Domestic offset projects around the world

The Kyoto protocol provides for two so-called "project" mechanisms, which enable a project’s greenhouse gas emission reductions to be converted into tradable carbon assets. Outside these two well-known mechanisms, other project systems are being developed linked to emissions permit trading systems and functioning on a more local basis in countries that may or may not have ratified the protocol. While the purpose of these mechanisms is the same – i.e. to broaden the scope of an emissions permit market and encourage the introduction of emission-reducing projects, their implementation varies significantly. This report will present an overview of these new domestic offset mechanisms.

Domestic offset project development in the world

Canadian scheme *
CCX: 3 projects

RGGI *

*: Project systems currently being structured

New Zealand: 39 projects
New South Wales: 127 projects

Thanks. The author would like to thank Shaun Hildebrand (Canadian Ministry of the Environment), Christopher Sherry (RGGI), Margaret Sniffin and Lauren Jones (New South Wales GHG Abatement Scheme), David Pheasant (New Zealand Ministry for the Environment) and Mike Walsh (CCX) for the information they were kind enough to provide. The author nevertheless assumes all responsibility for the contents of this report.
1- Emergence of new project mechanisms

Project mechanisms have been developed relatively recently to aid in tackling climate change. Whereas the concept of the Clean Development Mechanism (CDM) and of the Joint Implementation (JI) mechanism date from the Kyoto protocol (1997) and the Marrakech agreements (2001), the first CDM project was not approved until the autumn of 2004. With regard to other schemes, the earliest was implemented in New South Wales (Australia) and became operational in early 2003.

Prior to this development, there had been a number of mechanisms for the direct purchase by the State of emission reductions, such as the "CO$_2$-reductieplan" in the Netherlands (1997) and Canada's "PERRL" programme (2002), which are described in Appendix V.

<table>
<thead>
<tr>
<th>Geographic region</th>
<th>Project mechanism or associated emissions market name</th>
</tr>
</thead>
<tbody>
<tr>
<td>New Zealand</td>
<td>Projects to reduce emissions</td>
</tr>
<tr>
<td>Canada</td>
<td>Large Final Emitters system*</td>
</tr>
<tr>
<td>New South Wales (Australia)</td>
<td>New South Wales abatement scheme*</td>
</tr>
<tr>
<td>North America</td>
<td>Chicago Climate Exchange (CCX)*</td>
</tr>
<tr>
<td>Nine States in North Eastern US</td>
<td>Regional Greenhouse Gas Initiative (RGGI)*</td>
</tr>
</tbody>
</table>

* = name of the market associated with the project mechanism (no specific name for the project system)

New domestic offset project mechanisms

A concept under development

While project mechanisms, taken as a whole, are relatively recent, they are developing rapidly. Currently, in addition to CDM and JI mechanisms, three project mechanisms are operational – one in the Kyoto zone (New Zealand) and two outside the zone (the US and New South Wales in Australia). Two other mechanisms are currently being structured. The first, in Canada, is linked to the so-called "Large Final Emitters" trading system, whose principle is somewhat similar to that of the European Union Emissions Trading Scheme, and is expected to be in place by the end of 2005. The second involves nine states in the North Eastern US, which are putting in place a trading system for GHG

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1 See project mechanism definition in Appendix II
emissions from power generation known as the Regional Greenhouse Gas Initiative (RGGI) and linked to a project mechanism. In Europe, the implementation of a domestic offset projects scheme linked to the European Union Emissions Trading Scheme was debated during the negotiation of the linking directive\(^2\), but in the end this option was rejected. The upcoming June 2006 mid-term review of the directive will provide the occasion for renewed discussions on whether or not to include such projects. Certain Kyoto zone countries have considerable stocks of Assigned Amount Units (AAUs)\(^3\), often called "hot air" units, and are in the process of implementing project schemes enabling them to "green" their units. Proceeds from the sale of these units would make it possible to implement emission reduction projects. These systems are nevertheless different from the domestic offset project mechanisms which are the subject of this report, and will therefore only be dealt with in Appendix III.

_Volumes are still low_

In May 2005, the three mechanisms in operation counted a total of 169 approved projects (127 in New South Wales alone). The corresponding emission reductions are counted differently in each case, making comparisons difficult: on a yearly basis by the Chicago Climate Exchange (CCX), on the basis of emissions avoided by the Australian scheme and for the period from 2008 to 2012 in New Zealand.

<table>
<thead>
<tr>
<th>System</th>
<th>Approved projects (no.)</th>
<th>Corresponding credits (tCO2eq)</th>
</tr>
</thead>
<tbody>
<tr>
<td>New South Wales Abatement Scheme</td>
<td>127</td>
<td>12.2 million from 2003 to 2005</td>
</tr>
<tr>
<td>New Zealand</td>
<td>39</td>
<td>10 million from 2008 to 2012</td>
</tr>
<tr>
<td>Chicago Climate Exchange</td>
<td>3</td>
<td>300,000 pa as from 2005</td>
</tr>
</tbody>
</table>

_Number of approved projects and amount of corresponding tradable credits (May 2005)_

Volumes are still relatively low at global level due to the mechanisms' newness.

_Predominance of local emissions schemes_

The New Zealand scheme is alone in generating CO\(_2\) units compatible with the Kyoto system and its associated emissions trading system (see part 3): it is therefore linked to the international emissions permit trading system. All the other project mechanisms are linked to national (Canadian) or regional (New South Wales, CCX\(^4\) and RGGI) trading systems, and therefore generate "local" CO\(_2\) units.

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\(^3\) See Appendix 1 - Glossary  
\(^4\) In theory, the Chicago Climate Exchange (CCX) concerns all North American companies that volunteer to take part.
2- Domestic offset project mechanisms that currently exist or are being structured

Projects to reduce emissions in New Zealand

New Zealand ratified the Kyoto protocol in 2002 and committed to stabilizing its emissions at their 1990 level during the period from 2008 to 2012.

The New Zealand government has instituted a tender for projects in order to turn over part of its Assigned Amount Units\(^5\) (AAU) to GHG emissions reducing projects from 2008 to 2012.

So far, two tender have been issued – in 2003 and 2004 – resulting in the delivery of 10 million units to a total of 39 projects. Units are effectively delivered once emission reductions have taken place.

Project eligibility criteria

The proposed projects must be based in New Zealand and result in GHG emission reductions that are recorded in the national inventory. Foreigners may submit proposals in response to a call for projects so long as their projects are to take place in New Zealand. Such projects are then subject to the Kyoto protocol's Joint Implementation provisions.

The projects must be economically "additional", i.e. not economically viable without the transfer of carbon credits. Moreover, the proposed projects must result in emission reductions of at least 10,000 metric tons of CO\(_2\) equivalent in the period from 2008 to 2012. Lastly, the presentation of the project must specify the amount of CO\(_2\) units requested and that amount must be less than or equal to the effective emission reductions. The sponsor of a project might well receive a number of units less than the emission reductions which the project will generate, and the amount requested is one of the project selection criteria.

Projects relating to the sequestration of CO\(_2\), in forest or soil sinks are not eligible. However, projects resulting in reduced consumption of electrical power (energy efficiency) are eligible, although none has been accepted to date.

Credits are allocated on an annual basis to project sponsors as a function of observed effective emission reductions.

Calls for project proposals

To date, two calls for project proposals have been issued.

The first, in 2003, allocated a total of 4 million AAUs. The stated priority favoured renewable energy projects. Fifteen of the 46 projects submitted were selected:

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\(^5\) See definition appendix 1
<table>
<thead>
<tr>
<th>Project Owner</th>
<th>Project</th>
<th>Emission Units Awarded</th>
</tr>
</thead>
<tbody>
<tr>
<td>Esk Hydro Power Ltd</td>
<td>Toronui mini hydro scheme</td>
<td>12</td>
</tr>
<tr>
<td>Genesis Power Ltd</td>
<td>Awhitu Peninsula wind farm project</td>
<td>279,864</td>
</tr>
<tr>
<td>Genesis Power Ltd</td>
<td>Extension to the Hau Nui wind farm</td>
<td>50,55</td>
</tr>
<tr>
<td>Genesis Power Ltd</td>
<td>Hydro scheme enhancement on the Tongariro Power</td>
<td>107,013</td>
</tr>
<tr>
<td></td>
<td>Development</td>
<td></td>
</tr>
<tr>
<td>Fire-Logs (NZ) Ltd</td>
<td>Manufacture and sale of wood pellets</td>
<td>19,818</td>
</tr>
<tr>
<td>Mighty River Power Ltd</td>
<td>Rotokawa geothermal electricity generation project</td>
<td>790,923</td>
</tr>
<tr>
<td>New Zealand Refining Company Ltd</td>
<td>Electricity and steam co-</td>
<td>1,225,545</td>
</tr>
<tr>
<td></td>
<td>generation project</td>
<td></td>
</tr>
<tr>
<td>New Zealand Windfarms Ltd</td>
<td>Te Rere Hau wind farm project</td>
<td>519</td>
</tr>
<tr>
<td>Palmerston North City Council</td>
<td>Awapuni landfill project</td>
<td>149,006</td>
</tr>
<tr>
<td>Southern Paprika Ltd</td>
<td>Bio-energy plant project</td>
<td>58,824</td>
</tr>
<tr>
<td>TrustPower Ltd</td>
<td>Taranaki hydro project</td>
<td>10,458</td>
</tr>
<tr>
<td>TrustPower Ltd</td>
<td>Waipori hydro project</td>
<td>103,8</td>
</tr>
<tr>
<td>TrustPower Ltd</td>
<td>Landfill gas to electricity project [This agreement</td>
<td>233,743</td>
</tr>
<tr>
<td></td>
<td>is no longer in place</td>
<td></td>
</tr>
<tr>
<td>Wainui Hills Wind Farm Ltd</td>
<td>Wainui Hills wind farm project</td>
<td>378</td>
</tr>
<tr>
<td>Watercare Services Ltd</td>
<td>Mini hydro-electricity generation projects</td>
<td>10,829</td>
</tr>
<tr>
<td><strong>Total Emission Units Awarded</strong></td>
<td></td>
<td><strong>3,949,373</strong></td>
</tr>
</tbody>
</table>

Source: Climate Change Office, New Zealand

Projects accepted in New Zealand's first project call for tenders

It is interesting to note that, as we explained above, the number of credits allocated does not necessarily correspond to the amount of emissions avoided. For example, whereas the Wainui Hills wind farm project may result in emission reductions of nearly 600,000 metric tons of CO$_2$ over the period from 2008 to 2012, it will only receive 378,000 credits.

A second tender, issued in 2004, allocated 6 million units. Projects were classified according to their ratio of "number of credits requested to emission reductions" and to their inherent risk.

Twenty-four projects were selected (windpower, hydraulic, geothermal, bio-energy, landfill gas), for estimated emission reductions of 7 million metric tons of CO$_2$ equivalent from 2008 to 2012. If all these projects are effectively implemented, they will represent an additional 450 MW of electricity, of which 99% from renewable sources.
The Canadian system (currently being structured)

Canada has committed to reducing its emissions by 6% relative to their level in 1990. In its climate plan⁶, the government describes the measures it intends to take to meet its goals. One of these measures is the "Large Final Emitters" GHG emissions trading scheme, which will be linked to a domestic offset project mechanism.

Large Final Emitters System

This system involves the mining and manufacturing sectors, oil and gas, and thermal electricity sectors, altogether around 700 companies that account for slightly less than half of Canada's GHG emissions. Based on a benchmark scenario, these companies must reduce their GHG emissions by an annual amount of 45 million metric tons of CO₂ equivalent by 2010. The government has committed to the companies that the cost of emission reductions will not exceed CAD 15 (€9.8) per tonne of CO₂ avoided.

To meet their commitments, companies have several possibilities:
- Investing in reducing the emissions generated by their own facilities;
- Buying emission reductions from other companies who have outperformed their goals;
- Buying credits from emission reduction projects carried out in Canada;
- Buying international credits generated by Kyoto project mechanisms (CDM and JI) or "greened" Assigned Amount Units⁷;
- Lastly, investing in a fund for the development of technologies to be used in tackling climate change (the Greenhouse Gas Technology Investment Fund), and counting these investments towards their compliance. One metric ton will correspond to each CAD 15 invested, with an overall limit for all the companies of 9 million metric tons.

The domestic offset project system

For a project to be eligible, the emission reductions generated must be recorded in the national inventory⁸; in addition, the project must have started after 1 January 2002. Credits will be delivered for the period from 2008 to 2012.

The sectors targeted by the government are primarily forestry (conservation and plantations), agriculture (low-till, methane), waste and renewable energy. However, transport and energy efficiency projects are also eligible.

The Climate Fund

The Canadian government has also announced the creation of a Climate Fund, which will be exclusively dedicated to the purchase of emission reductions. As a priority, such purchases will involve domestic offset projects (or emission reductions from the trading system), but also CDM and JI credits and AAUs if they cannot be qualified as "hot air".

The fund aims to buy 75 to 115 million metric tons of CO₂, i.e. up to 40% of the total reductions Canada needs over the period from 2008 to 2012.

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⁷ The "greening" of AAUs corresponds to a system where the proceeds from the sales of credits are reinvested in emission reduction projects (see box on page 7).
⁸ However, there have been exceptions to this system, notably concerning projects for the sequestration of carbon in agricultural soil which can be eligible even if the Canadian registry does include them.
New South Wales Abatement Scheme

A scheme aimed at reducing emissions in the electrical power sector

The aim of the system is to reduce the "CO₂ intensity" of the power generated in the region, which in 2003 required 8.65 metric tons of CO₂ per inhabitant, an amount that must be cut to 7.27 metric tons by 2007.

To achieve this objective, electricity retailers and certain other companies participating in the system must account for the CO₂ emissions due to the power they supply to the region. If emissions exceed a maximum amount, set in accordance with their share of the region's consumption and population, they can either pay a fine of AUD 10.5 (€6.25) per additional metric ton or offset the excess emissions by one of the two following means:

- purchasing "green certificates" that attest to the generation of power from renewable sources;
- purchasing credits generated by GHG emission reduction projects within the State, i.e. New South Wales Greenhouse Abatement Certificates (NGACs).

NGACs as an asset class constitute a domestic offset project system supported by CO₂ emission caps imposed on the power sector. From 2003 to the spring of 2005, 127 projects had been approved representing a total of 12 million metric tons of CO₂ avoided. A majority of the NGAC credits delivered have been used to bring the system's participants into compliance. Some have also been used, on a voluntary basis, to ensure the CO₂ neutrality of a specific event or product, providing a further source of liquidity.

The domestic offset projects mechanism

Projects must comply with a set of precise criteria to obtain these credits, which are delivered on an annual basis once emission reductions have been achieved. They may therefore lead to lower CO₂-intensive power generation (e.g. by improving yields) or to lower energy consumption. In the latter case, which in some countries is part of a "white certificate" system, projects may also be implemented at both industrial and commercial facilities (replacement of heating or cooling systems) and in private homes. Small-scale projects may be aggregated in order to reduce transaction costs. Lastly, projects involving CO₂ forest sinks or the reduction of CO₂ emissions resulting from industrial processes are also eligible for credits: e.g. a project to plant 30,000 hectares with eucalyptus trees was recently accepted.

A link between green certificates and NGACs has also been provided for. Power generation projects using renewable energy may obtain either of these two environmental assets, with green certificates financially more advantageous at present. The two types of credits may also be combined, as in a project combining power generation and GHG neutralisation (e.g. landfill gas).

If the New South Wales system is successful, it could be extended to other States and discussions are currently under way in this respect.

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9 A more detailed description of this system is to be found in Appendix IV.
**Chicago Climate Exchange (US)**

**A voluntary scheme**

The Chicago Climate Exchange (CCX) was launched at the end of 2003 as a purely voluntary system for trading GHG emission reductions in North America (Canada, the US and Mexico). CCX members, which include companies and municipal authorities amongst others, have committed to reducing their emissions by 1% pa from 2003 to 2006, relative to their average annual emissions from 1998 to 2001. The six Kyoto gases are included in the system.

The CCX currently has around 30 members, including one municipal authority (Chicago), four universities, and companies in the automobile, electronics, power generation, paper and other sectors. In all, these members account for annual emissions of around 250 million metric tons of CO\textsubscript{2} equivalent, i.e. approximately 4% of total emissions in the US.

**The project mechanism**

To meet their commitments, members may also buy emission reductions from other members or use credits generated by emission reduction projects in North America or Brazil. These credits are limited to 50% of emission reductions.

Emission reduction projects can be implemented in the following areas:
- reduction of agricultural methane and landfill gas emissions
- sequestration of carbon in the soil or forests
- renewable energy

It is expected that the types of eligible projects and the geographic limits will be extended in the future.

To be eligible, projects must generate annual emission reductions of at least 10,000 metric tons of CO\textsubscript{2} equivalent (it is possible to group projects together), which must be verified by an independent entity.

The credits delivered are subsequently put up for sale on the exchange where they become indistinguishable from other types of assets: a member buying a metric ton of CO\textsubscript{2} equivalent does not know whether or not he is receiving a credit from a project.

To date, three projects have been approved: two agricultural projects (methane emission reduction and land use) and a landfill gas project. All three are in the US and represent total reductions of 300,000 metric tons of CO\textsubscript{2} equivalent pa.

**The Regional Greenhouse Gas Initiative (RGGI) in the US (currently being structured)**

**A trading system for power generation in the North Eastern US**

Further to an initiative of the governor of New York in April 2003, nine States in the North Eastern US (Maine, New Hampshire, Vermont, New York, Massachusetts, Connecticut, New Jersey, Delaware and Rhode Island) decided to launch a GHG emissions trading system for power companies. The system will become operational in 2009, and Pennsylvania, Maryland, the District of Columbia and two Canadian provinces are observing the process.
The States in the RGGI emitted 577 million metric tons of CO₂ equivalent in 2002 – i.e. more than either France or Italy. Power plants with capacity in excess of 25MW\(^{10}\) (there are around 600) are required to stabilise their emissions at around 150 million metric tons of CO₂ pa\(^{11}\) between 2009 and 2015, then reduce them by 10% from 2015 to 2020. Each State has been allocated a total amount of emissions in the form of allowances, which it is free to allocate as it sees fit amongst the various power companies. However, 5% of these allowances must be allocated to the "Strategic Carbon Fund", which resells them on the open market and uses the proceeds to implement emission reduction projects. The resulting emission reductions must be used to offset the system's potential leakage (increased imports of power from States outside the RGGI due to emissions restrictions within the region). Moreover, 20% of the allowances must be allocated to a vehicle – State-owned or not – that will sell them and use the proceeds to promote clean technologies (renewable energy, energy efficiency, etc.). In all, 75% of the allowances will thus be allocated free of charge to power plants and the remaining 25% sold to them.

**The link to a domestic offset project mechanism**

The trading system is linked to a domestic offset project mechanism that generates allowances of the same type as those allocated to power plants. Such projects must be implemented in an RGGI member State and will be limited initially to the following areas:

- Landfill gas
- Afforestation
- \(\text{SF}_6\) emission reductions in electricity transmission and distribution
- End-use natural gas, home heating oil and propane projects

The amount of allowances that can be created by domestic offset projects cannot exceed 50% of the system's total emission reductions (the difference between the benchmark emissions scenario and the limit set by the RGGI). Furthermore, it is possible that using European allowances and CDM (CER) credits to bring plants into compliance will be allowed in the future\(^{12}\).

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\(^{10}\) To be included in the system, power plants must also use more than 50% fossil fuels and sell more than 10% of their power to the grid.

\(^{11}\) This amount corresponds to the companies' average emissions.

\(^{12}\) This decision will depend on actual prices of allowances within the RGGI scheme.
3- **Analysis of the implementation of the various mechanisms**

For project mechanisms to achieve their objectives in terms of economic and environmental efficiency, several factors must be taken into account in their implementation.

First, the assets delivered to projects must be easily tradable with a sufficient number of buyers to ensure their liquidity. This requires a link to a reliable and recognised trading system.

Next, the system must avoid any "windfall effects" (the allocation of credits to a project that would be implemented in any event, thus creating a "carbon dividend") and ensure a certain degree of environmental integrity by guaranteeing that the projects are in effect implemented and generate emission reductions, and by preventing project inflation.

Lastly, the system must lead to the discovery of sources of low-cost emissions and affect sectors not covered by trading systems. Existing systems and those currently being structured have taken different approaches to meeting these challenges.

### Characteristics of the various project mechanisms

<table>
<thead>
<tr>
<th>System</th>
<th>Type of credits allocated to projects</th>
<th>Potential buyers</th>
<th>Limit to the no. of credits allocated</th>
<th>Price</th>
<th>Areas concerned</th>
</tr>
</thead>
<tbody>
<tr>
<td>New Zealand</td>
<td>Assigned amount units</td>
<td>Annex B States</td>
<td>Total amount set followed by a call for proposals</td>
<td>Free</td>
<td>Vary with the different calls for proposals, but in fact mainly renewable energy</td>
</tr>
<tr>
<td>Canada</td>
<td>Offset credits</td>
<td>Mandatory participants, Climate Fund</td>
<td>Unlimited</td>
<td>Limited to CAD 15 (€10)</td>
<td>Mainly forest sinks, agriculture and landfill gas</td>
</tr>
<tr>
<td>New South Wales Abatement Scheme</td>
<td>New South Wales Greenhouse Abatement Certificates (NGACs)</td>
<td>Mandatory participants</td>
<td>Unlimited</td>
<td>De facto limit of AUD 13.65 (€6.25) due to the full discharge penalty</td>
<td>Power generation, energy savings, forest sinks, industry</td>
</tr>
<tr>
<td>Chicago Climate Exchange</td>
<td>Offset credits</td>
<td>Mandatory participants</td>
<td>50% of the credits on the market</td>
<td>Aligned with prices of other CO2 assets</td>
<td>Forest and farm land sinks, landfill gas, agricultural methane, renewal energy</td>
</tr>
<tr>
<td>Regional Greenhouse Gas Initiative</td>
<td>Allowances</td>
<td>Mandatory participants</td>
<td>50% of total emission reductions</td>
<td>Free</td>
<td>Landfill gas, forest plantations, SF6, non-electrical energy efficiency</td>
</tr>
</tbody>
</table>

**Types of credits and buyers**

The type of credits delivered, their fungibility with other assets (CO₂ or not) and the types of potential buyers are essential factors for the credits’ liquidity and therefore for the smooth functioning of the system.

New Zealand delivers to projects part of the Assigned Amount Units (rights to emit delivered to States under the Kyoto system). As a result, these are not really "credits" delivered specifically to projects but rather the part of the "Kyoto units" of which New Zealand disposes that it chooses to give to projects that reduce GHG emissions in the country. These "Kyoto units" can subsequently be sold by project sponsors to other participants in the Kyoto system, and therefore to the Annex B States. The market is relatively narrow but is built on a broad institutional base.
The other systems allocate specific CO₂ credits to projects, often called "offset credits" since they offset emissions. These credits are valid on a "local" CO₂ market (see above) that may include a large number of participants and thus of potential buyers (700 companies for the Canadian system compared with the 34 Annex B States. However, their visibility and the amount of overall restrictions are less significant than under the Kyoto system. The main buyers are therefore mandatory participants but public authorities may also play the role of buyer, helping the market get off the ground. In Canada, the State will put in place a fund that will buy CO₂ credits mainly generated by the project mechanism and will also buy CDM and JI credits.

In these different markets, the CO₂ credits generated by project mechanisms are sometimes fungible with other environmental assets. In Canada, for purposes of compliance, participants will be able to use these "offset" credits and also CDM and JI credits and Assigned Amount Units\(^\text{13}\). This type of fungibility may also appear in the US under the RGGI system for European allowances and CDM credits. Such a link would be all the more innovative in that it would link a non-Kyoto zone system to assets used in the Kyoto zone (the link would work in only one direction however). Fungibility could also develop with assets not specifically related to CO₂: in Australia "green certificates" for power generated by renewable energy may be used for compliance purposes by participants, with a conversion coefficient making it possible to assign an equivalent CO₂ value. Renewable energy power generation projects can choose which of the two assets they wish to receive (currently the green certificate is financially more advantageous), or even both if they combine the replacement of fossil fuels with other GHG emission reductions (e.g. landfill gas). In both cases, the purpose of linking the different assets is to enhance market liquidity.

Limits to the number of projects

To prevent project inflation, which would risk excessive relaxation of restrictions on mandatory participants, certain systems limit the number of projects to which credits can be allocated. In New Zealand, there is a de facto limit due to the existence of limited amounts of units, which are subject to calls for proposals (to date, two calls have been issued, the first for 4 million units and the second for 6 million). These calls for proposals can specify priorities in terms of areas. When a sponsor presents its project, it specifies the number of units requested, which may be lower than the amount of emissions effectively avoided. The ratio of requested units to emissions avoided is one of the factors used to classify projects. The CCX also sets a limit on the implementation of projects but is much less restrictive: total credits allocated may not exceed 50% of the CO₂ credits available on the exchange. In the case of the RGGI, the limit is equal to half of the amount of emission reductions.

The other systems currently in operation or being structured (New South Wales, Canada and the RGGI) do not put limits on the number of projects that can receive credits.

Trading prices

The purchase price of a credit and its comparison with the price of the emission permit allocated to mandatory participants will have a significant impact on the completion of projects and whether or not there will be a mass market for these credits. If the price is too high, it will be difficult to sell credits and the project mechanism will not genuinely provide additional flexibility to the mandatory participants. If the price is too low, it will prevent CO₂ credits from playing a leveraging role with regard to emission reduction projects. Many factors influence these prices, including market liquidity and the number of buyers and sellers. Certain project mechanisms include systems that tend to regulate prices.

\(^{13}\) If these AAUs are "green" (a term that has not yet been precisely defined – see Appendix III on "greening").
Asset prices can thus be limited by a full discharge penalty imposed on participants\(^\text{14}\): if the emissions generated by a mandatory participant exceed the amount of its CO\(_2\) assets, it may pay a fixed fine per additional metric ton. The amount of the fine in fact corresponds to the maximum value that the CO\(_2\) assets (permits or credits) can reach: beyond that limit, participants will prefer to pay the fine.\(^\text{15}\) Such a system has been chosen in New South Wales. The amount of the penalty is AUD 10.50 (around €6.25), a price well below the actual price of a metric ton of CO\(_2\) on the European market, for example.

Canada's system is slightly different. The public authorities have guaranteed that the price per metric ton of CO\(_2\) will not exceed CAD 15 (around €10). To meet their commitments, mandatory participants may therefore pay CAD 15 per excess metric ton\(^\text{16}\) emitted into a research fund focused on low-emission technologies.

The Chicago Climate Exchange has chosen to align the price of credits generated by projects with the price of emissions permits: all CO\(_2\) assets trade on an electronic exchange at the same price. An order to buy CO\(_2\) can therefore be met either by emission permits or project-generated credits. The current price of these assets is around USD 1.

\textit{Areas covered still limited}

Each project mechanism covers precise areas: all projects that reduce GHG emissions are not necessarily eligible for credits. Project choices are influenced by the areas to which the countries give priority, the estimated sources of potential emission reductions and policies already in force.

Renewal energy plays an important role in the mechanisms that have been implemented: e.g. it is involved in virtually all the projects that have been selected in New Zealand. Amongst the sources of renewal energy, power generation using landfill gas, which also reduces methane emissions, is particularly well represented.

Fixing CO\(_2\) via forest, or to a lesser extent agricultural soils, and reducing agricultural methane emissions are also widely accepted by the various mechanisms. Examples include the recent approval in New South Wales of a project to plant 30,000 hectares of eucalyptus, and two of the three projects approved to date by the CCX involve agriculture (soil sinks and methane). The Canadian system is also largely focused on agriculture and forests with regard to its project mechanism.

However, the New South Wales scheme is alone in accepting projects to reduce energy consumption (Demand-Side Abatement Projects), notably in buildings and the service sector, projects which are integrated into “white certificate” systems in certain countries. The likely reason is that accepting such projects can result in double counting. Moreover, the industrial and transport sectors are poorly represented both in terms of coverage by the various mechanisms and in terms of the number of projects (a single industrial project and no transport projects). Industrial facilities in fact are often subject to other types of measures and may even themselves be mandatory participants in a trading system, as is the case in Canada. The absence of transport projects can be attributed partly to the high cost of each metric ton avoided and to the difficulty of measuring and assessing emission reductions.

For its project mechanism, New Zealand had chosen to focus on certain types of emission reductions: its first call for proposals explicitly favoured renewable energy. Canada's PERRL purchasing programme operated on the same principle for the “purchase” by the State of emission reductions and each call for proposals concerned one particular area and had a specific budget.

\(^{14}\) The penalty paid by participants in the European Union Emissions Trading Scheme which are in non-compliance does not fully discharge them.

\(^{15}\) does this make sense – I would have thought “up to that limit…”

\(^{16}\) Up to a maximum of 9 million metric tons of CO\(_2\) for all participants
**Importance of the national inventory**

For countries included in Annex B to the Kyoto protocol (countries subject to commitments), the implementation of emission reduction projects impacts their compliance with the Kyoto objectives only if the emissions reduced by the project result in an equivalent reduction in the national emissions inventory. This is not necessarily the case for certain types of emissions, notably diffuse emissions, since the inventories are based on standard factors when more precise data is not available\(^\text{17}\). Several mechanisms, notably those of Canada and New Zealand, have therefore included amongst project eligibility criteria the inclusion in the national inventory of the emissions reduced.

**4- Conclusions**

Despite their recent origins, project mechanisms are meeting with increasing success. They seem to fit naturally as a complement to emissions trading schemes as a means to include in an incentive scheme non-mandatory participants, diverse sources of emissions, the greenhouse gases not included in the allowance trading systems and projects outside the zone covered by these systems.

The diversity in the implementation of the mechanisms we have reviewed reveals that there are certain essential choices to be made in implementing a new project mechanism. One such choice is between a local or a national unit of credit. Another involves fungibility with other types of assets. These choices determine the potential buyers of the credits, an aspect that has an important role in terms of market liquidity and depth. How the public authorities interact with the mechanism is another important factor: should they intervene at the level of price for example, by setting limits? Should they buy credits? What should be the procedures for obtaining administrative approval for a project?

Europe will be required to find answers to these questions should it choose to strengthen the impact of its emissions trading scheme by establishing a domestic offset project mechanism.

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\(^{17}\) In France, emissions generated by enteric fermentation of cattle are estimated based on the number of heads. In current circumstances therefore, a reduction in emissions due to feeding practices that would not change the number of heads would not have an impact on the French inventory or on France's compliance with Kyoto requirements.
<table>
<thead>
<tr>
<th>Name</th>
<th>Country or region</th>
<th>Launch date</th>
<th>Mandatory participants</th>
<th>% of the region's emissions</th>
<th>Reduction goals</th>
<th>Penalty for non-compliance</th>
<th>Other assets that can be used for compliance purposes</th>
<th>Project Mechanism</th>
<th>Name</th>
<th>Geographic region</th>
<th>Areas covered</th>
<th>Type of credits delivered</th>
<th>No. of approved projects</th>
<th>Corresponding amount of credits (tCO2eq)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kyoto</td>
<td>164 States</td>
<td>16 Feb 05</td>
<td>34 States</td>
<td>61.8%</td>
<td>5.2% relative to 1990 level for the period from 2000 to 2012</td>
<td>Not provided</td>
<td>CERs, ERUs</td>
<td>Clean Development Mechanism</td>
<td>Countries not in Annex B</td>
<td>16 areas including energy, industry, transport, fluoridize GHGs, waste, planting and reforesting of forests</td>
<td>CERs</td>
<td>15</td>
<td>6 million pa</td>
<td></td>
</tr>
<tr>
<td>Joint Implementation</td>
<td>Annex B countries (investment must be by country other than the host country)</td>
<td>Unlimited</td>
<td>ERUs</td>
<td>0</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Green investments schemes</td>
<td>Certain Eastern countries, Russia</td>
<td>Varies from country to country, can include institutional strengthening and capacity enhancement programmes</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Projects to Reduce Emissions</td>
<td>New Zealand</td>
<td>Vary with calls for proposals</td>
<td>AAUs</td>
<td>39</td>
<td>10 million from 2003 to 2012</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chicago Climate Exchange</td>
<td>North America</td>
<td>2003</td>
<td>Voluntary participation (currently around 30)</td>
<td>4% of total US emissions</td>
<td>1% pa from 2003 to 2016</td>
<td>Not provided</td>
<td>Domestic credits*</td>
<td>Offset</td>
<td>North America and Brazil</td>
<td>Forest and agricultural land sinks, landfill gas, agricultural methane, renewable energy</td>
<td>Certificates (four types depending on project)</td>
<td>3</td>
<td>300,000 pa</td>
<td></td>
</tr>
<tr>
<td>Large Emissions System</td>
<td>Canada</td>
<td>End-2005</td>
<td>Large industrial emitters (thermal power, mining and manufacturing, oil, gas) Around 700 companies</td>
<td>Around 50%</td>
<td>45 million tCO2es relative to benchmark scenario</td>
<td>Price ceiling = CAD 15</td>
<td>&quot;Green&quot; AAUs, CERs, domestic offset credits, investment in clean technologies</td>
<td>Offset</td>
<td>Canada</td>
<td>Mainly forest, agriculture, landfill gas</td>
<td>Offset credits</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Regional Greenhouse Gas Initiative (RGGI)</td>
<td>Nine North Eastern US States (may be extended)</td>
<td>2008</td>
<td>Power plants with capacity of more than 25 MW (around 600)</td>
<td>0.26</td>
<td>Stabilization at 150 MCO2 until 2015, then 10% reduction between 2015 and 2020</td>
<td>Financial penalty (without full discharge)</td>
<td>Domestic credits, European allowances, CERs</td>
<td>Offset</td>
<td>RGGI States</td>
<td>Landfill gas, forest plantations, SFI (sustainable forest initiative), energy efficiency (natural gas and domestic heating oil)</td>
<td>Allowances identical to those allocated to mandatory participants</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>New South Wales Abatement Scheme</td>
<td>New South Wales (Australia)</td>
<td>Early 2003</td>
<td>Power stations and some other participants (total of 32 in 2005)</td>
<td>0.4</td>
<td>7.27 tCO2e for power generated per annum by 2017</td>
<td>AUD 10.50 (US 6.25)*</td>
<td>NGAICs, REC's (green certificates)</td>
<td>Offset</td>
<td>NSW</td>
<td>Power generation, energy savings, forest sinks, industry</td>
<td>NGAICs</td>
<td>127</td>
<td>12.2 million from 2003 to 2005</td>
<td></td>
</tr>
</tbody>
</table>

Note: The information provided is subject to change in the case of mechanisms current being structured.
### Appendix I: Glossary of CO₂ assets

*One unit of each asset corresponds to one metric ton of CO₂ equivalent.*

#### Kyoto and similar assets

**Assigned Amount Unit (AAU):** units attributed to participating States by the Kyoto system for the period from 2008 to 2012, corresponding to the maximum amount of GHG that they can emit.

**Green AAU:** unit that corresponds to AAUs whose sale proceeds are reinvested in GHG emission reduction programmes or other environmental projects.

**Certified Emission Reduction (CER):** credit delivered to projects under a Clean Development Mechanism (CDM).

**Emission Reduction Unit (ERU):** credit delivered to projects under a Joint Implementation (JI) mechanism. In fact, the country hosting the project converts one of its AAUs into an ERU.

#### Asset in other markets

**European Union Allowance (EUA):** tradable emission allowances delivered to facilities in the sectors covered by the European allowances directive (2003/87 EC).

**New South Wales Greenhouse Abatement Certificate (NGAC):** credit delivered to emission reduction projects by the New South Wales system.
Appendix II – Project mechanisms

What is a project mechanism?

Project mechanisms provide voluntary participants with the opportunity to obtain "CO₂ credits" in exchange for the implementation of projects that reduce greenhouse gas (GHG) emissions relative to a benchmark scenario.

These mechanisms are linked to a GHG cap-and-trade system, in which participants (companies, States, etc.) are subject to restrictions on their emissions through the delivery of "emission permits". These permits can be traded by the mandatory participants. The CO₂ credits generated by projects can be sold to participants in this market, who use them for compliance purposes as they do emission permits.

Functional schema of a project system linked to an emissions trading scheme

A participant's total amount of GHG emissions must be equal to the number of "CO₂ assets" (CO₂ emissions permits or credits) it holds at the end of a period.

Example of the compliance of a mandatory participant with its GHG emission restrictions

18 Some markets are limited to CO₂, while others have been extended to more than one gas. For the sake of clarity, we use the term "CO₂ assets" to refer to all the various types of GHG permits and credits.
A domestic offset project is one in which the investor's country of origin is the same as the country in which the project is implemented (e.g. a project developed in Germany by German project sponsors).

**Application: the Clean Development Mechanism (CDM)**

The Kyoto protocol includes provisions for two types of project mechanism: the Clean Development Mechanism (CDM) and Joint Implementation (JI). The CDM is currently the more advanced of the two and enables projects carried out in the countries not in Annex B (therefore in developing countries that have ratified the Kyoto protocol) to generate carbon credits in exchange for GHG emission reductions. At the end of August 2005, 15 projects had been approved, representing savings of 6 million metric tons of CO$_2$ pa.

The credits generated by CDM projects, or Certified Emission Reduction (CER) units\(^\text{19}\), may be used for compliance purposes by participants in the Kyoto system, i.e. the Annex 1 countries. As a result, a country that has committed to emitting 100 over the period from 2008 to 2012 but in fact emits 110 can offset its excess emission by buying 10 CDM credits.

In order for a CDM project to be approved (and therefore receive credits), it must submit to an approval procedure verifying compliance with eligibility criteria. These criteria include, amongst others:

- The approval of the project by the host country
- Additionality: the emission reductions must be in addition to those that would be generated in the absence of the project

The credits delivered correspond to the amount of GHG emissions avoided in relation to a benchmark scenario (see chart).

![Conversion of the emissions avoided by a project into "emission credits"](image)

All projects must provide systems for tracking and measuring emissions to verify that GHG emission reductions actually occur.

The European Union Emissions Trading Scheme has also provided a link to the project mechanisms provided for in the Kyoto protocol. For example, a European manufacturer subject to allowances may use CDM credits for compliance purposes.

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\(^{19}\) See Appendix I, glossary of CO$_2$ assets
Macro and microeconomic interest of project mechanisms

Project mechanisms make it possible to extend the scope of a trading system by including sectors that are not covered and/or by including additional geographic regions. This is true in particular for sectors whose emissions are too diffuse to enter into a cap-and-trade system (e.g. the agriculture, building and transport sectors), but which have genuine potential for reducing emissions. Project mechanisms thus provide an economic incentive to the implementation of projects in these sectors.

In addition, these mechanisms provide flexibility to mandatory participants and enable reducing the overall cost of emission reductions for a given constraint. In fact, the market will favour projects whose cost per metric ton avoided is the lowest, which will result in a reduction in the cost of reducing emissions for mandatory participants. This is consistent with the search for economic efficiency in emission reductions since the latter have the same impact regardless of sector and geographic location.

Lastly, project mechanisms make it possible to provide data to the public authorities with regard to the cost and sources of emission reductions (by favouring the most cost-effective projects). This is of significant importance since gaining access to such information is costly and complex. Through the market mechanism, domestic offset projects enable locating sources of emission reductions that have not yet been identified and understanding their cost.
Appendix III: The greening of the Kyoto allowances

The greening of the Kyoto allowances

Certain countries in Eastern Europe and Russia have stocks of Assigned Amount Units (AAUs) in excess of their own needs. As from 2008, they will therefore be able to sell part of these so-called "hot air" units on the international market. Given the reluctance of some States to buy this hot air, some of the countries with surpluses are putting in place Green Investment Schemes (GIS) whose aim is to reinvest the proceeds from the sale of AAUs in environmental projects.

This so-called "greening" approach can take several forms:

- Investments in projects that reduce GHG emissions and which are therefore similar to CDM projects (this is called the "hard greening" approach)
- Investments in more horizontal efforts that result in GHG emission reductions but which are more difficult to quantify: awareness-raising and information campaigns, capacity building, strengthening institutions, etc. (the "soft greening" approach)
- Investments in environmental projects other than those reducing GHG emissions

These approaches, in particular the "hard greening" approach, thus have similarities with the project mechanisms described in this report. However, there is a significant difference in that transactions (the sale of emission permits) take place prior to the launch of the project and the quantity sold does not necessarily correspond to an equivalent reduction resulting from the project.
The Australian State of New South Wales has put in place a mandatory system whereby a certain number of electricity retailers and users are obliged to reduce their emissions. The system, which has been operational since early 2003, aims at reducing the CO\textsubscript{2} intensity of electricity generation in the region and is linked to a project mechanism that generates tradable emission reduction certificates.

**The New South Wales trading system**

The government of New South Wales has set obligations to reduce emissions progressively for electricity generation to reach 7.27 metric tons of CO\textsubscript{2} per inhabitant by 2007, which corresponds to a reduction of 5% relative to the level in 1990. For 2003, the goal was for 8.65 metric tons per inhabitant which then had to be gradually reduced to the target level for 2007 and subsequently be held at that level until at least 2012.

The obligations are set annually for each participant, as a function of the State's population, the mandatory participant's participation and the region's total electricity generation. Voluntary participants (users) have emission reduction goals determined as a function of their electricity consumption and their share of the region's total consumption.

Each year, participants whose emissions exceed the forecast level can surrender emission reduction certificates (see below) corresponding to the difference between their actual emissions and the level required by the system. They can also use Renewable Energy Certificates (RECs), which are the equivalent of "green certificates" and correspond to the purchase of electricity generated using renewable energy. A coefficient is applied to attribute an amount of CO\textsubscript{2} avoided to each REC. In 2003, these green certificates accounted for 30% of all the certificates delivered by the participants.

A penalty providing full discharge of AUD 10.50 (€6.25), which is adjusted annually for inflation, is imposed on participants that fail to meet their obligations to reduce emissions. This expense cannot be deducted for tax purposes (companies pay a 30% marginal rate), and is thus equivalent to a tax-deductible expense of AUD 13.65 (€8.15). This results in a de facto ceiling for the price of a certificate.

The extension of this system to other Australian States is currently under review.
Domestic offset project mechanism

New South Wales Greenhouse Abatement Certificates (NGACs) are delivered in certain circumstances and enable participants to offset part of their emissions.

The following emission reductions are eligible:

- **Low CO\textsubscript{2} intensity electricity generation**
- **Activities leading to a reduction in energy consumption** (Demand Side Abatement or DSA, the equivalent of our white certificates) via improved energy efficiency or the substitution of energy sources. To date, most DSA projects have concerned energy efficiency: low-power light bulbs, the replacement of heating and cooling systems with more efficient systems, etc. The projects involve either industrial facilities, commercial premises (supermarkets, banks, hotels, etc.), or households. Projects involving households require an "aggregator" grouping together the total emission reductions. For example, an electricity retailer gave individual consumers 500,000 compact fluorescent bulbs in exchange for a commitment in writing to use them and a statement transferring their rights to create NGACs to the retailer. In 2004, emission reduction coefficients were introduced to simplify measurements and calculations.
- **CO\textsubscript{2} forest sinks**: only projects involving planting or replanting are accepted and planting must take place after 2003. However, the credits delivered are permanent and must correspond to a forest that will stand for at least a century.
- **Industrial emission reduction** (not linked to the consumption of electrical power): the system's voluntary participants may receive credits for industrial emission reductions not linked to their consumption of electricity. These credits are then to be used to offset greenhouse gas emissions linked to that consumption. Unlike other types of credits, these cannot be traded.
- **Projects for electricity generation using renewable energy** can choose between "green" renewable energy certificates ("RECs") and NGACs. At current prices, the REC is financially advantageous. Certain projects may even accumulate the two types of certificates: e.g. a project for generating electricity using landfill gas may obtain NGACs for the neutralisation of methane and RECs for substituting renewable energy for fossil fuels.

Each type of project is subject to precise rules that determine how many credits can be allocated and in what conditions. Financial additionality is not required.

In 2003, the system allocated 1.2 million certificates. At end-May 2005, a total of 12.2 million NGACs had been delivered to the various projects (there were 127 approved projects in January 2005), which was in excess of participants' requirements. However, more and more NGACs are used outside the system to enhance a participant's image (events, carbon-neutral products, etc).

The 127 approved projects include:

- 74 power generation projects with lower CO\textsubscript{2} emissions (many landfill gas projects)
- 51 consumption reduction projects (Demand-Side Abatement), corresponding to 560,000 certificates
- 1 industrial project (aluminium)
- 1 forest project (eucalyptus plantation by CO\textsubscript{2} Australia)

The system is administered by the Independent Pricing and Regulatory Tribunal (IPART), which also verifies that participants have met their obligations. The IPART reviews project proposals, provides detailed rules for calculating emissions and is responsible for auditing facilities and projects. Audit frequency depends on an ex-ante project risk assessment.
Appendix V: Government programmes to purchase emission reductions

Netherlands: CO2-Reductieplan

Between 1997 and 2002, the Netherlands implemented its "CO2-reductieplan", a programme whereby the government purchases emission reductions generated by domestic offset projects jointly sponsored by the Economy, Environment, Agriculture and Transport ministries. A total of €680 million was allocated to the programme from 1997 to 2005; of this amount €425 million was earmarked for investment projects.

The programme is open to companies, public bodies and NGOs. It is managed by the "Projectbureau CO2-reductieplan", and a cooperative effort of the Senter and Novem agencies is responsible for allocating subsidies on behalf of the ministries.

Further to calls for proposals, projects are assessed in term of cost efficiency, which is measured in terms of the amount of CO₂ reductions per euro of subsidy.

Pilot Emission Removals, Reductions and Learning (PERRL) programme

Launched in 2002, PERRL is a programme whereby the Canadian government purchases verified emission reductions generated by emission reduction projects. No "carbon credit" has been created.

Over all, around CAD 15 million (around €10 million) is allocated for these purchases. During the proposal process, each project sponsor indicates the unit amount which it proposes the government will pay for its emission reductions. If a project is selected, this is the amount that applies.

The following four areas are involved in the calls for projects:

- Landfill gas capture and flaring
- Geological CO₂ sequestration
- Renewable energy
- Agricultural land sinks and forest sinks

The following table summarises the four calls for projects that have been issued to date:

<table>
<thead>
<tr>
<th>Date</th>
<th>Amount allocated</th>
<th>Project types</th>
<th>No. of projects selected</th>
<th>Emissions avoided (tCO₂eq)</th>
<th>Price per tCO₂eq</th>
</tr>
</thead>
<tbody>
<tr>
<td>Autumn 2002</td>
<td>CAD 2.5m</td>
<td>Capture and flaring of landfill gas</td>
<td>4</td>
<td>900,000</td>
<td>From CAD 1.70 to CAD 6.90</td>
</tr>
<tr>
<td>Autumn 2002</td>
<td>CAD 2.5m</td>
<td>Geological CO₂ sequestration</td>
<td>0</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Autumn 2003</td>
<td>CAD 5m</td>
<td>Agricultural and forest sinks; renewable energy</td>
<td>Not available</td>
<td>600,000</td>
<td>Not available</td>
</tr>
<tr>
<td>Early 2005</td>
<td>CAD 5m</td>
<td>All</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

Of the four projects selected further to the first call for proposals, three were proposed by Canadian municipal authorities. The fourth was sponsored by André Simard and Associates Ltd, a municipal landfill manager, and had the highest price per tCO₂eq paid by the government (USD 6.90).
Research reports of the Caisse des Dépôts Climate Task Force

Research report N°1: “Carbon investment funds: general assessment of the market”
Ariane de Dominicis, January 2005

Research report N°3: “CO2 emissions exchanges and the functioning of trading systems”
Romain Frémont, June 2005

Research report N°5: « domestic offset projects »
Ariane de Dominicis, September 2005

Research report N°7: “Carbon investment funds: growing faster”
Ariane de Dominicis, November 2005

Executive summary of the report: “Expanding the means to combat climate change through domestic offset projects”
Emmanuel Arnaud, Ariane de Dominicis, Benoît Leguet, Alexia Leseur, Christian de Perthuis, November 2005

All publications and Climate taskforce’s quarterly newsletter available in English at:
http://www.caissedesdepots.fr/GB/espace_presse/fiche3.3.php

All publications available in French at:
http://www.caissedesdepots.fr/FR/espace_presse/fiche3.3.php
This research report was written on behalf of the Caisse des Dépôts Climate Task Force. The analyses and opinions expressed do not bind Caisse des Dépôts.

The Climate Task Force of Caisse des Dépôts is a company-wide unit that conducts and coordinates research and development work in the field of fighting against climate change.

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