Disclaimer: This paper is the result of the analysis carried out by a sub-group within the AGF. However, the paper does not purport to represent the views or the official policy of any member of the AGF.

WORK STREAM 8
CARBON MARKETS: BENEFITS TO DEVELOPING COUNTRIES AND OPTIONS FOR EXPANSION

8.1 PURPOSE

Carbon markets can generate significant abatement financed by developed countries to the benefit of both developed and developing countries.

This paper seeks to explore the potential benefits to developing countries that arise from financial flows from developed countries via carbon markets, as one of several possible sources of funds to meet international financing commitments.

In this context, broad quantitative estimates of the size of the potential financial flows under different scenarios are provided. The size of these potential carbon market flows is dependent on a number of factors, including policy and institutional arrangements in both developed and developing countries.

The most important determinant of carbon market flows is the global level of mitigation ambition: higher levels of mitigation ambition are likely to drive higher carbon market flows.

The second most important determinant of the size of carbon market flows is likely to be the extent to which developed countries use abatement sourced in other countries to meet their own mitigation targets.

Finally, the design of carbon markets themselves – what types of units can be created, and under what circumstances – will influence the overall size of carbon market flows and potential benefits arising from those. There has been a range of different proposals to improve existing carbon market mechanisms and to create new mechanisms – creating more effective and efficient modes of trade will assist in maximising the benefits to developing countries through carbon market-based financial flows.

There is a relationship between countries' mitigation policies and what can be credited in carbon markets. Where developing countries put in place nationally appropriate mitigation actions, carbon markets can be designed to build on those actions, using them as baselines for further crediting.

This paper is set out as follows:

- Section 8.2 sets out the structure of the carbon markets and the role of offsets;
- Section 8.3 sets out scenarios for carbon market flows and quantitative estimates of those flows, based on the standard set of assumptions agreed by the AGF;

- Section 8.4 sets out quantitative estimates of capital investment and inframarginal rents under different scenarios;
- Section 8.5 sets out possible benefits and risks associated with carbon market flows;
- Section 8.6 explores a range of high level options for achieving the expansion of carbon offset markets;
- Section 8.7 sets out a high level assessment of carbon markets as a financing mechanism, against the standard criteria agreed by the AGF;
- Section 8.8 sets out a range of conclusions; and
- Section 8.9 sets out recommendations for how the scope for carbon markets to play a useful role in financing mitigation activity in developing countries might be expanded.

Appendix 1 sets out a range of carbon market reform and expansion options that have been raised in the context of international negotiations and by academic contributors.

Appendix 2 sets out a specific proposal in relation to an advance market commitment/emissions reduction underwriting mechanism for carbon and REDD.

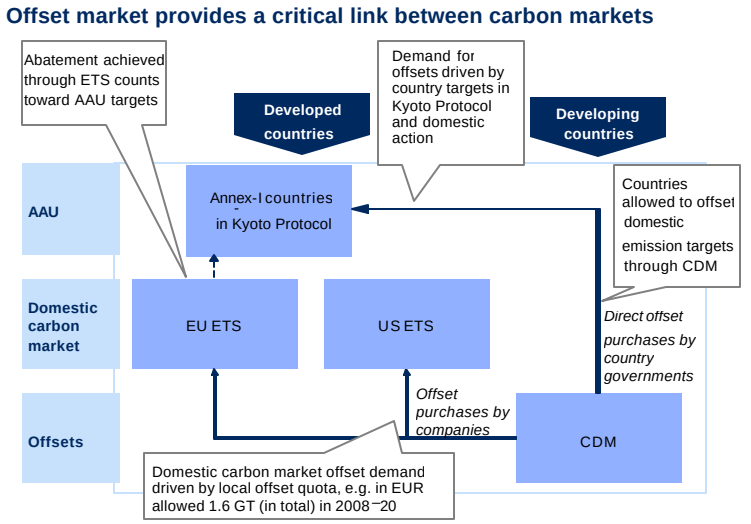
8.2 CARBON MARKET STRUCTURE AND THE ROLE OF THE OFFSET MARKET

'Carbon markets' currently comprise three types of market, which strongly influence each other but are functionally separate. One of these is the carbon offset market, which is the focus of this paper - the three markets are:

- Kyoto / AAU markets, created by allowing developed (Annex-I) countries to trade their capped carbon emissions, usually at government-to-government level;
- Domestic carbon markets created at the level of individual countries or sub-national states, in which companies can trade their capped emissions; and
- International offset markets, in which actors in developing countries can earn carbon credits for emission reduction or removal projects, which can be imported into developed world carbon markets to be 'offset' against compliance commitments. The Clean Development Mechanism under the Kyoto Protocol is currently the largest source of such offsets.

Actors in the Kyoto/AAU market and the domestic markets can import offset credits, typically limited by either a quota or a qualitative restriction. For example, the EU allows only 1.6 GT of offset credits over 2008-20 into its market, subject also to qualitative limitations, and has limited the annual use of offsets for companies to a percentage of their emissions. In contrast, New Zealand does not limit the quantity of Kyoto-compliant credits that may be imported into its ETS, but prohibits the import of credits from certain types of projects. Exhibit 1 shows how the offset market links with other carbon markets.

Exhibit 1: Offset market structure



Looking at the largest offset market, the CDM was created under the Kyoto Protocol and commenced in 2001, with significant growth from 2005. Over 2000 projects have been registered, and the mechanism is expected to produce around 975 million offset credits over the Kyoto commitment period (2008-2012).[1] Prices for certified emission reductions (CERs – the carbon offset credits created under the CDM) have varied significantly ranging from EUR 7.6 per tonne to EUR 22.8 per tonne. For most of the period prices have strongly correlated with the EU ETS price, which formed the largest source of demand for offset credits. However, as more domestic markets are developed, price formation for offsets may be increasingly influenced by those markets as well as the EU market. Exhibit 2 shows the price development over the past three years.

[1] CDM pipeline: http://www.cdmpipeline.org/overview.htm

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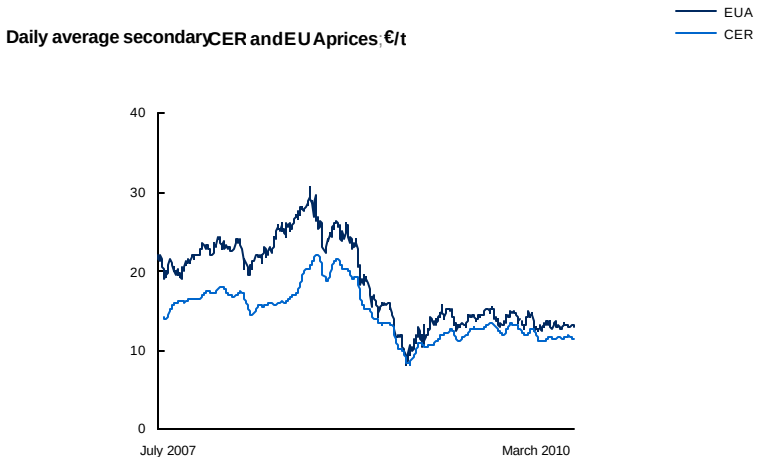
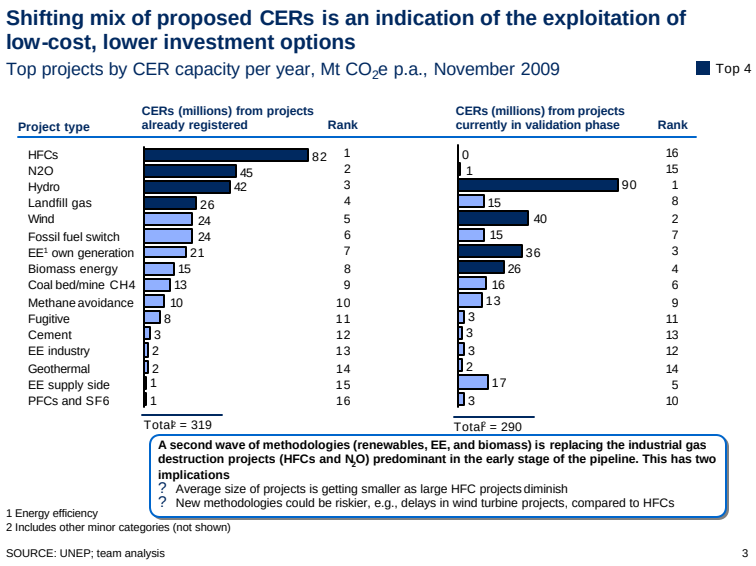
Exhibit 2: Historical carbon market prices



SOURCE: Point Carbon 2

Carbon offset development stimulates private sector investment. Traditionally the private sector has looked for the lowest cost abatement opportunities first, before moving to higher cost and investment opportunities. This is reflected in the projects that have already been registered (and for which credits have been issued). Exhibit 3 shows a large proportion of relatively low cost gas capture projects, of which HFCs and N2O rank number 1 and 2 and have accounted for almost 40% of all offset credits issued so far. Exhibit 3 also shows the list of projects currently in the validation phase, which includes a much higher proportion of renewable energy projects – which typically are higher cost. This is a reflection of the increasing maturity of the offset market.

Exhibit 3: Top CDM-projects by type

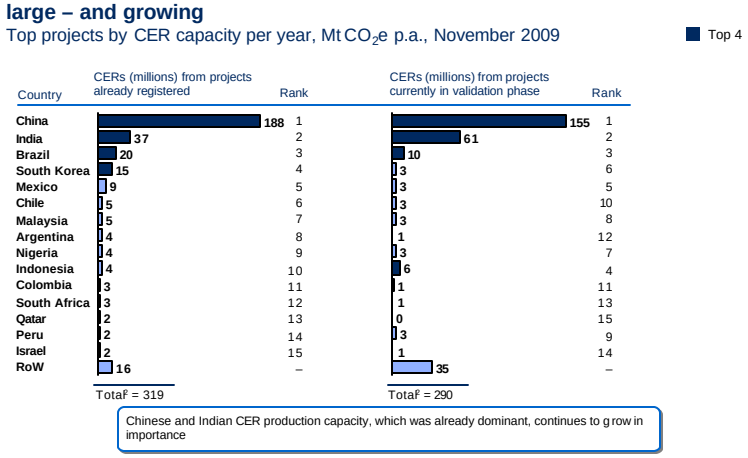


So far, most carbon offset projects have been established in China (almost 60% of total credit volume) and India (accounting for just over 10% of volume). This is a reflection of their relative share of abatement opportunities globally but in the case of China also a reflection of the good business climate for carbon offsets. This trend is expected to continue, in the short to medium term with China currently accounting for 53% of projects in the validation stage. Exhibit 4 shows the country of origin for projects registered and at validation stage at November 2009.

Exhibit 4: Top CDM projects by country

Geographically, CER production capacity in India and China is very large – and growing

Top projects by CER capacity per year, Mt CO_2e p.a., November 2009



1 Energy efficiency
2 Includes other minor categories (not shown)

SOURCE: UNEP; team analysis

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It is instructive to understand the scope and financial characteristics of various CDM projects:

- Energy Efficiency projects are increasingly popular. CDM offset income is mainly used to pay off the capital investment costs, as energy efficiency projects generate net energy savings – although not always to the actual investor.
  - As an example: Osram set up 3 lighting CDM projects in India which aim to replace lightbulbs in 1.5-3.0 million households. Osram is responsible for supplying the compact fluorescent lights (CFLs) as well as organizing the actual replacement. Each project is forecast to abate 0.3-0.5 Mt over the 10-year crediting period. The project had set-up costs of € 2.7m and (discounted) revenues of € 5.0m, yielding an IRR of ~20% at an assumed CER price of USD10/t. The project offers both very attractive returns and an entry point into a new market for Osram.
- Waste projects rely on CDM credits for a large part of their income.
  - As an example, a project aims to set up 6 compost plants for treating municipal solid waste in Tamil Nadu, India. The plants will be able to process 545 tonnes of waste per day and yield total emission reductions of 1.2 Mt CO2e over a crediting period of 10 years. Combining the income from the sale of the compost with the income from CERs yields an IRR of 18% (3% without CER).
- Renewables rely on multiple income streams and are typically quite capital intensive.
  - For example, a proposed CDM project is to build a wind power plant in China that substitutes fossil fuel powered power plants. The power plant will have a capacity of 50 MW and deliver 101 GWh to the grid annually. The project would reduce 116 kt of CO2-e annually and has a life span of 21 years. An up-front investment of € 53m is required which yields an IRR of 11% (7% without CERs).

8.3 SCENARIOS AND QUANTITATIVE ESTIMATES FOR CARBON MARKET FLOWS

In 2005-2009 the mechanism resulted in approximately EUR 5.8 billion in financial flows to developing countries, based on 400 MT issued and an average price of EUR 14.6 / tonne. This makes it the most significant financial flow in the global effort to address climate change.

The scale of future carbon offset market flows will be a function of:

- the stringency of the carbon emission caps in developed nations – both in the global Kyoto/AAU market and in domestic markets. The more stringent the (global) carbon caps, the higher the carbon flows;
- the structure of the developed nations' offset quotas. Less restrictive quotas will stimulate greater carbon offset market flows;
- the design of carbon markets themselves – what types of units can be created, and under what circumstances. The extent to which new mechanisms and markets emerge will be determined by differences in abatement costs across developed and developing nations. Carbon offsets from developing countries become more attractive to the extent that they are less expensive than abatement in developed nations, although price is not the sole determinant of this given that developed countries with low cost domestic abatement opportunities available may still choose to purchase international offset credits in some circumstances; and
- the ability of offset mechanisms to scale to generate sufficient supply of offset credits to meet demand in developed nations.

The AGF has developed a number of scenarios for possible future carbon market flows. Those scenarios take a view on which carbon markets will emerge, the stringency of (global) targets and the amount of offsets allowed.

The low price scenario is based on the low end of pledge ranges made under the Copenhagen Accord, and it assumes that some Annex 1 countries adopt cap and trade schemes domestically. No government-to-government AAU trading is assumed to occur in this scenario.

The medium price scenario is based on the higher end of Accord pledges. It assumes that most Annex 1 countries introduce domestic cap and trade schemes and that government-to-government AAU trade occurs.

Based on these assumptions, the potential carbon market flows in these scenarios range from:

- 500-800 MT of abatement and $5-12 billion per year in 2020 in the low price scenario.
- 1500-2000 MT of abatement and $30-50 billion in carbon market offset flows in the medium price scenario. (Note that this figure relates only to flows between developed and developing countries – it excludes the value of any trade in AAUs.).
- The high price scenario could be considered representative of a possible 2 degree reference scenario, assuming tighter national emissions targets across all Annex 1

countries. This scenario would be associated with significantly higher carbon prices and quantities of abatement secured through offsets. Table 1 illustrates those flows.

Table 1: Potential carbon offset market flows based on AGF scenarios

Carbon market scenario	**Potential offset demand** 2020; MT p.a.	**Potential offset price** 2020; $/tonne p.a.	**Carbon offset flows** 2020; $ billion p.a.
Low price	500-800	10-15	5-12
Medium price	1,500-2,000	20-25	30-50
High price	~3,000	50	150

Different **rules surrounding the carbon market** – and the nature of reforms undertaken to scale up the flows of offsets as detailed in Appendix 1 – are likely have large impacts on which countries are likely to experience the greatest inflow of carbon market finance. Key questions relate to:

- The treatment of REDD credits: whether or not REDD credits are included in future carbon market arrangements will have a significant impact on carbon market flows to countries such as Indonesia;
- The treatment of commitments by developing countries. As more advanced developing countries take on commitments, the scope for carbon market finance (where developed countries are able to count the resulting abatement towards their own targets) may be reduced; and
- The methodology chosen to scale up carbon market flows – whether it manifests itself as programmatic CDM, positive lists, sectoral crediting/trading, crediting of Nationally Appropriate Mitigation Actions (NAMAs), or some other form.
- Finally, differences in developing country market readiness are likely to have an impact on where carbon market funds are eventually directed. There is currently a significant difference in the market readiness of different developing countries. The steps taken by developing countries themselves, combined with the level and effectiveness of assistance provided by developed countries in this regard, will affect relative market readiness.

8.4 SCENARIOS AND QUANTITATIVE ESTIMATES OF INVESTMENT AND INFRAMARGINAL RENTS

8.4.1 Scale of potential rents

Assessing inframarginal rent in practice is inherently difficult, In theory, the scale of inframarginal rent can be calculated as the difference between the carbon market price and the theoretical cost of abatement. However, in practice it is hard to observe inframarginal rent. Key issues in estimating the scale of the inframarginal rent are:

- First, establishing the real cost of carbon offset abatement is difficult as in practice the cost of carbon abatement will be affected by competitive conditions: increased investment in mitigation activities can drive up returns to land, facility and technology owners, which translates into higher offset project costs and lower profits.

- Second, in carbon offset projects with multiple income streams (e.g. renewable energy projects that benefit from local electricity price income as well as offset credits), it is hard identify which share of profit can be assigned to the carbon credits (rather than other income streams.

- Third element, the share of domestic versus international profits will vary. While some foreign project developers might expatriate large shares of their profits (rather than reinvest locally), the growing cadre of domestic project developers keep profits in country and reinvest them. It is however, hard to identify which share of profits is kept in-country.

Additional assumptions are required in assessing the scale of future inframarginal rent, including: the types of offset mechanisms available by 2020, the inclusion/exclusion of certain sectors/project types, access rules for different developed countries' purchasing mechanisms, and knowledge of future real abatement costs.

For illustrative purposes, the potential scale of inframarginal rent has been estimated using an 'offset supply cost curve' for the medium price carbon market scenario, using a carbon price of US$25. In line with current offset market practice, only positive cost projects have been taken into account, and forestry and agricultural levers excluded..

McKinsey cost curve data has been used to rank all theoretically possible offset projects on their full cost, containing operating costs and capital expenditure. Average costs of (offset) abatement were derived for the scenarios, by taking into account all projects up to the offset prices given by the scenarios.

The approach assumes a range of offset projects is developed from across the supply curve (and not only on the far left of the supply curve). This approach captures the fact that that projects will not be chosen solely on their abatement cost but are influenced by many other factors (availability, political will in host countries, etc). The derived costs should be viewed as a lower bound as they exclude additional costs such as transaction cost and a potentially higher private sector discount rate.

It should be noted that the estimates shown in Table 2 involve a number of assumptions and can be treated as indicative only. They most notably vary with differing assumptions on discount rates, risk and reward considerations and carbon prices.

Table 2: Estimates of inframarginal rents at 2020 ($US billion per year)

Carbon market scenario	**Carbon offset flows (from Table 1)**	**Carbon offset cost**	**Carbon offset rent**
Low price scenario ($15)	8-12	n.e.	n.e.
Medium price scenario ($25)	38-50	24-36	8-14

High price scenario ($50)	150	n.e.	n.e.

8.4.2 Scale of future carbon offset related capital investment

The CDM has created significant capital investment n estimated $95 billion in clean energy investment benefited from the CDM over 2002–08.[2] This compares to total global climate change investment of $37 billion in 2009[3]. Analysis of the UNFCCC CDM database shows that abatement projects require on average EUR 100 in capital investment for each annual CER issued. These numbers can go up quickly for more capital intensive (renewable energy) projects for which CERs are only one of multiple income streams.

Assuming carbon offset projects continue to increase in capital intensity as the offset markets develop, the capital flows will grow exponentially.

There are three different approaches to estimating the potential capital investment flows:

- the World Bank's Development Report assumes each dollar of carbon market flow results in $4-9 of capital investment;
- the McKinsey Abatement Cost Curve, allows calculation of the expected investment based on a micro-economic assessment of potential offset supply; and
- The UNFCCC CDM database allows for observations of ex-ante expected investment in CDM projects.

Overall, potential capital investment might be in the $30-144 billion range for the low price scenario, and this could rise to $130-200 billion in the medium price scenario.

Table 3: Potential capital investment 2020 ($US billion per year)

Carbon price scenario	Approach I – World Bank Development report	Approach II – McKinsey Abatement Cost curve	Approach III – UNFCCC project database
Low price	32-144	31	50-80
Medium price	150-200	130	150-200
High price	600-1,350	225 (excl. REDD)	300

8.5 BENEFITS AND RISKS OF CARBON MARKET FLOWS

Carbon offset markets provide benefits to the host (developing) country, purchasing (developed) country and investors. The primary benefit of carbon offset financing is the

[2] World Bank – World Development Report 2010 – page 262
[3] UNEP-SEFI-New Energy Finance - Global Trends in Sustainable Energy Investment 2009 – page 12

emission reduction or abatement achieved in developing countries, but other key benefits include significant carbon offset finance flows to developing countries, increase in capital investment and support for broader economic development including knowledge transfer and value creation for offset originators and related supply chains. This section sets out the benefits as well as the drawbacks of carbon market flows as a financing mechanism.

Benefits and risks to host countries

The carbon market mechanism rewards the private sector for taking risk and provides it with a return, being the difference between the cost of generating offset credits and the prevailing market price. This **(inframarginal) rent** can be captured by the (domestic or international) project developers. It can result in higher value for certain assets (e.g. land), higher labour costs and / or higher tax income in the host country. Inframarginal rent can be seen as a net contribution to the host country, provided that the profits do not get fully expatriated by international project developers.

Developed countries can choose what types of abatement activities can be the subject of carbon market finance flows. In considering options, developing countries can consider the range of different marginal abatement costs applying in different sectors, and the scope for rents attaching to different types of projects. In turn, this can influence a developing country's strategy for attracting foreign investment into different sectors, as well as policies to seek to capture some of this surplus through taxation and reinvestment.

Overall, offset finance has the potential to create a number of **broader economic, environmental and social benefits:**

- **Economic growth** created by the direct and indirect effects of investment. Projects may alleviate other blockages to growth by providing essential infrastructure (e.g., renewable power generation projects in regions previously unsupplied with electricity). This is more likely to be the case for genuinely additional investments rather than diversions of existing investment flows.

- Economic growth can be associated with **broader social benefits**, for example, where chronically high unemployment rates are reduced, or where access to electricity becomes available in some areas.

- Carbon finance can help **place the growth trajectory of developing countries onto a lower carbon intensity footing** and avoid lock-in of emissions intensive investments (making it easier for developing countries to achieve lower emissions outcomes in future).

- **Environmental co-benefits** might be created: for example, there are likely to be significant environmental co-benefits associated with habitat preservation, water quality and erosion prevention associated with many REDD activities. Another example of broader environmental impacts is to reduce the air quality costs associated with reliance on coal-fired energy.

- Improvement of the overall **investment climate** as the result of private sector investment and involvement in carbon emission reductions. Lessons learned in developing institutional capacity to underpin carbon market financing is likely to be valuable in supporting other types of investment.

- **Knowledge transfer** from developed country (project developers) to developing countries. This will manifest itself in the transfer of knowledge of carbon abatement as well as the installation of advanced equipment to reduce emissions.

- **Pulling through support to achieve domestic commitments**. If host country commitments are used to establish clear baselines prior to allowing access to offset credit creation, these approaches may be able to draw through private sector investments in activities to achieve the host country commitments.

- Carbon offset finance can also **stimulate financial flows for developing nations**, e.g. in the context of the Copenhagen Accord commitments. One main form of commentary on the latter is the fact that offset finance does not stimulate additional abatement, but moves the abatement from the developed to developing world. However, access to carbon markets may also stimulate developed countries to take on more stringent targets than they otherwise would have.

Offset projects have the ability to **create significant value or profits**. Offset credits serve as an income stream for carbon abatement projects, often among a range of income streams. (Private sector) investors demand returns to compensate for their cost of capital. In some cases, the income from offset credit generation can drive up those returns adding to the value creation in an economy – depending on multiple factors like the taxation regimes and whether the value is retained and reinvested in the country.

However, reliance on carbon offset flows as a financing mechanism also carries some **risks for host countries**, including:

- **Fluctuations in carbon prices** can affect the value of flows in the short term, while price instability can also affect the underlying volume of flows as investors perceive greater risk, leading to difficulties for host country planning in respect of carbon market flows.

- **Reputation of market** – given inherent difficulties with judging additionality, and the related potential for gaming, any instances of fraud in carbon offset markets can have wider reputational implications and affect purchasing country governments' and market participants' willingness to engage in carbon markets.

Benefits and risks to purchasing countries

Purchasing countries' main benefit from carbon markets is to **lower the cost of meeting abatement targets**, both under the Kyoto / AAU market as well as for companies operating in domestic carbon markets.

Recent experience in the EU ETS shows that the CER price has been lower or equal to the EUA price – and has likely been driving down the price of EUAs (see Exhibit 2). Forward looking carbon market models suggest that offset prices can lower the cost of carbon in developed world domestic markets, while costs go up in markets that exhaust their offset import quotas.

Risks for purchasing countries in the use of offset markets include:

- Political risk related to use of funds for offset purchase: Governments of developed countries setting a budget for purchase of carbon offsets will pay the clearing price in the offset market. A developed country government would therefore pay more than the

average cost of abatement for those projects – that is, it would incur the cost of the inframarginal rent. As there is no guarantee that the inframarginal rent would be captured by the developing country government, or (if captured) that it would be used for abatement or sustainable development objectives, this could affect political support in developed (and developing) countries for carbon offset flows as a form of mitigation financing.

- Offset quality risk: The quality of the carbon assets sold in international offset markets, and the outcomes achieved, is dependent on the quality of regulations governing those markets. If the quality of offset projects comes under question due to inadequate regulations allowing the creation of sub-grade offset credits, there will be a potential loss of credibility for purchasing countries in reaching their national mitigation commitments and flow-on impacts for developed country domestic political support and investment in developing countries..

Benefits to investors

Investors are those people or companies that provide investment capital to achieve emission reductions. They are normally the third group involved with carbon offset projects (alongside the developed country purchasers, and developing country hosts), and achieve multiple benefits from carbon offset finance.

In the first place, investors will benefit from an **income stream to finance abatement**. Often this will be in the absence of targeted other regimes. However, in many cases offset income streams are one of multiple income streams – depending on the nature of the project.

A major benefit of offset finance over other income streams is that offset carbon credits are an **international currency**, which appeals to (international) investors that value the exposure to internationally priced offset credits that they can 'monetise' in multiple ways.

On top of this, offset carbon finance facilitates (debt) **finance through international capital markets**. Abatement projects with significant carbon finance have access to international capital that might not be available in the local capital markets.

Beyond that, companies have the potential to **profit from carbon finance**. In the purest form, offset projects are 100% financed through the carbon market income stream (e.g. HFC projects). In those cases, projects benefit from carbon prices that are significantly above the direct costs of carbon abatement. However, in many cases this distinction is less easy to make, as carbon finance is only one of the income streams – e.g. in renewables projects most of the income will be derived from the sale of electricity, with only a limited percentage due to carbon offset finance.

Another element is that the offset market is effectively an amalgamation of multiple projects that are started in rapid succession. Developers that come with a new 'methodology' or type of project can derive larger margins from their first mover advantage, although this is quickly eroded as other developers copy their methodology and drive down margins. In many cases these margins are captured as rents by land owners, owners of facilities or technology providers as the holders of key inputs – rather than captured as profits by the project developers.

However, while offset projects carry benefits, they also carry **significant risks for investors**, which have held back the scale of the offset market. Some of the key risks are:

- **Significant price risk**: In the past 5 years, offset market prices have varied between EUR 7.6 and 22.8/tonne (see Exhibit 2). This has in multiple case led to significant financial losses and has created market insecurity which has led to the cancellation of significant amounts of planned projects. It should be noted that carbon prices reflect the demand for carbon assets as determined by the level of emissions caps and the actual level of emissions. Going forward, carbon prices will continue to reflect reasonable expectations of supply and demand over the short and long term;
- **High risk due to policy changes**: As offset demand is created by the imposition of carbon emission caps and is heavily influenced by a number of other government policies – both internationally and domestically – there is significant policy risk; and
- **Intense competition:** The carbon offset market is characterised by low barriers to entry and significant competition between companies for new technologies. The result is that few project developers are able to maintain their relative market position for long as they are competed away in the next wave of projects.

Key uncertainties in markets

Going forward there is a number of uncertainties that are holding back the development of offset projects

The uncertainty over the extension of the Kyoto Protocol has held back investment. Key issues are that:

- Insights in **country level caps** are required to judge future offset demand
- The **significant AAU overhang** from the Kyoto Protocol's first commitment period could potentially 'crowd out' future offset supply;
- The **development of domestic markets** can generate significant 'hard' offset demand. Yet the legislative process to establish domestic markets in key developed countries has been slower than expected, adding to the uncertainty about the scale of future offset demand; and
- The **future structure of the offset market,** - in particular the structural reforms needed to allow the market to scale up.

8.5.1 How can the scope of carbon markets be expanded? What can purchasing countries do to increase carbon market financial flows?

Increasing demand

Two key policy settings in developed (purchasing) countries can influence the size of the flow of carbon market funds to developing (host) countries.

The first is the level of developed country targets; the more stringent are developed country targets overall, the higher the developed country demand for abatement. This demand could be met either domestically or internationally.

The second key setting is the extent to which developed countries allow domestic targets to be met through the purchase of international offsets. More stringent targets on their own will not affect the flow of funds to developing countries; developed countries must also allow a significant proportion of their commitments to be met through abatement purchased from developing countries. This could be achieved in two ways.

- First, if developed countries have domestic emissions trading schemes (essentially devolving their international commitments to domestic liable parties), those emissions trading schemes could have either no limits on the use of international units, or else generous limits.
- Second, developed country governments could meet a greater proportion of their national emissions reduction or limitation targets through the purchase of international units. This could potentially be funded through a domestic emissions trading scheme, or via a carbon tax – although it could also be funded through general revenue.

Box 1: Quantitative limits on the use of international units in domestic emissions trading schemes

Emissions trading schemes in operation:

If the European Union adopts a 20% reduction target, overall imports in the European Union Emissions Trading Scheme (EU ETS) would be limited to 50% of the EU-wide reductions over the period 2008-2020 (i.e., Phase II and Phase III). For existing installations, this will represent a total of approximately 1.6 billion credits over this period. Under a 30% EU-wide target, the allowed overall quantity would increase by up to 50% of the additional abatement required.

In contrast, the New Zealand ETS allows unlimited imports of eligible Kyoto units (CERs (not including tCERs, lCERs and CERs from nuclear project activities), ERUs, RMUs; and the potential for AAUs).

Emissions trading scheme proposals:

The Kerry-Lieberman US American Power Act proposal was written to allow liable entities to collectively use up to 2 billion domestic and international offsets per year for compliance purposes, with three quarters of this figure to come from domestic sources and one quarter from international sources. In the event of a shortage of domestic offsets, the number of allowable international offsets could have been increased to 1 billion tons per year.

The Waxman-Markey bill (American Clean Energy and Security Act) passed by the US House of Representatives contained similar provisions, but split the 2 billion ton limit equally between domestic and international sources and allowed for an increase in the use of international offsets to 1.5 billion tons in the event that supplies of domestic offsets were limited.

Australia's Carbon Pollution Reduction Scheme (CPRS) proposal was designed to allow (after a fixed price phase) unlimited imports of eligible international units (CERs (not including tCERs and lCERs), ERUs and RMUs) for compliance purposes.

Some sensitivities surround the use of international units to meet developed country targets. In developed countries with their own emissions trading scheme, concerns include the difficulties of maintaining a floor price to underpin new low carbon investments in their home countries when the domestic emissions trading scheme is open to potentially cheaper imports. Concerns also relate to carbon markets being seen as governments taking the 'easy' way out, rather than requiring more abatement activity to occur at home. Finally, large outflows of funds raise sensitivities about the efficient and appropriate uses of those funds in the host nations, and about alternative domestic uses of those funds in the purchasing nations.

The Kyoto Protocol required that the use of carbon markets be 'supplemental' to abatement actions in developed countries. Supplementarity has never been defined through the UN process. Interpretations of supplementarity usually focus on the proportion of the abatement task that is expected to be met through the use of abatement sourced from other countries. The abatement task is considered by reference to a 'business as usual' estimate of emissions. As the size of the abatement task increases, the size of a fixed proportion of that task appears larger compared with the developed country cap on emissions.

Among developing countries, concerns arise regarding the sale of cheap abatement actions offshore which will not be available to count against future commitments, and control over how such funds are spent.

Assisting developing countries' market readiness

Developed countries have an important role in providing assistance to developing countries to build capacity and market readiness (see below).

Reducing risk

The current state of international negotiations entails significant risks for offset project proponents (see chapter 8.5 for detailed description of risks).

To help reduce this risk, Climate Change Capital has proposed the establishment of a fund to guarantee a price for offset credits for certain types of projects (an Advance Market Commitment or Emissions Reduction Mechanism for Carbon and REDD). By standing in the market and offering a floor price, the fund would reduce downside risk. (In practice, the fund may not actually purchase offsets – they may be sold to other purchasers.) More information about this proposal is provided at Appendix 2.

8.5.2 What can developing countries do to increase carbon market financial flows?

There are several measures that could be taken by host developing countries that would increase inbound carbon market financial flows.

Capacity building requirements for developing country participation in carbon markets

To enable participation in global carbon markets, developing countries will need to progress capacity building efforts in a number of areas, including:

- **Assessment:** enhancing capacity to assess the appropriateness of adopting different market mechanisms, as well as setting scheme boundaries and emissions reference levels.

- **Data collection and management**: building or enhancing existing data collection systems and institutional capacity for data management to increase transparency.

- **Monitoring, reporting, verification, compliance and enforcement (MRVCE):** designing or enhancing existing MRVCE frameworks to ensure transparency, quality and credibility. This includes establishing registries and transaction logs to enable trading and prevent double counting[4].

- **Institutional capacity:** building government capacity in technical areas, including data gathering and establishing MRVCE systems. Capacity may also need to be expanded to identify areas of policy reform, especially when existing policies could undermine the efficiency of carbon markets.

- **Piloting and testing:** building the infrastructure and systems needed to encourage piloting of new mechanisms. There is a strong need to test and pilot market mechanisms in order to demonstrate the scale of finance they can deliver.

A number of the above market readiness requirements are useful not just for the implementation of carbon market instruments but also for the design of low carbon growth plans and the identification of areas of low-cost mitigation potential. These requirements include data collection, MRVCE processes, and identification of possible policy instruments aimed at promoting emissions reductions.

Market readiness activities should take place both at installation and national levels in a coordinated way. Involving installations and the private sector in general early on is crucial to establish a shared understanding of the objectives of market mechanisms. For example, the implementation of an emissions trading system requires bottom-up reporting of emissions at the installation level. In parallel, countries will put together top-down national emission inventories. Coordinating and harmonising bottom-up reporting with top-down inventories will save resources and avoid unnecessary administrative burdens.

It should be noted that substantial capacity already exists in several of the more advanced developing countries. Capacity building efforts should build on these existing capacities and focus on countries with a willingess to participate in the global carbon market.

Existing offset regimes such as the CDM and the Voluntary Carbon Standard (VCS) are examples of mechanisms under which some developing country capacity has already been established.

- The VCS represents the largest offset program in the voluntary space, accounting for 35% of all credits transacted in the voluntary carbon market in 2009.[5] Like the CDM, the majority of projects under the VCS are based in China and India. While the voluntary carbon market remains small relative to the size of regulated markets (approximately 1%), advances in market readiness achieved under the voluntary carbon market could be built on to increase developing country participation in global carbon markets.

[4] the failure to appropriately retire an offset when used for compliance resulting in the unit being used by another entity in the same scheme or another scheme.

[5] http://www.forest-trends.org/documents/files/doc_2433.pdf

In addition to the capacity building requirements discussed above, non-capacity related barriers also need to be addressed. These include, inter alia, political will and stability, access to finance, and general infrastructure arrangements.

Estimated costs for building capacity in developing countries

Estimates for the cost for capacity building in developing countries could be around $5.1 billion.[6] This figure allows for real-world inefficiencies in capacity building processes, for example, the need to repeat training due to staff turnover.

Upfront funding will be necessary to kick start the implementation of the regulatory framework necessary for carbon market instruments. Such upfront funding will have to come from non-market sources of finance, especially during the early stages of carbon market development until carbon market flows are generated.

Other measures to increase benefits to developing countries

Increased tax revenues – which, in turn, can be reinvested in mitigation or abatement activities – are a potentially significant benefit to developing countries of participating in carbon markets. Some countries already have specific measures in place to seek to secure a larger proportion of project rents. For example, China has a schedule of rates determining the government's share of revenues to be received from different CDM projects, ranging from 65% for HFC and PFC projects, to 2% for priority areas such as improving energy efficiency, new and renewable energy sources, coal mine methane recovery and use and reforestation. This approach seeks to tailor the amount payable to the size of the rents likely to accrue to particular project types. The successful implementation of such an approach relies on good information about actual resource costs associated with different types of projects (which can change over time).

Developing countries may also act as intermediaries both to catalyse further investment in carbon markets, and to seek to capture a greater proportion of project rents. Where credit is to be awarded based on the performance of a whole sector (rather than an individual project), developing country intermediation is required in any event.

8.5.3 What can the international community agree regarding the types of units that might be created to increase the scope of benefits from carbon markets?

It will be essential to increase the efficiency and effectiveness of carbon offset generation to scale up offset markets to meet future demand, but there are significant challenges associated with the regulation of carbon offset markets. Concerns have been expressed in some quarters about the additionality of a variety of CDM project types, including HFC and N_2O emissions reduction, which currently account for a large proportion of the offset market. Commentators have noted that these concerns also extend to a variety of other kinds of CDM project.

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[6] *Linking Developing Countries to Carbon Markets: Cost assessment of capacity building requirements*, ECOFYS, April 2009, available online here: http://www.decc.gov.uk/Media/viewfile.ashx?FilePath=What%20we%20do%5CGlobal%20climate%20change%20and%20energy%5CTackling%20Climate%20Change%5CEmissions%20Trading%5CLazarowicz%20report%5C1_20090720133430_e_@@_Capacitybuildingcostfordevelopingcountries.pdf&filetype=4

Additionality and the broader credibility of CERs as offsets must be taken into account in any expansion of supply from the Clean Development Mechanism.

A summary of key proposals made to improve the effectiveness and efficiency of existing crediting mechanisms, as well as new mechanisms, is provided at Appendix 1. These proposals are generally not mutually exclusive.

Proposals based on the CDM

A number of proposals have been made to improve the efficiency and effectiveness of the existing CDM mechanism, for example, through improved governance arrangements, and greater use of standardised baselines.

Additionality assessment is a key hurdle in developing a CDM project. A major part of this process is baseline estimation. Currently this is done on a project-by-project basis, but standardised approaches to baseline setting could contribute to improving the efficiency and transparency of the approvals process. This would reduce uncertainty for investors and encourage greater participation in the CDM.

Further proposals have been made to increase the scope of the CDM, for example, to cover carbon capture and storage (CCS), nuclear and a broader range of land use, land use change and forestry (LULUCF) activities.

To avoid all projects needing to demonstrate additionality, positive lists have been proposed, for activities which are deemed to be additional.

In response to the difficulties associated with multiple small scale projects, proposals have been made to improve and expand existing programmatic CDM arrangements.

Making progress on all of these fronts is likely to significantly improve the scale of carbon finance to developing countries, as uncertainty is reduced, timeliness is improved and transaction costs are reduced.

However, there are potential downsides to project-based crediting mechanisms:

- Even after reforms such as those proposed are implemented, the transaction costs of a per-project approach may not attract projects in all cost-effective forms of abatement;
- Although methodologies are designed to address these issues, there may be residual risks of leakage and non-additionality;
- In some sectors lessons learnt at the individual project level may not be translated into better performance across the sector; and
- They may not provide a clear pathway for developing countries to transition to commitments relating to absolute emissions limits. Some countries consider that project-based mechanisms should be focused on least developed countries, rather than more advanced economies.

Sectoral proposals

In light of some of the limitations of project-based approaches, a number of proposals have been put forward for models based on sectoral performance (rather than individual project performance).

Two broad approaches have been proposed:

- Sectoral **crediting** approaches, where if overall sectoral performance exceeds an agreed baseline, credits can be created. There would be no penalty attached to performance that does not exceed the baseline; and
- Sectoral **trading** approaches, which are essentially sectoral cap-and-trade schemes (where exceeding the cap carries a penalty, such as the need to purchase additional international units).

For all sectoral approaches, boundaries would need to be determined. This presents challenges, particularly in relation to industries where a large proportion of associated emissions are indirect (e.g. the aluminium industry).

Sectoral crediting poses a range of practical issues. It is inherently a collective concept, requiring developing country governments to translate the potential for carbon market flows that would accrue in the first instance to the government to incentives for individual firms within the affected sector to improve their performance. No individual investment in abatement would necessarily be rewarded unless the sector as whole were to outperform its baseline. Even if shares of eventual carbon market flows were promised to those whose performance improves, individual firms would not know whether their own improvements would be cancelled out by poor performance elsewhere in the sector. The extent to which the risk of offsetting poor performance were shared between the government and individual firms would be likely to affect the strength of abatement incentives in that sector.

Timing issues also present challenges for sectoral crediting. Where emissions are expected to be variable over time due to other factors, a sectoral baseline that applies to a multi-year period is likely to be more appropriate. However, if the sectoral improvement is not rewarded until the end of the period, this poses additional challenges for financing abatement activities up front.

As such, one of the elements likely to assist in making a sectoral mechanism effective would be the clear devolution of incentives to participating entities. There are a number of ways of achieving this, including domestic trading, regulation, or other policy approaches. An international system could allow flexibility for national governments to devolve incentives in their own way.

Care would need to be taken to ensure that the mechanism did not encourage or allow for the overselling of emissions rights in the early years of the crediting period – a mechanism similar to the Kyoto Protocol's commitment period reserve may be required.

There are design and implementation challenges common to both sectoral crediting and sectoral trading arrangements. These include how the sectoral baselines or targets would be set; how they would be monitored and/or enforced; and how responsibility for and incentives to meet the baseline or target would be devolved to relevant private entities.

Box 2: REDD+ crediting – an example of a potential sectoral approach

Reducing emissions from deforestation and forest degradation in developing countries and enhancing removals from forests (REDD+) potentially represents a large scale opportunity to encourage relatively low cost abatement.

Recognising REDD+ through a carbon market mechanism inherently requires a whole-of-sector approach, due to issues surrounding permanence, including the substitutability of forest resources for harvest or conversion to agricultural lands, and the scope for leakage.

Translating REDD+ into a market mechanism would require:

- Robust accounting and monitoring methodologies to ensure that REDD is real, measurable, permanent, additional and independently verifiable. These methodologies will need to be supported by appropriate national-level carbon accounting systems.
- Mechanisms to address leakage or a lack of permanence will be required - for example, an insurance-like mechanism that withholds a percentage of REDD+ credits. Such a mechanism could be structured to provide long term performance-based incentives.
- A methodology to determine baselines would need to be developed, and should be designed to address national circumstances, as well as leakage, permanence and additionality issues.

The drivers of deforestation differ between countries and regions. Any REDD+ crediting mechanism would need to be sensitive to national circumstances. Appropriate national level governance, policy, law enforcement and regulatory frameworks in host countries would be required.

Relationship between developing country commitments and carbon markets

As developing countries make commitments to undertake nationally appropriate mitigation measures (NAMAs), the question arises as to what the relationship is between these NAMAs and the carbon market. There are three broad options for the activities that carbon markets could finance:

- Only abatement or activities beyond the developing country pledge could be funded through carbon markets;
- All developing country actions could be funded through carbon markets; or
- Carbon markets could credit some of the abatement associated with developing country commitments.

The stage of development of the developing country, as well as the nature of the commitment, are likely to influence developed countries' willingness to fund NAMAs through carbon markets. Since units would be purchased to offset emissions in developed countries, all existing mechanisms have emphasised the need for that abatement to be additional. Clarity on this fundamental issue will be an important priority in setting the foundations for the post-2012 carbon market. Guidance will be required both at the level of how much of the

abatement associated with the developing country commitment can be used to offset developed country emissions, as well as the implications (if any) for broadly-specified NAMAs applying to either the whole economy or sector and the scope for project based credits in that country or sector.

NAMA crediting

As discussed in Appendix 1, proposals have been made for crediting NAMAs. Credit would be issued for the verifiable emissions reductions from the NAMAs undertaken by developing countries.

NAMAs could take a variety of forms, with varying degrees of difficulty in assessing the abatement associated with them. A discounting approach (where multiple units would be required to offset a single tonne of emissions in a developed country) could be one way of dealing with uncertain actual abatement outcomes.

Relationship between carbon markets and other sources of finance

Carbon markets are likely to perform well as a financing arrangement for mitigation activities where:

- abatement activities are relatively tightly defined. For example, the construction of a wind farm to displace fossil fuel-fired electricity generation is more amenable to contractual definition than a program of measures to improve community awareness of public transport options;
- performance, in terms of abatement resulting from the activity, is easily monitored and verified; and
- transaction costs represent a small proportion of the value of overall abatement. (Programs of Activities under the CDM are designed deliberately to target the transaction costs associated with multiple small installations.)

Carbon markets are therefore likely to be good ways of encouraging abatement activity in areas such as:

- Renewable energy
- Coal mine methane capture and destruction
- Industrial emissions reduction.

Carbon markets are likely to be less useful at promoting abatement where the relationship between activities and outcomes is less clearly defined. For example, educating households and businesses in relation to energy efficiency opportunities is likely to have an abatement payoff – but the size of the resulting abatement would be difficult to estimate. Other methods of financing are more likely to be appropriate to encourage such activities.

Carbon markets are likely to provide good incentives for developing countries to develop their capacity to host carbon market activities, and learning by doing through participation in carbon market activities is likely to have broader institutional benefits. However, other sources of finance are more likely to be useful in assisting developing countries grow their institutional capacities.

As discussed above, special challenges relate to abatement types where long-term permanence is an issue – particularly for forestry-related activities and potentially for CCS. Large scale purchases of abatement are unlikely if developed country purchasers are ultimately required to make good if the abatement is not maintained in the developing country. Appropriate mechanisms to deal with this risk are important prerequisites to allowing carbon markets to promote abatement through REDD or afforestation/reforestation.

In some areas, such as appliance standards or the construction of new buildings (or the retrofit of existing buildings), regulation is likely to be the most cost-effective way of encouraging abatement. Using carbon markets to encourage developing countries to adopt best practice regulatory approaches would be difficult, although further development of NAMA crediting proposals may arrive at workable methodologies.

8.6 CRITERIA FOR ASSESSMENT

The AGF has identified a common range of criteria for assessing the pros and cons of different financing options.

A brief assessment of the performance of carbon markets generally against these criteria is set out in Box 3 below. However, carbon markets are creatures of regulation: the actual performance of different trading mechanisms will depend on their individual designs.

Box 3: Overall assessment of carbon markets as a financing mechanism

Efficiency: Carbon markets can promote global allocative efficiency by ensuring that abatement occurs where it is least costly. Carbon markets can also promote dynamic efficiency in developing countries by creating additional pathways by which learning and innovation can be encouraged and shared.

The efficiency benefits of carbon markets could be undermined to the extent that carbon markets are affected by gaming and market abuse.

Incidence and equity: In broad terms, carbon markets can encourage a flow of funds from developed countries to developing countries. All things being equal, developing countries with the largest quantities of low cost abatement are likely to benefit most from such flows. In practice, however, a number of other factors might influence how benefits are distributed. For example, developing countries differ in their preparedness to participate in carbon markets, which implies a significant role for assistance in developing market readiness, particularly among least developed countries. Also, the extent to which developing countries can capture benefits – rather than having a large proportion of benefits accruing to foreign investors – depends on a range of other settings. For example, taxes on carbon market projects can keep revenue in the host country and could potentially be reinvested in further low-emissions growth activities, but could potentially deter participation in some projects. More subtly, but potentially of large long-run significance, some activities may result in a greater degree of knowledge transfer and skills development than others, due to the inherent nature of the abatement being pursued, but also due to institutional factors in the host country.

Practicality – Carbon markets rely on firm institutional and governance arrangements to function effectively. In particular, governance arrangements are required to establish what kinds of abatement will be recognised, and how this abatement can be transformed into units for trade. Agreed monitoring, reporting and verification (MRV) arrangements are at the core

of well-functioning markets. Common registry arrangements will also facilitate international trade, and will assist in ensuring that abatement is not double-counted. Key practical challenges for future carbon market arrangements relate to individual mechanism types. For example, for REDD, practical but effective ways of dealing with establishing baselines, dealing with leakage, and addressing the risks of non-permanence need to be found. As noted above, the preparedness of individual countries to engage in carbon markets can be a key practical determinant of how carbon market flows are distributed.

Universality - One potential benefit of carbon market financing is that it does not rely on all countries to participate for it to be an effective option. That said, among participating countries harmonisation and agreed standards, particularly in relation to MRV and registries, is likely to be beneficial.

Political acceptability – The positive attractions of carbon markets in many countries principally relate to access to cheaper abatement than is available domestically, and the perceived contribution being made to the development and growth of developing countries. Access to carbon markets is likely to be a key factor in the willingness of developed countries to take on more stringent targets.

However, there remain a number of sensitivities surrounding the use of carbon markets that should also be taken into account. Many stakeholders in developed countries argue that over-reliance on carbon markets to meet domestic mitigation targets as taking the 'easy way out', and would prefer developed countries to work harder at reducing their own emissions. A related key sensitivity is the size of the outflow of funds, which can be seen as money that would have been better invested at home, rather than benefiting (competing) countries. In countries where carbon market expenditure is financed principally by governments, the budget impact is also a sensitivity in its own right. Sensitivities can also emerge where carbon markets result in large profits for some types of very low cost abatement (since carbon prices will generally be set at the level of the marginal cost of abatement), which can be seen as 'unfair.' Confidence in carbon markets can be undermined if their environmental integrity is impugned: even if a small subset of units are found to relate to spurious abatement, there is potential for the entire market to attract a negative reputation. Finally, the extent to which carbon markets are seen to promote abatement at the expense of other social or environmental objectives could weaken political support in both purchasing and host countries.

Additionality: carbon markets are likely to generate new finance for mitigation efforts in developing countries. In some cases, carbon markets may represent a diversion of investment funds that would otherwise have been committed in that developing country into different activities. In others, it will represent an entirely new stream of investment flow between developed and developing countries.

Reliability/predictability – carbon markets are functions of a range of government decisions in both purchasing countries and host countries, and collectively agreed sets of market rules. Changes to any of these parameters can affect the size of carbon market flows in aggregate, and to and from individual countries. Furthermore, broader economic factors, such as the global financial crisis and associated economic turndown, can affect the demand for abatement from developing countries (as developed country emissions fall with slower growth). To date, carbon market prices have been subject to considerable volatility. For these reasons, it is possible that carbon market flows may be inherently more uncertain than other types of financial flows. However, the predictability and reliability of carbon market financial flows can be increased in the context of strong mitigation commitments, and through clear

domestic policies to meet those targets that allow for the use of carbon markets (such as relatively generous allowance for the purchase of international units in domestic emissions trading schemes, or clear commitments and funding for government purchase arrangements.

8.7 CONCLUSIONS

By facilitating financial flows from developed to developing countries, carbon markets are likely to create three broad types of benefits for developing countries:

- **First, carbon markets ensure funds flow from developed to developing countries to underpin low carbon investments and deliver abatement.** The size of these flows is critically dependent on the stringency of the overall global mitigation target, and the extent to which developed countries are prepared, and the international community agrees that they are able, to meet a significant proportion of those mitigation targets using abatement sourced from developing countries. The scale of flows will also depend on supply-side reforms to improve the efficiency and effectiveness of carbon offset generation. The AGF has assessed three scenarios:
  - The low price scenario implies carbon markets could fund between 500 and 800 Mt of abatement in 2020, which would imply funding flows from developed countries to developing countries of between $8 billion and $16 billion a year.;
  - In the medium price scenario, the level of abatement secured through carbon markets is estimated at between 1.5 and 2 Gt, implying flows of funds of between $30 billion and $50 billion a year by 2020. Inframarginal rents associated with these flows are estimated at between $8 billion and $14 billion a year at a $25 carbon price; and
  - Finally, the high price scenario implies around 3 Gt of abatement being funded via carbon markets by 2020, and carbon market flows of around $150 billion a year.

  A key issue that will affect the size of flows to developing countries is developed country targets. In addition, the rules regarding the types of credits that can be created, and which are accepted by major buyers, will be a determinant of the overall size and pattern of flows across developing countries.
- **Second, developing countries can benefit from significant capital investments in their countries**. In the low price scenario, it is estimated that this could lead to between $31 billion and $144 billion in capital investments a year. The medium price scenario capital investment is estimated to be between $130 and $200 billion a year.
- **Third, carbon markets can be the source of wider economic, environmental and social benefits**. Carbon markets can help place a developing country on a lower emissions trajectory for economic growth. This will help lower the burden to developing countries of taking on emissions reduction commitments in future. Carbon markets can also assist with the large-scale deployment of emerging abatement technologies, reducing costs through learning by doing and realising economies of scale in technology production. This is a further way in which early participation in carbon markets could help lower the future cost to developing countries of further mitigation action.

Reforms of the current Clean Development Mechanism could further stimulate the development of offset credits and their associated benefits. Key options to do so include: enhancing the performance of existing project-based mechanisms; extending the scope of existing project-based mechanisms; and developing and trialling new methodologies based on sectors rather than individual projects.

Carbon markets are most likely to be useful in financing abatement for activities that are relatively easily defined, where resulting abatement can be readily estimated and verified, and where transaction costs represent a very small proportion of the overall value of abatement. For this reason, carbon markets are likely to be particularly useful in financing abatement activities in the power generation sector, the industrial sector (including through increased energy efficiency and fuel-switching), and for reducing fugitive emissions associated with coal mining or landfills. It is inherently more difficult for carbon markets to finance mitigation stemming from diffuse actions with no clear and reliable relationship between activities and resulting abatement. Finally, while carbon markets create good incentives for developing countries to improve their institutional capacity and market-readiness, other sources of finance are likely to be required to assist in this regard.

Using carbon markets to promote abatement through either avoided deforestation or afforestation/reforestation involves particular challenges. Allocating the risk of non-permanence to buyers (who would need to make good) is unlikely to result in significant carbon market flows to developing countries for this purpose. The development of insurance-like mechanisms to deal with risks of non-permanence while maintaining appropriate incentives for developing countries to maintain forest sequestration is a priority for further development in this area.

The further development of carbon markets is currently hampered by uncertainties regarding the post-2012 environment, as well as the sub-scale and bureaucratic nature of the current Clean Development Mechanism. Key uncertainties are the lack of firm carbon caps in developed nations post 2012, which drives uncertainty in the demand for carbon offsets. There is also uncertainty about potential shape of the offset market.

Those two factors combined could:

- reduce supply of offset projects potentially resulting in carbon markets not being able to deliver the quantities of abatement that they would have contributed had arrangements been clearer sooner, given the lead times involved;

- increase the potential for 'lock in' of higher emissions developments in developing countries. These investments might have been avoided had carbon markets been able to encourage the more rapid, larger scale deployment of lower emissions alternatives – the time taken to be on a path towards lower emissions growth may now be longer;

- delay in the benefits associated with increased foreign investment, knowledge and skills transfer, and faster economic growth; and

- potentially reduce the willingness of some developed countries to take on more stringent mitigation targets, because meeting such targets may be contingent on access to a deep and liquid carbon market. In turn, this would have more serious repercussions for the carbon market;

8.8 RECOMMENDATIONS

It is recommended that the Group advises of the need to:

1. **Support the continued development of carbon markets, noting that carbon markets have the potential to generate very substantial financial flows**: carbon

markets provide incentives for investors to seek out abatement opportunities in developing countries and to supply funds for mitigation purposes.

2. **Work to increase developing and developed country awareness that the magnitude of the flows are strongly linked to the level of global mitigation ambition:** the size of the flows between developed and developing countries principally depend on the level of global ambition, as well as the willingness and capacity of developed countries to use international credits towards their emissions targets.

3. **Work to increase developing and developed country awareness of the benefits of carbon markets, including inframarginal rents and the mobilisation of capital through carbon market flows**: carbon market financing results in significant capital investments, which can benefit developing countries. Inframarginal rents from projects are also available (the difference between the price at which credits are sold and the resource cost associated with creating them), which can be shared between investors and host countries to varying degrees. Carbon market investments may also be associated with broader economic, social and environmental benefits. A key issue will be determining how much of the carbon market flows can be counted towards the Copenhagen Green Climate Fund.

4. **Significantly improve existing carbon market mechanisms:** improvements can be made to improve timeliness, reduce transaction costs and improve the standard of governance within the existing market mechanism framework. The subject matter scope of existing mechanisms should also be expanded. These reforms will be essential to having a carbon offset market that reaches real scale and is fit for purpose.

5. **Develop and trial new market mechanisms:** new approaches that expand the range of carbon markets, such as sectoral approaches, including for REDD+, can be further developed and trialled to demonstrate the contribution they could make.

APPENDIX 1: Key Proposals for Scaling Up Carbon Offset Markets

There are a number of key proposals for scaling up carbon offset markets which would have effect in the post-2012 period. These can be classified into two broad groups – project-based approaches and sectoral and other aggregated approaches – with a range of cross-cutting issues applying to each. The following proposals in particular are outlined below:

Project-based approaches:

1. Reform of the existing CDM
    a. to improve the efficiency of administrative and governance processes
    b. to expand coverage to new sectors and technologies
2. Programmatic CDM
3. Positive lists

Aggregated approaches:

4. Sectoral crediting / no-lose targets
5. Sectoral trading
6. Crediting of Nationally Appropriate Mitigation Actions (NAMAs)

Cross-cutting issues:

7. Developing country contribution to global mitigation
8. Discounting

A high-level overview of each of the reform proposals is provided below, recognizing the fact that within each proposal, there are a number of variations.

Project-based approaches:

1a. Reform of the CDM – administrative and governance changes

Summary of proposals	Several proposals have been put forward to expand and improve the operation of the CDM, which would in turn result in the creation of greater levels of abatement and crediting. These include: - Governance reforms to improve the effectiveness and efficiency of the governance of the CDM, including professionalising the CDM Executive Board and strengthening the Executive Board's supervisory role - Greater use of standardised baselines, which would simplify the assessment of additionality for project developers - Greater use of benchmarking, which would facilitate the assessment of additionality and simplify the process for project developers Some or all of these proposals may be agreed before 2012, but are likely to have effect on the generation of abatement and credits for the post-2012 period.
Potential scale	The scale will depend on the demand for offset credits. These reforms will facilitate the process of project registration, making it simpler, more transparent and faster, but it will be up to the market to take advantage of this. Since the market has been complaining about the blockages and delays caused by the current system, it can be expected that removal of these blockages will facilitate greater

	levels of confidence by project generators, and therefore probably greater levels of project generation. Nevertheless, there is an inherent limit on the amount of abatement and crediting that is likely to be created under a project-by-project system.
Institutional cost	Some of these reforms are already underway, under the guidance of the CDM and the CDM Executive Board. As such, costs can be covered by the administrative fee already in place. The creation of standardised baselines and benchmarks will involve considerable effort in gathering and collating the necessary data. Some of this data may already exist for certain sectors, industries or countries, in which case the upfront costs would not be as great as for those groupings with no or minimal data. However, data will need to be regularly updated in order to keep the aggregated assessment of additionality meaningful – and this will involve ongoing costs for data collection. The creation of standardised baselines or benchmarks will therefore only be economically efficient if they are likely to be used by a large number of project proposals. Proposals to professionalise the CDM Executive Board – including by making all or some Board Members full time – may have cost implications.
Market reaction	The market has been calling for, and will welcome, changes that make the CDM approval process simpler, more transparent, and faster.

1b. Reform of the CDM – expansion of sectors and technologies covered

Summary of proposal	There are several proposals under this heading, including expansion of the CDM to include: a broader range of land use, land-use change and forestry (LULUCF) activities; carbon capture and storage activities; and nuclear activities. While these proposals are being discussed under negotiations for the current commitment period, if adopted, their effect on the generation of abatement and credits would be minimal up to 2012, but potentially much larger for the post-2012 period.
Potential scale	Estimates of the potential scale of expanded LULUCF coverage of the CDM range from minimal to significant. This potential is largely contingent on development and implementation of appropriate estimation methodologies and systems. Peat land management in certain countries has significant abatement and crediting potential, but it is not certain that this will be classified as a LULUCF activity. Apart from this possibility, it is likely that LULUCF projects will be small, and more valuable for their ability to increase regional distribution than for their significant abatement potential. An expert report to the CDM Executive Board estimated that CCS could account for over 9 $GtCO_2$/year of available abatement

	potential but only 2 $GtCO_2$/year of CER demand. The report pointed out that 'To date, prices for CERs have not reached the level needed to finance a significant range of possible CCS project categories'. Under a 2030 mitigation scenario, the UNFCCC report on 'Investment and Financial Flows to Address Climate Change' (2007) identified the potential for CCS in power and industry sectors to generate 2.5 $GtCO_2e$ of abatement, second only to the potential for abatement from end use efficiency (6.0 $GtCO_2e$) and above the potential for nuclear, clean fossil fuel generation and renewables (each 1.6 $GtCO_2e$).
Institutional cost	Some changes to the operation of the CDM Executive Board and its subsidiary panels and bodies are likely to be necessary to allow the inclusion of these technologies in the CDM in a way that ensures safety, environmental integrity and social concerns are adequately addressed. Nevertheless these changes will largely be administrative (e.g. expansion of the panels and administrative processes to include the necessary technical expertise), so costs should not be excessive. Arrangements are likely to be able to be made within the existing CDM framework to accommodate these technologies and sectors.
Market reaction	The market will only take up these opportunities if they can compete cost-effectively with other mitigation options. Market commentary suggests that this is not currently the case for CCS and nuclear projects at current market rates. Market interest in LULUCF activities under the CDM is limited by the temporary nature of the current crediting system (i.e. lCERs and tCERs). If other arrangements were found to deal with the issue of permanence, the market might show more interest in LULUCF credits. There is potential to generate credits at rates attractive to the market.

2. Programmatic CDM

Summary of proposal	Building on the Programs of Activities that are currently operational under the CDM, larger-scale projects could be clustered together with a view to reform of an entire sector. Scaling up the CDM from a project-based to a programmatic regime would require project boundaries to be relaxed to allow for project clusters or programmes of work to generate offsets. Emissions reductions from programmatic CDM could be intensity-based or absolute. Bundling of project clusters has taken place for small scale CDM projects, which benefit from simplified modalities and procedures under the CDM. Extending these simplified modalities and procedures to larger projects would allow further project aggregation.
Potential scale	The scale will depend on both the demand for offsets, and the extent to which reforms unleash further supply of offsets.

	According to the carbon market scenarios developed for the AGF, demand for offsets could range from 0.5 Gt to 3 Gt around 2020 – potentially leading to annual international financial flows of $76.6 billion to $191.5 billion. These flows could serve as a catalyst for much broader investment in low-carbon sectors in host countries, potentially on the scale of 4:1. The extent to which reforms to the CDM unleash further supply of offsets will depend not only on broadening the project boundaries of the CDM, but also on the professionalization of the system to reduce the delays in validation and issuance that have plagued it to date.
Institutional cost	Significant – full scale-up of a programmatic offset regime would require the project registration process to be streamlined. In addition, the CDM Executive Board and Designated Operational Entities would need to upgrade their operational resources, efficiency, and effectiveness to reduce the delays and uncertainty that currently characterise the system.
Market reaction	If implemented in an orderly manner, these reforms would be welcomed by markets, which currently struggle with the small scale and bureaucratic nature of the CDM.

3. Positive lists

Summary of proposal	An entire project category, as categorised on a positive list, would be assumed to be additional, with no further additionality assessment required. The project category could be defined as a technology type, all projects in a given sector, or all projects from a given country or region, for example. Decisions as to what projects are included on a positive list would need to take into account an assessment of aggregate additionality, if the environmental integrity of the mechanism is to be maintained.
Potential scale	The scale of abatement would depend on decisions as to what project categories are included in the list. A large number of categories with considerable abatement potential could result in the creation of significant numbers of credits – or conversely, a tightly controlled and conservative list might simplify registration procedures for those projects but not have much, if any, effect on overall levels of abatement and crediting.
Institutional cost	Relatively low – once the decision is made as to which project categories are to be included on a positive list, administrative costs would be reduced for those projects since additionality assessment would no longer be necessary.
Market reaction	The market would welcome the transparency and certainty that would come from knowing in advance that a particular project proposal would not need to be assessed for additionality.

Aggregated approaches:

4. Sectoral crediting / sectoral CDM / sectoral no-lose targets

Summary of proposal	Sectoral crediting, sectoral CDM and sectoral no-lose targets are all characterised by an aggregated emissions reference level for a particular industry sector (most likely at national level), with no penalty for excess emissions. At the end of a pre-defined period, once aggregated emission reductions have been verified, credits would be issued for the emissions reduced beyond the reference level. • Sectoral CDM implies a reference level of business-as-usual emissions, with a certification process equivalent to the existing CDM including additionality requirements • Sectoral crediting could also be established as a new mechanism, not necessarily tied to existing CDM structures • Sectoral no-lose target implies a reference level more ambitious than business–as-usual and therefore no need to test for additionality (other than in setting the target). This approach would accommodate the host country unilaterally contributing to net global abatement. Reductions up to the target would not be credited, while reductions beyond the target would be credited for international sale as offsets (see Section 7 below). Sectoral crediting could adopt a reference level of absolute emissions or emissions intensity. Sectoral crediting is an approach being considered for reducing forest emissions (REDD+). Applied at a national level with appropriate MRV, sectoral crediting could address concerns of emissions 'leakage' within a country for the given sector. Devolution of credits to private entities (if applicable) could be achieved through a variety of domestic policies or measures.
Potential scale	High depending on the sector – most suited to large and homogenous commodity sectors such as cement. Likely to be more effective and efficient than the current CDM, with double the net revenues (Lazarowicz 2009).
Institutional cost	Setting up sectoral crediting within the current CDM framework would necessitate a greater level of government and/or industry-wide involvement to contribute to the creation of data collection for sector-wide reference levels. Sectoral no-lose targets and sectoral crediting outside the CDM would require the creation of an international decision framework to judge the acceptability of proposed reference levels, including any standards or institutional frameworks to govern the verification of abatement. Both models would require a high level of government capacity, MRV at national level with robust inventories and processes to establish the reference level. Nevertheless these options would be less onerous than requirements to participate in sectoral trading.
Market reaction	The absence of penalties is attractive to industry participants. Low transaction costs and potentially low additional private capacity

	would be needed depending on national rules.

5. Sectoral trading

Summary of proposal	Unlike the proposals for sectoral CDM or no-lose targets, which work on a baseline-and-credit system, sectoral trading would be based on cap-and-trade. A cap would be set on emissions for a nominated sector in a developing country, and trading would be allowed between entities within that sector, and potentially with external market players as well. Allowances would be issued at the start of the predefined period rather than the end, in contrast to sectoral crediting. There would be a compliance obligation on the host country to ensure that the sector meets or exceeds the sectoral cap. This proposal would be most workable with an absolute target, rather than an intensity target.
Potential scale	High, depending on the sector, for more advanced developing countries. Modelling suggests substantial abatement is possible at no net cost in 2015 (Lazarowicz 2009), and would reduce the global cost of abatement financed through trading by up to half compared with the CDM.
Institutional cost	Requires high government capacity, MRV at national level with robust inventories, processes to establish the reference level and trading system. More onerous than requirements to participate in sectoral crediting.
Market reaction	There would probably be some resistance from covered sectors in developing countries that have previously had no obligation to reduce their emissions.

6. Crediting of Nationally appropriate mitigation actions (NAMAs)

Summary of proposal	NAMAs could refer to sectoral or project-level approaches equivalent to those described above, or policies or measures more generally, as long as an appropriate boundary and reference level can be established to enable robust MRV. Similar to sectoral crediting, the reference level could be equal to or more ambitious than business-as-usual.
Potential scale	Significant, although there could be implications for the environmental integrity of the mechanism if it is difficult to quantify the abatement achieved by the activity to be credited.
Institutional cost	A framework for decisions relating to the acceptability of activities for crediting would need to be created. This could include decisions related to environmental integrity, and the percentage of abatement to be credited (e.g. full offset or including an element of uncredited developing country action).
Market reaction	NAMAs framed in terms of policies or programs are likely to be devised and delivered under the guidance of governments, therefore supply-side market involvement is likely to be limited to the public rather than the private sector. If there is sufficient confidence in the integrity of the credits being generated, and all units are considered to be fungible in a post-2012 arrangement, purchasers of NAMA

	credits are unlikely to have reason to treat these activities differently to other potential supplies of credits.

Cross-cutting issues:

7. Developing country contribution to global mitigation

Summary of proposal	There is an overarching issue of whether reference levels against which additionality is assessed (for example baselines, benchmarks or sectoral targets) should be set at business-as-usual level (i.e. 100% offset) or whether they should include an element of developing country contribution to global mitigation efforts (i.e. only a part of the mitigation effort is credited). An element of uncredited abatement could be applied uniformly to all countries, or it could be differentiated according to national circumstances and respective capabilities.
Potential scale	Uncredited abatement could be applied to most of the reform proposals listed above. It would result in greater levels of abatement compared to full crediting (i.e. a stronger environmental outcome compared to the level of crediting generated), but would not necessarily result in greater levels of global abatement overall. The latter would be dependent on the level of global ambition, which may take into account a reduction in offset crediting but would not be dependent on it.
Institutional cost	A decision framework would need to be created at the international level to agree crediting levels for different reform proposals and/or countries. Once this is done, implementation would be administrative, and not involve significant costs.
Market reaction	There is likely to be some resistance from the supply side of the market, especially if this involves players that have until now been accustomed to receiving full offset crediting for their abatement efforts. The demand side of the market may end up paying higher prices for the credits it buys, at least initially, to compensate for the uncredited element of effort undertaken – although this extra cost could also conceivably be absorbed by host country governments or international assistance for capacity building efforts. Ultimately, once the supply side of the market has adjusted to any costs involved in less than full offset crediting, the market should operate smoothly and there should be no impact on demand-side participants.

8. Discounting

Summary of proposal	Discounting has been proposed to increase the number of offsets required to satisfy demand. There are a number of ways in which a discounting regime could operate: - adopting a uniform discounting rate for all offset credits (e.g. 2-for-1). This would strengthen the environmental outcome of the global effort;

	- varying the discount rate by geography (e.g. low discounting rates for least developed countries, higher for middle-income countries). This would be a concrete way to deliver on the proposal in Section 7, above, and could also favour the generation of credits in underrepresented countries; or - varying the discount rate by project type (e.g. high discount rates for HFC-23 projects). This could be a way of favouring renewable projects or projects with high sustainable development benefits, for example.
Potential scale	The scale of action that discounting would prompt depends not only on the rate of discounting, but also the transparency of the regime and its ease of use. This proposal could increase the amount of abatement achieved but would not increase the amount of credits generated (or therefore the total amount of financial benefits flowing to developing countries).
Institutional cost	Manageable. Once decisions on different levels of discounting are made, implementation would be a relatively simple administrative issue. Costs would be dependent on the decision framework put in place: if decisions were politically-based, they could be made within negotiating frameworks. Alternatively, a set of parameters could be agreed internationally and implemented by a secretariat or similar administrative body.
Market reaction	The proposed changes could generate significant uncertainty in the markets initially, but once there is clarity as to the basis for decisions on discounting, the market would adjust its expectations for crediting and then be able to operate with confidence.

Appendix 2: An Advance Market Commitment / Emission Reduction Underwriting Mechanism for Carbon and REDD

An Advance Market Commitment ('AMC') or ' Emission Reduction Underwriting Mechanism' is an opportunity to generate a carbon forward price curve, which would build transparency, market continuity and predictability for developing country governments, local developing country private actors, and FDI, by guaranteeing payment for performance in delivering emissions reductions.

The Mechanics of CDM and REDD AMC

A transitional fixed price regime or underwriting facility for CERs and REDD credits would be created, bolstering demand ahead of the creation of scaled-up offset markets. This would have a similar effect to bank underwriting of bond issues in anticipation of end investor demand, or advance market commitments providing a market to the pharmaceutical industry for drugs.

Two windows could be created to underwrite the CDM and REDD. By way of example, this might take the form of an AMC for 3 gigatonnes of CO2e (2Gt of CDM, 1Gt of REDD) with a fixed price bid for CERs of $10 and of $5 for REDD credits (i.e. of $25 billion) over an 8 year period from 2013.

The commitment of, in this example, $25 billion may actually have to be drawn down if there turns out to be less than 3 gigatonnes of additional demand for offsets from OECD countries over the period to 2020; or the committed funds could be recycled once market demand picked up. The AMC would commit no more than $3.125 billion per annum, and could therefore contribute to investment and developing country mitigation actions and increase the supply of offsets for cost containment without the funds necessarily ever being spent.

A developing country government, or project developer would see a forward price of $10 (or $5) from the CDM AMC (or REDD AMC) once a project was registered, but could retain the option to sell into the market at higher prices in the future. If CERs or REDD credits were sold into the open market, then the window could simply recycle the AMC funds into other international climate financing mechanisms (grants for adaptation, concessional loans etc).

AMC/Underwriting Prices

In the absence of a market clearing mechanism, the level at which to underwrite the guaranteed fixed price (or 'put option strike'), would necessarily be a technocratic decision, but with the aim of being sufficiently high to ensure scaled up investment without generating excessive rents. The ability to plug a guaranteed carbon price revenue line into spreadsheets would transform investor expectations. It would also signal an intention on the part of developed countries to grow the carbon market through compliance demand. This would have the effect of de-risking the downside of many de-carbonisation investments while holding out the potential for further upside from higher market prices. The AMC should therefore be able to set the fixed price at closer to incremental costs than a market clearing price.

The CDM and REDD AMC windows could differentiate between different CERs or REDD credits by price or some other filter. Thus CERs from LDCs could receive a higher bid of $12 for example, which would encourage investment in these countries. Or CERs from industrial gas methodologies might be excluded. A special window could be created reserving some

demand for sectoral credits. But complexity should be avoided, as it could undermine the effectiveness of the window in generating market continuity and investment.

More analysis needs to be done on whether the CDM and REDD AMC windows operate on a 'first come first serve' basis, or whether projects contract with the AMC after project registration on the basis of conservative projected credit delivery schedules.

Evolution of the CDM and REDD crediting.

The effect of the AMC, would be not only to galvanise investment, but it could also spur progressive improvements in the effectiveness of the CDM and REDD crediting mechanisms, incentivising developing countries to position themselves as good investment environments. Private actors could also be encouraged to develop methodologies to fit more progressive and dynamic baselines over time, including through a special sectoral window. This in turn would help progress global GHG inventory management and accounting, for the future when the major emerging economies move away from dependency on offset demand for mitigation.

Accounting

The CERS and REDD credits purchased by the AMC window would be retired. Finance ministries would need to account for the liability represented by their capital commitment to the AMC. Using the example above of 3 gigatonnes of demand over the period to 2020 (2 for CDM and 1 for REDD at $10 and $5) the liability would be: ($25 billion * the probability of the underwriting facility being exercised every year and the offsets retired) / $(1+r^t)$). It would be the commitment to retire offsets and credits which would give the AMC the strongest impact in terms of creating investor confidence that developed countries would create additional compliance demand. Accounting for such a financing mechanism is not straightforward, but given the underlying unit of CO_2e and the pay for performance characteristics of the AMC, it is no harder than quantifying the cost and impact of other financing mechanisms and NAMAs.