

CDM - simplicity is the key

The Clean Development Mechanism is a major financial innovation that may radically alter the way developing countries and industrialised nations deal with issues of climate change. **Richard Sandor** explains its importance and recommends a simplified CDM process



Richard Sandor is chairman and chief executive of Environmental Financial Products, a Chicago-based company which designs novel risk management tools for the environmental, financial and commodity markets

The Clean Development Mechanism (CDM) may be critical to jump-starting the carbon emissions markets. It also provides a vehicle for forging political consensus between the industrialised and developing countries, thereby expanding the comprehensiveness of the Kyoto Protocol.

Simply stated, the CDM is a mechanism whereby developing and industrialised economies can both benefit from projects that mitigate emissions of greenhouse gases (GHGs) in developing countries. 'Certified emission reductions' (CERs) are created when a project causes emissions to be lower than they might otherwise have been. The projects must also contribute to environmentally sustainable economic development. Emission sources in industrialised countries can use the emission reduction credits arising from those investments toward meeting their own GHG emissions caps. There is also increasing momentum to ensure that credits for reforestation projects are included in the CDM.

It is important to emphasise that the use of these credits is not dependent on either country having developed its own emissions trading programme. The salient features of the CDM and the associated references to the treaty, are presented in summary form in Table I. Many of the details are expected to be finalised during the COP 6 meeting in The Hague in November.

Although we cannot precisely determine the likely size of the CDM portion of the carbon market, academics and governments have attempted

to forecast its importance. Most analysts use the assumption that 1 billion tons of annual carbon mitigation will be required worldwide during the period 2008–2012, the first period when Kyoto's binding targets are measured. As a result, it appears that the CDM might generate capital flows of approximately \$10 billion per year (see Table 2).

The CDM therefore has the potential to make a significant impact on industrialised and developing countries. However, Article 12 of the Kyoto Protocol, which defines the CDM, only provides a framework for implementation. Carbon market participants now

face the same challenges summarised by the quote of the day in the internet community – execution is everything – and Goethe's famous thought – the genius is in the details. It's all about execution and details.

Fees, regulatory uncertainties and transaction costs could undermine this potentially powerful mechanism. It's our view that we must develop a simplified CDM process. The wide-

I. Salient features of the Clean Development Mechanism

<i>Participation</i>	Transactions between industrialised (Annex I) and developing countries
<i>Timing</i>	Certified emission reductions can be accumulated starting in 2000 for use in 2008–2012
<i>National emission budgets</i>	Acquisition of CERs raises the "assigned amount" (emissions budget) of the buyer
<i>Recognised projects</i>	Emission reduction projects; treatment of carbon sinks not yet clear
<i>Fees</i>	To be levied to cover CDM administrative costs and to contribute to the adaptation and assistance fund for developing countries vulnerable to climate change damage
<i>Project approval, monitoring and verification</i>	Participation by any country is voluntary. Monitoring protocols and independent auditing and verification procedures are to be developed
<i>Reporting of transfers</i>	Registries to be established; likely to include both international and national systems

2. Summary of estimates of the potential size of the CDM

<i>CDM share of overall carbon market (%)</i>	<i>Total CDM volume (million tons carbon)</i>	<i>Assumed market price (\$/t of carbon)</i>	<i>CDM market value (\$bn)</i>
19–57	144–723	13–37	5.2–21

Source: adapted from Grubb, Michael and Vrolijk, Christiaan, "The Potential size of the CDM", Greenhouse Gas Emissions Trader, Issue 6, February 1999

3. Alternative emissions reduction credit calculations and value of credits for a 50 kW electric power generating plant¹ in Amazonas, Brazil

Possible emission baselines	Baseline CO ₂ /MWh (tons)	Total tons credited/year (CO ₂)	Value of credits			
			\$5/ton CO ₂		\$10/ton CO ₂	
			Annual	DPV	Annual	DPV
Coal	0.9m	105	525	3,226	1,050	6,452
Gas	0.55	64	320	1,966	640	3,932
Gas combined-cycle	0.37	43	215	1,321	430	2,642
Hydro	~0	0	0	0	0	0

¹ Estimated production: 117 MWh/year; DPV = present value of a flat 10-year revenue stream discounted at 10%. Based on actual experience, the solar plant is assumed to run 365 days/year, at 80% of rated capacity for 8 hours/day

spread use of a rule-based system will enhance sustainable development. We hope that as the private sector begins experimenting with the CDM, its design approach, driven by lessons from the capital and commodity markets, will guide policy-makers charged with developing rules and regulations associated with the origination of CERs.

Simplified emission reduction credits

Efficiency in the capital markets relies on both standardisation of a financial instrument or commodity as well as a market architecture that minimises transaction costs and provides transparency. For example, successful spot and futures trading of commodities like wheat depends on uniform warehouse receipts specifying the quality of the underlying commodity. At the Chicago Board of Trade, criteria such as eligible grain types and grain moisture content provide standards defining commodity grades acceptable for delivery.

It is self-evident to market participants that a greater degree of ambiguity in this process and in the definition of CERs implies higher transaction costs. It is in this spirit that we strongly advocate a streamlined CDM origination process which results in Simplified Emission Reduction Credits (SERCsSM). Participation would be voluntary. This new financial instrument would in many cases provide a lower cost, fast track alternative to the project-by-project analysis required to generate conventional CERs. A rules-based system also provides transparency and uniformity that allows all projects to be treated equally and reduces the potential for favouritism and corruption.

What is a SERC? Simply stated, it is an emission reduction credit that is measured by the difference between a predetermined reference emissions rate (RER) and the implemented emissions rate (IER) associated with new or modified facilities. Measurement of the IERs would be conducted on a standardised basis.

As a hypothetical example of the

SERC calculation process, assume the reference emissions rate for electric power generation reflects a conventional gas-fired plant (0.55 tons of carbon dioxide [CO₂] per MWh). A newly installed zero-emission solar or wind plant producing 1,000 MWh in a year would earn 550 tons CO₂ worth of SERCs. Independent monitoring and verification would involve only an on-site visit to determine the existence of the facility and subsequent documentation of its production rate. Baselines and additionality would have already been addressed through the use of a predetermined RER and the IER.

Simply summarised:

$$\begin{aligned} \text{SERC} &= (\text{RER}-\text{IER}) * \text{Production} \\ &= (0.55-0) \text{ tons CO}_2/\text{MWh} * \\ &\quad 1,000 \text{ MWh/year} \\ &= 550 \text{ tons CO}_2/\text{year} \end{aligned}$$

Table 3 shows a numerical example of a real 50 kW solar facility in Amazonas, Brazil illustrating four possible baselines that the new facility could face. It also shows the value of SERCs under a further simplifying assumption that the initial certification is for a 10 year period.

Applying the SERC methodology, a project proponent would use a common global reference emissions rate. This would vastly reduce uncertainties and CDM processing costs, while guaranteeing that renewable energy projects receive credits. Without this SERC one could imagine lengthy debates over project-level details among administrators of the host country government, staff of the climate secretariat, the CDM executive board, certifying agencies, NGOs and others. Without an agreed-upon standard, the debate could be endless.

Why is this important? Numerous studies of the AJI pilot phase conclude that establishing emission baselines and project additionality on a non-standardised, project-by-project basis causes high transaction costs and uncertainty regarding the carbon benefits produced. Initial estimates indicate that the process of defining a CDM project, establishing the case-specific emissions baseline, document-

ing additionality and conducting all required certification, government approvals and registration would cost at least \$40,000 for the simplest project types. This does not include the costs of selling these credits in the capital markets. Additional fees for legal, accounting and underwriting might still be required. We will be calling for simplicity in these parts of the process as well.

At realistic CO₂ prices, we estimate that solar power projects that cost as much as \$5 million might derive little or no net economic benefit under the conventional CDM process. This is hardly a recipe for success for this important financial innovation.

The role of forestry and agriculture in a simplified CDM

It is important to note that there is a difference between the quantitatively specified national emissions reduction targets and the unresolved role of forests and soils in meeting these requirements.

For example, the Kyoto treaty clearly specifies in Article 3.1 that Japan, Germany and the United States must achieve reductions from the 1990 baseline of 6%, 8% and 7% respectively during the budget period 2008–2012. Specific gases to be controlled are identified and the exchange rates across those gases are set.

Contrast the clarity of Article 3.1 with Articles 3.3. and 3.4, which deal with forestry and land use change. Article 3.3 states that the “net changes in greenhouse gas emissions by sources and removals by sinks resulting from direct human-induced land use change and forestry activities, limited to afforestation, reforestation and deforestation since 1990, measured as verifiable changes in carbon stocks in each commitment period, shall be used to meet the commitments under this Article of each party.”

This seems to imply that sequestration of carbon due to reforestation could be counted in meeting the quantified mitigation objectives. However, Article 3.4 leaves open the treatment of issues such as soil carbon sequestration and modified management of existing forests. It states that the meeting of the parties to the Kyoto Protocol shall: “decide on which additional human induced activities (besides afforestation, reforestation and deforestation) related to changes in greenhouse gas emissions and removals by sinks in the agricultural soil and land use change and forestry categories shall be added to, or subtracted from, the assigned amount for parties included in Annex I”.

In order to illustrate a simplified



approach to carbon sinks we will assume that ambiguities associated with forestry and agriculture will be resolved at COP 6. Furthermore, we will assume the parties will recognise assisted and natural regeneration of forests and a switch to no-till agriculture as desirable policies. These activities virtually define sustainability as they allow for economic utilisation of natural resources while simultaneously reducing soil erosion, improving water quality and fostering biodiversity.

It is in this spirit that we assume there will be three guiding principles associated with Emission Offsets (EOs):

1 Natural and assisted regeneration projects and changes in tillage practices that cause an increase in carbon stored in forests and soils initiated by *legal entities* in non-Annex B countries after December 10, 1997 can earn EOs. The amount of EOs issued to such projects is equal to the net removals of CO₂ equivalent emissions caused by such projects minus any net emissions in non-Annex B countries resulting from land use changes on other lands controlled by that entity or a financially affiliated entity;

2 EOs shall be earned by any non-Annex B Parties in an amount reflecting the demonstrated net increase in carbon stocks within the country, measured as verifiable changes in carbon stocks occurring after January 1, 2000 minus the quantity of EOs earned by *legal entities* from projects based in the territory of the Party as in **1**; and

3 the quantity of EOs earned under **1** and **2** shall reflect the scientifically accepted and validated methods for estimating carbon stocks, adjusted to reflect the statistical variance of the estimation technique, such that the calculation produces a conservative high-confidence estimate of net carbon stock increases. Validated methods can include statistical inference, remote sensing or other methods for assessing overall carbon stocks held in biomass and soils.

These rules allow projects that cause the enhancement of forest-based sinks to be credited, provided they cause a net increase in carbon stored on all lands in non-annex B countries controlled by the project proponent or affiliated entities. They furthermore provide that EOs can be earned by national governments provided that there is a nationwide net increment in carbon storage. They also avoid double counting.

Because the cost of precisely monitoring and verifying carbon sinks suggests that the process could be prohibitively expensive, the adoption of conservative reference sequestra-

tion rates would allow for increased participation in these environmentally desirable activities.

It is for this reason that we propose a Simplified Emission Offset (SEO) as a complement to the Simplified Emission Reduction Credits defined above.

As indicated in Table 4, inspection of a small handful of countries indicates that a staggering amount of pasture land is available for reforestation. Even if only a portion of this were to be reforested, the local benefits realised by renewing a sustainable source of food, medicines and employment, not to mention enhancement of water quality and biodiversity, would constitute a major win-win opportunity for both local and global good. Table 5 reports the amount of land now planted in soybeans in selected countries. Even for a single crop, widespread adoption of no-till practices could cause major increases in soil and moisture retention (in addition to lowering fuel consumption) while increasing the amount of carbon stored in the soil.

What is a SEO in forestry? For assisted or natural regenerated forests it is, simply stated, the lowest predetermined rate of sequestration determined for a given set of standard reforestation practices in a specified geographic location. For example, sequestration rates for the Atlantic Brazilian rainforests might have the following ranges: 2–3.50 tons of carbon per hectare per year for the first 10 years; 2–2.75 tons for years 11–20; and 1.0–1.5 tons for years 21–60.

In order to be confident that the number of SEOs issued does not overstate the amount of carbon absorbed by the sink enhancement project, a simplified SEO system would grant offsets equal to 80% of the lower end of the applicable reference sequestration rate. Reference sequestration rates would be established for various defined practices (such as natural forest regeneration or assisted regeneration) for specified regions by agricultural ministries or by independent organisations such as Winrock or SGS. Verification would simply involve an independent attestation by an accounting firm that the required activity was occurring. If the project owner wanted instead to be credited for the actual amount of carbon sequestered then actual monitoring and verification could be undertaken at his expense.

What is a SEO in agriculture? It is essentially the amount of carbon sequestered at a predetermined rate when there is a shift from heavy till to no-till farming within a particular geographic location. For example, soil carbon sequestration rates in the Brazilian

4. Land in pasture in selected countries

Country	Hectares
United States	239,250,000
Brazil	185,000,000
China	400,000,000
Argentina	142,000,000
India	11,100,000

Source: UN Food and Agriculture Organisation 1999 Database

5. Land planted with soybeans

Country	Hectares
Argentina	7,509,000
Brazil	13,011,341
China	8,200,670
India	6,450,000

Source: UN Food and Agriculture Organisation 1999 Database

soybean belt might be 0.4–0.6 tons of carbon per hectare per year¹. Once again, a simplified SEO would provide for 80% of the lower value (ie, 0.32 tons of carbon per hectare per year). These rates would be determined by an appropriate government agency or independent consulting firm. Third party independent attestation would simply verify that the switch to no-till had occurred. If the landowner wanted to claim more than the predetermined rate then actual monitoring and verification would have to take place.

It is important to emphasise that these numbers are only hypothetical and are meant to illustrate the predetermined nature of sequestration rates. The use of the simplified process should also extend to other offsets such as landfill gases. We are so convinced of the need to use simplified formulas for crediting mitigation projects that we will propose their widespread usage in the Midwest US pilot market we are now designing.

To borrow a phrase from the capital markets, the reader should consider our ideas for standardisation to be 'indicative' terms. The objective is to start a dialogue that advances the development of a workable system that can enlist the maximum possible adoption of climate friendly practices.

We are convinced that a rules-based system will enhance sustainable development. Our hope is that policy makers at The Hague will hear this clarion call for simplicity.

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¹ Conversion to no-till may result in either a significant reduction in net farm-wide emissions or may cause a farm to be a net carbon sequesterer. For purposes of the Simplified CDM this distinction is irrelevant

