WOULD PREFERENTIAL ACCESS TO THE EU ETS BE SUFFICIENT TO OVERCOME CURRENT BARRIERS TO CDM PROJECTS IN LDCs?

DISCUSSION PAPER

Contributing Authors
Paula Castro
Axel Michaelowa

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www.climatestrategies.org
Project Leader
Dr. Axel Michaelowa, University of Zurich

Contributing Authors

<table>
<thead>
<tr>
<th>Paula Castro, <a href="mailto:castro@pw.uzh.ch">castro@pw.uzh.ch</a></th>
<th>University of Zurich Institute of Political Science and Center for Comparative and International Studies Hirschengraben 56, 8001 Zurich, Switzerland</th>
<th>University of Zurich Institute of Political Science</th>
</tr>
</thead>
<tbody>
<tr>
<td>Axel Michaelowa, <a href="mailto:axel.michaelowa@pw.uzh.ch">axel.michaelowa@pw.uzh.ch</a></td>
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Would preferential access to the EU ETS be sufficient to overcome current barriers to CDM projects in LDCs?
Abstract

We try to answer the question whether preferential access to the carbon market is sufficient to overcome current barriers to CDM development in Least Developed Countries (LDCs). We first discuss the current status and a potential future supply of CDM projects in LDCs, and the barriers limiting CDM development in these countries. The new EU climate and energy package grants some limited preferential access to CERs from LDCs and allows restrictions to CER imports on the basis of quality considerations. Taking these policy options into account, we develop possible CER supply and demand scenarios for the period 2013-2020, in order to quantitatively assess their impact on CER supply from LDCs. We find that CER supply will likely not meet the demand. For LDCs, we conclude that a restriction limiting the supply of CERs from CDM projects registered after 2012 to just LDCs, would not have an important impact if the existing barriers for project implementation in these countries are not overcome. Other likely limitations in CER supply on the basis of project quality would have an even smaller effect on CDM project distribution across host countries. To complement the findings, we draw a comparison between a preferential access agreement in the agricultural trade system and the climate regime. Looking at the Lomé Conventions, we find further evidence that not just preferential access is important, but also reduced access costs, and that even so the impact of preferential access measures is limited if they do not address the underlying causes of lack of competitiveness. Only a few specific products gained from the Lomé preferences, due to increased incentives related to their added value. For the climate regime, this could be translated into added financial incentives for CDM projects with added value – such as strict additionality or sustainable development benefits. Finally, financing was identified as a critical issue to undertake these measures.
1. Introduction

Through the Clean Development Mechanism (CDM), greenhouse gas emission reduction credits from projects in developing countries can be acquired by industrialised countries to comply with their Kyoto Protocol emission reduction targets. By the end of 2008 (UNEP Risoe Centre, 2009), the CDM has mobilised almost 4500 projects, out of which 1300 have been formally registered with the CDM Executive Board (EB) and are thus accredited for generating Certified Emission Reductions (CERs). About 2.7 billion CERs are expected to be generated by these projects by 2012.

The CDM project portfolio is very unevenly distributed across potential host countries. China, India and Brazil account for over 71% of all projects and 76% of expected CERs. Least Developed Countries (LDCs) host just 41 CDM projects in the pipeline (0.9%), out of which only 10 projects are registered. Sub-Saharan Africa (SSA) hosts 66 projects in the pipeline, but South Africa, accounts for 41% of these (UNEP Risoe Centre, 2009).

In December 2008, the EU launched its climate and energy package for 2013-2020. Besides stating its climate mitigation commitments and the measures to achieve them, this package also establishes certain conditions on CER imports. CER imports are capped both in the EU ETS and the non-trading sectors. Nine EU member states have a special import quota for CERs from LDCs or Small Island Developing States (SIDSs). Further qualitative limitations on CER imports have not been agreed, but can still be added to this scheme. We thus see, for the meantime, an effort to grant preferential access to LDCs and SIDSs to the EU carbon market.

Could this measure really improve the participation of LDCs in the CDM?

In this paper, we first discuss the current status of the CDM in LDCs, and project their potential supply from secondary sources. Then we present an overview of the barriers limiting CDM development in poor countries. In section 3, we describe the new EU climate and energy package and its provisions to promote CER supply from LDCs and to possibly restrict CER imports on the basis of quality considerations. Section 4 develops possible CER supply and demand scenarios for the period 2013-2020, in order to quantitatively assess the impact of these policies on CER supply from LDCs in section 5. In section 6 we draw a comparison between a preferential access agreement in the agricultural trade system ad the climate regime.

2. The CDM in LDCs

2.1 Current supply of CDM projects from LDCs

According to the CDM Pipeline from January 2009 (URC, 2009), there are currently 41 CDM projects proposed in LDCs, out of which just 10 have already been registered by the CDM Executive Board. This represents just 0.94% of the whole CDM pipeline, or 0.77% of all registered projects so far. In terms of volume of credits, LDCs are expected to generate also just about 1% of all CERs projected till 2012 from the whole CDM pipeline.

If we look at LDCs in Sub Saharan Africa (SSA), the situation is even worse. While about 60% of LDCs are located in SSA, there are only two registered CDM projects in a SSA country that is also a LDC. LDCs in Asia are faring better than those in Africa in the CDM market, but even so, their presence in the pipeline is still marginal.
2.2 Potential supply of CDM projects from LDCs

There are still no comprehensive studies of the emissions abatement potential in LDCs, which shows the universal belief that emissions abatement options are larger and cheaper in countries with larger markets, larger emissions levels and more developed industries. Also, the potential is being first explored and exploited in countries where incentives and conditions are favourable: stable economic and political environment, existence of a decent infrastructure and availability of capital – this is not the case in LDCs. Therefore, most studies have concentrated on China, India and other large developing countries. However, there are a few studies pointing to the potential for the CDM in specific countries or regions within LDCs and SSA, which we summarise here with the aim of building as comprehensive a picture as possible.

A recent study commissioned by the World Bank (De Gouvello et al., 2008) has looked at the abatement potential in the energy sector in Sub Saharan Africa, using the existing CDM methodologies to identify technologies that could promote GHG emission reductions and at the same time support energy development in the region. They have thus built a bottom-up inventory of clean energy projects applying 22 technologies in 44 countries in SSA, which includes over 3200 projects, among them 361 programmes of activities. These projects would amount to more than 170 GW of additional power-generation capacity, with about 740 million tCO₂eq of emissions reductions per year or about 9.8 Mt CO₂eq over a project lifetime of 10-21 years. Comparing this theoretical potential with the real amount of CDM projects from these countries in the current market provides an idea of how huge the barriers for implementation are in these countries.

With respect to the LDCs outside Africa, there have been a few case studies on some of them, which can cast a picture of the challenges faced by these countries and their abatement potential.

In Maldives, Myanmar and Haiti, there are so far no CDM projects. While the two first ones have officially designated their DNAs, Haiti is still lagging in this respect.

Bangladesh was an early mover in the CDM, it has a well-established DNA and there were strong capacity building initiatives in this country. It hosts 2 registered projects and 2 in validation. However, the country is now stalled at this level, there do not seem to be new initiatives, and we do not know the background why this has happened. A website promoting the CDM in Bangladesh has been last updated in 2006. The potential of projects identified there amounts to almost 2 million CERs over the project lifetimes. Similarly, in Bhutan, there are 2 projects at validation and 1 registered, but further developments are not apparent.

Cambodia and Laos contribute with 0.022% and 0.015% towards the world’s total CO₂ emissions. They possess modest bases of indigenous energy resources, with small natural gas and coal reserves, and some hydro power and wood fuel potential. Their economies are mainly based on agriculture, and their total and per capita energy consumption is still very low. The early stage of economic development in both countries, and especially the high energy intensity in Laos, entail opportunities to improve energy efficiency. The existence of hydro, solar and biomass potential imply opportunities in the renewable energy sector. However, due to the probable small scale of these activities, the opportunities for the CDM in the energy sector in both countries are limited. Further, the investment environment in both countries is still considered as unattractive (Dang et al., 2006). From the institutional side, there have been quite large capacity building initiatives in both countries, which have helped establish the DNAs. Cambodia, as a result, could be considered the most successful LDC in the CDM, with 5 projects in the pipeline, three of which are already registered. Other project...

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1 This potential is referred to all SSA, including South Africa and other countries not belonging to the group of LDCs. The potential estimated for only LDCs in SSA amounts to 5.6 Mton CO₂eq over the whole crediting period.

2 http://cdmbangladesh.net/index.htm
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ideas, listed by Chea (2006), could provide about 2.8 million CERs over their lifetime. Laos hosts just one registered energy efficiency CDM project, but the bureaucracy is extremely heavy, which places further barriers for CDM development.

Nepal has received capacity building and has established a DNA. This country hosts two registered biogas power projects and one hydro project at validation. As of March 2006, there were also other 9 CDM project ideas under development in several categories, such as solar energy, cooking stoves, transportation, solid waste management, forestry and energy efficiency, with an overall potential of around 3.2 million CERs over 10 years (Uprety, 2006). All this indicates some interest and potential for the CDM in this country. However, there are still technical capacity problems that need to be overcome. The biogas power projects, supported by the World Bank and praised for their expected contribution towards sustainable development through the promotion of small-scale, decentralised biogas power systems in rural households, comprise the first case where the issuance of CERs was rejected, due to problems at monitoring.

Yemen established its DNA in 2003, but it remained inoperative due to lack or resources and capacity. Since then, the country has had a strong capacity building component, with over 20 workshops and initiatives to identify potential project opportunities, and between 2007 and 2008 the DNA has become fully operational, with a clear approval process and rules. So far, Yemen does not have any CDM projects in the pipeline, but the website of its DNA lists 5 projects at the Project Idea Note stage, with an overall potential of around 7 million CERs. Yemen’s abatement potential, mainly for small-scale projects but also for some larger ones, is related to waste water, renewable energy (solar, wind, geothermal), energy efficiency, landfill management, fuel switch and recovery of associated gases in the oil industry. Yemen’s economy still depends on donor assistance and has difficulties for attracting foreign direct investment, which is also an indicator of the barriers facing CDM development in the country. Thus, even though there is interest from investors for Yemeni CDM projects, most of these are oriented towards buying CERs and not towards investing in the projects. Unilateral CDM emerges as an option for this country, but only if appropriate sources of financing can be secured, which does not seem possible domestically in the near future (Sieghart, 2008; Sieghart, 2009).

The foreseeable short-term CER supply from all these countries, adding up the CDM projects presently in the pipeline and the individual project ideas in other LDCs mentioned above amounts to about 142 million CERs over the whole lifetime of the projects. This level is definitely dwarfed by the potential in China, India and other advanced developing countries, which considering the current CDM pipeline reaches almost 7.9 billion CERs. However, the theoretical potential for SSA estimated by the World Bank study (De Gouvello et al., 2008) would add a sizeable 2 billion CERs from Sub Saharan LDCs, if the implementation of these projects is achieved.

To finalise this section, we wanted to highlight the case of Honduras as a positive exception in the CDM market. Honduras is not a LDC, but is a relatively small and poor country, with a historically unstable political regime and unattractive investment climate – though these conditions are improving lately. Corruption and crime are high, access to finance is difficult. Despite substantial CDM capacity building that helped to establish a functional DNA, which was initially fully funded through development aid (Figuieres, 2002), replacement of staff after change of governments has led to losses in institutional experience and capabilities (Lokey, 2008; Keller, 2008). Still, as of end of 2008, Honduras hosts 25 CDM projects, 14 of them already registered. In terms of number of projects per GDP, it can be considered the most successful CDM host country (Keller, 2008). According to Keller (2008), most of its electricity is produced from fossil sources, so that the mitigation potential from renewable energy is significant, but not as large as in bigger countries. Further, Honduras was an early mover in the privatisation of the electrical sector in Central America, and financial incentives for

renewable energy are in place. However, the Honduran electricity system is highly inefficient, and prices can only be sustained due to subsidies from the National Electricity Enterprise (Lokey, 2008). Most importantly, Honduras probably has benefited from the leadership of a strong group of entrepreneurs in the renewable sector, who initiated all projects in its current pipeline. Through an association of renewable energy companies, the project proponents could pool experiences (Keller, 2008). There is also a local CDM consultancy, among with a couple of international ones with presence in the country (Lokey, 2008). This domestic leadership, coupled with the early support from international donors, may be the key for the success of this country in the CDM.

2.3 Barriers

What are the reasons for the marginal involvement of LDCs in the CDM? There are two, albeit related, sides of the answer. First, there is the attractiveness of host countries from the point of view of foreign CDM investors. Second, there are several more specific barriers that might be preventing the development and implementation of CDM projects in certain regions.

Jung (2005) looked at the attractiveness of host countries for CDM non-sink projects using cluster analysis. As factors influencing attractiveness she included emissions reduction potential (measured as expected absolute greenhouse gas emissions), institutional CDM capacity (index of Kyoto Protocol ratification, participation in the A11 pilot phase, timely establishment of a Designated National Authority and completion of a National Strategy Study) and general investment climate (index based on political stability, regulatory quality and rule of law taken from the World Governance Research Indicators Dataset by the World Bank). Out of the 114 host countries included in her study, 34 were LDCs. According to Jung’s results, about 74% of the LDCs in her sample are very unattractive, 24% have a limited attractiveness, and only 1 is attractive for non-sink CDM projects. It is interesting to note that this one attractive country, the Maldives, is not hosting any CDM project yet.

Using logistic regression, Dolšak and Bowerman Crandall (2007) analysed two groups of factors that might impact the location of CDM projects: host country attractiveness and investor country’s familiarity with the host country’s institutions. While confirming the importance of host country attractiveness (higher greenhouse gas emissions and presence of UNFCCC institutions) for CDM project location decisions, their analysis suggests that investors are even more likely to locate CDM projects in countries with which they have had prior exchanges, such as past bilateral trade and past bilateral aid. As explanation they posit that transaction costs of CDM project enforcement would be lower in familiar countries.

The barriers for CDM implementation in LDCs, especially in SSA, have been thoroughly discussed within the Nairobi Framework, an initiative launched at COP/MOP 2 in Nairobi (2006) with the aim of helping these countries to improve their level of participation in the CDM. Some authors discussing them are Muyungi (2006), Agyemang-Bonsu (2007), Ellis and Kamel (2007), Kinkead (2007), UNEP (2007), and the World Bank (2007).

One of the barriers most frequently mentioned is the limited institutional and technical capacity to develop and implement CDM projects. In the public sector, not only the CDM authorities (DNAs) need to be established and have a minimum budget, but also the institutional framework for the sectors where the CDM takes place (e.g. energy) is crucial. In the private sector, the existence of trained national CDM consultants is essential for coping with the complex CDM rules at affordable costs. The limited access to financing is an equally important barrier. On the one hand, domestic financial institutions lack capacity and awareness of the CDM as an investment option. On the other, the unattractive investment climate in these countries discourages foreign investors. Indeed, the CDM is mainly working as an additional revenue for companies that already have financing. Annex I countries and companies are investing in CDM projects only in countries where they are already present (e.g. through subsidiary electricity companies), where they see a market for their products,
and where stability is guaranteed (Lütken and Michaelowa, 2008). Thus, the availability of domestic finance is a key barrier for CDM in LDCs.

In Africa, the small size of the potential CDM projects makes them unattractive for investors, who are looking for larger projects where transaction costs and risks can be minimised. Further, the largest emission reduction potential lies in sectors that are not significant in the CDM at present (forestry, agriculture, reduction the use of non-renewable biomass); and the low grid emission factors make grid-connected renewable energy and energy efficiency projects unviable, with the exception of off-grid fossil fuel electricity generation. Another important barrier is the availability of data for baselines and monitoring: gathering this information is too costly just for one or two projects, so nobody wants to make this effort. Further, the lack of infrastructure (roads, large equipment but also for example laboratories for calibrating measurement devices) is another limiting factor for the CDM in LDCs.

3. The EU climate and energy package

Starting in January 2008 with a package of ambitious proposals by the European Commission, intense negotiations at the EU level between the Commission, the Council and the Parliament have finally given birth last December to the European Climate and Energy Package for 2013-2020. The EU has committed itself to reducing its overall emissions to at least 20% below 1990 levels by 2020, and to 30% below 1990 if a new global climate change agreement with comparable efforts by other developed countries is reached. The measures to reach these goals include an expansion of the European Emissions Trading System (EU ETS) and also stricter emissions reductions for sectors not included in the EU ETS.

This climate package imposes new limits on the amount of CERs from CDM projects and ERUs from JI projects that will be allowed to be imported into the EU ETS and the non-trading sectors. In the 20% emissions reduction scenario, the overall credit limit for the EU ETS in the period 2008-2020 (this is, including both Phases II and III) is about 50% of the reductions required by the system, or around 1550 million credits. This amount could increase if new installations, sectors or countries are incorporated into the EU ETS after 2013. Under the 30% reduction scenario if an international agreement is reached, additional 870 million credits could be imported between 2013 and 2020.

For the sectors not covered yet under the EU ETS, the limit for credit imports under the 20% reduction scenario has been set at 3% of their 2005 emissions or 4% for nine countries\(^4\) that comply with specific criteria, which corresponds to about 750 million credits over 2013-2020. The extra 1% granted to these 9 countries – equal to 80 million CERs - can be imported only from LDCs or Small Island Developing States (SIDSs). With a 30% reduction scenario, the import of up to 550 million additional credits would be allowed.

Assuming that the EU ETS credit imports would be distributed linearly along all years in the period 2008-2020, Table 1 summarises the potential CDM/JI credit demand from the EU for the period 2013-2020 under the scenarios with and without international agreement.

<table>
<thead>
<tr>
<th>Source</th>
<th>20% reduction (Mt CO(_2)eq)</th>
<th>30% reduction (with international agreement) (Mt CO(_2)eq)</th>
</tr>
</thead>
<tbody>
<tr>
<td>EU ETS</td>
<td>954</td>
<td>1824</td>
</tr>
<tr>
<td>Non-trading sectors</td>
<td>750</td>
<td>1300</td>
</tr>
<tr>
<td>TOTAL</td>
<td>1704</td>
<td>3124</td>
</tr>
</tbody>
</table>

\(^4\) Austria, Belgium, Cyprus, Denmark, Finland, Ireland, Italy, Luxembourg, Portugal, Slovenia, Spain, Sweden
There are some additional conditions for the acceptance of CERs or ERUs in the European system. While the additional restrictions on approved project types sought by the Commission (on the basis of a consideration of "high quality projects") were not approved, forestry credits will still be banned from the EU ETS, but are accepted for the non-trading sectors. Additionally, if no new climate agreement is reached, only the following CERs or ERUs will be accepted:

- Credits issued during 2008-2012
- Credits from projects registered before 2013, but issued later
- CERs from projects registered after 2013 in LDCs
- Credits from projects in countries where a bilateral agreement has been reached with this aim.

In the case that a new international climate agreement is reached, only credits from third countries that have ratified this agreement will be accepted from 2013.

Further qualitative criteria restricting the acceptance of credits in the EU system from 2013 onwards could still be agreed. The qualitative criteria proposed, discussed and discarded so far have been that only renewable energy and energy efficiency projects would be accepted; or that only "high quality" projects would be accepted. While it has been speculated that "high quality" could mean credits that are not based on reductions of industrial gases, credits that are based on projects with a clear sustainable development component, and/or credits with stronger additionality substantiation, this term was never clearly defined officially.

This new EU climate package gives a clear signal that credits from LDCs will be preferred, providing a specific demand for about 80 million credits from LDCs and SIDSs over 2013-2020. If no agreement is reached, initially only those post-2012 CDM projects located in LDCs will be allowed to deliver to the EU ETS. Some questions remain as to the extent to which these measures can boost CDM development in LDCs: Are other Annex I countries going to match this EU’s initiative, and to what extent? Will the financial and technical barriers for CDM development in LDCs be overcome through these measures? And even if they are, will LDCs be able to match this demand with an adequate supply?

In the following section we present a few possible post-2012 climate policy and carbon demand scenarios, which will be matched with our estimations of carbon credit supply from CDM projects.

4. Post-2012 climate policy and market demand-supply scenarios

In order to assess the effect of possible preferential access for LDCs and other policy scenarios for the future CDM, we create carbon credit demand and supply scenarios with and without an international agreement for the period 2013-2020.

4.1 Demand scenarios

For the demand scenario without agreement, we take the above described EU 20% case, and current greenhouse gas reduction targets announced by other individual Annex I governments, which are not contingent on an international agreement. For the scenario with agreement, we take the 30% target for the EU and tighter targets for other Annex I governments, which we expect could be agreed during the coming negotiations. We thus build three demand scenarios, as described in Table 2.
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Table 2: Carbon credit demand scenarios 2013-2020: assumed emission reduction targets

<table>
<thead>
<tr>
<th>Country / Group</th>
<th>Scenario 1: No agreement</th>
<th>Scenario 2: International agreement</th>
<th>Scenario 3: Financial crisis</th>
</tr>
</thead>
<tbody>
<tr>
<td>EU-27</td>
<td>20% below 1990, credit import up to 50% of reduction effort</td>
<td>30% below 1990, credit import up to 50% of reduction effort</td>
<td>Same as in Scenario 2, but emissions during first two years are 3% less than in the base case</td>
</tr>
<tr>
<td>US</td>
<td>Back to 1990 emission levels</td>
<td>10% below 1990 levels</td>
<td></td>
</tr>
<tr>
<td>Canada</td>
<td>Back to 1990 emission levels</td>
<td>10% below 1990 levels</td>
<td></td>
</tr>
<tr>
<td>Japan</td>
<td>10% below 1990 levels</td>
<td>20% below 1990 levels</td>
<td></td>
</tr>
<tr>
<td>Australia</td>
<td>5% below 2000 levels</td>
<td>15% below 2000 levels</td>
<td></td>
</tr>
<tr>
<td>Russia</td>
<td>20% below 1990 levels</td>
<td>30% below 1990 levels</td>
<td></td>
</tr>
<tr>
<td>Belarus and Ukraine</td>
<td>20% below 1990 levels</td>
<td>30% below 1990 levels</td>
<td></td>
</tr>
<tr>
<td>Other Annex I</td>
<td>20% below 1990 levels (including Turkey with 5% below 2012 levels)</td>
<td>30% below 1990 levels (including Turkey with 10% below 2012 levels)</td>
<td></td>
</tr>
</tbody>
</table>

As baseline emissions we use the figures taken by the EU Parliament in their calculations for the climate package described above; European Environmental Agency (EEA) projections for non-EU European countries (EEA, 2005); energy-related CO₂ emissions from the Energy Information Administration (EIA) of the US Department of Energy and extrapolations of UNFCCC inventories for forestry and non-CO₂ emissions for the USA, Canada and Russia (EIA, 2008a; EIA, 2008b; UNFCCC, 2008); projections from the Australian Government for Australia (Australian Government, 2008); and extrapolations of UNFCCC emissions inventories for the years 2000-2005 for other countries (UNFCCC, 2008).

We only assume that CERs are required to be supplementary to domestic emissions reductions in the EU-27 case, as this group has already announced that only 50% of the effort may be covered from emissions credits. For the other countries, we assume that up to 100% of the required reductions could be covered through the CDM. We choose, where available (Australia and other European countries), the low emissions path projections, which would account to some extent for some domestic mitigation action.

The resulting demand scenarios are shown in Table 3 and Figures 1-3.

Table 3: Carbon credit demand scenarios 2013-2020: Projected demand for CERs/ERUs

<table>
<thead>
<tr>
<th>Country / Group</th>
<th>Scenario 1: No agreement</th>
<th>Scenario 2: International agreement</th>
<th>Scenario 3: Financial crisis</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Demand for CERs/ERUs 2013-2020 (Mt CO₂eq)</td>
<td>Demand for CERs/ERUs 2013-2020 (Mt CO₂eq)</td>
<td>Demand for CERs/ERUs 2013-2020 (Mt CO₂eq)</td>
</tr>
<tr>
<td>EU-27</td>
<td>1704</td>
<td>3124</td>
<td>3101</td>
</tr>
<tr>
<td>US</td>
<td>2603</td>
<td>5038</td>
<td>4677</td>
</tr>
<tr>
<td>Canada</td>
<td>3302</td>
<td>3520</td>
<td>3457</td>
</tr>
<tr>
<td>Japan</td>
<td>205</td>
<td>736</td>
<td>668</td>
</tr>
<tr>
<td>Australia</td>
<td>740</td>
<td>976</td>
<td>939</td>
</tr>
<tr>
<td>Russia</td>
<td>-1462</td>
<td>116</td>
<td>-29</td>
</tr>
<tr>
<td>Belarus + Ukraine</td>
<td>-553</td>
<td>-120</td>
<td>-154</td>
</tr>
<tr>
<td>Other Annex I</td>
<td>762</td>
<td>916</td>
<td>882</td>
</tr>
<tr>
<td>Total</td>
<td>7301</td>
<td>14306</td>
<td>13540</td>
</tr>
</tbody>
</table>
**Figure 1: Carbon credit demand 2013-2020 for the “no agreement” scenario**

**Figure 2: Carbon credit demand 2013-2020 for the “international agreement” scenario**
4.2 Supply scenarios

How will CDM project submission develop in the future? As in the past, start-up of new project types such as supercritical coal power plants, carbon capture and sequestration and forestry could lead to rapid changes in the composition of the inflow. Moreover, the interpretation of additionality by the EB and changes in baseline methodologies can have sudden and massive impacts. Supply would decrease if a project category is suddenly deemed non-additional as happened with cement blending. Supply might increase as two non-renewable biomass methodologies were approved by the Bali COP, resolving an issue that had prevented such projects with high development benefits for two years. However, in Bali no decision on new HFC-23 projects could be taken and, as expected, no decision on carbon capture and storage (CCS) was made. It is of note that India, which has a high CCS potential, opposed to the inclusion of CCS in the CDM stating that “sustainable development is the primary objective of the CDM.”

Another key influence is the development of post-2012 negotiations, including present Annex B countries pressing for increased mitigation actions by developing countries, and, as outlined above, possible limitations on the import of CERs on the basis of “quality” considerations.

Due to these manifold influences, it is extremely difficult to forecast the total CER volume. Besides the inflow of new project types and projects of types that are already in the CDM pipeline, the key parameters influencing supply are the delay of project implementation, non-validation rate of submitted projects, the rejection rate of validated projects and the performance rate of registered projects. We therefore derive our supply scenarios based on the projected 2020 CERs from UNEP Risoe Centre’s CDM Pipeline (UNEP Risoe Centre, 2009), modified in order to account for these parameters.

We use the following formulae to project CER supply volumes:
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(1): Total CERs projected up to 2020 from CDM projects registered until 2012:

\[ CER_{\text{subm}2020} = \left( \left( CER_{\text{subm}} + \sum_{2008}^{2012} CER_{\text{infl,}y} \right) p_{\text{valid}} \times \left( 1 - p_{\text{rej}} \right) + CER_{\text{reg}} \right) \times p_{\text{perf}} \]

Where:
- \( CER_{\text{subm}} \) = CER volume by 2020 listed in PDDs of currently submitted projects
- \( CER_{\text{infl,}y} \) = CER volume by 2020 listed in PDDs of projects to be submitted in each year between 2008 and 2012
- \( p_{\text{valid}} \) = probability of validation of projects currently submitted and submitted until 2012
- \( p_{\text{rej}} \) = probability of rejection of validated projects by the CDM EB
- \( CER_{\text{reg}} \) = CER volume by 2020 listed in PDDs of currently registered projects
- \( p_{\text{perf}} \) = CER issuance rate in % of CER_{\text{reg}}

We do not include possible delays in this formula because for projects with a 10-year crediting period starting before 2010, any delay will not change overall CER volumes. Only for projects with 7 year periods renewed, delay matters.

(2): Additional CERs projected up to 2020 from projects registered between 2013 and 2020:

\[ CER_{\text{add}2020} = \left( \sum_{2013}^{2020} CER_{\text{infl,}y} \times d_{\text{delay,}y} \right) p_{\text{valid}} \times \left( 1 - p_{\text{rej}} \right) \times p_{\text{perf}} \]

Where:
- \( CER_{\text{infl,}y} \) = CER volume by 2020 listed in PDDs of projects to be submitted in each year between 2013 and 2020
- \( d_{\text{delay,}y} \) = percentage of pre-2021 CERs remaining due to delay of project implementation, for each year, calculated according to equation (3)
- \( p_{\text{valid}} \) = probability of validation of projects currently submitted and submitted until 2012
- \( p_{\text{rej}} \) = probability of rejection of validated projects by the CDM EB
- \( p_{\text{perf}} \) = CER issuance rate in % of CER_{\text{reg}}

Until recently, it was unknown which projects have failed validation as validators did not publish their rejections. In January 2008, the head of the DOE Forum stated in the context of the 38th EB meeting that the five largest DOEs had rejected 369 projects during validation. About two thirds of the rejections were due to a lack of additionality. If one puts the number in relation with all projects registered and submitted for registration by January 2008, the share of rejections would be 32%. Thus, for the probability of validation of projects we assume, for a business-as-usual case, 70%.

Our assessment of 288 projects which had achieved CER issuance by early 2008 shows an average performance of 98.2% of predicted CER generation. We use this figure for the CER issuance rate in the business-as-usual case. However, issuance performance varies greatly across project types, so that the median performance is only 82%. We use this median for modeling stricter CDM supply scenarios.

Delays in development of projects lead to loss of CERs before a certain date (2012 or 2020), even if not all of them lead to an overall loss of CERs if the CDM continues afterwards\(^5\). The

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\(^5\) If a project suffers a delay in its registration while its operations have started already, it will lose the CERs for the emission reductions achieved before the date of registration. As project developers can change the start date of a project’s crediting period once after registration by simple communication to the CDM Executive Board, a delay of implementation of an already registered project does not lead to
effect of this delay on estimated CER volumes depends on the remaining crediting period of a project and would thus theoretically have to be summed up by project. This also applies to those registered projects whose crediting period only starts in the future. Therefore, the impact of the delay depends on the shape of the CER inflow over time. Assuming that the crediting period of all projects coming in during a year would on average begin in the middle of this year, the discount of CERs due to delay can be quantified in the following functional form:

(3): Project delay function:

\[
delay_{\text{year}} = \frac{duration_{\text{pre-2021}} - delay}{duration_{\text{pre-2021}}}
\]

Where:
- \(d_{\text{delay, year}}\) = share of pre-2021 CERs in terms of projected CER level for projects submitted during this year remaining due to delay of project implementation
- \(duration_{\text{pre-2021}}\) = number of months between July of year until end of December 2020
- \(delay\) = delay of project implementation (months)

We assume, for all projects, that the delay in project implementation averages 6 months.

So far, 87 projects out of 1753 that have requested registration have been rejected by the CDM EB, which results in an average 5% probability of rejection. However, rejection rates have increased over time, from less than 2% in 2005 to 10% in 2007 and early 2008 (UNEP Risoe Centre, 2009). As there is no indication of falling rejection rates, we take 10% as input for our business-as-usual projection of CDM supply in 2013-2020.

Using the formulas and parameters described above, we generate six CER supply scenarios for the period 2013-2020. In a very strict scenario, only the credits generated from projects registered up to 2012 would be accepted in the global carbon market (Scenario A). In a status quo scenario, the CDM would continue with the same rules, stringency and host countries as today, continuing to increase the credit supply beyond 2012 (Scenario B). Following a “high quality CERs” demand by the EU, Annex I countries could agree to no longer accept credits from industrial gas projects, which builds the basis for our Scenario C. Following an equity-based cap on CERs, Annex I countries could agree to only accept CERs from LDCs for projects registered after 2012 and to create appropriate incentives that promote CDM development in this region (Scenario D). Stronger pressure by developing countries to accept REDD (reduced emissions from deforestation and degradation) and CCS (carbon capture and storage) projects and clarify rules for programmatic CDM could lead to a larger CDM supply (Scenario E). Finally, a stricter “high quality” scenario would allow CERs from post-2012 projects with stricter additionality considerations and again without industrial gas projects (Scenario F).

Table 4 provides an overview of these scenarios, their assumptions and calculations. In all cases, from the overall CER supply for 2008-2020, we deduct the CER demand projected for 2008-2012, which we have previously estimated will total 3300 Mt CO\(_2\)eq (Michaelowa, 2008). Taking into account the current geographical distribution of CDM projects, we estimate supply from following five regions: LDCs, Latin America, Europe and Middle East, Asia-Pacific other, Africa other. For scenario D, where only credits from LDCs are accepted from projects registered after 2012, we assume that CDM will be actively promoted in LDCs.
To account for this, we take 50% of the theoretical potential estimated by a World Bank Study for LDCs in Sub Saharan Africa (De Gouvello et al., 2008) and add it to the CERs projected from the CDM pipeline.

Table 4: CER supply scenarios 2013-2020: assumptions

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Description</th>
<th>Values for parameters</th>
</tr>
</thead>
</table>
| A - Only CERs up to 2012  | Only CERs generated from projects registered up to 2012 are considered for supply up to 2020 | $p_{valid} = 70\%$  
$p_{rej} = 10\%$  
$p_{perf} = 98\%$  
$supply = CER_{sum2020} - demand_{2008-12}$ |
| B - CDM same              | CDM continues with same rules, same stringency and same countries            | $p_{valid} = 70\%$  
$p_{rej} = 10\%$  
$p_{perf} = 98\%$  
$supply = CER_{sum2020} + CER_{add2020} - demand_{2008-12}$ |
| C - No new industrial gases | CDM continues with same stringency and countries after 2012, but without industrial gas projects | $p_{valid} = 70\%$  
$p_{rej} = 10\%$  
$p_{perf} = 98\%$  
$supply = CER_{sum2020} + CER_{add2020} (w/o ind gases) - demand_{2008-12}$ |
| D - After 2012 only LDCs  | For projects registered after 2012, only CERs from LDCs are accepted. Promotion measures to incentivise this supply are in place. | $p_{valid} = 70\%$  
$p_{rej} = 10\%$  
$p_{perf} = 98\%$  
$supply = CER_{sum2020} + CER_{add2020} (only LDCs) + CER_{LDC additional} - demand_{2008-12}$ |
| E - CDM enlarged          | CER generation between 2013 and 2020 with 50% higher potential each year     | $p_{valid} = 70\%$  
$p_{rej} = 10\%$  
$p_{perf} = 98\%$  
$CER_{ext}$ is multiplied by 150%  
$Supply = CER_{sum2020} + CER_{add2020} - demand_{2008-12}$ |
| F - CDM strict rules      | From 2013 onwards stricter additionality, no industrial gases: less validations, more rejections, smaller CER issuance rate | Up to 2012:  
$p_{valid} = 70\%$  
$p_{rej} = 10\%$  
$p_{perf} = 98\%$  
After 2012:  
$p_{valid} = 50\%$  
$p_{rej} = 15\%$  
$p_{perf} = 82\%$  
$supply = CER_{sum2020} + CER_{add2020} (w/o ind gases) - demand_{2008-12}$ |

The results of our projections are shown in Table 5:

Table 5: Carbon credit supply scenarios 2013-2020: Projected supply from CDM projects

<table>
<thead>
<tr>
<th>Scenario / Region</th>
<th>A Only CERs up to 2012</th>
<th>B CDM same</th>
<th>C No new industrial gases</th>
<th>D Only LDCs after 2012</th>
<th>E CDM enlarged</th>
<th>F CDM strict rules</th>
</tr>
</thead>
<tbody>
<tr>
<td>Africa other</td>
<td>107</td>
<td>166</td>
<td>167</td>
<td>107</td>
<td>196</td>
<td>141</td>
</tr>
<tr>
<td>Asia-Pacific other</td>
<td>3342</td>
<td>5211</td>
<td>5136</td>
<td>3342</td>
<td>6146</td>
<td>4355</td>
</tr>
<tr>
<td>Europe and Middle East</td>
<td>74</td>
<td>113</td>
<td>112</td>
<td>74</td>
<td>133</td>
<td>96</td>
</tr>
<tr>
<td>Latin America</td>
<td>560</td>
<td>810</td>
<td>799</td>
<td>560</td>
<td>935</td>
<td>695</td>
</tr>
<tr>
<td>LDCs</td>
<td>41</td>
<td>81</td>
<td>82</td>
<td>671</td>
<td>101</td>
<td>64</td>
</tr>
<tr>
<td>Total supply 2012-2020 (MtCO₂eq)</td>
<td>4124</td>
<td>6382</td>
<td>6297</td>
<td>4753</td>
<td>7511</td>
<td>5350</td>
</tr>
</tbody>
</table>
5. Estimating quantitative impact of scenarios on CER demand from LDCs

5.1 Supply-demand balance

The combination of our CER supply and demand scenarios is shown in Table 6. It should be noted that in this analysis we have disregarded the potential supply form JI projects, on the grounds that this instrument has not yet really taken off due largely to delays in host country approval and that it also constitutes mitigation effort from the side of Annex I countries.

<table>
<thead>
<tr>
<th>Scenario</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No agreement</td>
<td>International agreement</td>
<td>Financial crisis</td>
</tr>
<tr>
<td>A Only CERs up to 2012</td>
<td>3177</td>
<td>10182</td>
<td>9416</td>
</tr>
<tr>
<td>B CDM same</td>
<td>919</td>
<td>7924</td>
<td>7158</td>
</tr>
<tr>
<td>C No new industrial gases</td>
<td>1004</td>
<td>8009</td>
<td>7244</td>
</tr>
<tr>
<td>D Only LDCs after 2012</td>
<td>2548</td>
<td>9553</td>
<td>8787</td>
</tr>
<tr>
<td>E CDM enlarged</td>
<td>210</td>
<td>6794</td>
<td>6029</td>
</tr>
<tr>
<td>F CDM strict rules</td>
<td>1951</td>
<td>8956</td>
<td>8190</td>
</tr>
</tbody>
</table>

These figures indicate that under most scenarios, the CDM would not provide sufficient credits to cover the potential demand during 2013-2020. The resulting balance provides an idea of the domestic effort that Annex I countries (except the EU, which is already accounted for in the model), would have to make in order to comply with the targets assumed in the scenarios.

It should be noted that several of these combinations are not likely. Under a scenario with no agreement, for example, it is unlikely that the CDM will be significantly enlarged, as Annex I countries will not be willing to finance further project development in developing countries. It is also unlikely that all Annex I countries agree to only accept high quality CERs if they do not agree on a new common framework for climate change mitigation, but some parties or groups (as the EU) could decide to implement these limitations unilaterally. Thus, while not completely realistic, the combination of scenarios shows an overall picture of the range of possible balances in the future carbon credit market from the most optimistic to the most pessimistic possibilities, provided that our assumptions are sufficiently accurate.

More interesting is to look at how the supply would be spread across regions, which is shown in Figure 5. The graph shows again the large difference that might arise between demand and supply of carbon credits. But it also shows that under most scenarios, LDCs remain unimportant in the market.

We expected that specifically the scenarios without industrial gases, with strict rules or with CERs only from LDCs after 2012 could have an impact on supply from LDCs. However, industrial gases are no longer so important in the CDM pipeline. In 2004, 2005 and 2006, CERs projected to be supplied by industrial gas projects amounted to 44%, 57% and 39% of the whole CDM supply, respectively. In 2007 and 2008, new industrial gas projects represented only 8% and 4% of the new supply (in terms of amount of CERs). Thus, our estimations assume that new industrial gas projects decrease in the future, so that a limitation on these types of projects will not have a large impact in the market.
The scenario with strict rules is similar. As our assumptions on rejections, validation success and issuance success are constant across all project types and host countries, these strict rules do not provide for further supply from LDCs. Further work could refine our projections to include some degree of differentiation across project types, which would then be reflected in the shares of host countries according to their project portfolios.

Finally, the scenario with preferential access for LDCs after 2012 does show some improvement for these countries, but still, the supply from all other countries up to 2012 is much larger. We should also remember that this supply from LDCs will only materialise if the existing barriers for CDM project implementation in these countries are overcome.

![Figure 4: Supply-demand balance 2013-2020](image)

6. Discussion of preferential access options

In the world trade system, there is a case that could be used to illustrate the effect of preferential access options for a specific group of countries. The Lomé Convention, first signed in 1975 and renewed three times afterwards, is a trade and aid agreement between the European Union (at that time the European Community (EC)) and 71 so-called ACP (African, Caribbean and Pacific) countries. It establishes the basis for trade and development cooperation between these two groups of countries, on the one hand out of Europe’s interest to guarantee supply of raw materials, and on the other out of their wish to support ACP countries’ sustained development. The Lomé agreements set preferential access quotas for agreed agricultural products that could then enter the EC market free of duty. While these agreements are no longer in place due to their incompatibility with World Trade Organisation...
rules, they are still an interesting case study that could illustrate the limitations of preferential access policies.

According to Cosgrove (1994), ACP exports to Europe accounted for 3.4% of total EC imports in 1975, when the first Lomé Convention was signed. Due to the large the growth in EC trade, ACP exports declined to 3.2% of EC imports by 1985 and further to 1.5% in 1992. While ACP exports to the EC did grow, they could not keep pace with the growth in the European market. Cosgrove concludes that the Lomé Convention did not provide sufficient support to enable ACP countries to keep their market share, and that it therefore failed its goals.

The preferences generated by Lomé for ACP exports were highly dependent on the barriers that the EC placed for trade in general. For agricultural products, the general rule is that the more processed the product is, the more barriers it faces. Thus, ACP countries would have benefited most from adding value to their raw materials and exporting them to Europe in processed form. Trade also depends on the current prices of commodities. During the 1980s and 90s, the prices for agricultural products have mainly fallen, which had also a negative impact on ACP trade. Finally, the increase in trade from the preferred country group will also depend on the elasticity of demand for the product. The elasticity of demand for most ACP products in Europe is low, so that a lower price for them (offered by ACP countries) would have little effect on their export volume (Cosgrove, 1994).

Some success non-traditional products have been identified as benefiting from the Lomé Convention, among them canned tuna, leather and leather products, fresh flowers, some vegetables, textiles and garments. Many of these products were subject to levies from the European common agricultural policy (CAP), and thus profited from comparative advantage under Lomé. In the case of Mauritius, the strong specialization on sugar exports to the EC enabled to build up the funds that were then used to embark on development of industry and services. Despite these successes, the main barriers inhibiting ACP export performance could not be overcome by a trade agreement: climatic conditions (droughts and desertification), crop and livestock diseases, lack of infrastructure leading to high transportation and communication costs, oil price increases, AIDS continued to restrict development and integration of ACP countries in the world market (Cosgrove, 1994).

The Lomé experience provides lessons for the climate regime. Through Lomé, not just access to a market was secured, but access with less costs (no tariffs or levies). In the climate regime, CDM projects from LDC countries benefit from zero registration fee. However, registration is only a small fraction of the CDM transaction costs, where the bulk of the investment is directed towards PDD development, if needed methodology development and validation.

In the EU climate package, some degree of preferential access for CDM projects from LDCs has been secured, but no provisions are yet in place for further supporting the implementation of these projects. As seen in the Lomé experience, the underlying causes of poor countries’ lack of competitiveness need to be addressed.

Further, in Lomé, success was observed for special types of products with added value. A parallel could be made here to CDM project types with added value (sustainable development benefits or stricter additionality, for example), but only if this added value is transformed into some kind of financial incentive that supports these projects. This kind of differentiation between project types is not yet in place in the climate regime.

A final issue is the source of financing for such preferences. In the Lomé conventions, the EU was a relatively homogeneous group of countries that could agree on securing financing for the trade and aid components of the agreements. In the climate regime, it is still to be seen whether all the range of industrialised and developing countries can reach an agreement on how mitigation – and adaptation – will be financed.
7. Conclusions

In this paper, we started by looking at the current and potential supply of CDM projects from Least Developed Countries, and at the underlying barriers preventing their further participation in the carbon market. Analysing the case of Honduras, not a LDC but a very small and still poor country, we found that under limited international financial sources, local entrepreneurship and leadership can bring successes in the CDM when coupled with external aid to set up appropriate institutions.

We discussed the options that are being proposed internationally for fostering CDM development in LDCs, particularly from the European side. Preferential access to part of the European carbon market has been ensured to CERs from LDCs through the new EU climate and energy package, and further qualitative discrimination of CDM projects could still be agreed.

By projecting possible CER supply and demand scenarios for the period 2013-2020, we find that supply will likely not meet the demand. We further find that even a restriction limiting the supply of CERs from CDM projects registered after 2012 to just LDCs, would not have an important impact if the existing barriers for project implementation in these countries are not overcome. Other likely limitations in CER supply on the basis of project quality would have an even smaller effect on CDM project distribution across host countries.

Drawing a comparison between preferential access agreements in the agricultural trade system (Lomé Conventions) and the climate regime, we find further evidence that not just preferential access is important, but also reduced access costs. The current registration fee exemption for LDCs represents only a small fraction of CDM transaction costs and probably not enough. Further, the limited impact of the Lomé agreements on ACP trade was partly due to the fact that the underlying causes of lack of competitiveness were not addressed. In the climate regime, if CDM implementation barriers are not directly addressed, the CDM might remain a dream for poor countries. Increased incentives for products with added value led to the few success stories in the Lomé framework. For the climate regime, this could be translated into added financial incentives for CDM projects with added value – however this may be interpreted. Finally, financing was identified as a critical issue to undertake these measures: if financial incentives for special projects or specific regions are to be created, an agreement between financing and financed countries will need to be reached and enforced.
8. References


Climate Strategies

Climate Strategies aims to assist governments in solving the collective action problem of climate change. It connects leading applied research on international climate change issues to the policy process and to public debate, raising the quality and coherence of advice provided on policy formation.

We convene international groups of experts to provide rigorous, fact-based and independent assessment on international climate change policy. To effectively communicate insights into climate change policy, Climate Strategies works with decision-makers in government and business, particularly, but not restricted to, the countries of the European Union and EU institutions.

Contact Details

UK
Managing Director: Jon Price
jon.price@climatestrategies.org

US
Research Director: Thomas L. Brewer
thomas.brewer@climatestrategies.org

Climate Strategies
c/o University of Cambridge
13-14 Trumpington Street
Cambridge, CB2 1QA, UK
Office: +44 (0) 1223 748812
www.climatestrategies.org

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