 430 projects registered in any one year, with expected annual emission reductions of about 80 million CERs. The likelihood of delivering large potential volumes of CERs within the present regulatory constraints of CDM is highly unlikely. Scaling up offset markets will require improving CDM efficiency and governance, starting with urgent attention to expanding alternative, conservative and simpler approaches to additionality. Increasing the participation of developing countries will involve consideration of programmatic CDM and sector-based crediting, as well as including reducing emissions from agriculture and from deforestation and land degradation. Programmatic CDM clearly has promise, but it should be remembered that the first programmatic CDM project has yet to be approved. Sector-based credits also have promise, but considerable work remains to be done politically and technically before it can be a reality.

¹⁰³ IETA's *Fourth GHG Market Sentiment Survey* (2009) identifies "uncertainties over the post-2012 regulatory regime, and the transparency and consistency of decisions made by the CDM-EB" as 3rd biggest challenges to the future success of the CDM."

Table 7: Proposed 2020 targets by Major Developed Countries

| Country or region | 2020 target | 2020 target (ref: 1990 emissions) | 2020 target (ref: 2005 emissions) |
|--------------------------|--|--|--|
| EU | 20% below 1990 levels, scaling up to 30% if international agreement | -20% to -30% | -14% to -25% |
| Australia | 5% below 1990 levels, scaling up to 15%, possibly 25%, if international agreement | +13% to +1%, possibly -11% | -11% to -21%, possibly -30% |
| Canada | 20 % below 2006 levels | -3% | -22% |
| US | 17% below 2005 levels | -4% | -17% |
| Overall ambition | | -10% to -15% | -16% to -21% |

Note: 1990 and 2005 emissions GHGs excluding LULUCF, Source: UNFCCC

The ability to generate a large and credible supply of offsets should also encourage industrialized countries to take on real targets with ambitious reductions in line with the latest science. If achieved, the total reductions of the various plans of major industrialized economies would only deliver an aggregate reduction effort of 10%-15% below 1990 emissions levels by 2020 (Table 7). This is far short of the 25-40% reductions below 1990 levels that have been called for by the IPCC in the 2020 time-frame. Setting more ambitious targets will send the right market signal to stimulate greater cooperation with developing countries to scale up mitigation. According to one estimate, science-based targets by developed countries could generate significant financial flows for developing countries, up to US\$150 billion in 2020 (or about 60% of their additional needs per year over the next decade in the context of global stabilization efforts at 450 ppm).¹⁰⁴

¹⁰⁴ Source: "How will the world finance climate action?", *Bali Brunch* (April 2009), at worldbank.org/climatechange. Projections of volumes and prices are contingent on the stringency of the targets taken on by developed countries, the proportion of effort that can be met through offsets and market price. Assuming that all OECD Annex 1 countries reduce emissions by 25-40% below 1990 levels by 2020 in line with 450 ppm, and agree to allow from 30 to 50% of these reductions to be achieved through the use of international offsets corresponds to average potential annual demand for international offsets by 2020 of 3.1 GtCO₂e per year (within a range of 2.0-4.4 GtCO₂e per year). At a price of price US\$50 per tCO₂e, this would result in a potential annual market for offsets of US\$150 billion.

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ANNEX I: COMPARISON OF MAJOR PROVISIONS OF ETS

MAIN FEATURES OF EXISTING OR PROPOSED SELECT CAP-AND-TRADE SCHEMES (AS OF MID-MARCH 2009)

| | ETS in existence | US | Australia |
|---------------------------------------|---|---|--|
| Mid-term and long-term targets | <ul style="list-style-type: none"> • 6% below 1990 levels over 2008-12 • 20% below 1990 levels by 2020 • 30% if a new agreement post-2012 is achieved • 60-80 % below 1990 levels in 2050⁶ | <ul style="list-style-type: none"> • 3% below 2005 levels in 2012 • 20% below 2005 levels in 2020 • 42% below 2005 levels in 2030 • 83% below 2005 levels in 2050¹ | <ul style="list-style-type: none"> • Starts July 2011 • 5 – 15% below 2000 levels in 2020 (possibly 25%) • 60% below 2000 levels in 2050 |
| Cap on emissions | <ul style="list-style-type: none"> • National caps, on average at 2,080 MtCO₂e per year over 2008-12 • EU-wide cap setting, starting 2013 <ul style="list-style-type: none"> – 1,720 MtCO₂e for 20% target by 2020 – 1,505 MtCO₂e for 30% target by 2020⁴ | <ul style="list-style-type: none"> • 2012: 7,042 MtCO₂e • 2020: 5,808 MtCO₂e • 2030: 3,049 MtCO₂e • 2050: 1,234 MtCO₂e⁵ | <ul style="list-style-type: none"> • Not defined (to be announced in 2010)⁶ |
| Scope | <ul style="list-style-type: none"> • CO₂ (initially) • N₂O and PFCs (bilateral opt-in over 2008-12, inclusion 2013-2020) | <ul style="list-style-type: none"> • All GHG included under the KP and any other anthropogenic gas designated by the EPA¹ | <ul style="list-style-type: none"> • All GHG included under the KP |
| | <ul style="list-style-type: none"> • Electric power, oil refineries, coke ovens, metal ore & steel, cement kilns, glass, ceramics, paper & pulp⁹; • Aviation, starting 2012 • extension (2013-2020): CO₂ emissions from petrochemicals, ammonia and aluminum, N₂O emissions from the production of nitric, adipic and glycolic acid production and perfluorocarbons from the aluminum sector. | | <ul style="list-style-type: none"> • Emissions from industrial processes, stationary energy, transport, waste, and fugitive emissions will be covered under the Scheme • Agriculture to be possibly included by 2015 |
| | <ul style="list-style-type: none"> • Covers (currently) over 10,000 installations in the energy and industrial sectors which are collectively responsible for close to half of the EU's emissions of CO₂ and 40% of its total greenhouse gas emissions¹⁰ | <ul style="list-style-type: none"> • Establishes an emission cap that covers about 85% of total U.S. GHG emissions, and virtually all emissions from the combustion of fossil fuels³ | <ul style="list-style-type: none"> • The Scheme will cover around 75 per cent of Australia's emissions and involve mandatory obligations for around 1,000 entities⁶ |
| Allocation of allowances | <ul style="list-style-type: none"> • 2005-07: 5% auctioned max and most permits given away free⁹ • 2008-12: 10% auctioning max is allowed⁹ • 2013-20: <ul style="list-style-type: none"> – 100% auctioning for power sector with possible waiver (given interconnectivity, share of oil sector, and GDP per capita) to start at 30% in | <ul style="list-style-type: none"> • 4.77 billion of allowances to be set by the administrator in 2012 equals² • Most details of action and allocation were not specified (first quarterly auction to be held before April 2011)¹ | <ul style="list-style-type: none"> • Some permits will also be administratively allocated, in order to address the transitional challenges for energy-intensive and trade-exposed industries as well as coal-fired power generation⁶ |

| | | | |
|--|--|---|---|
| | <ul style="list-style-type: none"> – 2013 and reaching 100% by 2020 – 20% auctioning in 2013, increasing to 70% auctioning in 2020 with a view to reaching 100% in 2027 for other sectors with free allocation (with benchmarking) for competitiveness-exposed companies¹⁰ | | |
| Banking and borrowing | <ul style="list-style-type: none"> • Unrestricted inter-period banking, but no borrowing¹² | <ul style="list-style-type: none"> • Full banking • An emitter can meet up to 15% of its compliance by holding allowances of a vintage 1 to 5 years later, with interest | <ul style="list-style-type: none"> • Full banking • Limited to 5% of liability using units from the following year |
| Price cap | <ul style="list-style-type: none"> • No price cap¹⁴ | <ul style="list-style-type: none"> • Not determined | <ul style="list-style-type: none"> • Cap of AU\$40 per allowance for 5 years at scheme commencement, and rising in real terms at 5% per year⁶ |
| Other price control mechanism | <ul style="list-style-type: none"> • If market fundamentals are not being observed, Member States may be allowed to bring forward the auctioning of a part of the quantity to be auctioned, or auction up to 25% of the remaining allowances in the new entrant reserve. | <ul style="list-style-type: none"> • EPA to make reserve allowances available through an auction when allowance prices rise to unexpectedly high levels • Strategic Reserve to Moderate Prices: the EPA would create a “strategic reserve” by setting aside about 2.5 billion allowances each year • Oversight of position limits and margining requirements | <ul style="list-style-type: none"> • Exports of carbon pollution permits will not be allowed, and would only be introduced with five years’ notice⁶ |
| Use of offsets (and Other carbon units) | <ul style="list-style-type: none"> • CDM and JI allowed • Domestic offsets (JI) • No AAUs and no non-Kyoto units • Projects in EU Member States which reduce greenhouse gas emissions not covered by the ETS could issue credits. Such provisions would be adopted only for projects that cannot be realized through inclusion in the ETS¹⁰ | <ul style="list-style-type: none"> • International offsets may be accepted if <ul style="list-style-type: none"> – U.S. is party to an agreement with the host country – the project or activity is within a developing country • Domestic offsets¹ • CDM and JI allowed <ul style="list-style-type: none"> – Reductions occurring after January 1, 2009² | <ul style="list-style-type: none"> • Offset credits could be created by those sectors not covered by the Scheme • Domestic offsets for agriculture to be considered after 2013. |
| | <ul style="list-style-type: none"> • <i>quantitative limitations</i> – credit import is limited to 13.5 % of the cap (differentiated by Member State) over 2008-12¹³ | <ul style="list-style-type: none"> • Total market not to exceed two billion offset credits per year (50% domestic, 50% international)¹ • Covered entities may satisfy compliance by holding 1.25 offsets in lieu of an allowance² | <ul style="list-style-type: none"> • |

| | | | |
|-------------------------------|---|---|--|
| | <ul style="list-style-type: none"> • <i>qualitative limitations</i> – no nuclear and sinks credits, limited uptake of hydro credits | <ul style="list-style-type: none"> • | <ul style="list-style-type: none"> • |
| Compliance enforcement | <ul style="list-style-type: none"> • Phase I: €40/tCO₂e for non-compliance • Phase II and forward: €100/tCO₂e for non-compliance | <ul style="list-style-type: none"> • Not determined | <ul style="list-style-type: none"> • Comprises both an administrative (financial) penalty and a continuing obligation to surrender compliance permits for any permit shortfall.⁶ |
| REDD provisions | <ul style="list-style-type: none"> • Not included | <ul style="list-style-type: none"> • The draft includes provisions for inclusion of offsets generated from international REDD projects² | <ul style="list-style-type: none"> • Not included⁶ |
| Other provisions | <ul style="list-style-type: none"> • 5% of total quantity of allowances will be put into a reserve for “new entrants” (new installations or airlines) • A part of the new entrant reserves sets aside 300 million allowances for CCS¹⁰ | | <ul style="list-style-type: none"> • Establishment of a A\$2.15 billion Climate Change Action Fund over 5 years to smooth the transition for businesses, community sector organizations, workers, regions and communities⁶ |

Sources:

- 1) Environmental Markets US Policy Update, p. 1 April 8, 2009, JP Morgan
- 2) TFS Energy bulletin – March 31, 2009
- 3) EPA Analysis of the Waxman-Markey Discussion Draft: The American Clean Energy and Security Act of 2009. Executive Summary April 20, 2009
- 4) Carbon Emissions The ETS Review: Unfinished Business. 23 February 2009. Deutsche Bank
- 5) Climate Change Policy in the USA: What can we expect from the US on the road to Copenhagen? Presentation at the World Bank of Ned Helme, President Center for Clean Air Policy. April 16, 2009. Washington, DC.
- 6) CARBON POLLUTION REDUCTION SCHEME: Australia's low pollution future. White Paper. 15 December 2008.
- 7) Carbon Pollution Reduction Scheme – EXPOSURE DRAFT Legislation. Australian Government. March 2009.
- 8) Citizens' summary EU climate and energy package
- 9) THE EUROPEAN UNION EMISSIONS TRADING SCHEME (EU-ETS) INSIGHTS AND OPPORTUNITIES. Pew Center on Climate Change
- 10) Questions and Answers on the revised EU Emissions Trading System. MEMO/08/796. Brussels, 17 December 2008
- 11) Emissions Trading Scheme - Roundtable March 3 2008. Australian Government. Department of Climate Change
- 12) The European Union's Emissions Trading System in Perspective. *A. Denny Ellerman, Paul L. Joskow*. Prepared for the Pew Center on Global Climate Change. May 2008
- 13) The EU Emission Trading Scheme (EU ETS). Presentation by Peter Zapfel – European Commission (www.climatechange.utah.gov/docs/Webinar_5.ppt)
- 14) Questions & Answers on Emissions Trading and National Allocation. MEMO/05/84. Brussels, 08 March 2005

ANNEX II: METHODOLOGY

ACCURATELY RECORDING project-based transactions is becoming more difficult each year since the number of transactions together with the diversity of players involved is increasing dramatically. Prices and contract structures, in particular, are confidential in a gradually more competitive market. The authors have collected information from a review of the major relevant carbon-industry publications¹⁰⁵ and direct interviews covering a range of market players (private companies in Europe and in Japan, fund managers and traders) to gain a broader view on the state and trends of the market.

Evolution Markets was also engaged to provide elements on transactions activity and characteristics over the year (including in emerging North American markets).¹⁰⁶ Our focus is on regulatory compliance; therefore our coverage of the voluntary segment of the market is not exhaustive. For the most part, the information provided here on the voluntary market is from a recent report by Ecosystem Marketplace and New Carbon Finance.¹⁰⁷

Only signed emission reductions purchase agreements (ERPAs) are included in the project-based transaction database. Although the study received a high level of cooperation from market players, the authors were not able to obtain complete data for all reported transactions. The completeness of data exceeds 80% in most cases except for information related to contractual terms, especially prices, where reliable data were obtained for only slightly more than 50% of the volume. Prices are expressed in nominal US\$ per tCO₂e.¹⁰⁸ In between the periodic reports in this series, the authors have occasionally become aware of unrecorded transactions from previous years that have now been included in the database. This revision explains why data for the previous years may be different from previous publications in this series.

The authors are relatively confident that the projects database for this series captures most transaction activity entered into by governments and a high proportion of primary transactions. Data for secondary transactions (guaranteed CERs) were obtained from exchanges and through interviews with brokers.¹⁰⁹ The authors consider that the analysis in this series provides a rather conservative estimate of the carbon market, one that provides a good representative view of the carbon market. The reader is invited to do his or her own comprehensive due diligence of the market prior to taking any financial position, and in this regard nothing in this report should be seen as constituting advice to take a position on the market as a whole, or any component thereof.

In contrast to the project-based market, daily price and volume information on allowances markets is available online. The report draws on data collected from the various trading platforms as well as aggregated information on the volume known to have been exchanged over-the-counter for the EU ETS.¹¹⁰ The authors have also obtained detailed information on transactions conducted under the

¹⁰⁵ Including online sources such as Carbon Finance (www.carbon-financeonline.com), Joint Implementation Quarterly (www.jiqweb.org), PointCarbon (www.pointcarbon.com) as well as Caisse des Dépôts (www.caissedesdepots.fr), Carbon Positive (www.carbonpositive.net), the Climate_L list (www.iisd.ca), IDEACarbon (www.ideacarbon.com), Ecosystem Marketplace (ecosystemmarketplace.com) or Reuters (www.reutersinteractive.com) and websites of market players (DNAs, DOEs, Project developers and aggregators, exchange platforms, governments, companies and purchasing vehicles, financial institutions and brokers).

¹⁰⁶ Per new.evomarkets.com: The opinions and results expressed in this paper are solely those of the authors, and do not necessarily represent the views of Evolution Markets.

¹⁰⁷ K. Hamilton, M. Sjardin, A. Shapiro and T. Marcello (2009). *Fortifying the Foundation: State of the Voluntary Carbon Markets 2009* Ecosystem Marketplace & New Carbon Finance.

¹⁰⁸ Exchange rates from oanda.com

¹⁰⁹ For year 2007, such exchanges and platforms were: Bluenext, Chicago Climate Exchange (CCX), European Climate Exchange (ECX), European Energy Exchange (EEX), Green Exchange, London Energy Brokers Association (LEBA) and Nordpool.

¹¹⁰ Transactions data of EUAs (Spot, Futures and Options) were obtained from the following exchanges and platforms: Bluenext, Chicago Climate Exchange (CCX), Climex, Energy Exchange Austria (EXAA), European Climate

CCX, RGGI as well as aggregate information on transactions under the New South Wales Greenhouse Gas Abatement Scheme (NSW GGAS).¹¹¹

Exchange (ECX), European Energy Exchange (EEX), Green Exchange, Italian Power Exchange (IPEX), London Energy Brokers Association (LEBA) and Nordpool.

¹¹¹ For NSW, data come from registry (volumes) as well as Ecosystem Marketplace (prices).

ANNEX III: GLOSSARY

Additionality: According to the Kyoto Protocol, emission reductions generated by Clean Development Mechanism and Joint Implementation project activities must be additional to those that otherwise would occur. Additionality is established when there is a positive difference between the emissions that occur in the baseline scenario, and the emissions that occur in the proposed project.

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

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 (Art. 3), during the first commitment period of that protocol (2008-12). AAUs equal one tCO₂e.

Avoided Deforestation: Preventing deforestation by compensating countries for carbon dioxide reductions realized by maintaining their forests.

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. Some restrictions on the amount of units that can be carried over may apply: for instance, AAUs may be banked with no restriction by a Kyoto Party while the amount of CERs that can be carried over is limited to 2.5% of the assigned amount of each Party.

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

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

California Climate Action Registry (CCAR): Non-profit organization formed by the State of California that serves as a voluntary greenhouse gas registry to promote early actions to reduce GHG emissions by organizations. It develops notably protocol and tools to measure and verify GHG emissions and emission reductions.

Carbon Asset: The potential of greenhouse gas emission reductions that a project is able to generate and sell.

Carbon Finance: Resources provided to projects generating (or expected to generate) greenhouse gas (or carbon) emission reductions in the form of the purchase of such emission reductions.

Carbon Dioxide Equivalent (CO₂e): The universal unit of measurement used to indicate the global warming potential of each of the six greenhouse gases. Carbon dioxide — a naturally occurring gas that is a byproduct 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.

Carbon Pollution Reduction Scheme (CPRS): the Australian ETS, aiming to reduce emissions between 5 % and 15% below 2000 levels by 2020 (or more). Draft bill is under consultation.

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 tonnes of carbon dioxide equivalent. One CER represents a reduction of greenhouse gas emissions of one tCO₂e.

Chicago Climate Exchange (CCX): Members to the Chicago Climate Exchange make a voluntary but legally binding commitment to reduce GHG emissions in 2010 by 6% below a baseline period of 1998-2001.

Clean Development Mechanism (CDM): The mechanism provided by Article 12 of the Kyoto Protocol, designed to assist developing countries in achieving sustainable development by permitting industrialized countries to finance projects for reducing greenhouse gas emission in developing countries and receive credit for doing so.

Conference of Parties (COP): The Meeting of Parties to the United Nations Framework Convention on Climate Change.

Eligibility Requirements: There are six Eligibility Requirements for Participating in Emissions Trading (Art. 17) for Annex I Parties. Those 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 (vi) submit supplementary information on 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 non-compliant with the eligibility requirements.

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

Emission Reductions Purchase Agreement (ERPA): Agreement which governs the purchase and sale of emission reductions.

Emission Reduction Units (ERUs): A unit of emission reductions issued pursuant to Joint Implementation. This unit is equal to one metric ton of carbon dioxide equivalent.

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 the cornerstone of EU climate policy towards its Kyoto commitment and beyond. It regulates emissions from energy-intensive installations. Over 2008-12, emissions are capped on average at 6% below 2005 levels, further decreasing to 21% by 2020, or further in the event of a satisfactory international climate change agreement.

Gold Standard: The Gold Standard certification applies to renewable energy and energy efficiency offset projects that contribute significantly to sustainable development.

Grandfathering: Allocation mechanism on the basis of historical emissions (as opposed to performance-based allocation approaches, or benchmarking).

Green Investment Scheme: A financing mechanism in which the proceeds from emissions trading under the Kyoto Protocol are reinvested in projects in the host country's economy with the objective of further reducing emissions.

Greenhouse gases (GHGs): These are the gases released by human activity that are responsible for climate change and global warming. The six gases listed in Annex A of the Kyoto Protocol are carbon dioxide (CO₂), methane (CH₄), and nitrous oxide (N₂O), as well as hydrofluorocarbons (HFC-23), perfluorocarbons (PFCs), and sulfur hexafluoride (SF₆).

High quality emission reductions: Emission reductions of a sufficient quality so that, in the opinion of the Trustee, at the time a project is selected and designed, there will be a strong likelihood, to the extent it can be assessed, that PCF Participants may be able to apply their share of emission reductions for the purpose of satisfying the requirements of the UNFCCC, relevant international agreements, or applicable national legislation.

Host Country: The country where an emission reduction project is physically located.

International Transaction Log (ITL): the ITL connects 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 carry-over). It came live in November 2007 while EU as a whole connected in October 2008.

Joint Implementation (JI): Mechanism provided by Article 6 of the Kyoto Protocol, whereby a country included in Annex I of the UNFCCC and the Kyoto Protocol may acquire Emission Reduction Units when it helps to finance projects that reduce net emissions in another industrialized country (including countries with economies in transition).

Kyoto Mechanisms (KMs): the three flexibility mechanisms that may be used by Annex I Parties to the Kyoto Protocol to fulfill their commitments through emissions trading (Art. 17). Those are the Joint Implementation (JI, Art. 6), Clean Development Mechanism (CDM, Art. 12) and trading of Assigned Amount Units (AAUs).

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 reduce their greenhouse gas (or "carbon") emissions by an average of 5.2% compared with 1990 emissions, in the period 2008-2012.

Land Use, Land-Use Change and Forestry (LULUCF): A greenhouse gas inventory sector that covers emissions and removal of greenhouse gases resulting from direct human-induced land use, land-use change and forestry activities. Expanding forests reduce atmospheric carbon dioxide; deforestation releases additional carbon dioxide; various agricultural activities may add to atmospheric levels of methane and nitrous oxide.

Leakage: Process by which emitters relocate activities to avoid regulation.

Monitoring Plan (MP): A set of requirements for monitoring and verification of emission reductions achieved by a project.

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 and the treatment of exiting installations or the process of allocation (free allocation or auctioning).

New South Wales Greenhouse Gas Abatement Scheme (NSW GGAS): Operational since 1st January 2003 (to last at least until 2012), the NSW Greenhouse Gas Abatement Scheme aims at reducing GHG emissions from the power sector. It is expected to end upon the commencement of the CPRS.

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.

Operational Entity (OE): An independent entity, accredited by the CDM Executive Board, which validates CDM project activities, and verifies and certifies emission reductions generated by such projects.

Pre-Certified Emission Reductions (pre-CERs): A unit of greenhouse gas emission reductions that has been verified by an independent auditor but that has not yet undergone the procedures and may not yet have met the requirements for registration, verification, certification and issuance of CERs (in the case of the CDM) or ERUs (in the case of JI) under the Kyoto Protocol. Buyers of VERs assume all carbon-specific policy and regulatory risks (i.e., the risk that the VERs are not ultimately registered as CERs or ERUs). Buyers therefore tend to pay a discounted price for VERs, which takes the inherent regulatory risks into account.

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

Programme of Activities: Emission reductions that are achieved by multiple verifiable activities executed over time as a direct response to a government measure or private sector initiative. Programmes typically result in a multitude of greenhouse gas-reducing activities in multiple sites over the life of the programme.

Project-Based Emission Reductions: Emission reductions that occur from projects pursuant to JI or CDM (as opposed to “emissions trading” or transfer of assigned amount units under Article 17 of the Kyoto Protocol).

Project Design Document (PDD): A project specific document required under the CDM rules which will enable the Operational Entity to determine whether the project (i) has been approved by the parties involved in a project, (ii) would result in reductions of greenhouse gas emissions that are additional, (iii) has an appropriate baseline and monitoring plan.

Project Idea Note (PIN): A note prepared by a project proponent regarding a project proposed for PCF. The Project Idea Note is set forth in a format provided by the PCF and available on its website www.prototypecarbonfund.org.

Reducing Emissions from Deforestation and Forest Degradation (REDD): A set of strategies and incentives (including performance-based) for reducing emissions from deforestation and degradation.

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

Regional Greenhouse Gas Initiative (RGGI): RGGI targets CO₂ emissions from power sector in ten U.S. Northeast and Mid-Atlantic states, with a target of 10% below current levels by 2020.

Registration: The formal acceptance by the CDM Executive Board of a validated project as a CDM project activity.

Secondary transaction: A transaction where the seller is not the original owner (or issuer) of the carbon asset.

Sequestration: Sequestration refers to capture of carbon dioxide in a manner that prevents it from being released into the atmosphere for a specified period of time.

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. However there is no quantitative limit to the utilization of such mechanisms. While assessing the NAPs, the European Commission considered that the use of CDM and JI credits could not exceed 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.

Validation: The assessment of a project’s Project Design Document, which describes its design, including its baseline and monitoring plan, by an independent third party, before the implementation of the project against the requirements of the CDM.

Verified Emission Reductions (VERs): A unit of greenhouse gas emission reduction that has been verified by an independent auditor. This designates emission reductions units that are traded on the voluntary market.

Verification Report: A report prepared by an Operational Entity, or by another independent third party, pursuant to a Verification, which reports the findings of the Verification process, including the amount of reductions in emission of greenhouse gases that have been found to have been generated.

Voluntary Carbon Standard (VCS): One of the standards in existence in the voluntary market.

