

# **EXPERIENCES OF AN OPERATIONAL ENTITY UNDER THE CDM AND JI SCHEME: CREDIBLE VALIDATION AND VERIFICATION**

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## **ABSTRACT**

To assist Annex I countries in meeting their emission reduction commitments, the Kyoto Protocol introduces the flexible mechanisms Clean Development Mechanism (CDM) and Joint Implementation (JI), which allow government and private entities in Annex I countries to obtain Certified Emission Reductions (CERs) or Emission Reduction Units (ERUs), respectively, to achieve compliance with emission targets. The credibility of both mechanisms is ensured by independent third party verification carried out by accredited operational entities. Before a project can be registered as CDM project, the project design must be validated against certain eligibility criteria defined by the UNFCCC and the host country. Furthermore, only independently verified emission reductions attributable to a CDM project will form the basis for issuance of CERs. DNV Certification has during the last 7 years gained considerable experience with the validation and verification of CDM projects. This paper provides guidance on the CDM modalities and procedures, by translating them into a more practical language and by illustrating them with project examples and the experiences gained so far - from an operational entity's point of view. It addresses key validation and verification issues, such as baseline setting and project additionality, approval by host country, stakeholder consultation process and necessary provisions for consistent monitoring and reporting of emission reductions.

## **INTRODUCTION**

The international response to climate change started in 1992 with the adoption of the UN Framework Convention on Climate Change (UNFCCC). In 1997 the commitment to reduce anthropogenic emissions of greenhouse gases (GHG) was concretised. By signing the Kyoto Protocol 38 industrialised countries (Annex I countries) committed themselves to reduce their collective GHG emissions by at least 5% compared to the 1990 level by the period 2008 – 2012 (As of June 2004, 6 countries have not ratified the Kyoto Protocol, including the USA with contributed with 36.1% of the total CO<sub>2</sub> emissions of the industrialised world in 1990).

Acknowledging that market mechanisms have proven to be successful in achieving emission reductions in the most cost-efficient manner, the Kyoto Protocol introduced three flexible mechanisms for achieving compliance with emission reduction commitments: i) Joint Implementation (JI), ii) the Clean Development Mechanism (CDM) and iii) International Emission Trading (IET).

IET allows for trading of assigned amount units (AAU) between countries with a quantitative commitment to reduce their emissions (i.e. Annex I countries). JI and CDM, on the other hand, are project-based mechanisms where a project sponsor - an Annex I country's government or a private or public entity in an Annex I country - sponsors a GHG emission abatement project

and in return receives emission reduction credits which can be used to meet its emission reduction commitment under the Kyoto Protocol. Depending on whether the GHG emission abatement project is hosted by another Annex I country or a non-Annex I country (typically developing countries), this mechanism is called JI or CDM, respectively, and emission reduction credits are referred to as Certified Emission Reductions (CERs) or Emission Reduction Units (ERUs), respectively.

Emission reductions can potentially be achieved at a low cost in many developing countries – compared to often high marginal abatement costs in Annex I countries – and CDM projects can start as early as in the year 2000. As a result, the CDM has received a lot of attention by national governments, multinational institutions such as the World Bank and the business community. For this reason and because the CDM is already operational and contains the most detailed rules, this paper focuses on the CDM.

The framework for the CDM was agreed at the 7<sup>th</sup> Conference of the Parties to the UNFCCC in Marrakesh in 2001 and the Parties to the UNFCCC elected the CDM Executive Board for supervising the CDM. Since then, more than 100 CDM projects have been proposed. However, no project is yet registered as CDM project (the registration of the first CDM project is expected to occur in 2004). The establishment of the necessary institutional framework took quite some time. Several expert panels, such as the Methodology Panel, needed to be appointed by the CDM Executive Board and an accreditation scheme for Designated Operational Entities needed to be developed. Finally, the countries participating in the CDM must establish Designated National Authorities for approving CDM projects.

## **KEY ASPECTS OF CDM PROJECTS**

As stated in the Kyoto Protocol, the two main objectives of a CDM project activity are i) to result in the reduction of emissions that are real, measurable and additional to any that would occur in the absence of the CDM project and ii) to contribute to sustainable development.

Defining a baseline scenario and the consequent baseline emissions are key for determining the emission reductions attributable to a CDM project. The emissions of the CDM project are compared against the emissions that would occur in the absence of the CDM project - the baseline - and the difference between the project and the baseline emissions represents the emission reductions attributable to a CDM project. A baseline may be determined based on actual or historic emissions or it represents the emissions from a technology that represents an economically attractive course of action, taking into account barriers for investment. Baseline emissions are typically determined by multiplying an activity level of the CDM project, e.g. the amount of electricity produced by a renewable energy project, with a baseline emission factor, e.g. the GHG emissions associated with producing an equivalent amount of energy using an alternative fuel such as oil, coal or natural gas.

<p>The baseline of a CDM project activity is the scenario that reasonably represents the anthropogenic emissions in the absence of the proposed project activity.</p> <p><i>CDM modalities &amp; procedures, paragraph 44</i></p>
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Text Box 1 Definition of a baseline for a CDM project

Baselines for typical CDM projects may be established as follows:

*Renewable energy projects:* It is assumed that the electricity produced by the renewable energy project is replacing electricity productions at other existing power plants and/or that the project postpones the construction of a new power plant. A CO<sub>2</sub> emission intensity (e.g. tCO<sub>2</sub> per MWh) of the power plant(s), which in the absence of the CDM project would likely produce the equivalent amount of electricity produced by the renewable energy project, must be determined. A common approach is the combined margin approach, i.e. the average of the operating margin (CO<sub>2</sub> emission intensity of existing power plants operating at the cost margin i.e. where electricity production levels are most likely to be affected by the CDM project) and the build margin (CO<sub>2</sub> emission intensity of capacity additions which construction is assumed to be postponed by the CDM project).

*Energy efficiency projects:* The energy efficiency prior to the implementation of the CDM project is determined and it is assumed that the energy efficiency would remain the same in the absence of the CDM project. In case efficiencies have been continuously improved in the past, the baseline must take into account such a trend. In the process of determining the baseline, one must also consider the residual lifetime of the equipment to be able to exclude that some equipment would need to be replaced with more efficient equipment anyway.

*Landfill gas recovery projects:* The baseline is the amount of landfill gas (Landfill gas contains ca. 50% methane) that would be recovered and flared in the absence of the CDM project. The baseline must be selected taking into account national legislations concerning landfill gas capture, requirements in concession contracts between municipalities and landfill operators and the necessity to capture and flare certain amounts of LFG for safety reasons.

Baseline setting is not only one of the most important aspects of a CDM project activity but also amongst the most difficult ones. The baseline shall - on a project specific basis - describe the emissions that would occur in the absence of the CDM project. As such, the baseline will always be counterfactual, as it describes a scenario that never occurs. Finally, through the process of defining the most likely baseline scenario, it must also be demonstrated that the CDM project itself is not a likely baseline scenario. This is generally referred to as the additionality of a CDM project, another key concept of the CDM that is not simple to apply in many cases.

Emission reductions shall be additional to any that would occur in the absence of the certified project activity.
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*Kyoto Protocol, Article 12*

Text Box 2 Definition of additionality

## **THE CDM PROJECT STAGES - VALIDATION AND VERIFICATION**

Recognising the need for independent verification of CDM projects - both Parties have an incentive to overstate emission reduction claims - a rigorous verification scheme was adopted. Independent third parties, i.e. Designated Operational Entities (DOE) accredited by the CDM Executive Board, validate the project design and its eligibility as CDM project and subsequently verify emission reductions attributable to a CDM project activity. The DOE thus ensures that emission reductions from CDM project activities are real and additional to any that would occur in the absence of the CDM project activity. In March 2004 DNV Certification became one of the first accredited DOEs.

Figure 1 illustrates the different steps of a CDM project from the project design to the issuance of CERs. Figure 1 also shows the parties involved in a CDM project activity: Besides the Project Participants, the DOE and the CDM Executive Board, the Designated National Authority of the Parties involved must approve a CDM project and public stakeholders must be consulted.

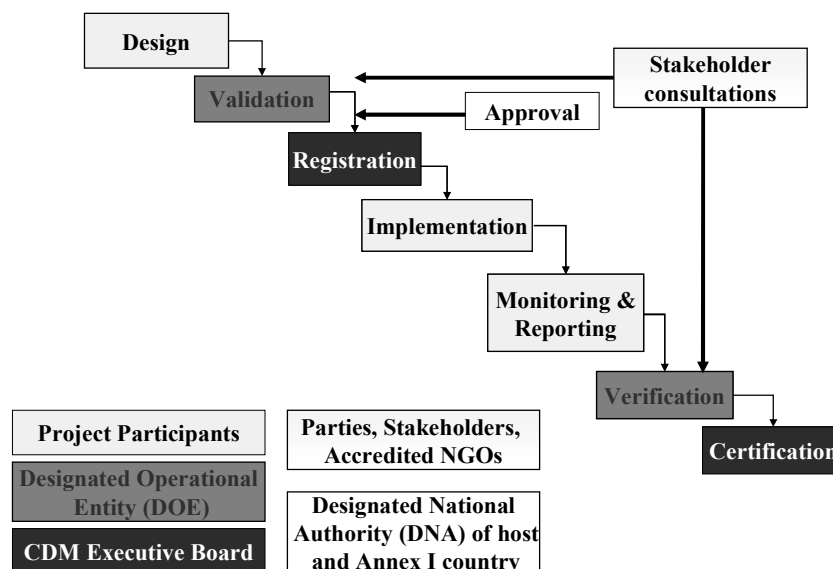


Figure 1 Steps of a CDM project and the parties involved

For CDM projects comments by public stakeholders are actively invited. Public stakeholders, such as environmental NGOs, have the role of a watch dog and are invited to within 30 days provide comments on a proposed CDM project during the process of validation. For this, the DOE has to make publicly available the Project Design Document (PDD) describing the proposed CDM project and has to consider all comments received in its validation opinion.

## VALIDATION OF CDM PROJECTS

Validation is a requirement for all CDM projects and is seen as necessary to provide assurance to stakeholders of the quality of the project and its intended generation of CERs. During the process of validation, a DOE assesses the design of a proposed CDM project and must confirm that the proposed project meets all requirements for the CDM adopted by the Parties to the UNFCCC and adopted by the country hosting the CDM project. Besides verifying that the participating Parties (Annex I country and non-Annex I host country) meets the relevant participation requirements, the environmental impacts of the project have been assessed in line with relevant national legislation and that local and global stakeholders have been consulted and due account was taken of the comments received, the DOE must also assess the appropriateness of the selected baseline and must confirm the project's additionality.

The assessment of the baseline and additionality of the project is guided by project type specific baseline methodologies. Baseline methodologies, together with a methodology for

monitoring both project and baseline emissions, for specific project types are in a bottom-up process proposed by project developers and eventually approved by the CDM Executive Board. For renewable energy projects, for example, several baseline and monitoring methodologies have been proposed and a consolidated methodology is currently prepared. Common to all these methodologies is that they include an additionality test, i.e. a test to demonstrate that the CDM project is not likely to occur due to the existence of barriers, and an algorithm for determining the baseline emission factor, e.g. the CO<sub>2</sub> intensity of the power plants, which, in the absence of the CDM project, are likely to produce the equivalent amount of electricity.

The assessment of the baseline must include an investigation of the national and sectoral circumstances relevant to the project technology in the host country. The DOE must assess whether there are any national policies and incentives that may promote certain technologies. In case there are policies and/or incentives, the DOE must assess whether these policies and/or incentives alone are sufficient to promote the technology proposed by the CDM project activity or whether there remain barriers that can only be overcome through the benefits of the CDM. Such benefits may be the revenue from CER sales as well as technology and capacity transfer from an Annex I country to the host country.

Although additionality tests are designed to allow for an objective evaluation of a project's additionality, it must be recognised that the assessment of a project's additionality is never 100% objective but always to a certain extent dependent on the subjective judgment of the DOE. Only in few cases, the DOE can, with a high level of assurance, confirm that a proposed CDM project would not have occurred in the absence of the CDM and that emission reductions achieved by the project are thus additional. In most cases, the DOE can only confirm that there are convincing arguments, such as investment, technology or institutional barriers facing the project, which demonstrate that the proposed CDM project is not likely to occur without CDM benefits.

Many approved baseline methodologies advocate financial analysis, such as the analysis of the Internal Rate of Return (IRR) or the Net Present Value (NPV) of the project, as a tool to demonstrate the additionality of a project. Although a financial analysis provides a quantitative assessment criteria an IRR or NPV analysis often gives a false impression of an objective criteria for determining additionality. Financial calculations are easily manipulated and especially for hydropower projects, where CER revenues typically have little effect on the IRR or NPV, the financial calculations become sensitive to financial data that is difficult to verify with the necessary level of assurance. Moreover, a company's hurdle rate, i.e. the rate of return that is normally expected and thus represents the additionality threshold, is again difficult to verify.

The verification of a CDM project's contribution to sustainable development in the country the project is located in is another difficult aspect of the validation of a proposed CDM project. However, the CDM modalities and procedures clearly note that the decision whether a project contributes to a country's sustainable development is the host country's responsibility. The DOE must simply check that the host country, as part of giving its approval of the project, confirmed that the project contributes to sustainable development.

## **VERIFICATION OF EMISSION REDUCTIONS OF A CDM PROJECTS**

Verification by a DOE of the emission reductions achieved by a CDM project is mandatory for the CDM. The emission reductions determined ex-post by the DOE is the basis for an equivalent amount of CERs being issued by the CDM Executive Board. Besides checking that the project is implemented as planned and that the monitoring system, e.g. meters, is in place and fully functional, the objective of the verification is to verify that the emission reductions quantified and reported from the project are free from material misstatement and represent an accurate and conservative quantity, considering associated monitoring uncertainties.

By employing a risk-based approach for the verification of emission reductions, the key reporting risks related to claimed emission reductions are identified. Key issues are for example the correct use of emission factors, accurate fuel consumption estimates, correct use of conversion factors and consistency in aggregation of emissions data. It is then assessed to which extent the project operator's control systems are adequate for mitigating these key reporting risks. Key reporting risks that are not sufficiently addressed by the project operator's control system represent residual risk areas where detailed audit testing is necessary. In addition, other areas that have material impact on the amount of emission reductions may be selected for detailed audit testing.

When verifying emission data the DOE shall verify that there is a clear audit trail for the reported emission reductions. The DOE shall also obtain sufficient and appropriate audit evidence. A complete audit trail including source documents, the basis for assumptions and other information underlying the emission data must be presented to the DOE. Operational records to sustain claimed emission reductions may include fuel purchase records, fuel consumption records, invoices for sold thermal energy, invoices for sold electricity, laboratory analysis and the likes.

A well developed monitoring plan lays the basis for accurate monitoring of emission reductions and ensures that emission reductions can subsequently be verified by a DOE. The monitoring plan shall make the necessary provisions for collecting and archiving of all relevant data for determining project and baseline emissions. Moreover, it shall describe the necessary procedures for internal control of reported data. A monitoring plan should build as much as possible upon monitoring of data that is already monitored for other reasons such as process control and upon already established internal quality control procedures.