Does the CDM support a low-carbon energy future?

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Abstract

Power generation contributes to a quarter of world greenhouse gas emissions, and therefore is one of the key sectors which must go low-carbon in order to reach our emission reduction goals and allow for continued economic growth. Power generation is also one of the sectors where viable low-carbon power generation alternatives exist and can be deployed immediately. Wind energy is one of the renewable energy technologies which can make a substantial contribution to making our power generation low-carbon. The CDM is touted as the means to allow this to happen.

This article shows that currently the CDM in fact does not offer the full support needed for deployment of wind and other renewable energies, neither in financial terms nor in terms of the other conditions necessary (transmission, administrative). Further, the CDM cannot offer a sufficient carbon price today, and may not be able to do so in the currently foreseeable future.

The conclusion outlines changes to the current climate change regime that have the potential to make a difference in this situation, and highlights that more than a carbon market is needed in the short term to reduce emissions in time to avoid dangerous climate change. Further, the conclusion shows that in addition to carbon markets providing sufficient financial support, appropriate transmission infrastructure, reasonable administrative procedures, and ultimately sufficient return on investment are needed to deploy energy solutions.

1 Introduction

The IPCC recommends a 60-80% reduction in greenhouse gases, from 1990 levels, by the year 2050, in order to avoid dangerous climate change. In order to reach this goal, emissions should be reduced by 20-40% by 2020. Emissions needs to peak and begin to decline in the next 10-15 years [1]. Reducing emissions as early as possible has many advantages, as the evidence gathered by the Stern Review points to: “The benefits of strong, early action considerably outweigh the costs [of not acting]. There will be a wide range of opportunities for growth and development along the way. For this to work well, policy must promote sound market signals, [and] overcome market failures.” Reducing emissions will be more difficult and much more expensive the longer we wait, therefore these reductions can and should start as soon as possible [2].

The electricity sector is responsible for the largest single chunk of emissions worldwide, nearly 25% of the gases covered under the Kyoto Protocol. Despite current emission reduction initiatives, emissions have grown in developed countries, and are expected to continue growing as developing countries’ energy consumption rises (see Figure 1) [3, 4]. A reduction in greenhouse gas emissions from this sector is a crucial step in the process of fighting climate change, and finding sources of low-carbon energy is a necessity in order to allow all countries to continue their economic growth and development without a growing carbon footprint. One of the measures of the success of the climate change regime should be its ability to promote shifts towards low-carbon energy sources.

Emission reductions in the power sector can and should start right away. Wind power can contribute in the near term and this window of opportunity should not be wasted while we get distracted by discussions of future technologies that may or may not become technologically proven, physically scalable, economically affordable, or publicly acceptable. Box 1 shows the benefits of wind power.

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Box 1. Wind energy:

- Is one of the currently available and rapidly deployable large scale technologies (a wind farm can be built in two years) demanded in the effort to secure energy supply, economic growth and CO₂ reduction;
- Provides economic growth through jobs and technology transfer
- Helps reduce emissions even while electricity consumption grows;
- Provides immediate reductions and avoid additional carbon liability;
- Creates a time buffer for emerging new clean technology, allowing time for additional advanced low-emitting technologies to develop, become commercialized, and bring down their costs;
- Reduces stress placed on other energy sources and alleviates energy price pressure;
- Reduces competition for scarce water resources; and
- Reduces the cost of compliance to a global climate regime.
The key question this article will therefore answer is: does the CDM\footnote{The Kyoto Protocol’s Clean Development Mechanism} support a low-carbon energy future? In order to answer this question, we need to understand what wind energy in particular requires in order to fulfill its full potential in fighting climate change, and then we need to evaluate whether the CDM can and does support this. This analysis will be based on empirical data: practical experiences so far. From the results of this analysis we can outline a conclusion and next steps showing how the CDM - and the global climate change regime - can be enhanced to ensure the contribution of renewable energy to fighting climate change.

2 Developing wind energy

Wind energy needs a series of conditions to be present in order to develop:

- Long term government commitment to a wind energy target is the first key condition.
- Financial support is the next key condition, in order to ensure that the targets are reached. Wind energy is increasingly competitive with other sources of energy, and while it can still be more expensive in cost per unit of power generated, the benefits of wind energy far outweigh the costs.
- The next keys to ensure a diversified energy mix that includes wind energy are access to transmission infrastructure, and strategic expansion of this infrastructure, and
- Streamlined planning and permitting procedures.

Put together, these conditions provide investor certainty, and the share of wind energy in power consumption grows.

A country like Germany offers a good example of the right conditions for wind energy. In 2007 Germany lead the world in total installed wind energy capacity. The growth of wind energy in Germany is based on a 1991 renewable energy law (updated several times since). The law sets specific targets for renewable electricity - most recently, 12.5% by 2010 and 30% by 2020. The latter target was further revised to 30% by 2020. Establishing official targets sets in motion a series of other policies and processes that are necessary to reach those targets.

In Germany’s case, the law guarantees priority grid connections and access for electricity from renewable sources. This provides certainty that if the power is produced, it will be fed into the system. Further, grid operators and utilities are obliged to buy the renewable electricity at a fair, fixed minimum price - a feed-in tariff. This provides additional certainty, as investors can confidently predict the return on their investment. The law also provides for differentiated tariffs based on the commercial readiness of different technologies. More mature renewable technologies like wind power receive a lower tariff than less market-ready technologies, encouraging the development of new technologies. Further, the law calls for tariff degressions - that is, gradually lower tariffs in fixed increments each year over a fixed period of time. The purpose is to promote innovations that lower costs for consumers. Combined, these policies stimulate competitiveness and encourage innovation among different technologies, which contributes to security of supply by diversifying the country’s energy mix.

Additionally, the costs associated with the feed-in tariffs are passed on to the power consumers - not paid by the state budget as a subsidy. And the costs are distributed across all power consumers, ensuring no one region bears a disproportionate burden to create the benefits that all in society enjoy. This “burden” on the German consumer is, according to a March 2008 government report, not significant: the higher tariffs paid for renewable energy added about €3 per household per month [5, 6].

As can be seen from this section, wind energy requires a series of conditions relating to finance, transmission, and administrative conditions, in order to be realised.

3 Wind energy and the CDM

In this section we will evaluate the experience of wind energy projects in the CDM. Ideally, the CDM should be able to provide financial conditions that allow wind energy projects to be developed, if the
design is right: the CDM should enable development of greenhouse gas-reducing and sustainable development-fostering projects which need financial support in order to be carried out.

However, experience shows that due to the design of the CDM and existing framework conditions in many developing countries, CDM projects are skewed towards specific project types and specific countries that have attractive conditions for investments [7]. This can be seen in Figure 2.

Figure 2: Graph from the UneP RiseCDM Pipeline showing that the vast majority of CDM projects is concentrated in just a few countries, and over half of them are in China and India. Source: [7]

Renewable energy represents a growing share of CDM projects by number - but not by CER generation. For example, wind energy represents about 13% of all CDM projects by number, but only 8% of CERs generated, because wind energy does not reduce some of the more potent greenhouse gases [8]. Renewable energy projects are more expensive per certificate generated than many other types of projects, and therefore the CDM does not fairly reflect the contribution from (for example) wind energy to reducing emissions quickly, fostering technology transfer, job creation, energy security, and all the other advantages of wind energy cited above. The potential contribution of wind energy to reducing emissions is shown in Box 2.

Box 2. The contribution of wind energy to reducing greenhouse gas emissions

EWEEA estimates that the 56.5 GW of wind capacity installed in Europe by the end of 2007 will avoid the emission of about 90 million tonnes of CO$_2$ per year. By 2010, with 80 GW of installed capacity expected to be in operation, annual savings will reach 135 m/t. This is equivalent to more than 35% of the total commitment made by the European Union under its initial Kyoto Protocol obligation. By 2020, a total of 180 GW of onshore and offshore wind power could be installed in the EU. This would result in a saving of around 325 m/t of CO$_2$. Cumulative global wind power capacity could reach more than 1000 GW by the end of 2020, producing about 2600 TWh of electricity per year. This would save as much as 1.5 billion tonnes of CO$_2$ every year [8, 9].
Experience with wind energy CDM projects shows that, while the number of project applications have grown, the CDM is not benefiting wind or renewable energies as much as was expected, despite the obvious advantages of renewable energies in reducing emissions. Many CDM wind projects are placed in China and India, which are countries where conditions are already attractive for wind energy. “Both countries are ranked eight and third respectively in the Renewable Energy Country Attractiveness Indicator (Ernst & Young, 2007), which takes into account wind potential as well as the political and legal framework. China’s potential is huge and the Renewable Energy Law of the People’s Republic of China from 2005 provides attractive conditions for the establishment of wind farms. The situation is India is not very different. The country has good potential and solid fiscal policies in place, with utilities obliged to source a certain percentage of their supply from renewables [10].”

Moreover, CER prices are not enough on their own to encourage renewable energy projects in the CDM: CER prices in 2006 fluctuated between €3.5/ton and €20/ton. Comparing this to the available support schemes in European countries, an average CO$_2$ price of €40/tonCO$_2$ would be needed in a very low risk environment to foster wind energy in Europe [10]. And finally, in many countries, it is impossible to secure loans using the future income from CERs. This lack of bankability is due to the perception of risk of the climate regime. The CDM is thus being called “the cherry on the cake, [however] in those countries where you don’t have a cake in the form of a national regulation, the cherry of the CDM is not enough to make a project profitable [8].”

4 Conclusion and next steps

The conclusion which can be drawn from the previous sections is that the current CDM-based carbon market, in and of itself, is not enough to promote the development of renewable energies, where favourable conditions do not previously exist. The following changes have the potential to make a difference in this situation:

- Stringent caps on emissions are a necessary precondition for achieving emission reductions. All too often, there is too little focus on this crucial point. Stringent caps will create the scarcity of emission certificates and drive the carbon market.

- Interim targets are the next necessary condition for achieving emission reductions in a timely and cost-effective manner, as indicated by both the IPCC and the Stern Review. having interim targets can make sure that all technologies which can make a contribution to fighting climate change, do so.

- The post-2012 agreement must be longer, so that it adds certainty to investment and reduces risk, since many investments, like wind energy, have a 20 years+ lifetime.

- A change to the additionality rule, perhaps through an approved list of technologies which contribute significantly to sustainable development as well as providing carbon-free power, should be considered. This would ensure that wind energy, an obvious solution to climate change, is not penalized by increasingly failing the additionality test due to increased market penetration, but would be rewarded for all the benefits it brings.

- No-lose sectoral targets for the electricity sector could allow developing countries to make a contribution without hampering their development.

Even if the changes suggested are all implemented, the price of carbon needs to be sufficiently high in order to promote the right investments. Like shown in the previous section, it is assessed that an average CO$_2$ price of €40/tonCO$_2$ would be needed in a very low risk environment in to foster wind energy in Europe. This figure is an assessment only, which shows only the potential order of magnitude needed. In other words, a price on carbon is a necessary condition, but may not be enough.

Besides the changes suggested, it needs to be remembered that it takes years to establish a market mechanism like the CDM-driven carbon market and get it running efficiently, and therefore more is needed in the immediate term to reduce emissions so that they can peak and begin to decline in the next decade as the IPCC indicates they should. The uncertainty associated with a fledgling market do not allow big investments with uncertain returns to be made. We cannot afford to wait for the market
to mature before making crucial investment decisions, which may lock us into path dependence for decades to come.

Finally, it is worth remembering that regardless of the framework that emerges from COP15 in December in 2009, this framework will likely not address all the necessary conditions for timely deployment of renewable energy. In addition to carbon markets (ideally) providing sufficient financial support, all forms of energy need appropriate transmission infrastructure, reasonable administrative procedures, and ultimately, sufficient return on investment in order to be deployed.

References


