How many CERs will the CDM produce by 2012?

Discussion paper CDM-2

September 2007

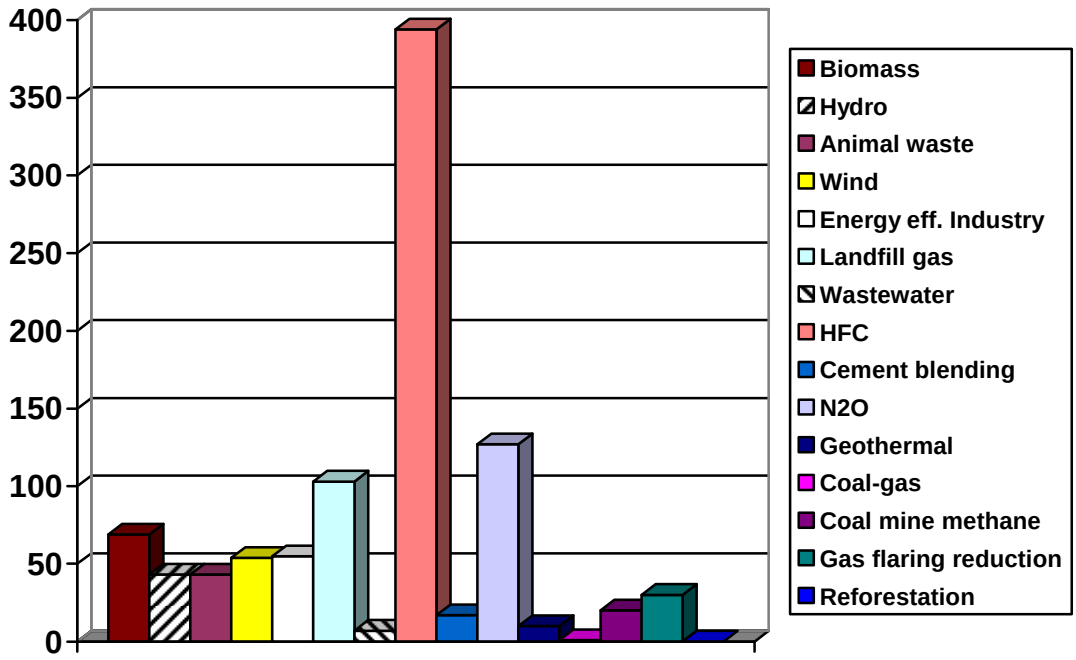
Axel Michaelowa

University of Zurich, Institute for Political Science, Mühlegasse 21, 8001 Zürich, Switzerland,
Phone +41 762324004, axel.michaelowa@pw.uzh.ch

1. The current CDM project pipeline

CDM projects registered by July 2007 forecast generation of 1 billion CERs by 2012, representing an increasingly wide range of projects (see Figure 1).

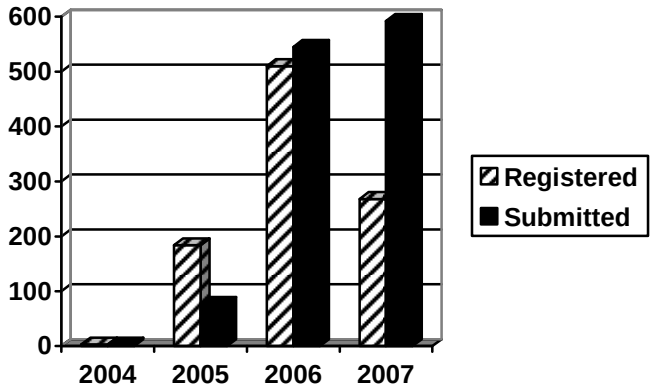
Figure 1: Types of registered projects (million CERs expected by 2012)



Source: Calculation from data from UNFCCC website, cutoff date June 25, 2007.

Submitted, but not yet registered projects project another 1.2 billion CERs by 2012. There is a steady inflow of new projects at a rate of over 100 per month; the expected downturn due to the post-2012 uncertainty has not yet started (see Figure 2).

Figure 2: Development of CDM pipeline (annual addition of CER volumes by 2012 in million from registered projects and projects still in the validation pipeline)



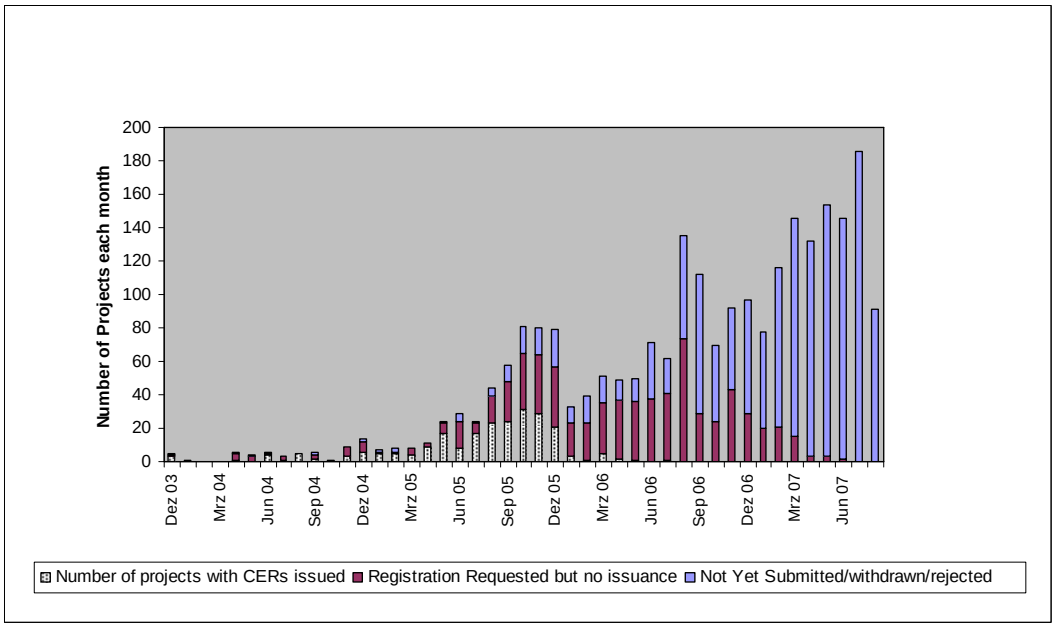
Source: Data from UNFCCC website, cutoff date June 25, 2007.

CER supply from inflow of new projects strongly depends on the decisions of the CDM Executive Board regarding baseline methodologies, interpretation of additionality and the attractiveness of programmatic CDM. Forecasts are notoriously difficult. Only four years ago, no analyst predicted the key role that industrial gases would play in the CDM; everybody had placed bets on waste management and renewable energy. Shifts of shares of projects have been strong over the years.

2. Where are the early start projects?

An interesting feature of the CDM process is the fact that a substantial share of projects submitted in 2004 and 2005 has not yet been registered (see Figure 3). This may signal problems of these projects to achieve validation.

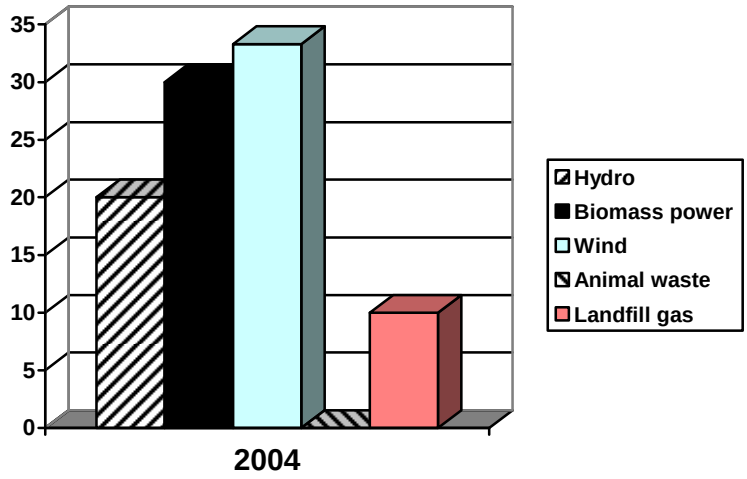
Figure 3: Monthly submissions of CDM projects and registration



Source: URC (2007)

While absolute numbers are small, shares of unregistered projects submitted in 2004 reach up to 30% (see Figure 4). These projects cannot be submitted for registration any more.

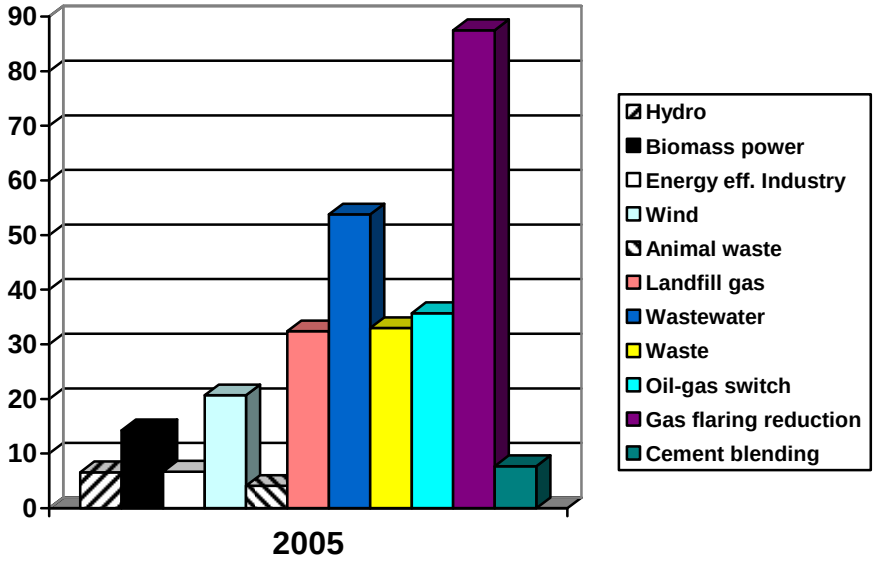
Figure 4: Share of projects submitted in 2004 but not yet registered according to project types



Source: Calculation from data from UNFCCC website, cutoff date June 25, 2007.

The shares of yet unregistered projects submitted in 2005 are high for gas flaring reduction waste-related and moderate for renewable energy projects.

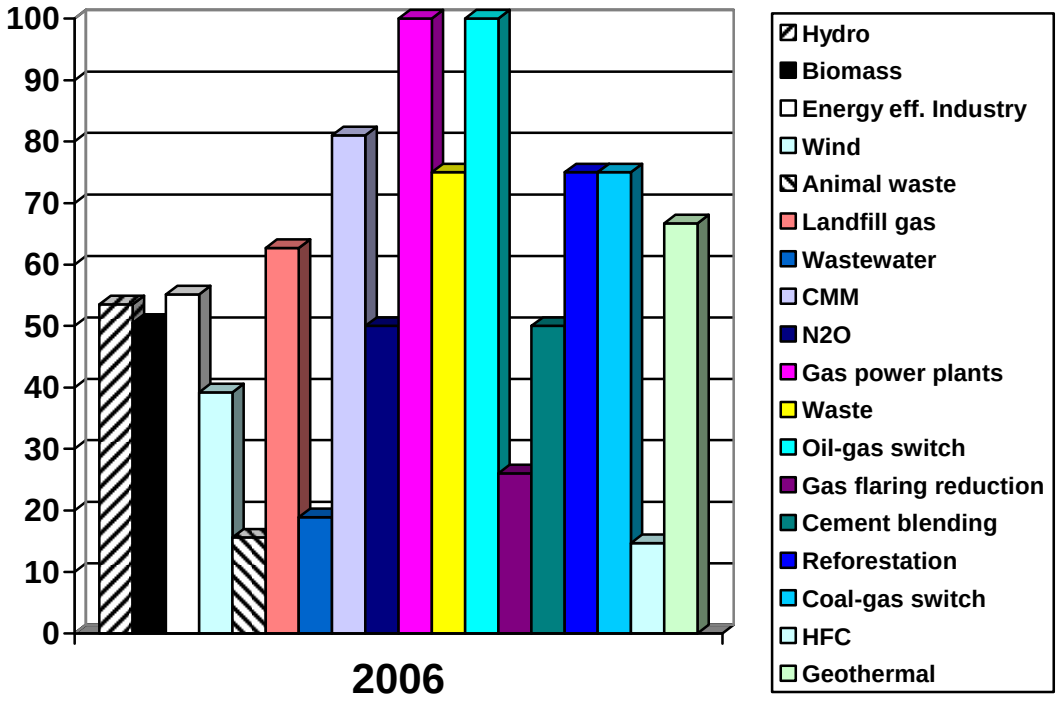
Figure 5: Share of projects submitted in 2005 but not yet registered according to project types



Source: Calculation from data from UNFCCC website, cutoff date June 25, 2007.

The shares of yet unregistered projects submitted in 2006 are high for gas power plants, oil-gas switch and coal mine methane projects. For important other categories such as hydro, biomass power and landfill gas, they are above 50% (see Figure 6). While a part of this low success rate is probably due to a bottleneck in procuring services of a validator, for some project categories there are deeper concerns.

Figure 6: Share of projects submitted in 2006 but not yet registered according to project types

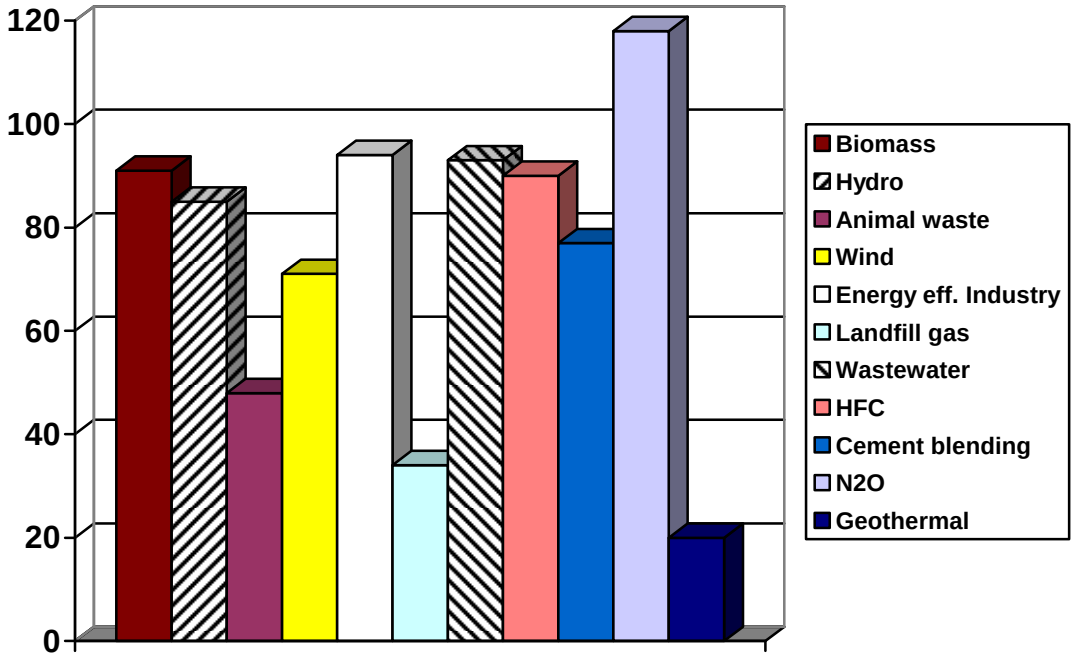


Source: Calculation from data from UNFCCC website, cutoff date June 25, 2007

3. Performance of registered projects

With 63 million CERs issued to over 200 projects by mid-2007, substantial experience has accumulated regarding the performance with regards to the forecasts (see Figure 7). On average performance has reached 85%. So far, only N_2O reduction projects have an overperformance; animal waste and landfill gas projects have a serious underperformance. Most project types have an average performance of 80-90%, variance is substantial.

Figure 7: Performance rate (issued CERs in % of projected CERs according to types of registered projects)



Source: URC (2007a), calculation from data from UNFCCC website.

4. Estimating overall CER generation

As in the past, startup 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. Thus, it is extremely difficult to forecast the total CER volume. Besides the inflow of new project types, the key parameters influencing supply are the non-validation rate of submitted projects, the rejection rate of validated projects and the performance rate of registered projects. The formula used to project CER supply volumes is as follows:

$$CER_{sum\,2012} = ((CER_{subm} + CER_{\inf\,l})\,p_{valid} * (1 - d_{delay}) * (1 - p_{rej}) + CER_{reg}) * p_{perf} \quad \text{(eq. 1)}$$

with

CER_{subm} = CER volume by 2012 listed in PDD of currently submitted projects = 1.3 billion

CER_{infl} = CER volume by 2012 listed in PDDs of projects to be submitted from now until 2012

d_{delay} = discount of CERs due to delay of projects (% of submitted and to be submitted projects)

p_{valid} = probability of validation of projects currently submitted and submitted until 2012

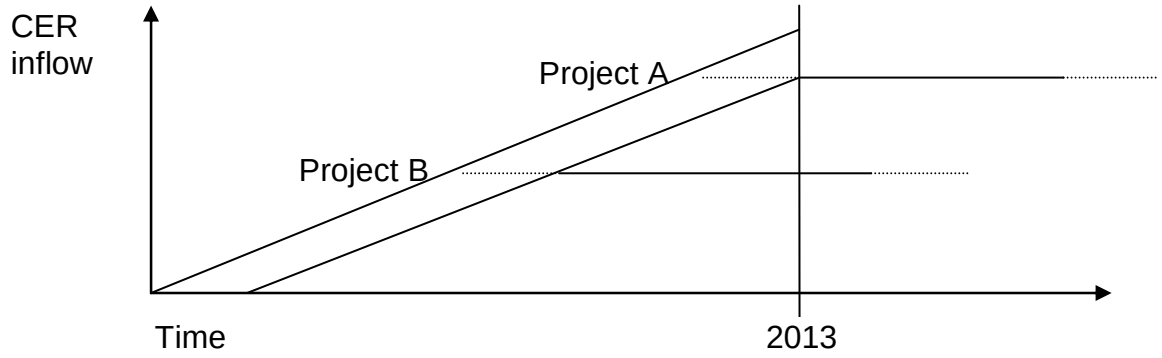
p_{rej} = probability of rejection of validated projects by the CDM EB

CER_{reg} = CER volume by 2012 listed in PDDs of currently registered projects = 1 billion

P_{perf} = CER issuance rate in % of CER_{reg}

d_{delay} is complex to estimate, as it depends on different factors. Delays in development of projects lead to loss of CERs before 2012, even if not all of them lead to an overall loss of CERs if the CDM continues after 2012[1]. The 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 project by project. This also applies to those registered projects whose crediting period only starts in the future. For example, in Figure 8, project A loses all its pre-2013 CERs due to a delay (shaded line) that in the case of project B would only lead to a loss of a relatively small share of CERs.

Figure 8: Different impact of delay on pre-2013 CER volumes depending on remaining crediting period before 2013



The faster inflow, the lower the impact of the delay in terms of share of CERs lost. Assuming inflow of all projects at once, the percentage CER loss is equal to the fraction of the time remaining until 2013 lost through the delay (i.e. 10% in case of a half a year delay in the first half of 2008). The flatter the slope of the inflow curve, the higher the share of CERs lost through the same delay, until the slope is 0.5 where 20% are lost. At flatter slopes, the loss rate falls again.

A sensitivity analysis is done according to different levels of the parameters shown in the formula. Under ***business-as-usual***, the current values of the parameters are used, with inflow continuing at current levels until 2010 and then stopping due to post-2012 uncertainty.

The scenario "***Strict additionality***" assumes that the EB clamps down on validators who will thus validate far fewer projects than up to now. Moreover, rejection rates by the EB would increase substantially. Over time, inflow of projects would fall as the strict additionality interpretation serves as a deterrent to project developers who would otherwise submit business-as-usual projects. In the "***Hangover***" scenario, the inflow of new projects dries up due to spectacular bankruptcies of CDM project developers, which also reduces performance of registered projects. Under the "***Acceleration***" scenario, an aggressive post-2012 climate policy agreement in 2009 and a lenient interpretation of additionality rules lead to huge inflows and high validation as well as low rejection rates, but a slightly decreased performance rate due to the lacking experience of many project developers newly entering the market. For numerical values of all scenarios, see Table 1.

[1] 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 an overall loss of CERs during the crediting period, but a loss compared to the quantity estimated to accrue by a specific date.

Table 1: Projected CER supply for 2008-2012 for different scenarios

Scenario name	**Business-as-usual**	**Strict additionality**	**Hangover**	**Acceleration**
CER_{infl} (billion)	3	2	1.5	5
d_{delay} (%)	15	15	20	20
p_{valid} (%)	75	50	75	90
p_{rej} (%)	4	10	4	0
p_{perf} (%)	85	85	75	80
Total CER volume (billion)	3.1	1.9	2.0	4.4

CER supply thus spans the range of 1.9 to 4.4 billion, with business-as-usual reaching 3.1 billion.

5. References

URC (2007): CDM pipeline, version August 27, 2007, www.cdmpipeline.org