

## **Review of Carbon Markets**

**Richard Gledhill, Jonathan Grant and Lit Ping Low**  
**PricewaterhouseCoopers LLP, UK**

# **About the 'Breaking the Climate Deadlock' Initiative**

'Breaking the Climate Deadlock' is an initiative of former UK Prime Minister Tony Blair and independent not-for-profit organisation, The Climate Group. Its objective is to build decisive political support for a post-2012 international climate change agreement in the lead up to the 2009 UN Climate Change Conference in Copenhagen. Its particular focus is on the political and business leaders from the world's largest economies, particularly the G8 and the major developing countries. The initiative builds on Mr Blair's international leadership and advocacy of climate change action while in office, and The Climate Group's expertise in building climate action programmes amongst business and political communities.

This briefing paper and its companions were commissioned by the Office of Tony Blair and The Climate Group to support the first Breaking the Climate Deadlock Report – 'A Global Deal for Our Low Carbon Future' – launched in Tokyo on June 27<sup>th</sup> 2008. Written by renowned international experts and widely reviewed, the papers' purpose is to inform the ongoing initiative itself and provide detailed but accessible overviews of the main issues and themes underpinning negotiations towards a comprehensive post-2012 international climate change agreement. They are an important and accessible resource for political and business leaders, climate change professionals, and anyone wanting to understand more fully, the key issues shaping the international climate change debate today.

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# Executive Summary

## **Putting a Price on Carbon**

- Carbon markets and emissions trading schemes have a key role to play in helping to achieve the required scale of reductions in global emissions over the coming decades. They put a price on carbon which helps stimulate abatement and drive investment in low carbon technologies and services.

## **Achieving Scale**

- Much has been achieved since the Kyoto rules were elaborated and agreed. Trading schemes have been implemented in key countries and regions and the market for carbon instruments has grown rapidly. In 2007, the EU Emissions Trading Scheme (EU ETS), which covers more than 40 percent of the EU's total emissions, achieved a traded value of \$50 billion. The primary Clean Development Mechanism (CDM) market is valued at \$7.4 billion, and is also generating a fast-growing secondary market. Elsewhere, many national and local compliance schemes are planned or under development. In addition, "environmentally aware consumers" are driving growth in the voluntary carbon market.
- The key issue is whether these new markets are capable of delivering the scale of required investment and abatement activity.
- As with any market, carbon markets need to have depth, breadth, liquidity and transparency if they are to be fully effective. In addition, because carbon instruments are commodities created by intergovernmental agreements and by national or local government policies, they need long-term policy visibility and stability.
- Measured against these criteria, the existing and planned carbon markets have some way to go. A central issue is the question of scale.

## **Towards a Global Carbon Market**

- The "sum of the parts" of the carbon markets today may not deliver the deep cuts in emissions that are required. Many "domestic" emissions trading schemes have "self-protection" features that mean they are not as open or international as the architects of Kyoto had in mind, or as many experts in the field would recommend.
- A comprehensive post-2012 global agreement could re-open the door for domestic ETS schemes to develop in a more open fashion – with rules and currencies that have more in common. Having effective carbon market structures in place internationally would help limit the debate about what is the "right" price, as the market will provide efficient price signals consistent with the overall emissions goal.
- In developing countries, investment in emissions reductions has been held back by the project-by-project approach, constraints over institutional capacity, and the difficulty in applying additionality within the CDM. Sectoral or programmatic approaches could broaden the scope of the CDM, but alternative approaches such as sectoral no-lose targets may be required to fully engage more countries and sectors.
- The adequacy of institutional capacity at both national and international levels is central to the success of the carbon market. Key roles include setting targets, approving projects and overseeing monitoring requirements. Harmonisation of institutional arrangements will also help the market operate efficiently and effectively. Proposed sector-based approaches, or the linking of emissions trading schemes, will require greater institutional capacity and cooperation.

## **Just a Part of the Solution**

- Finally, emissions trading is just one of the necessary tools in the climate change mitigation toolkit. Carbon price signals cannot in practice be expected to effectively "dig out" all mitigation opportunities. Nor can they necessarily provide the "pull" to bring forward all the technologies required for deep global emissions reduction. Other policies and measures are needed within an overall sustainable development agenda that addresses climate security, as well as food, water, energy and other "securities".

### **Potential Deliverables**

- By industrialized countries: a re-direction of the evolution of domestic (entity-level) emissions trading schemes towards an open and efficient global market with common rules and currencies.
- By developing countries: a significant step beyond project-based mechanisms to sector-based approaches that are capable of mobilising the required scale of investment in low carbon technologies and practices.
- By all countries: resourcing the necessary levels of institutional capacity building required to achieve these outcomes.

### **Recommendations**

#### **a) Decisions required from leaders this year:**

- Provide confidence in the longevity of the carbon market and through that encourage abatement and low carbon investment. Agree on (or at least signal) long term targets to 2050 and a credible trajectory to achieving these.
- Direct more intensive work efforts by policymakers and experts on means to achieve open and efficient global carbon markets. This should go beyond efforts to understand how to link domestic emissions trading programs, and address concerns about securing environmental outcomes, equity and competitiveness. A key step will be to develop new carbon market policy instruments for developing countries that move beyond the CDM framework.

#### **b) Decisions required by Copenhagen (December 2009):**

- Agree mid-term targets for industrialised countries and the mechanisms for achieving these targets.
- Establish the framework for an efficient global carbon market that allows open trading between cap-and-trade schemes and removes limits on offset schemes based in developing countries.
- Decide on the future of the project-based approach and agree sectoral targets in relevant developing countries. Agree funding to build capacity within developing countries and the institutions required to manage the project- or sector-based approaches.

# Review of Carbon Markets

This paper provides a brief introduction and overview of the carbon markets, identifies their impact, assesses their success as functional markets and considers the potential issues faced by governments and policy makers in moving towards a global carbon market.

## [Introduction to carbon markets and emissions trading](#)

**Carbon markets operate on the basic principle of supply and demand, which establishes a “price of carbon”. Emissions trading schemes set the rules and regulations that govern trading in the market. Economic efficiency and environmental effectiveness are hallmarks of carbon markets and emissions trading.**

### [Carbon markets and emissions trading: how they work](#)

Like a market for any other traded commodity, carbon markets represent all the ways in which carbon units (the commodity) are bought and sold. Beyond this basic trading function, the critical importance of “the market” is that it reveals the “price of carbon”. As with other traded commodities, this price fluctuates as a result of expectations of the supply and demand, in this case for the right to produce emissions. The supply and demand dynamic is initially determined by the imposition of an emissions cap by a central authority (this could be at a global, regional or national level). Trading rules and regulations (i.e. an emissions trading scheme) then determines how the market functions in practice.

### **Cap-and-trade schemes**

The most common form of emissions trading scheme is a “cap-and-trade” system. In such schemes the regulator sets an overall limit on emissions from a defined group of greenhouse gas (GHG) emitters, allocates a fixed number of allowances across these emitters, and then allows market participants to decide whether to meet their targets by reducing their own emissions or by buying allowances on the open market.

In theory this flexibility means that the emissions reductions are achieved at the lowest possible cost, as it encourages those who find it cheaper to cut their own emissions to do so, and make money by selling any surplus credits. The overall cap will determine the underlying scarcity in the system and this, in turn, will strongly impact the price (or value) of carbon. Assuming reasonable liquidity, this process should create an efficient and cost-effective mechanism for the reduction of emissions.

This approach, which was pioneered by the sulphur dioxide (SO<sub>2</sub>) market in the US, is well suited to greenhouse gas (GHG) management, as these gases have a global rather than local impact, and there are many different opportunities for companies to reduce them. That said, such markets require robust monitoring, verification and reporting protocols to establish both baseline data and ongoing performance, and there must also be credible penalties for non-compliance, if total emissions are to stay within the overall cap.

### **Project-based offset mechanisms**

Most emissions trading schemes (either existing or proposed) allow participants to meet their emissions obligations through the use of “offset” credits generated by projects<sup>1</sup> in sectors or countries not covered by the schemes’ caps. A project-based credit represents an emissions reduction (equivalent to a tonne of CO<sub>2</sub> (or tCO<sub>2</sub>e) abated) below a baseline target.

The Kyoto Protocol’s Clean Development Mechanism (CDM) and Joint Implementation (JI) process are both examples of project-based mechanisms. The CDM is designed to assist developing countries in achieving sustainable development by permitting industrialised countries to finance GHG emissions reduction projects in developing countries in return for offset credits. JI works in a similar fashion, except the projects are between two developed countries.

The benefits of project-based mechanisms include: increased supply of credits (thus reducing costs of compliance); environmental effectiveness<sup>2</sup> (because mitigation action has taken place that would not have occurred otherwise); technology diffusion; and support for sustainable development.

### **The benefits of carbon markets and emissions trading**

The benefits of carbon markets and emissions trading include:

- Guarantee of environmental outcome, assuming proper design and enforcement<sup>3</sup>
- Lower costs of compliance for all obligated emitters – in aggregate and individually – while the decision about whether to trade is left to emitters
- The opportunity for emitters to profit by over-complying with their set targets
- The requirement that emitters measure, report and verify their emissions and so consciously consider whether it is cheaper to abate or buy emission units
- The creation of price signals, which are crucial in helping emitters decide when to abate and when to buy
- The requirement that businesses take into account potential carbon liabilities when making investment decisions
- Support for sustainable development through funding of emission abatement projects in developing countries in return for offset credits

Emissions trading therefore causes both technical and financial managers to pay closer attention to controlling emissions than would be the case if they were required simply to use a particular control technology or pay an emissions fee (i.e. a “carbon tax”). It thus leads to a management dynamic, driven by a cost saving imperative that is more innovative and opportunity-seeking.

### **The current state of the carbon markets**

**The emergence and growth of a market for carbon and emissions trading schemes is perhaps the most visible result of worldwide efforts to mitigate climate change. Carbon markets can be divided into compliance markets and voluntary markets. These markets are increasingly supported by a growing range of financial institutions and instruments, reflecting the emergence of carbon as a mainstream commodity.**

#### **Compliance markets**

Compliance markets emerged following the elaboration and agreement of emissions trading rules under the Kyoto Protocol, during UN climate change negotiations in Marrakech in 2001<sup>4</sup>. They generally consist of a cap-and-trade emissions trading scheme complemented by project-based mechanisms.

#### **Emissions trading schemes**

The largest and most high-profile compliance market is the EU Emissions Trading Scheme (EU ETS), which is a classic cap-and-trade mechanism. The scheme covers over 11,000 energy-intensive installations, which account for over 40 percent of the EU's CO<sub>2</sub> emissions. The total traded volume of EU allowances (EUAs) in 2007 amounted to around two billion tCO<sub>2</sub>e, with a market value of approximately \$50 billion, representing about three-quarters of the total value of carbon markets world-wide.

Exhibit 1 lists the other compliance markets in operation or under development around the world. At present, these markets operate (or will operate) largely independent of each other due to differences in regulations and units of trade (amongst other things). This lack of compatibility reduces overall economic efficiency as well as global environmental effectiveness. Formally linking these schemes is one of the key policy challenges facing governments.

Existing Schemes	Year Established & Commitment Period	Coverage	
		Gases	Sectors
European Union Emissions Trading Scheme (EU-ETS)	Phase I: 2005-2007 Phase II: 2008-2012 Phase III: 2012-2020	Only CO <sub>2</sub> at present	Power, steel, cement, refining, ceramics, lime and glass sector combustion installations in many other sectors
New South Wales Greenhouse Gas Abatement Scheme (GGAS)	2003, Annual	All six GHG	Power sector
<b>Proposed Schemes<sup>5</sup></b>			
US states' Regional Greenhouse Gas Initiative (RGGI)	Starts 2009	CO <sub>2</sub>	Electricity generators; coal, oil and gas fired power generation >25MW
Australia Federal Greenhouse Gas Emissions Trading Scheme	Starts 2010, Annual	All GHG	Large facilities (above 25ktCO <sub>2</sub> e/year)
New Zealand Emissions Trading Scheme (NZ ETS)	Starts 2008 for forestry subject to legislation approval, Other sectors gradually included starting 2010	All GHG	All emitting sectors. Staggered inclusion of forestry, liquid fossil fuels, stationary energy, industrial process, agriculture, and waste from 1 Jan 2008 through to 1 Jan 2013.
Assembly Bill 32 (AB32), California	Starts 2012	All GHG	Major industries including transport, electricity and natural gas
Canada Emissions Trading Scheme	Starts 2010	All GHG	Heavy industries (50% of emissions) including electricity generation, oil and gas
US states' Western Climate Initiative Cap-and-Trade Program (Draft plans)	Varies by state	All GHG	Sources under consideration: industrial and commercial sources, transportation fuels, residential and commercial fuel combustion
US Lieberman-Warner	Proposed start 2012	All GHG	Economy wide (84% of GHG emissions)
US Bingaman-Specter	Proposed start 2012	All GHG	Economy wide (86% of GHG emissions)

### Project-based mechanisms

Certified Emission Reductions (CERs)<sup>6</sup> generated by the CDM are the most common type of project-based carbon credits, and a few countries (Brazil, India and China) currently dominate the supply. In the absence of a global carbon market, CERs have also assumed a de facto role as a linking mechanism between schemes as they are one of the few units generally accepted in all carbon markets. This has also meant that CERs have effectively become the closest proxy for an international price of carbon.

The primary CDM market generated 551 million tCO<sub>2</sub>e of credits worth \$7.4 billion in 2007, while trading in the secondary CDM market exploded in 2007, with volumes traded rising tenfold to 240 million tCO<sub>2</sub>e, or \$5.5 billion. The volume and trading of JI credits – known as Emission Reduction Units or ERUs – is much lower. In 2007, 41 million tCO<sub>2</sub>e of ERUs were transacted with the estimated market value of around \$495 million.

Despite the success of these project-based mechanisms, the very fact that the credits are generated by individual projects can lead to constraints in supply in the primary market.

### Increasing financial sophistication

The emergence of carbon markets as mainstream commodity markets is reflected in the increasing participation of financial players and the proliferation of financial instruments. Clear evidence of the increasing commoditisation of carbon credits is seen in the establishment of exchanges such as the European Climate Exchange (ECX) and Nordpool, and the launch of BlueNext, the Montreal Climate Exchange (MCeX) and the New Zealand TZ1.

The major financial institutions have also moved decisively into the carbon market space. Many are large buyers of carbon credits in their own right, but are also developing and trading increasingly sophisticated financial instruments to other market players. Forward purchase contracts, carbon delivery guarantees, swaps between CERs and EUAs, and carbon-linked bond transactions are already available, and more will emerge.

Specialist carbon funds can be used as vehicles to pool carbon market investments, especially CERs and ERUs, helping to overcome the supply constraints for these units noted above. There were over 50 such funds by the end of 2007, with capital of more than €6 billion. Investors ranged from developed country governments to private firms. As the number and variety of investors grow, radical changes in policy become more difficult.

### **Voluntary markets**

Alongside the compliance market are the emerging and unregulated voluntary markets, which are driven primarily by the demand from environmentally aware companies and consumers. These markets can complement the regulated schemes, but they can sometimes also be crowded out by them. For example, many US firms are buying voluntary credits today but they may switch away from the voluntary market when a formal US trading scheme is implemented.

### **Impacts and implications of carbon markets**

**There is some evidence that the establishment of a price for carbon has encouraged green investments, but many believe that current prices are too low and too uncertain over time to make a significant impact. Ensuring that carbon markets are properly structured would help set an economically efficient and environmentally effective price for carbon and so encourage more investment. Carbon markets can also act as a key mechanism for financing climate change related investment in developing countries. Although carbon markets are effective instruments, they need to be complemented with other policies and measures.**

### **Impact of carbon markets to date**

Carbon prices influence both operational and capital decisions. While it is difficult to obtain hard data, anecdotal evidence suggests that carbon markets are leading to growing levels of investment in emissions reduction and abatement technology.

In a recent survey, 14 percent of European utility companies were prompted to reduce emissions by improving operational efficiency or maintenance<sup>7</sup> in Phase I of EU ETS. Some two-thirds also reported an increase in investment in renewable generation. Another study found “internal abatement” in the EU ETS amounts to 50-100 million tCO<sub>2</sub>e on top of the over-allocation of allowances in Phase I<sup>8</sup>.

### **The need for higher carbon prices**

Although the findings thus far have been encouraging, many believe that the current price of carbon is not a sufficient encouragement for the larger scale investments that a low carbon economy will need over the longer term.

The IPCC Fourth Assessment report suggests that carbon prices of \$20 to \$80 by 2030 “would be consistent with [atmospheric] stabilization levels around 550 parts per million by volume (ppmv) CO<sub>2</sub>e by the end of the century”. The International Energy Agency (IEA) has more recently suggested that to achieve the more ambitious stabilization levels of around 450 ppmv CO<sub>2</sub>e by 2050<sup>9</sup>, a marginal cost of carbon of up to \$200 would be needed to stimulate all the necessary abatement options and technologies.

However, many governments and industries are reluctant to accept high carbon costs, stressing that these may discourage other forms of investment which are important for economic growth. The result has been a number of cost containment measures in different carbon markets, such as “soft” caps, the inclusion of safety valves, and the capacity to borrow allowances.

Clearly a balance needs to be struck: carbon prices need to reflect the real environmental cost of emissions, but at the same time there need to be mechanisms to address the commercial implications of high carbon costs.

### **Not the only tool in the box**

It is clear then that carbon markets are not the complete or only way to address climate change. While the cost of carbon is now one element of many in the decision making process for market participants, other more direct support mechanisms may be needed

to encourage the development and deployment of cleaner technologies. This is especially so when these entail high capital investments or are specific to certain sectors only. Solely relying on carbon prices to create the same incentives may require particularly high trigger prices, which could be inefficient as well as inequitable to other sectors or market participants.

### **Carbon markets as mechanisms for climate change investment**

If properly designed and developed, carbon markets – and especially offset provisions – could enable potentially major flows of finance to regions where low cost abatement opportunities exist. Given that these regions are made up predominantly of developing countries, carbon markets can provide an effective mechanism for providing much of the financial flows (estimated at between \$250-381 billion in 2030<sup>10</sup>) that will be needed as part of a post-2012 agreement, without this having to come from public coffers in (largely) developed countries.

### **Assessment of the success of carbon markets**

**Like any other market, a successful carbon market needs to satisfy some key basic principles: depth, breadth, equity and competitiveness, long term visibility, liquidity and transparency. In addition, carbon markets must also be judged on their environmental effectiveness. The extent to which existing carbon markets meet these criteria varies. This should not be taken as an indication of failure, but rather the inevitable consequence of a “learning-by-doing” process and the inherently political nature of carbon market policy.**

#### **Have emissions trading schemes delivered?**

An overall assessment of the success of existing emissions trading schemes can be made against the key principles identified above. The EU-ETS and other emerging schemes exhibit the various attributes of successful carbon markets, but to different degrees. Earlier schemes have provided useful lessons for market participants and policymakers alike, but more could be done to improve the design of emissions trading schemes. Significant challenges ahead include determining the level of emissions reduction required in individual schemes, and the harmonisation of different schemes.

#### **Depth in the level of reductions**

‘Depth in the level of reductions’ describes the level of ambition of the emissions target or cap. The EU-ETS has gradually increased its depth. Emissions reduction objectives for Phase III, for example, are more ambitious than earlier phases – a commitment of at least a 20 percent reduction below 1990 levels by 2020, rising to 30 percent if an international agreement is concluded. This sends a clear message to emitters about the EU’s long-term commitment to carbon markets. The RGGI has varying targets for each US state, ranging from a 3.5 percent to 10 percent reduction below 1990 levels by 2020. The Lieberman-Warner bill in the US, one of the more ambitious proposals (and recently defeated in the US Senate), aimed for a reduction of only around 4 percent below 1990 levels over the same period<sup>11</sup>. Such varying levels of commitment make the harmonisation of goals and markets much more problematic.

#### **Breadth of scope**

‘Breadth’ relates to a scheme’s coverage of GHG, sectors and regions (or countries). The greater the breadth the better, as this improves both economic efficiency and environmental effectiveness. In the absence of wide coverage, linkages with other parts of the carbon market (geographically or across sectors) as well as other financial, commodity and product markets in the domestic and international economies may be necessary.

Increasing breadth in international carbon markets is evident in the gradual inclusion of more greenhouse gases, more sectors, and more jurisdictions. For example, Norway, Liechtenstein and Iceland (all non-EU states) joined the EU-ETS in Phase II, while France and the Netherlands have unilaterally included domestic installations emitting nitrous oxide (N<sub>2</sub>O). Domestic and international aviation emissions will be included in the EU-ETS from 2012, although there has been considerable controversy regarding the inclusion of the latter<sup>12</sup>. Another change in the EU-ETS is the ability to “bank” unused allowances for the future, which allows participants to address their longer term carbon needs, and avoid short term price volatility.

There has also been a growing interest in forestry offset projects in recent years, which has led to new investments in forest carbon sequestration, including both afforestation and reforestation. The potential for growth here is huge, as the sector currently represents only a very small share of the project-based credits market. The inclusion of forestry as a sector within some emissions trading schemes, such as the New Zealand ETS, is a sign of its increasing potential as a future source of carbon credits.

### **Equity and competitiveness**

Ensuring equity between market participants, and creating a level playing field for all, is essential to ensuring confidence in (and hence use of) emissions trading schemes. Harmonisation of policies and targets is critical in this respect, both within and between schemes.

Experience from the EU-ETS has shown the importance of harmonisation of policies and targets. In Phase II, allocation of allowances was largely devolved to member states. Unsurprisingly, states adopted different approaches and targets, thereby creating concerns about equity and competitiveness between industries in different countries. A proposal to centralise responsibility for emission allocation in Phase III with the European Commission should resolve this type of problem in the future.

The lack of a coordinated approach at an international level is likely to produce similar results in an emerging global market. Differences in emissions reduction targets, particularly between countries with otherwise similar abatement opportunities and costs, could create tensions over equity, competitiveness, and wealth transference. If, for example, similar countries set significantly different targets, the emitters in countries with generous (i.e. “easy”) targets are likely to meet and beat their targets much more easily than their competitors with stringent targets. These emitters could then profit from selling their credits to competitors operating under more stringent regimes, exacerbating existing competitiveness and equity concerns.

### **Long term visibility in policy and carbon prices**

Market participants require predictability to make long-term investment decisions with any confidence. Clear signals of support for emissions trading schemes from governments (and their opposition) provide this predictability.

While some existing schemes include emissions objectives to 2050, (thus providing a long term signal), in practice most targets continue to be agreed for the short term. This uncertainty about the future can limit investment, particularly in infrastructure with a long lifespan. Of all schemes, the EU-ETS has provided the clearest signals to date. Firm pledges up to 2020 have increased confidence in the longevity of the EUA market. With banking of emissions between phases now allowed and clear indication of the emissions target to 2020, there is a greater degree of market confidence which may be contributing to higher EUA prices. Conversely, a lack of full support from the EU for CDM and JI credits has kept expectations low for CER and ERU prices post-2012.

Wide price movements in emissions trading schemes have raised concerns about whether carbon price volatility might discourage investments in low carbon technology. Some emissions trading schemes, like the Australian federal ETS, propose safety-valve features by imposing a price ceiling. Greater certainty on prices could also be achieved with a price floor, which would mean that the carbon price would effectively trade within a band. However, there are concerns that price ceilings may hamper the achievement of the environmental objective, make it harder to link different emissions trading schemes, and remove the “long tail” of risk that could affect behaviour significantly.

### **Market liquidity**

As in any market, the number of participants should be sufficient to ensure there are ready and willing buyers and sellers at all times, and that undue price volatility is avoided. While transaction costs are inevitable, a well designed market lowers these costs over time and allows firms to use the market to manage their exposure to risk more efficiently as markets deepen and secondary markets emerge. The emergence of exchanges, particularly in the European markets, has helped to facilitate trading and lowered transaction costs.

### **Challenges in monitoring, reporting and verification (MRV)**

Robust and consistent monitoring, reporting and verification (MRV) provisions are crucial for a credible ETS. They need to be applied consistently to avoid distortions and to ensure the fungibility of the carbon credits. One way to make these systems less onerous, particularly for emitters, is to apply the cap upstream at the level of the producers and importers of fossil fuels, rather than at the “downstream” users, such as vehicles. However, there is an argument that such “upstream” caps create monopoly risks by concentrating allowances in the hands of a small group of emitters.

In the current EU-ETS, there are approximately 11,000 points of obligation (i.e. individual emitters who are required to account for their emissions), 7 percent of whom account for 60 percent of total emissions. In contrast, the 1,400 smallest emitters (14 percent of the total) account for less than 0.14 percent of emissions. Rationalising the number of emitters would create a more streamlined ETS, without greatly affecting its environment effectiveness. A proposal to this effect has been submitted to the EU Parliament and Council by the European Commission<sup>13</sup>.

### **Have project-based approaches delivered?**

**The CDM is changing investment patterns in developing countries. However, there are concerns about the complexity of the system, the lack of institutional capacity to manage it, and whether a project-by-project approach can really deliver the emissions reductions required.**

By many measures, the CDM can be considered a success. The incentive for companies to earn credits has encouraged growth in emissions reduction activities: over 1,000 projects have been registered by the CDM Executive Board with an expected 1,270 million tCO<sub>2</sub>e anticipated by 2012.

However, the CDM has been the subject of much debate since its inception. There are concerns about the project approval and issuance process, the complexity of preparing baselines and demonstrating additionality<sup>14</sup>, and the assessment of project risks. In the first years of operation the CDM Executive Board simply did not have the institutional capacity to cope with the volume of projects put forward for approval. The World Bank attributed this to the CDM being “a victim of its own success”. As things stand some 2000 projects are in the pipeline, each of which could face up to a two year wait for registration. Transaction costs can easily reach \$500,000 (€325,000) per project<sup>15</sup>, despite continuing efforts by the CDM Board to reduce this.

As project-based approaches generate new emissions credits it is essential to ensure the environmental integrity of these projects. However, it is challenging to develop an appropriate CDM methodology for each project, define the right baseline, and demonstrate additionality. The measurement of emissions reduction against an unobservable, project-specific baseline imposes substantial costs in terms of validation, verification, and independent scrutiny, which inevitably limits the number of projects carried out.

### **Next steps: moving towards a global carbon market**

**The “sum of the parts” of the existing carbon markets may not achieve the level of global emissions reductions desired. Linking national and regional schemes may go some way to address this but a new international framework may be required beyond 2012. Reform of the CDM and increased institutional capacity, especially in developing countries, may also be required.**

### **Improve linkages or “back to basics”?**

The central challenge currently facing the international community is fashioning an international framework to advance climate efforts beyond 2012. The complexity of the existing carbon markets, and the range of proposals to develop these markets and create new ones, has only added to that challenge. The combination of “bottom-up” approaches at national, sub-national and sector levels may not be aligned with a “top-down” international agenda such as the Kyoto Protocol.

Negotiators will need to resolve a range of complex and interconnected issues. A prominent one is the lack of linkage between both Kyoto-based schemes (such as the EU-ETS and similar schemes, e.g. in Australian and New Zealand) and sub-national ones such as the US RGGI initiative, which sit outside the current international climate change framework. The impacts of sectoral agreements will also need to be considered, such as the effect of linking avoided deforestation or international aviation sectors to emissions trading schemes. Finally, there is also the issue of how best to incentivise and improve developing country participation.

The architects of the Kyoto Protocol trading mechanisms had in mind a more open global trading scheme than what has been realised in practice. When the US withdrew from the Protocol the supply-demand balance of the carbon markets was fundamentally changed. Constraints and barriers were therefore put in place, first in the EU ETS, and then in subsequent ETS designs by others. The purpose of these was to ensure some management of the supply-demand balance and hence the price of carbon in these jurisdictions over the first 2008-2012 Kyoto commitment period. As a result, domestic and regional ETS programmes have evolved with their own unique units, and with limited compatibility.

One approach in Copenhagen may be going “back to basics” to impose absolute caps on a top-down basis; another may be to build stronger linkages between existing schemes. The former is likely to promote greater fluidity across countries, but the eventual outcome would again be dependent on the balance between supply and demand.

The latter option – establishing better linkages – could be addressed in a number of ways<sup>16</sup>. A full bilateral or multilateral link would allow the free trade of allowances within the regimes (as is currently the case amongst the Member States of the EU-ETS). Falling short of this are unilateral links where the entities within a scheme could purchase allowances from another scheme but not vice versa. Allowing the use of common project-based credits (such as CDM CERs) can create a common price signal to link isolated emissions trading schemes to all participants in the markets.

A number of important issues will need to be considered in any future efforts to link existing and proposed schemes. These include environmental integrity, equity and competitiveness, and technical compatibility<sup>17</sup>:

- Environmental integrity: all cap-and-trade schemes must have stringent targets, with project-based schemes like the CDM subject to rigorous baseline assessments,
- Equity and competitiveness: linking different schemes could have the unintended consequence of a one-way flow of credits from one region or country to another. Consistent targets, combined with flexibility in trading across schemes, would be a necessary political pre-condition
- Technical compatibility: For schemes to be linked, there must be credible registries, and consistency in monitoring, reporting and validation

### Reform of the Clean Development Mechanism

Scaling up developing country participation in emissions trading requires fundamental reform of the CDM. Almost by definition, a project-by-project approach can deliver only so much. One proposal is a more wholesale approach, possibly in the form of sector targets or programmatic emissions reduction objectives. In a sectoral approach the participants would have incentives to outperform sector-based targets and earn credits for doing so.

A sector-based target can also aim to address concerns about unfair competition, as all the operators in both developed and developing countries could have a consistent, bottom-up technology-based assessment of appropriate benchmarks. The concept of “targets” rather than “baselines” is also expected to reduce the current dependence on establishing additionality. While this has the potential to lower project-based transaction costs, the challenge of defining benchmarks for the targets would still remain. Expert assessments would be needed of benchmark energy intensity levels for major processes within each selected industrial sector; and the issue would remain of setting sufficiently stringent targets to protect the environmental integrity of the scheme. Some experts have therefore proposed sector-based targets that are not dependent on benchmarks.

**Schematic of a possible future international carbon market**

Source  
Adapted from Ward (2008)<sup>18</sup>

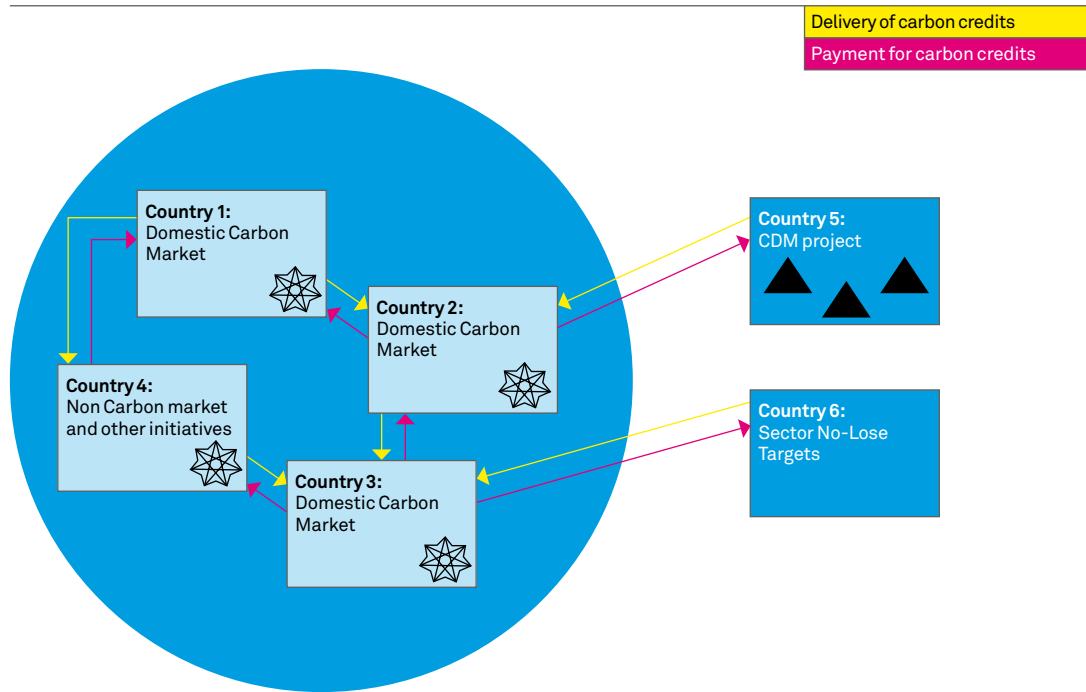


Exhibit 2 is a simple illustration of how international carbon markets might work in the future. The circle represents an agreed collective emissions cap for developed countries (i.e. like the current Kyoto Protocol). Within this developed-country circle, individual countries have individual (and usually different) emission caps.

How countries choose to meet their obligations is at their discretion. Some (e.g. Countries 1, 2 & 3) have domestic emissions trading schemes, which may or may not be linked. If they are, (the first best economic option), individual emitters can buy or sell carbon credits directly from other schemes. If there are not, trading can still take place via universally accepted units, such as CDM offset credits, which act as a kind of international currency. Alternatively, governments (as the ultimate holders of emission allowances under an international emissions reduction agreement) may engage in direct buying and selling amongst themselves, as well as with other market participants. This option remains open to Country 4, which does not have a domestic trading scheme and has chosen instead to use other policies and measures to meet its emissions target (e.g. a carbon tax or vehicle efficiency standards etc).

Developing countries, (which sit outside the binding emissions cap), can also participate in the carbon market and emissions trading. Currently, this is through the CDM, but in the future maybe via Sector No-Lose Target (SNLT) initiatives. The latter set voluntary sector-specific emissions targets for countries to meet. Any emissions reduction beyond this target generate offset credits which can then be sold to developed countries. Crucially, there is no penalty if the target is not meet, hence the 'no-lose' moniker.

Finally, the diagram also highlights how carbon markets can act as an important conduit for international financial investment in low-cost climate change mitigation in developing countries. If properly designed and implemented, carbon markets could provide a significant proportion of the investment estimated to be required in developing countries for GHG mitigation over coming decades.

### Institutional setting and capacity building

The institutional ability to approve projects, oversee monitoring requirements and set targets at the national and international level has been critical in the evolution of the carbon markets. New proposals for sector-based approaches or better links between emissions trading schemes will require even greater institutional capacity and co-operation.

The establishment of a global carbon market is a difficult and expensive ambition. Much has been said about the mechanisms and policies that could be explored, but there has been relatively little focus on the institutional capacity required in order to achieve this task. The CDM is a good example of the range of institutional challenges that the market could face, which includes:

- The definition of methodologies, baselines and standards
- Measuring, monitoring and verification
- The appointments of panels and experts
- The structure of the Designated National Authorities
- Day-to-day operational needs

The lack of institutional capacity at the national level, particularly in Africa and in other Heavily Indebted Poor Countries (HIPCs), partly explains the current imbalance in CDM projects, with five countries representing about 75 percent of the CER pipeline.

Attempts to link segments of carbon markets would necessarily require more co-operation and co-ordination among many different institutions. Completely new bodies may be needed, and existing ones may have to take on additional responsibilities. Timing is also an important element – while many are keen to push through legislation to encourage immediate environmental action, this would have to be balanced against the need for careful design, planning and capacity building.

These issues tend to be particularly costly for developing countries. The UNFCCC recognizes the need to build capacity, establish frameworks and provide additional financial and technical assistance for developing countries and economies in transition. Any future international policy frameworks would require similar arrangements in place to ensure that developing countries are able to put their national commitments into practice.

# Glossary of Terms

<b>AB 32:</b>	Assembly Bill 32, California.
<b>Additionality:</b>	According to the Kyoto Protocol, emissions reduction generated by CDM 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. See “baseline-and-credit”.
<b>Afforestation:</b>	The process of establishing and growing forests on bare or cultivated land, which has not been forested in recent history. Afforestation increases the capacity of land to sequester carbon.
<b>Allowances:</b>	An allowed, possibly tradable, right-to-emit in a country that has taken on an emissions cap under an emissions trading scheme.
<b>Annex I countries:</b>	Refers to the 36 developed countries listed in Annex I of the UNFCCC. Under the Convention these countries have a commitment to lead global efforts to address climate change. This commitment was subsequently strengthened under the Kyoto Protocol, which set quantified and binding emissions reduction targets for all Annex I countries during the Protocol’s first commitment period from 2008-2012.
<b>Annex B countries:</b>	Refers to the 39 developed countries listed in Annex B of the Kyoto Protocol. Annex B sets out the quantified emissions limitation or reduction commitment for each listed country for the Protocol’s first commitment period.
<b>Article 17:</b>	Article 17 of the Kyoto Protocol allows countries that have excess emission units - emissions permitted to them but not “used” - to sell this excess capacity to countries that are over their targets. In effect, this is the provision which established carbon trading under the Protocol.
<b>Baseline scenario:</b>	The emission of greenhouse gases that would occur without the policy intervention or project activity.
<b>Baseline-and-credit:</b>	A type of emissions trading scheme where participants are encouraged to reduce their greenhouse gas emissions below a baseline scenario. Any reductions below that baseline scenario earn credits for the difference which can be sold.
<b>Cap-and-trade:</b>	In a cap-and-trade system, the “cap” (the total amount of pollution that all regulated sources can emit over a period of time) is set and participants can trade emission allowances.
<b>CCS:</b>	Carbon Capture and Storage.
<b>Carbon tax:</b>	A price on emissions set by policy makers; emitters are allowed to emit any quantity of tCO <sub>2</sub> e at that price.
<b>CERs:</b>	Certified Emission Reduction, generated from CDM projects; one unit of CER is equivalent to 1 tCO <sub>2</sub> e (see below).

<b>CDM:</b>	Clean Development Mechanism; 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.
<b>CO<sub>2</sub>:</b>	Carbon dioxide.
<b>CSR:</b>	Corporate social responsibility.
<b>DOEs:</b>	Designated Operational Entities. A legal entity accredited by the CDM Executive Board, which can validate, register, verify and certify CDM projects.
<b>EUA:</b>	European Union Allowances; tradable emission credits from the EU-ETS (see below). Each allowance carries the right to emit 1 tCO <sub>2</sub> e.
<b>EU-15:</b>	The original 15 member countries in the European Union prior to 2004.
<b>EU-ETS:</b>	European Union Emissions Trading Scheme; in 2005, the European Union introduced a Europe-wide market in carbon dioxide emissions for major greenhouse gas emitting industries. The scheme is based on the allocation of greenhouse gas emission allowances, called EU Allowances, to specific industrial sectors through national allocation plans with oversight by the European Commission (EC).
<b>ERUs:</b>	Emission Reduction Units, generated from JI projects; one unit of ERU is equivalent to 1 tCO <sub>2</sub> e (see below).
<b>ETS:</b>	Emissions Trading Scheme.
<b>GHG:</b>	Greenhouse gases which includes carbon dioxide (CO <sub>2</sub> ), methane (CH <sub>4</sub> ), nitrous oxide (N <sub>2</sub> O), hydrofluorocarbons (HFC-23), perfluorocarbons (PFCs) and sulphur hexafluoride (SF <sub>6</sub> ).
<b>Grandfathering:</b>	Method of issuing emission permits for free to emitters and firms in a domestic emissions trading scheme according to their historical emissions.
<b>HIPC:</b>	Heavily Indebted Poor Countries.
<b>IPCC:</b>	International Panel on Climate Change; an international scientific panel charged with informing the UNFCCC with the latest scientific evidence on climate change. With representatives from 140 nations it is the world's pre-eminent scientific advisory body on global warming.
<b>JI:</b>	Joint Implementation: the mechanism provided by the Kyoto Protocol where an Annex I country may acquire Emission Reduction Units in exchange for financing projects that reduce net emissions in another Annex I country.
<b>Kyoto Protocol:</b>	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 emissions by an average of 5.2 percent compared with 1990 emissions, in the first commitment period from 2008-2012.
<b>LDCs:</b>	Least developed countries.

<b>MRV:</b>	Monitoring, reporting and verification.
<b>NAPs:</b>	National Allocation Plans.
<b>NGACs:</b>	New South Wales Greenhouse Abatement Certificates.
<b>NSW GGAS:</b>	New South Wales Greenhouse Abatement Scheme.
<b>Offset:</b>	Credits issued in return for a reduction of atmospheric carbon emissions through projects such as the provision of renewable energy to replace fossil fuel energy, or reforestation of cleared land to create a carbon sink. By paying for such emissions reducing activities, individuals and organisations can use the resulting credits to offset their own emissions, either voluntarily or in a regulated emissions trading schemes, depending on the rules of the scheme. One offset credit equates to an emissions reduction of one tonne of CO <sub>2</sub> .
<b>Phase I EU-ETS:</b>	Pilot phase of the EU-ETS, 2005 – 2007; The first phase of the EU ETS applies to 7,300 companies and 12,000 installations in heavy industrial sectors in the EU. These included energy utilities, oil refineries, iron and steel producers, the pulp and paper industry as well as producers of cement, glass, lime, brick and ceramics.
<b>Phase II EU-ETS:</b>	The second phase of the EU-ETS, 2008-2012
<b>Phase III EU-ETS:</b>	The third phase of the EU-ETS, 2013-2020
<b>Point of obligation:</b>	A point of obligation is a person or organisation (such as a business) that has a legal responsibility to monitor and report emissions and, at the end of each reporting period, to hold and surrender a quantity of 'emission units' or sink credits, equal to their emissions.
<b>Project-Based Credits:</b>	Typically used to refer to credits that result from emissions reductions from projects pursuant to JI or CDM.
<b>Rate-based system:</b>	Under a rate-based system, emission credits are generated when emissions are reduced from an agreed level (usually intensity targets or some other performance benchmarks).
<b>RGGI:</b>	Regional Greenhouse Gas Initiative.
<b>Reforestation:</b>	This process of re-establishing and growing forests in areas where forests have previously been harvested, thereby re-establishing carbon reservoirs
<b>tCO<sub>2</sub>e:</b>	Tonnes of Carbon-dioxide equivalence; the universal unit of measurement used to indicate the global warming potential of each of the six greenhouse gases. Carbon dioxide is the reference gas against which the other greenhouse gases are measured.
<b>UNFCCC:</b>	United Nations Framework of Convention on Climate Change; 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.



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# Endnotes

<sup>1</sup> Projects could include the provision of renewable energy to replace fossil fuel use or reforestation of cleared land to create a carbon sink.

<sup>2</sup> Strict monitoring, reporting and verification are critical to ensure this.

<sup>3</sup> As opposed to a carbon tax, which can only guarantee the carbon price and not the volume of emissions reduction. Design of the scheme, e.g. imposing a hard cap, would also affect the extent to which the environmental outcome is guaranteed.

<sup>4</sup> The 'Marrakech Accords' also established rules for a range of other technical issues arising out of the Kyoto Protocol.

<sup>5</sup> Proposed schemes as of going to print. Some schemes are in draft forms / awaiting legislation, and may not be implemented in practice, and are presented for comparison purposes.

<sup>6</sup> 1 CER = 1 tonne of CO<sub>2</sub>e abated.

<sup>7</sup> Energy and efficiency – The changing power climate, Utilities global survey 2007, PricewaterhouseCoopers.

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<sup>9</sup> Energy Technology Perspectives 2008, International Energy Agency, June 2008

<sup>10</sup> UNFCCC, 2007. Investment and Financial Flows to Address Climate Change, UNFCCC, Bonn.

<sup>11</sup> To put this in perspective, the US' Kyoto emissions reduction target (had it ratified the Protocol) was 6.5 percent below 1990-levels over 5 years.

<sup>12</sup> Most non-EU states oppose the inclusion of their airlines in the EU-ETS without mutual consent.

<sup>13</sup> Commission of the European Communities, 'Proposal for a Directive of the European Parliament and of the Council', Brussels, 23 January 2008 COM (2008) 16 Final. 2008/0013 (COD). <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2008:0016:FIN:EN:PDF>

<sup>14</sup> See 'Glossary of Terms' for explanation of additionality.

<sup>15</sup> State and Trends of the Carbon Market 2008, World Bank, May 2008 and Key Elements of a Global Deal on Climate Change, Lord Stern, May 2008.

<sup>16</sup> Options and Implications of Linking the EU-ETS with other Emissions Trading Schemes, European Commission Department of Economic and Scientific Policy, 2007

<sup>17</sup> Linking EU – Canada Emissions Trading Systems, An Opinion Paper By IETA, Sept 2005

<sup>18</sup> Ward, M., 2008 Breaking the Climate Deadlock: Briefing Paper: Architecture of a Global Climate Change Agreement. [www.breakingtheclimatedeadlock.com](http://www.breakingtheclimatedeadlock.com).



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## Important Notice

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