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Towards More Efficient Greenhouse Gas Reduction through the Use of Clean Development Mechanisms (CDM)

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Executive Summary

The EU's leading role in climate protection comes at a high cost. A key instrument to achieve the European climate protection targets is carbon trading. This leading role implies a substantial disadvantage for European industries competing internationally, because - unlike non-European industries - they bear the burden of additional costs for climate protection. This will either lead to a crowding out of European businesses affected by climate protection requirements by non-European competitors or to outsourcing abroad. These businesses will not only lose their competitive position, but the reduced emission in the EU will be offset by overcompensation abroad. If this leading role should be retained, an efficient form of emission trading is essential to reduce these disadvantages to a minimum. A more efficient way to protect the climate is the use of the Clean Development Mechanism (CDM), i.e. to impose climate protection measures in countries which have not agreed to reduce greenhouse gases (mainly developing countries). By using these greenhouse gas reductions, it will be possible to achieve the European emissions reduction targets at much lower costs. The outcome of this will be a lower cost burden for European industries at an identical degree of emission reduction, as these cuts in greenhouse gas emissions will happen abroad.

JEL-Klassifikation: Q 54, Q 56, Q 58

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1. Introduction

Global climate protection is one of the most challenging issues of our time. The man-made increase in greenhouse gases in the atmosphere will lead to an increase in the earth's temperature and will cause major global problems for humankind. Especially since publication of the Fourth Assessment Report by the Intergovernmental Panel on Climate Change (IPCC), the „Stern-Report“ and Al Gore's campaign on the issue, climatic changes are being discussed by the general public (Stern 2007). Many people are concerned what the possible outcomes of global warming will be. Politicians have reacted to these concerns by implementing climate protection measures which will burden each citizen with yet unknown costs.

In the international context the EU set an example and committed to cut CO₂ emissions by 20 percent by 2020 - compared to the base year 1990 - , to raise the portion of renewable energies to 20 percent and to increase energy efficiency by 20 percent. These spirited objectives for a leading role will cause massive costs. Particularly with regard to the recent global recession where there are controversies whether costs for climate protection can be borne at all, it is essential to demand adherence to climate protection targets and to pursue them with efficient measures. In this working paper we will show how the use of the Clean Development Mechanism (CDM) can achieve the existing climate protection targets in a most efficient way, i.e. with minimum costs. An efficient cut of CO₂-Emissions will help to reduce costs aligned to the achievement of environmental objectives to a reasonable level and, thus, not to jeopardize the public acceptance of these aspiring climate protection targets.

Initially, an efficient environmental policy is characterized by the way it achieves pre-set CO₂-reduction targets with known means, technologies and prospects at preferably low costs (*static efficiency*). At the same time it is required to shape a climate protection policy in such a way that incentives can be sustained long-term and that it stays open towards possible changes of technical aspects and political decisions (*dynamic efficiency*). Firstly, no measures should be taken which would hinder a development of international climate protection targets and agreements, as it would be the case if today's climate protection policy complicated future entries for non-participating countries to international treaties or

reduction mechanisms. Secondly, no constraints for research and development of possible future technologies must result from today's climate protection policy, including through a weakening of the economy.

The element of dynamic efficiency, therefore, equates to concentrating climate protection policy to a reduction target of environmentally unfriendly greenhouse gases. The goal must be to reduce harmful emissions of greenhouse gases, which - strictly speaking - is not the same as cutting CO₂-emissions. The guidelines of the official EU climate protection policy as listed above in our brief account, i.e. reduction of CO₂-emissions by improving energy efficiency as well as expanding certain energy sources, cannot yet be deduced from an impartial interest in climate protection.

2. An Emissions trading scheme as an instrument of European climate protection

2.1. Basic principles of an emissions trading scheme

In order to achieve CO₂ reduction in the most efficient way the European Union implemented the EU Emissions Trading Scheme (EU ETS) for emission permits with the support of most economists. An emission trading scheme promises substantial gains in efficiency compared to alternative environmental measures such as taxes or administrative rules. An emission allowance authorizes the owner to emit one ton of CO₂. The amount of emissions allowances within the EU will be restricted according to politically specified reduction targets. The required CO₂ reduction will inevitably be accomplished by lowering the number of emission allowances according to the politically predefined reduction targets. Therefore, it is a quantity instrument.

These allowances assure their owners of a guaranteed and exclusive right to emit CO₂ (property right). It is a matter of a tradable right to pollute, e.g. the owner himself can use the allowance for environmentally unfriendly emissions at production or he can offer these rights to other producers. The term "right to pollute" always causes irritation, as it appears to be ethically disputable to grant polluters the explicit right to harm the climate. Contrary, the environmental advantage of an emissions trading scheme is that the CO₂

emissions of market players who are already registered in the system will be limited to the amount of the issued certificates. Due to the scarcity of the allowances and the established trading scheme, a price for the allowances will result, which businesses will have to pay for emitting one tonne of CO₂. If we simplify the assumption that the politically defined reduction target equals the efficient amount of CO₂ reduction, there are two main consequences:

Firstly, a price for climate-damaging emissions will ensure that costs for climate pollution are now charged directly to the production of goods, energy or fuels. Before the introduction of an emissions trading scheme the costs for climate change resulting from CO₂-emissions did not factor into the businesses' calculation. Private marginal costs of production and actual marginal social costs as a whole (including costs for the climate) fell apart. As businesses only had to consider part of the costs, they were able to sell their products at a lower price, so there was a tendency to consume too much of these products. The requirement to buy emission allowances is an effort to internalize the costs of environmental damage resulting from provision of goods and services. This effect can be shown exemplary for the power generation. Negative externalities of climate damaging are being internalized because energy producers have to pay for an allowance for each emitted tonne of CO₂, the price of which indicates other businesses' willingness to pay. When calculating their prices, energy producers will consider the costs of the allowances. Energy prices will rise because direct production costs as well as negative externalities for climate damage are included. Different effects emerge from the signal of the now adequate price in view of environmental scarcity. As costs per kilowatt-hour now depend on the associated CO₂ emissions, power plant operators have incentives to invest into modern and efficient plants or to adjust their „energy mix“. At the same time higher energy prices will induce that costs for environmental damage are being charged to all other sectors as well as consumers, so they are motivated to save energy.

Secondly, certificate trading will see to it that emission rights are being used where emitting one tonne of CO₂ creates a maximum benefit - judging by the consumers' willingness to pay. Only producers whose goods and services are in most urgent demand by citizens can pass on their costs for buying emission allowances via price to the consumer. Inversely CO₂ will be reduced where it happens in the most efficient

way, i.e. where consumers do not have adequate willingness to pay to sustain the previous level of consumption.

Basically, the price per allowance arises from the interaction of supply and demand. The owner of an allowance will sell if the sales returns exceed the costs of avoiding one tonne CO₂ at production. Accordingly, an allowance will be bought if the price is lower than costs of avoiding one tonne of CO₂. The expected equilibrium price per allowance will settle at the level of the marginal abatement costs of one tonne of CO₂ in the plant, at which the avoidance of another tonne of CO₂ is no longer profitable.

Because of the above-mentioned reasons the use of an emissions trading scheme is theoretically the most efficient environmental solution, the location where the pollution happens is irrelevant but the amount of the emitted damaging substances counts. For the last decades economists have favored an international certificate's system particularly due to the global climate problem and the resulting efforts to reduce CO₂-emissions (see e.g. Stern 2008 and Zimmermann 1998). But the practical implementation in the European Union encounters various problems due to regional boundaries.

2.2. Difficulties of a regional-limited emissions trading scheme

However, the advantages of emissions trading can only prevail if the global climate problem is countered with an extensive global emissions trading scheme. If property rights worldwide are affected as well as a total upper limit of allowed CO₂-emissions specified, the trading scheme will display the above-mentioned value. In this case all costs for CO₂ avoidance will factor into the price of the allowances. By limiting the number of allowances the system will lead to a rise in prices for climate damaging products. Emissions are being reduced where it is most cost-efficient. The aspired climate protection target can be achieved in an efficient way. To meet the climate protection target it is essential for all countries to be involved in the efforts to protect the climate and in an emissions trading scheme. But when establishing such an emissions trading scheme a typical prisoner's dilemma will occur (Bardt 2005). All countries are affected by environmental damage and thus would benefit from measures to protect the climate – though the extent of this benefit might differ according to the expected impact of the climate change for the respective

countries as well the populations' environmental interest. However, because of the global character of the climate problem it is irrelevant who undertakes efforts to protect the climate and where they take place. In other words: While costs for climate protection have to be paid by certain players, proceeds of these investments in form of less climate damage are not for their benefit alone. Irrespective of who bears the costs all countries benefit from climate protection measures. As far as the reduction of CO₂ emissions alone is concerned, the logical strategy for each country seems to be hoping for others to become active in the field of climate protection measures. For each and every country or region the incentive is high not to commit to climate targets and to benefit from the environment protection of others without endeavors on their own. If all countries act this way the level of environmental protection will not be achieved satisfactorily or not at all. Nevertheless, the European Union decided to take a pioneer role in the field of climate protection and to commit to major reduction efforts unilaterally. Thus, the EU hopes to encourage other countries to contribute to climate protection measures. The regional boundaries of the emissions trading scheme, however, for a number of reasons leads to higher costs for climate protection than a global scheme would induce. At the same time regional emissions trading schemes bear the risk that environmental effects caused by CO₂ reduction within the system might be undermined by corresponding increases of emissions from abroad (Sinn 2007).

At first glance it is obvious that limiting the emissions trading scheme equals the limitation of the possibilities of efficient CO₂ reduction. In the European Union Emissions Trading Scheme it is not possible to use the worldwide most cost effective options for CO₂ reduction without further ado – for the time being only the most favorable possibilities throughout the EU are available. Marginal abatement costs do not adjust world-wide, but only throughout Europe. Provided that the European citizens have a specific willingness to pay for climate protection, a renouncement of the world-wide most cost effective options for reduction means lesser climate protection.

Due to existing trade relations between the EU and the rest of the world – which certainly are meaningful and welfare enhancing to a vast extent – serious second-round effects can be expected based on today's isolated application of a European emissions trading scheme (in technical literature also summarized under

the term “carbon-leakage”). Business competition for consumers and therefore their constant quest for cost-saving production sites may lead to a relocation of CO₂ emissions in case of a regional emissions trading system. A political pre-set scarcity of allowed CO₂-emissions in the EU will induce a rise of costs for CO₂ emitting activities within the system and accordingly will result in a lessening of climate damaging production. The ensuing reduction of demand for fossil fuels tends to result in a lower world price for these raw materials which will make their utilization more favorable in other parts of the world where the price for fossil fuels is not increased by environmental policy. Thus a part of the reduction obtained within the EU will be foiled by a rise in CO₂ emissions elsewhere. This is resulting to some extent in subsidization of CO₂ emitting consumption of fossil fuels in other countries by the European Union.

This effect is concealed by a substitution effect in the opposite direction. Additional costs for allowances will increase the relative prices for raw materials. Within the European Union the price for natural gas in relation to coal will be lower so that demand for natural gas will increase and demand for coal will decrease. The outcome of this is a price increase for natural gas. In case of a natural gas-exporting country outside of the certificates trading system- as for example Russia – the change in demand between coal and natural gas could lead to a substitution of domestic energy sources. As for them the price of natural gas in relation to coal is higher it is favorable to augment gas exports and to use coal for their own production of energy. Potential savings of CO₂ emissions in the EU due to a lesser use of coal could be negated by increased coal consumption by Russia.

This effect caused by a regional limited climate policy becomes even more apparent if we have a look at the direct distortion of competition between countries with and without such a policy which is connected with a regional rise in price for CO₂ emitting production. Producers of local goods and services will add their higher costs of production to their prices and thus shift the costs to consumers. Generally this is a sensible and desired procedure as – ultimately - it is the consumers who should bear the costs for climate protection as well as costs for a leading role. However, producers of internationally traded goods cannot shift their augmented manufacturing costs to the price to the ultimate consumer as long as not all competitors in all countries are equally effected by additional costs for climate protection. Due to higher

prices producers of international tradable goods run the risk to becoming less competitive or even uncompetitive. Either competitors abroad will squeeze European producers out of the market or these businesses will switch production as a whole or in part to other countries outside of Europe. Even a successful initial reduction of CO₂ emissions within the European Union will at least in part be offset by increasing climate damaging production abroad. As a result CO₂ emissions are not being reduced or avoided, they are just being transferred. Not unlikely is a situation in which ultimately not less but even more CO₂ is being emitted than without respective climate protection measures: If production of international tradable goods in the EU led to less CO₂ emissions, independent from a climate protection policy, than in countries to which production was switched because of climate policy it is possible that the same production now could induce even more emissions than before. By “carbon-leakage” the regionally defined politically pre-set goal is pro forma achieved. However, in fact nothing is gained for climate protection. In case of a crowding out of the domestic production there will be no positive environmental effects but inefficient relocations of production accompanied by a devaluation of capital and the problem of a redeployment of the labor market. Unemployment due to a loss of competitiveness can only be avoided if wages in the affected countries are being lowered to the extent where new jobs can be developed, respectively the old jobs persist. This means not the consumers of climate damaging products are being charged with the costs for climate protection but rather employees in countries with a regional limited climate protection policy. Therefore, world-wide specialization – i.e. a segmentation of production in the several countries – is being distorted. Nothing is gained in favor of climate protection because environmentally damaging production migrates to countries which do not participate in arrangements for limiting emissions. Of course, there is in part protection due to costs of transport; however, this does not change the basic statement: In case of internationally traded goods no independent environmental policy is possible. A single country and even a community of states as the European Union cannot enforce higher environmental standards for world-wide production of international tradable goods.

3. Global climate protection as a goal

Therefore, the European Union is in a difficult position. On the one hand, its industry is confronted with serious competitive disadvantages and on the other hand, the people expect that a significant improvement of the climate can be achieved by a European policy at reasonable costs. That is to say that the citizens anticipate a certain advantage from the European leading role and apparently they are willing to pay for climate protection. In combination with rising costs a dilemma could arise quickly.

In this specific situation it is essential to utilize the advantages of an emissions trading scheme and to keep the disadvantages of competitive distortion as low as possible. At the same time it is important not to lose sight of the goal to implement a world-wide emissions trading scheme as it is only through this mechanism that no competitive distortions and relocations of emissions which would thwart the environmental effects will occur. The European Union decided (European Parliament 2008) to respond to the above-mentioned issues of the EU Emissions Trading Scheme by implementing exceptional rules during the next trading period (2013-2020). Businesses with a high risk of relocation will receive cost-free allowances out of the allowances stock as from 2013. Thus, companies should be able to carry on offering their products on the international market. Nevertheless, these exceptional rules can only moderate competitive distortions not resolve them. Therefore, these exceptions will only concern producers of international tradable goods who are directly affected by the emissions trading system and not producers with international competition who are indirectly affected i.e. by higher costs of energy. At the same time all exceptional rules on their part cause distortion of competition, for example if exceptions are granted to a varying extent. Furthermore, the current emissions trading system fails to realize the vast potential for CO₂ avoidance. The main part of CO₂ reduction takes place within the European Union. In the EU production of goods and energy has reached a higher technical level than in many other parts of the world. The marginal abatement costs of one tonne of CO₂ therefore tend to be higher within the EU than in many other countries.

Thus, the concentration of climate protection policy within the borders of the European certificate trading has a serious disadvantage. Even if the national citizens are willing to pay the costs for climate protection a substantial part of this willingness is wasted because only local possibilities of CO₂ reduction can be utilized

and not world-wide options where the costs could be considerably lower. Technically speaking: Climate protection is inefficient and too expensive.

If a certain level of protection is desired, costs can be lowered considerably by permitting to reduce emissions in countries where it is possible at lower costs. In all likelihood it can be expected that the citizens' willingness to pay, i.e. the political enforceability to burden the citizens with the costs for climate protection, is the all-dominant size. In this case a much higher effect for climate protection could be attained with the same share of public funds.

It is the world-wide total volume of greenhouse gases which leads to climate change. EU Emissions Trading mainly focuses on CO₂ reduction on its own territory. For the climate protection target, however, it is unimportant if the amount of CO₂ is reduced within the EU or outside. Further, during the current trading period only emission allowances for CO₂ are being traded. Other climate damaging greenhouse gases which are also stated in the Kyoto protocol are left out of consideration. The damage to the climate of all other greenhouse gases emitted per tonne is much higher than that of CO₂. Apart from that it seems to be very favorable to define a European reduction target in a way that it is irrelevant whether CO₂ or other greenhouse gases are being avoided. The mechanism developed in the Kyoto protocol – the Clean Development Mechanism (CDM) – should be used much more extensively or even better, be approved without limits.

4. Clean Development Mechanism

4.1. Utilization of efficient ways of avoidance

In the Kyoto protocol and its United Nations Framework Convention on Climate Change (UNFCCC) industrial countries commit to limiting their annual emissions of climate-damaging gases. In order to fulfill the emissions targets so-called flexible mechanisms can be applied: Joint Implementation (JI), Clean Development Mechanism (CDM) and Emissions Trading (ET) (in the following according to United Nations 1998). Project-related mechanisms (JI, CDM) enable all countries with an obligation to reduce emissions to carry out a part of their reductions in a cost-efficient way by executing climate-protection projects in

countries in which the costs for avoidance of greenhouse gases are comparatively lower. Joint Implementation, defined in article 6 of the Kyoto protocol allows charging of emissions reductions due to projects which have been undertaken by industrial countries (Annex B countries) respectively by authorized project initiators on the territory of another industrial country. The so-called host state transfers an amount of Emission Reduction Units (ERUs) equivalent to the obtained emissions reductions to the investor state, which transfers the respective ERUs to the account of the project initiators. The Clean Development Mechanism (CDM) – which is in the focus of this analysis – enables the consideration of projects which are carried out by industrial countries, respectively an authorized project initiator on the territory of a developing country respectively a country without upper limit for national greenhouse gases (so-called non-Annex-I countries). These measures have to lead to additional greenhouse gas reductions and to contribute to a sustainable development of the host state. The board of the United Nations responsible for CDM projects, the CDM Executive Board, issues Certified Emission Reduction Units (CERs) to the project initiators. The so-called linking directive (European Union 2004) gives plant operators within the framework of the European Emissions Trading System the option to fulfill part of their obligations by delivering emissions rights from CDM and JI projects. The following explanations refer to project activities within the CDM.

A crucial pre-condition to genuinely achieve the climate protection target – a reduction of greenhouse gases – is the demand for additionality of greenhouse gas reduction, i.e. the attempt to assure that the designated amount of greenhouse gas reduction would not be cut down without this project. In this case the carbon credit acquired abroad can be used directly as a right to emit one additional tonne of CO₂ in Europe without affecting the reduction target. The tonne of CO₂ emitted in Europe will be compensated by the reduction of one tonne of CO₂ equivalent (CO₂e) abroad. This neutral kind of transition to flexible places for emissions reduction is favorable in an economical sense because costs of avoidance are lower. If the reduction abroad is not additional the tonne of CO₂ will not be compensated in the European Union and the globally emitted amount of CO₂ increases. Therefore, additionality is an essential pre-condition in the Kyoto protocol to utilize CDM. If CDM is an option, each business can chose between five different

possibilities respectively combinations of the strategy. Firstly, allowances of the EU Emission Trading Scheme (EU-ETS) can be obtained along with the right to emit CO₂. Secondly, a company can modernize its own plant and thusly save CO₂ and, thirdly, it can acquire CERs by investing directly in CDM-projects or to buy more CERs on the aftermarket. Furthermore the business can elude emissions trading by fourthly switching production abroad or fifthly shutting down its plant. Companies will tend to choose the most cost-effective option. Utilization of CDM equates to the above-mentioned demands for efficient climate protection because the reduction in greenhouse gases will happen where the cost is low. In many cases greenhouse gas reduction will be most cost-effective abroad. Compared to a reduction within the European Union costs can be avoided so that competitive disadvantages associated with a pre-set climate protection target of the affected businesses will lessen. The climate protection target will be achieved all the same.

4.2. Developing an optimal structure of production

The price for an emission allowance or a carbon credit from CDM will form unchanged according to the already demonstrated calculus. In case of an unlimited exploitability of CERs the price per allowance in a theoretical market equilibrium equals the marginal abatement costs of the business whose costs for avoiding an additional tonne of CO₂ are the same as the price for one allowance. As there are lower-cost options for avoiding greenhouse gases due to the possibility of CDM projects the price per allowance will settle at the lower level of global marginal abatement costs¹. For businesses this means a lower cost burden with unaltered CO₂ reduction and therefore a reduction of the competitive disadvantage.

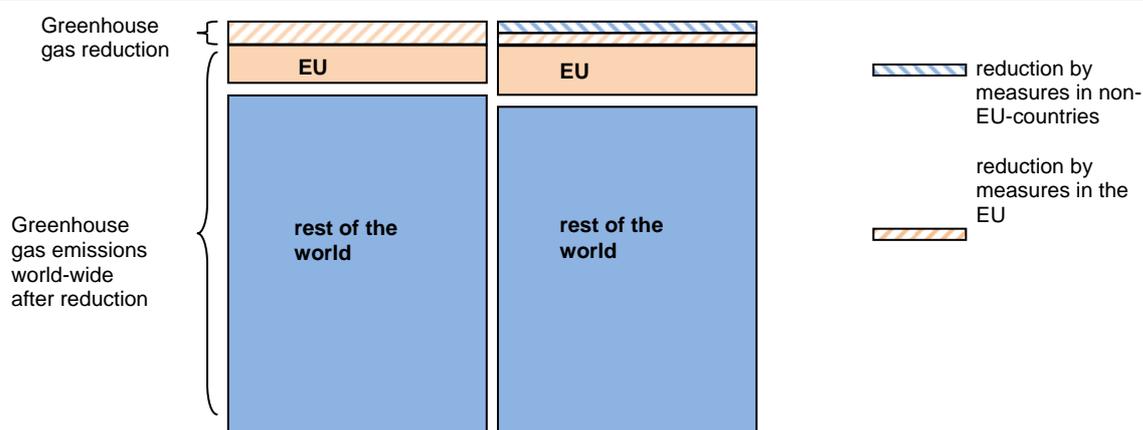
The utilization of CDM measures will lead to a better distribution of greenhouse gas reduction by emitting CO₂ where emission can be used in a most efficient way and to avoid it where reduction is possible at low-costs. The environmental target will not be affected in the ideal case of additionality of the CDM projects.

A hypothetical example for illustration: If the European Union obliges to reduce its CO₂ emissions by 37 million tonnes over the period of 2013 to 2014, the European industry however reduces emissions within the EU by only 30 million tons, additional efforts for climate protection in uninvolved third countries can be

¹ An adjustment of prices for allowances in the EU-ETS and CERs will only be attained by abstracting risk-costs.

made in the amount of 7 million tonnes CO₂ equivalent in order to obtain the missing certificates. It has to be pointed out that it is irrelevant for the climate protection target where greenhouse gases are cut. The environmental target will be achieved on the same level, but more efficiently. This process of shifting some reduction efforts from one region to another in case of unlimited use of CDM projects would continue theoretically for as long as the costs for greenhouse gas reduction world-wide have adjusted, i.e. until it is unfavorable to invest in CDM projects to obtain emission rights. Only then a global limiting of emissions will be achieved in an efficient way. Only then an optimal structure of emission – under abstraction of costs for transport and risks – will be attained by the EU and the other countries.

Illustration 1: Climate neutrality of CDM projects.



CERs do not increase world-wide emissions; they only shift emission reduction regionally. Emissions are being reduced where it is most cost-efficient. Reduction as well as the remaining total emissions will stay the same in both cases.

However, European companies are being criticized because by using CDM projects they would dispose of their obligations to reduce (World Wide Fund For Nature 2008). This criticism is based on the fact that European companies can obtain CERs through CDM measures which they can use for their own company. Plant owners registered in the European Emissions Trading Scheme are bound to deliver a certain amount of emission allowances for their emissions. They can meet this obligation in part by delivering emission rights from CDM projects and thus by investing in emission reductions abroad. The artificial “excess” of CO₂ emissions at home are opposite to “lower” CO₂ equivalent emissions in a developing country. The total

reduction of CO₂ equivalents continues to be predetermined by scarcity of emission allowances in the home country. Another example: In period 1 the European Union defines the limit for emissions of 100 tonnes of CO₂ which equals the actual emission within the EU. For each emitted tonne CO₂ the business has to present an allowance. In the next period the EU limits allowances to an amount of 80 which only permits the emitting of 80 tonnes of CO₂.

Tab. 1: Example for emission reduction with CDM in the course of time

	Available amount of EU-certificates	Emissions in the EU	Additional amount of CERs	reduced amount of CO ₂ e (compared to period 1)
period 1	100	100	-	-
period 2	80	105	25	20
period 3	60	90	30	40

But Businesses cannot see options to lower their emissions to justifiable costs. Due to an economic upturn for example there will even be a temporary increase in emissions up to the amount of 105 tonnes of CO₂. Certainly, businesses succeed in investing in projects in third countries where they receive carbon credits of the amount of 25 tonnes of CO₂ equivalent; i.e. in total the aspired reduction from period 1 to period 2 amounts 20 tonnes CO₂ equivalent, even though the emissions within the European Union were higher by 5 tonnes of CO₂. In the third period businesses within the EU reduced their emission in their own plants by 15 tonnes of CO₂ to 90 tonnes so they had to deliver have 90 allowances. The reduction path of the European Union envisages a reduction of further 20 tonnes to 60. Accordingly, businesses will have to save additional 5 tonnes CO₂ equivalent in CDM projects; a total amount of 30 tonnes to meet their obligations. In all likelihood, the reduction target will be achieved again. The Clean Development Mechanism enables the companies only to reduce emissions as advantageous as possible. For the utilization of CDM projects it is stated in the Linking Directive that each member country has to define an upper limit for the use of carbon credits. For example, in the current period Germany has agreed on a maximum quota of 22 per cent for the use of carbon credits from flexible mechanisms (European Commission 2006). If there should be no

international climate protection agreement after 2012 the European Parliament concluded last December to reduce the possibilities for CDM projects. But even in case the international community of states should agree on a follow-up treaty of the Kyoto protocol CDM will only be available in a limited way (European Parliament 2008).

For an efficient achievement of the climate protection target limitations of flexible mechanisms do not make sense. Not using CDM projects will increase the price for climate protection and will fail to realize potentials for reduction. As a result climate protection comes at much higher costs without further additional environmental benefit. The Clean Development Mechanism yields a similar result as if practically all countries would be included in the certificate trading. It then would also be a matter of a world-wide reduction of greenhouse gases and minimization of costs for avoiding greenhouse gases – which will lead to a larger reductions in countries where marginal abatement cost are low.

4.3. Methodology of certification

A project needs to be registered as an emissions reduction project so that tradable carbon credits can be issued. The CDM project passes through a multi-stage process. The verification of a project is carried out by various institutions with emphasis on the criteria of sustainability and additionality as basic requirement for the issuing of CERs (UNFCCC 2008). The CERs are finally being issued and registered by the CDM Executive Board which is the executive body of the United Nations Framework Convention on Climate Change (UNFCCC) in Bonn.

Additionality stands for emissions which would not have been reduced without the CDM project. If this requirement is not fulfilled the climate protection target is not achieved by the CDM measure because the additionally used Certified Emission Reductions CERs within the EU are not being compensated by a respective reduction abroad. Therefore, additionality has to be well-founded. The relevant reference setting –the so-called baseline – represents emissions which would have been emitted without the project in a business-as-usual case. The baseline will be compared to the estimated reduction of emissions. The

difference between these figures displays the amount of reduced emissions for which CERs are to be issued.

Another significant condition is that a sustainable development for the developing country should occur. In addition to the direct positive effects on the climate, these projects often contribute to a beneficial development in these countries, for example by creating new jobs or improving efforts in the field of education. This can be regarded as a positive side effect of CDM projects but should not be conditional for the implementation of such projects. That is to say that CDM projects with only a neutral influence for a country should be realized to enforce the climate protection goal. Sustainable development can be achieved more efficiently by specific means such as direct development aid.

The basis for an assessment is an extensive documentation of the CDM project, the Project Design Document (PDD) (in the following according to UNFCCC 2008). The making of the PDD begins before the start of the project and has to be continued throughout of the project. It consists of a detailed description of the project and is the central document for a later validation, registration and certification of the project.

The project will be reviewed externally within two assessments – the so-called validation and verification – by an independent institution which has to be accredited by the CDM Executive Board (Designated Operational Entity, DOE). In the process these assessments have to be carried out by different DOEs. If the project passes the first assessment, it will be registered by the CDM Executive Board within a period of eight weeks. After a successful second assessment the DOE verifies the saved emissions where appropriate and the CDM Executive Board will issue the CERs respectively.

4.4. Options to improve the terms for assessment

When arguing for a strengthening of CDM it is essential to examine criticisms with regard to the sensitivity for misuse of the instrument (Schneider 2007). Often the additionality of reductions projects will be doubted. Problems and possible doubts may occur when determining the baseline. The assumptions for the baseline are naturally challengeable. An accurate determination of the baseline is impossible in practice as it is a forecast and therefore cannot be definitely ascertained and examined. A central point in order to

ensure additionality is the demonstration of the financial additionality. Investors have to prove that only with help of these produced carbon credits the implementation of this project is economically feasible. Further, the problem of a pretended reduction is answered by a very conservative determination of the baseline. It appears to be reasonable to keep improving the instrument by new experiences and insights.

Another critical point refers to the Designated Operational Entity (DOEs). Some critics imply that they could unrightfully validate projects because they are being paid by businesses whose CDM projects they have to assess (Deutsche Gesellschaft für Technische Zusammenarbeit 2007). The fact that the examinee pays the examiner could in fact lead to false incentives. An argument against the assumption of possible courtesy appraisals is the fact that the process of accrediting DOEs is long and is executed according to strict guidelines. Further, after their accreditation regular samples are made by the CDM Executive Board (UNFCCC 2007). Even during the process of assessment a direct examination takes place as the verification and validation of a project are performed by different DOEs. Finally, the DOEs are renowned businesses who would jeopardize their reputation by issuing dubious validations or verifications. Considering that CDM is still a very “young” instrument the present development can be regarded as favorable.

4.5. Creating incentives for innovation

Some politicians fear that European businesses could fulfill their obligation to prove their emission rights with CDM and would eschew major investments for research and development of new climate friendly technologies (Wara 2008). In fact incentives for European businesses to invest into new procedures would decline at first compared to a European climate protection policy without CDM. An unlimited use of CDM instruments initially will lead to sinking marginal abatement costs as world-wide there are more favorable options to avoid CO₂ than within the European Union. Lower marginal abatement costs will cause lower prices for allowances. The lower the price for allowances the less favorable it becomes to invest into costly technologies and development. Business still has several options: They can buy allowances, they can invest into their plants and lower their own CO₂ emissions and they can reduce CO₂ emissions in a developing

country². If it is more costly for a company to invest into remodeling their plants than financing a CDM project they will opt for the latter if investments into their own business only refer to environmentally induced CO₂ abatement costs and cannot be considered favorable in view of future technologies independent from the European Emissions Trading Scheme. Therefore, it is possible that there will be an initial reduction of investments into technologies as well as research and development. This saving of costs is reasonable and questionable only if the political players prove to be better judges of profitability for certain investments than entrepreneurs. In order to be able to evaluate these facts accordingly the question of purpose has to be answered. If the purpose is world-wide reduction of CO₂ emissions a lower level of investments into new technologies is not to be considered unfavorable. Both ways the CO₂ reduction target will be achieved. The difference is that a reduction of CO₂ equivalents by use of CDM options is more cost-effective and industries involved in emissions trading are less affected in their ability to compete. It is absurd to assume that an easy and practicable way to reduce CO₂ equivalent emissions is hostile to innovation because more investments into new technologies could be expected if these obvious and easily viable possibilities for CO₂ equivalent reduction would be averted. Likewise, this would also mean a need to take vehement action against the saving of energy as each new energy-saving light bulb and every additional sweater will reduce the pressure to develop new technologies for the production of energy.

In any case, the incentive for innovation will grow due to a continuing scarcity of energy and increasing requirements for climate protection. If the favorable options for CO₂ avoidance are exhausted, the marginal abatement costs world-wide will rise. The higher the marginal abatement costs the higher the price for allowances.

A high environmental standard can only be achieved if all cost-saving options to reduce damaging emissions are being exploited. However, the costs of these investments have to be borne by consumers.

² Of course, there is still the option to close down the plant or to switch production abroad.

4.6. Incentive structure for developing countries

Another problem may occur in political decision-making processes in CDM countries. As these countries economically profit from CDM measures there are incentives to delay political decisions in favor of climate protection (for example the implementation of environmental standards), in order to be able to fix in baseline projections preferably high CO₂ emissions as reference value and thus to appear beneficial for CDM projects (Schneider 2007). Granted that country A passes a bill which regulates a minimum efficiency factor for power plants. At the same time a company plans to build a water-power plant in this country in order to generate a certain amount of CERs. After passage of the law the baseline has changed as only power plants with a minimum efficiency factor are allowed. The baseline would now be higher than before and the project possibly is no longer profitable and the company prefers to provide the project in country B where the requirements for climate protection are lower.

This idea cannot be generally dismissed. Contrary, it has to be considered that every successful CDM project firstly will directly assist in achieving higher environmental standards in a country and secondly will intensify the possibilities and incentives of these countries for technology transfer and transfer of technical know-how. The example shows that it is reasonable to include businesses in all countries into the system of emissions trading instead of defining different environmental standards in individual countries. Emission trading ensures that emissions will be reduced where this is most cost-effective. Thus, businesses in potential CDM-countries would reduce emissions at comparatively low costs and could sell carbon credits.

Another frequent argument against CDM is the fact that industrial countries deplete lower-priced options for avoiding greenhouse gases within the CDM and to cause higher marginal abatement costs for developing countries if they enter the emissions trading system at a later date. Developing countries therefore would have to anticipate that their reduction targets resulting from international agreements could only be achieved at higher costs as it would be the case without CDM measures.

This accusation has to be taken seriously. After all it is a warning against a development which would be contrary to the above-mentioned demands not to lose sight of the goal of a global system. In fact, the

depicted danger is based upon the assumption that the respective country at the time of entry would receive a reduction requirement which would not take into consideration already saved amounts of greenhouse gases or the achieved level of technological development. At present, this is rather unlikely. It is more probable that highly-developed industrial countries of the world - which display a certain willingness to pay for climate protection and who are prepared to show this disposition - will take over a major part of the costs for climate protection measures as the developing countries' and emerging nations' preferences at present will focus on economical growth and the fight against poverty. If as a next step the entry of these countries should follow it has to be ascertained that these countries will not be disadvantaged because of already completed CDM projects or established environmental standards. Ultimately, it is a matter of distribution between nations and the question of how high the share of costs for climate protection for the respective countries will be. In other words: Who owns the pollution rights?

Regardless of the political question of distribution CDM projects contribute to keeping costs for climate protection at a low level even though not all countries have joined the emissions trading system.

5. Literature

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