Annex 3.2 to Annex 3 New Baseline Methodology

Operational Guidelines for Baseline Studies for grid connected electricity projects (CERUPT methodology)

Senter Internationaal

Under the responsibility of
Ministry of Housing, Spatial Planning and the Environment of the Netherlands
April 2002

TABLE OF CONTENTS

1 INTRODUCTION

1.1 The greenhouse gas abatement project process & baselines

Clean Development Mechanism project activities (CDM) are defined under the Kyoto Protocol Art. 12 enabling cost-effective mitigation of greenhouse gas emissions and sink enhancement and international transfer of technologies and know-how. It allows Parties to meet their reduction commitments in non-Annex I Parties where specific greenhouse gas abatement costs may be lower. CDM is carried out on a project basis; the credits yielded by CDM are called Certified Emission Reduction units (CERs). A key requirement is that the emission reduction from the CDM project is *real, measurable and long-term*.

In order to determine the impact of CDM projects on greenhouse gas reduction, a so-called Project Design Document (PDD) is required. This document is used to determine the potential amount of CERs that can be generated. The PDD will be the basis for the validation process. The PDD compromises the following parts:

- Baseline study with the estimation of the amount of CERs.
- Monitoring and verification plan.
- Stakeholder comments and resulting measures from the Supplier.
- Analysis of the environmental impacts of the project as required by local regulations.

The baseline scenario for a CDM project activity is the scenario that reasonably represents the anthropogenic emissions by sources of greenhouse gases that would occur in the absence of the proposed project activity. The general characteristics of a baseline are contained in paragraph 45 of the CDM M&P.

The purpose of a baseline study is to provide a transparent picture of what would be emitted *without* the project,[1] (construction of a baseline scenario, related baseline carbon emission factor,[2] baseline emissions[3]) and what the project emissions are expected to be . With this an assessment emission reductions can be made.

The study should be specified in such a manner that it provides the validation/verification body with a complete understanding of the assessment and calculation process.

Consequently, a baseline study document:

- Clearly, correctly and completely describes the reference case of greenhouse gas emissions without implementation of the project, including a description and justification of all assumptions and calculations as well as the underlying data and references.
- Clearly, correctly and completely describes the project and the factors causing and influencing greenhouse gas emissions (reduction) of the project, including a description and justification of all assumptions and calculations.

---

[2] The baseline carbon emission factor (expressed in ton CO_2eq/GWh) represent the emission level in a certain year that would occur in the baseline scenario.

[3] Baseline emissions per year (ton CO_2eq/yr) are calculated as follows:

Baseline carbon emission factor (ton CO_2eq/GWh) in certain year * activity level in certain year (GWh/yr)

- Clearly and correctly defines project boundaries, including the assumptions and method for defining such boundaries.
- Identifies and describes the potential size and impact of any relevant foreseeable indirect greenhouse gas emissions outside the project's boundaries.
- Includes data sources and references to other documents in a traceable manner.
- Clearly presents the baseline calculations and the underlying data to the validator separately. This happens in such an orderly manner (preferably in a spreadsheet file) that not only recalculation can be easily carried out, but also that any sensitivity analysis the project developer has done in determining the most feasible baseline can easily be repeated by the validator.

1.2 Objectives & structure

The overall objective of this guideline document is to present operational guidelines for the preparation of baseline studies for grid-connected electricity projects.

The baseline approach presented is applicable for CDM projects realizing new capacity in the grid connected electricity sector. The methodology is applicable to "greenfield" projects as well as to expansion projects.

For definitions used document, see the glossary of terms in Annex 3.1.

1.3 Key concepts

The following key concepts (presented in alphabetical order) should be used as guidance when a baseline study is prepared, for validation as well as for monitoring, reporting and verification purposes.

Comparability
Emissions' projections should be comparable between their calculated carbon emission factors for the baseline scenario and for the project on the one hand, and for the calculated baseline carbon emission factors for similar projects on the other hand. This should enable validators/verifiers to compare the real project emissions with the baseline emissions, and to determine a baseline's further applicability for comparable projects. To enhance comparability, project developers should use the methodologies and formats as provided in these guidelines.

Consistency
The monitoring plan should address the same key factors as used to calculate the project emissions' estimates to allow for a consistent review of performance indicators over time. To guarantee consistency with the validation/verification stage, to the extent possible, the methodologies and measurements identified in the baseline study should also be addressed in the monitoring plan.

Practicability
Approaches employed for project documentation, implementation, monitoring, reporting, validation and verification should be based on simple, well-tested and functional principles.

Reliability
For the estimation of emission reductions from project-based activities the most likely development shall be chosen as reference case. The baseline estimate should be subject to validation by operational/independent entities as appropriate.

Transparency

Assumptions, calculations, references and methodologies used for baseline setting and for the estimation of emission reductions from project-based activities shall be clearly explained and described to facilitate replication and assessment of the baseline estimation by validator or verifier. Sources of all data should be public and explicitly mentioned in the documentation so that they can be verified. If non-public data are used, it should be motivated why; such data can only be accepted if they are verifiable by the validator /verificator.

Validity of the baseline carbon emission factor

The validity of baseline carbon emission factors can only be ensured if they are based on a clearly motivated scenario which is the most likely one, given the current knowledge about to-be-expected legal and institutional reforms, technological developments, policy developments, and other new developments affecting future emission patterns relevant for the project. These factors are covered by the list of key factors as described to be discussed in the project description.

1.4 Document structure

The structure of this document is as follows.

- Description of Project characteristics (Section 2.1).
- Description and determination of Greenhouse gas sources and project boundaries (Section 2.2).
- Description of the Grid connected power sector (Section 2.3).
- Description and determination of Key factors influencing project and baseline emissions (Section 2.4).
- Identification of the most likely baseline scenario and the associated greenhouse gas emissions (Section 2.5).
- Estimation of project emissions (Section 2.6).
- Estimation of emission reductions & determining additionality (Section 2.7).

Supplementary to the chapters are the specific reporting form for the baseline study (Annex A). In Annex B CO_2 emission factors for fuels are given plus the global warming potential of greenhouse gases. Finally, in Annex C references to this document are given and in Annex D abbreviations are explained.

The document combines background information and instructions, the latter being presented in text boxes.

> Instruction
>
> Develop a baseline study for the CDM project following the instructions in these Guidelines
>
> The reporting form in Annex A should be used.

2 BASELINE METHODOLOGY

2.1 Project characteristics

General information such as: the project title, host country, objective, the relevant contacts and responsibilities, *etc.* needs to be provided. Besides, a clear description of the project implementation plan, including timeframe of the planning, implementation and operation stages, should be given. The project developer needs to present a brief description of the context and goal of the project and of possible specific characteristics and/or circumstances. The project developer should specifically address how the proposed project is contributing to sustainable development in the host country.

Supplementary to the general project information, provision of detailed project design descriptions should be added as an appendix to the baseline study report, including a description of the technology, technical capacity, expected availability, expected capacity factor, expected project activity level (production per year).

Such information can provide additional insights to validation/verification bodies when baseline studies are validated. Process flow diagrams and detailed maps may also give useful information.

> Instruction
>
> Provide general project information
> Provide detailed project design descriptions
>
> Use reporting form in Annex A.1

2.2 Greenhouse gas sources and project boundaries

2.2.1 Flowchart for direct on-site and off-site greenhouse gas emissions

The project developer should make a flowchart describing which components or processes are introduced by the project.

> Instruction
>
> Give a flowchart of the project showing the processes relating to the project.
>
> Use reporting form in Annex A.1

2.2.2 Project boundaries

A next step is to draw project boundaries. Equivalent project boundaries should be used for both the calculations of the baseline emissions (Section 2.5) and of the project emissions (Section 2.6).

In order to get a consistent procedure for the determination of project boundaries enhancing comparability and reproduction, the following two principles should be respected.

The first is the so-called 'principle of control'. This principle implies that the project boundaries should be set in a way that they contain all relevant emission effects that can either be controlled or influenced by the project, and that are reasonably attributable to the project activity. So emissions from production, transport and distribution of primary fuels (oil, coal, natural gas) will not be included using this principle, as they are outside control, influence and measuring capacity of the project developer.[4]

The second principle to be used is to extend the project boundaries so that all sources of greenhouse gases related to the processes one-step up (towards) and one-step down (away from) of the physical project are included. Using this second principle could mean that transport of fuel is included in the project boundary after all.

Deviations from these two principle can only be accepted if emissions resulting from a process account to less than one percent of the total baseline emissions. Determining the significance is therefore an iterative process.

In case the project affects upstream emissions considerably (more than 10%), place these emissions within the project boundaries. A situation where the project developer can influence the upstream emissions occurs if the project has a clear connection to some nearby specific production site (e.g. coal mine, biomass production) and for which the project is a large client. If, e.g. the project consumes more than 10% of the fuel produced at some site, one should assume that the project developer has a significant effect on the emissions of the fuel supplier.

An example of a flowchart for a biomass fuelled power plant is given in Figure 1.
In this project, a source to be taken into account for the project emissions are the transport emissions, as these are one-step up of the emissions under control of the project developers. It is calculated that due to the transport roughly 0.030 kton CO_2 equivalent per year is emitted, which is less than one percent of the baseline emissions. Transport emissions will not be significant, therefore transport emissions are not taken into account within the project boundaries and not monitored after all.

4 Another reason for this choice is that most of the fossil-fuel related upstream emissions, *e.g.* methane emissions from gas transport, primarily depend on system characteristics (*e.g.* quality and length of pipelines) and not or less on activity level (*e.g.* throughput of natural gas).

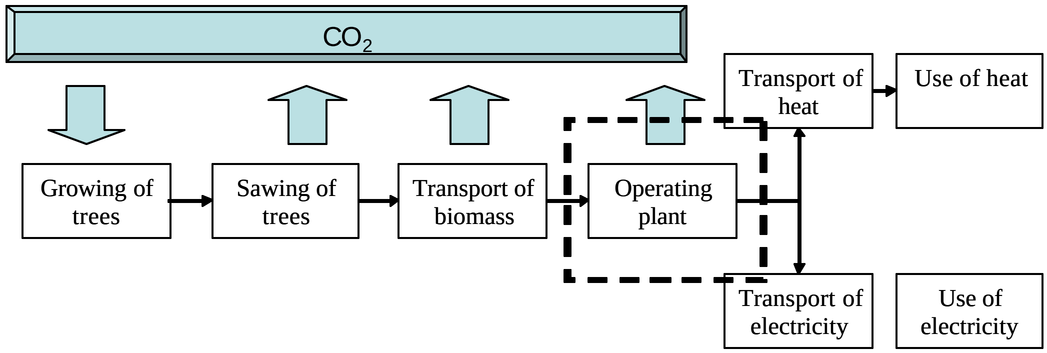

Figure 1 Example project flowchart and boundaries

Instruction

Draw the project boundaries in the flowchart excluding processes beyond control or influence of the project, but include the relevant beyond-control processes one-step up and one-step down of the physical project

Use reporting form in Annex A.2

2.2.3 Direct and indirect emissions and on-site and off-site emissions

The project developer should list all relevant emissions, among which:

- emissions resulting from operating the power plant
- emissions generated by other processes or activities
- emissions related to the handling and/or transportation of fuel
- emissions related to the use of electricity and heat both if they are produced on site as well as if they are produced off site.

The following classes of greenhouse gas emissions should be used:

- Direct on-site. This includes emissions from fuel combustion and process emissions on the site of the project included in the project boundary.
- Direct off-site. This involves emissions upstream and downstream of the physical project (but included in the project boundary), which are directly influenced by the activity of the project. This includes in principle both:
    1. one-step upstream emissions, *e.g.* connected with the production, transport, and distribution of fuels used for the project. An example is the power generation emission effect of electricity conservation projects.
    2. one-step downstream emissions, *e.g.* connected with electricity produced by the project that replaces off-site electricity generation.
- Indirect on-site. Due to the existence of the project the demand for the services that is provided by the project can change. A project could for instance result in a lower cost price for the consumer, leading to an increase in demand.
- Indirect off-site. This refers to changes in emissions and sequestration activities parallel to the project that may occur as a result of the existence of the project. An example is if reducing logging in a biomass project leads to an increase in logging in a forest elsewhere.

Indirect effects are usually referred to as leakages, because they are considered to occur outside the project boundary (see also Section 2.6.4).

The project developer needs to identify the emission sources and sinks of greenhouse gases relevant for the project boundaries in order to distinguish between emissions that will and will not need to be estimated/measured in the baseline study and in the monitoring phase. Where appropriate all Kyoto Protocol greenhouse gases (CO_2, CH_4, N_2O, SF_6, HFCs and PFCs) should be separately identified.

Where appropriate each of the six greenhouse gases should be separately identified in the project and reported in ton CO_2eq. Expressing in CO_2eq. should be carried out by using the conversion factors of their Global Warming Potentials (GWP), as defined by the IPCC and agreed by the CoP of UNFCCC (see Annex B.2).

If non-CO_2 greenhouse gas emissions account for less than 1% of the total CO_2eq. emissions from the project, they can be ignored in the calculations. However, non-CO_2 greenhouse gas emissions have to be estimated and reported in any case, so that the validation/certification body can assess whether they should be included in the calculations.

Information on the emissions of proposed CDM projects should be carefully reported to the host country authorities. Especially if in a proposed project new greenhouse gas sources are identified, the project developer should co-ordinate with the relevant authorities in the host country. This allows them to take up these new sources or sinks in the greenhouse gas emission inventory activity and in the reporting to the UNFCCC. This will prevent deviations between the reported and actual emissions at the national level. If emissions data of a particular CDM project are likely to be relevant for the Emission Inventory Guidelines, the referenced information should also be delivered to IPCC/IGES in order to take the information into account, if feasible, in the next version of those Guidelines.

Instruction

List the greenhouse gas emission sources and sinks related to the project, and make a distinction between:

- Direct on-site emissions
- Direct off-site emissions
- Indirect on-site emissions
- Indirect off-site emissions

Determine the significance of non-CO_2 emissions

Use reporting form in Annex A.2

2.3 Grid connected power sector

Current production and delivery patterns provide the starting point for defining a baseline scenario and a reference point for monitoring activities. Therefore, information on the current grid connected power sector, which is going to be affected by the project, is required.

The project developer should describe the power sector in the region or country where the project will connect to the grid and give a flowchart depicting this situation.

To understand the power sector, it is also essential to know which organisation is responsible for the power sector policy and how the power sector is organised.

The capacity for power production is usually sized to meet the highest annual peak in power demand. Consequently, at most times in a year there is excess capacity. Based on an economic assessment, different kinds of power plants are being operated in different modes. Nuclear power plants and run-of-river hydro power plants are usually being operated in such a mode that they operate as many hours are possible since the variable cost of these power generation options is very low. As long as their share in power production is less than e.g. 70%, their operation mode is not or hardly influenced by the power generation of other plants. Fossil-fired power plants are usually operated depending on the level of electricity demand. Thus, these plants are operated at the margin. Power plants with high priced fuel inputs and/or low conversion efficiency have high variable cost (*e.g.* aircraft type gas turbines). Therefore, they are usually operated for intermediate and peak load power production. Most coal-fired power plants have relatively low variable cost and are more frequently dispatched.

It is therefore important to know how is determined which plants will be dispatched, eg is this based on actual demand, forecasted demand, actual or forecasted marginal costs etc. Models used for short –and long term planning should be described.

A description of the current available capacity, status, adequacy and operation mode in the country or region is required. Necessary information per plant is

- the available capacity (MW),
- start-up year and condition
- recent production figures (GWh/yr) and/or normal availability,
- fuel,
- technology,
- efficiency,
- fuel use per unit produced (ton fuel per GWh),
- fuel carbon emission factors (ton CO2eq/ton fuel input)
- resulting carbon emission factor per plant. (ton CO2eq/GWh)
- resulting average carbon emission factor for the country/region affected by the project (ton CO2eq/GWh)

☞ Preferably, send along a spreadsheet with the calculation. Use industrial standards for efficiencies or other standardised values from recognised sources if no information on efficiencies is available.

A determination of which of the plants as mentioned are operating at the margin has to be given.

Instruction

Give a flowchart of the current grid-connected power system with the main components and their connections.

Give a description of the power sector

organisation (e.g. Which organisation is responsible for the power sector policy and dispatching of the power plants, how is determined which plants will be dispatched)

Give information about the status, adequacy and operation modes of the current delivery system.

Use reporting form in Annex A.3

2.4 Key factors

Every project and baseline is determined by a variety of project/sector-specific and country/region-specific factors. Some of those factors have a crucial impact, and will therefore be considered key factors, *i.e.* factors that need to be included in the procedure leading up to the baseline definition. These key factors can be distinguished at three levels. The following scheme gives an illustration of those three levels (the arrows between the dots indicate the interaction between key factors).

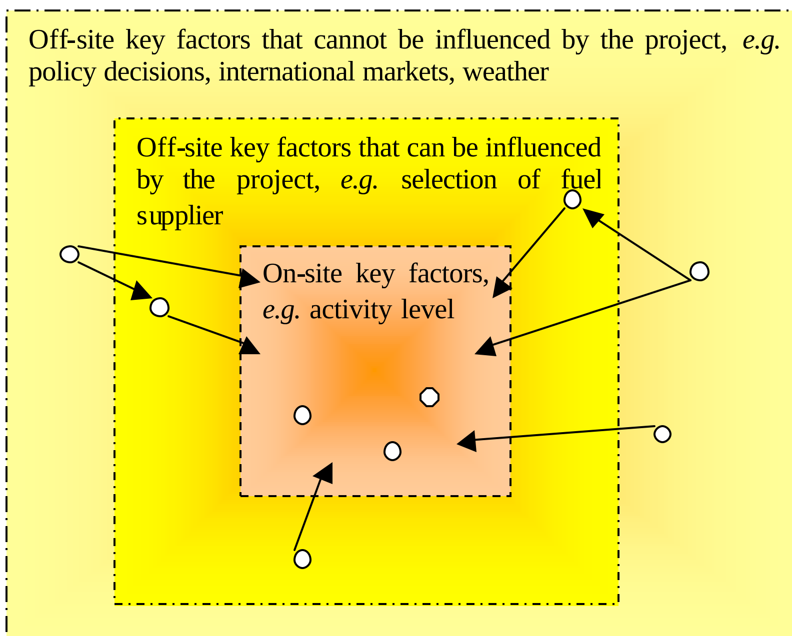

Figure 2 Key factors affecting greenhouse gas emissions divided in three groups

List key factors that affect either:

- the baseline development of emissions, and/or
- the project's activity level and greenhouse gas emissions, or
- risks for the project.

External (off-site) key factors

The project developer should identify and describe the external key factors (the off-site factors in Figure 2) and their role and effect on the current (or planned) and future project activity. Unless not applicable, the baseline developer should consider:

☞

1. legislation development
2. sectoral reform projects
3. economic growth, socio demographic factors, the economic situation in the electricity sector and resulting predicted power demand
4. fuel prices and availability
5. capital availability (investment barrier)
6. rate of return different alternative projects
7. available local technology, skills and knowledge, availability best available technologies in the future
8. social effects and local support
9. national expansion plan for the electricity sector

Project-specific (on-site) key factors

Project-specific factors are directly related to how the project is operated (and therefore correspond with the on-site key factors in Figure 2). All factors directly affecting the activity level are to be considered, e.g. operation mode and technical performance (which are usually also influenced by external factors). If systems can be operated in different operation modes one needs to specify which modes are possible, and under which conditions. E.g. a plant could have a 4 weeks overhaul every 3 years, meaning operating hours and thus the energy produced will be lower in these particular years

> Instruction
>
> List all key factors affecting:
> - the baseline development of emissions
> - the project's activity level and greenhouse gas emission
> - risks for the project.
>
> Use reporting form in Annex A.4

2.5 Identification of the most likely baseline scenario and the associated greenhouse gas emissions

The construction of the baseline scenario is one of the most crucial elements of the CDM project design as it largely determines the size of the emission reduction to be credited. The project developer has to show the project's environmental additionality: the credits that can be generated by the project will be based on the extent to which project emissions will be lower than the emissions in the baseline situation.

A baseline scenario is set up with the best knowledge and most recent information on future developments available at the time of or prior to the date of its set up.

In order to provide certitude and confidence to investors, baseline carbon emission factors, if validated and accepted, will be fixed, that is not recalculated during the first crediting period. An exception to the above applies when the project is substantially modified during the project lifetime.

In order to ensure compatibility of the project and baseline scale, the baseline activity level should be adjusted at regular intervals, preferably annually, if the monitored activity level of the project so requires.

2.5.1 Key factors

The current electricity system and the key factors as mentioned in sections 2.3 and 2.4 have a crucial impact on the baseline carbon emission factors. Project developers must make clear in this section what key factors' parameter values are used, what factors are not used, or to which factors no parameter values have been attached for the baseline design, and why.

☞ The development of the key factors in time determines the baseline carbon emission factor per year. For all key factors, a trend needs to given for the coming period. A range needs to be provided if feasible. Wherever applicable, it is recommended to apply statistical indicators, which allow for conservative estimates of the key factor parameter values, *e.g.* by providing 95% confidence ranges. The set of key factor values must be specified in such a manner that the validator is able to carry out a sensitivity analysis based on those values.

Especially for long-term projects, it is essential to give a clear indication of the 'business-as-usual' development of the values of the key factors mentioned for a country, region or sector. Such values may be taken from information contained in National Communications, as this covers agreed assumptions on future developments, or from other publicly known documents with some legal status.

> Instruction
>
> Describe the most likely trend of these key factors.
>
> Give a likely range of the key factor parameter values in time, and provide evidence for this.
>
> Use reporting form in Annex A.5.

2.5.2 Construction of the baseline scenario

The baseline is the scenario that reasonably represents the greenhouse gas emissions that would occur in the absence of the proposed project activity. A description must be given of the most likely developments, starting now up tot and including 2012. The current delivery system and the selected key factors and their development are the basis.

To determine the most likely scenario that would occur, a straightforward investment analysis could be used. This means that possible future scenarios (including the proposed project) are defined with equal likeliness. For each alternative the IRR or NPV is calculated, not taken into account any CER-revenues of course. The baseline scenario is than the scenario with the highest IRR.

☞ If however the key factor analysis shows that not only financial motives determine the most likely scenario (usually in situations where markets operate imperfect) , an

investment analysis would not provide a realistic answer. Basically it means that non-economic constraints are the predominant factors for a future development.
In many developing countries this is the case, as there is no adequate access to the capital market, pricing is not based on marginal costs, or market an pricing information is not public available or transparent.

In the case of an imperfect market, an extensive scenario analysis of the key factors should result in one single baseline scenario. If, even given this extensive analysis several scenarios appear to be equally likely, choose the scenario leading to the most conservative baseline carbon emission factor. If a straightforward investment analysis is used anyhow, a clear analysis of why the financial market can be considered as a perfect market should be given.

2.5.3 Different applications

☞ Application of the methodology is different for different situations. Following is a schematic overview of these different applications. The project developer must ask the following questions to determine which application fits best with the circumstances of the project. The overall goal of this exercise is to approximate reality or the most likely scenario of the future as close as possible.

The current situation in the power sector and key factors more detailed description) will need to be analysed to determine what the most likely future situation will be. By using Key Factors, the user of this methodology can assess what the most likely development will be. In most cases a National Expansion Plan is available, for which also several Key Factors have been analysed to determine the capacity mix of a grid during the forecast horizon.

The key factor analysis must make clear whether the electricity grid will be extended in the future of not. Based on this, the proposed project will either compete with future plants or will replace power, generated by currently operating plants. Also, it has to become clear from the analysis if the project will compete with plants operating at the margin or with the all the thermal power plants connected to the grid. The baseline scenario must give a likely but also conservative picture of this future situation.

The questions that the user must ask include:

- what are the available fuel options;
- what is the least cost investment option, taking into consideration the cost of capital;
- does the government or private investors have plans for adding new capacity or stimulating new sources of fuel;
- what other constraints (for example environmental) exist for alternative investments.

For each country, or each electricity grid, a determination can be made what the most likely next investment in electrical capacity would be, or which existing plans will be dispatched in the future.

By using the decision tree (Figure 1), the user of the CERUPT methodology will first make a decision on how the methodology is applied best, considering the unique circumstance of the project environment. The user of the methodology must substantiate its choice of the application of the CERUPT methodology.

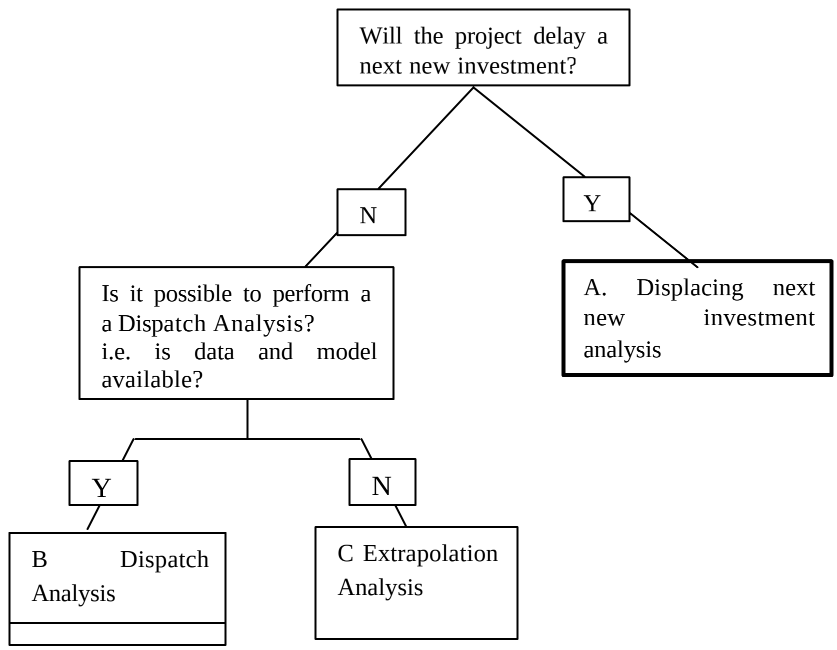

Figure 3 Decision tree to determine application of CERUPT methodology

Based on the decision tree (Figure 3), several applications of the methodology can be identified:

A. Displacing the next new investment – if electricity grid faces shortage and the project would meet new demand,
B. Dispatch Analysis - when the project will displace existing and future new generation,
C. Extrapolation – if access to data is difficult, or if extrapolation would be more conservative than the first two applications,

A clarification of the decision tree is given below:
"Will the project delay a next new investment?"
Many electricity markets in developing countries face a shortage of supply, which often leads to black outs and brown outs. If the supply outstrips demand in the near future, it is opportune to assume that the proposed project activity will either displace or delay new investment in new capacity. To determine this, a clear picture of how the demand to the electricity grid will develop has to be available (Key Factor 3).

The rationale behind this step is to approximate reality as close as possible: If this situation occurs, the project developer must analyse Key Factors, such as sectoral policies, cost of capital, availability of fuel, etc. to determine what the most likely new investment would have been. Also, it might be possible to use a National Expansion Plan if available.

If a next new investment will be delayed or displaced, a "**Displacing next new investments analysis**" must be executed.
By using the results of the Key Factor analysis, the user of this methodology can assess what the most likely next new investment will be, and use this new investment as the baseline scenario. Consequently, the related baseline carbon emission factor can be determined.

"Is it possible to perform a dispatch analysis?"
If the proposed project would not displace or delay an alternative investment directly but would displace current available capacity, a "**Dispatch Analysis**" is preferred. In a Dispatch Analysis, a very detailed calculation will be made to determine which power of existing and future facilities will be displaced by the proposed project. If possible, the project developer must use the official National Expansion Plan as input for the model

The Dispatch Analysis is the most sophisticated application of the CERUPT methodology and provides for the most accurate calculation of the electricity displaced by the proposed project activity. It is particularly useful in those cases where a National Expansion Plan (NEP) exists, or where otherwise a high degree of certainty exists of what the capacity mix of a grid will be during the forecast horizon.

Target of the analysis is to asses which power plants will be displaced by the proposed project activity. The analysis must be made for the with and without the project situation. Input data, like the thermal efficiency of power plant, capacity factors and the carbon content of the fuel used must be used. A reasonable forward price curve for alternative fuels, such as oil, diesel oil, coal price forecasts must be developed. Furthermore, the results of the Key Factor analysis will determine these input assumptions.
Key Factor data used must be based on, or consistent with, official statistics or studies, and be publicly available information if possible.

Dispatch analysis can be carried out with either a computer simulation model, which is often used by utilities or another entity which is responsible for planning, or spreadsheet model. Often such models require a high degree of expertise to be able to evaluate input, throughput and output. While the simulation remains an approximation of reality, by using conservative assumptions regarding thermal efficiencies, forward price curves of fuel prices, and electricity demand growth, a conservative baseline will be established. The model itself must be described in detail in the baseline study.

If data are unavailable to carry out a more sophisticated analysis, or if it would lead to a more conservative baseline than a dispatch analysis or establishing what new investment will be displaced, users of the CERUPT methodology shall utilize "**Extrapolation**". Extrapolation is a relatively easy to implement and a conservative and transparent application of the CERUPT methodology. Basically, the baseline scenario presented is based on the current situation in the power sector and on a future situation assuming a mix of highly efficient power plants using low carbon fuel. The yearly grid weighted average of the CEF (Carbon Emission Factor) is calculated by extrapolating between the carbon emission factor of the current and future situation.

2.5.4 Check if scenario is realistic and probable

In the methodology described here, Key Factors, applied in an appropriate way in a scenario analysis, shall safeguard a credible and conservative determination of the baseline. For an ex-post check on correct application of the Key Factors at least 5 specific questions are developed. These 5 questions are to be applied by the project developer, but also by the validator. As soon as one of the questions is answered with "yes" the baseline should be

rejected, or - when the baseline is equal to the project - the number of CERs from the project is equal to zero.
The relevant questions are:

1. Would legally binding (and enforced) obligations or other (e.g. safety) requirements impede the baseline scenario from ever be realized? (Check on Key Factors local rules and legislation)
2. Would local physical obstructions impede the baseline scenario from ever be realised? (Check on Key Factors available fuel, local technology, skills and knowledge)
3. Would the proposed baseline scenario be unrealistic from a financial perspective, in other words, would appropriate capital never be available to make execution of the proposed baseline scenario possible? This is relevant in case the proposed project represents the least-cost option. (Check on Key Factors capital availability and economics)
4. Would (in)sufficient local support impede the baseline scenario from ever being realized? (Check on Key Factors social effects and local support)
5. Would other inevitable factors imply that the baseline scenario would be equal to the project itself? This could be the case if the project itself, without revenues of CERs, is already extremely economically viable, so the project – and hence the baseline - could be considered as "business-as-inevitable" (Check on Key Factor economics)

Describe the baseline scenario and its underlying assumptions.
Report on:
- Straightforward investment analysis or scenario analysis
- Appropriate application selected based on key factor analysis
- Check if scenario is realistic and probable.

Use reporting form in Annex A.5.

2.5.5 Calculation of baseline carbon emission factors

The baseline carbon emission factors should present the greenhouse gas emission values for the baseline situation for each year up to and including 2012. To calculate the baseline carbon emission factors, as a guiding principle the actual or historical emission patterns will be used as a starting point. Since it is unlikely that the existing greenhouse gas emission pattern will remain unchanged in the future, a simple continuation of the actual emissions will usually not represent a reasonable baseline for long- or medium-term projects. An extrapolation of the historical emissions does not by definition represent a reasonable baseline for such projects.

The baseline carbon emission factor must be a *conservative* estimate of the greenhouse gas emissions within the project boundaries as discussed in Section 2.2. So, insofar as likely ranges of greenhouse gas emission factors would result, *e.g.* due to the various uncertainties in the key factor parameter values, the lower end of the emissions' range should be used.

The project developer must therefore assess systematically and through sensitivity analysis the extent to which the key factors (identified in Section 2.4) affect the future baseline emissions. For each key factor the project developer must first research for the likely range of its parameter values if and to what extent that factor can affect future emissions. Based on that assessment, the project developer should present a likely range of the baseline carbon emission factor for each year – taking the possible impact of *all* key factors into account while recognising their possible interrelationships – and use the lower end of that range to get the required conservative estimate.

The project developer should also indicate to what extent the key factor parameter values used to calculate the baseline emissions are interrelated, and try to make corrections for such interrelations. Any such corrections should be carried out in a transparent manner, so that any remaining potential biases in the baseline that would result from such interrelations can be taken into account by the validator.

2.5.6 Calculation of activity level

This information needs to cover the estimated project activity level (annual production in GWh/yr) and its plausibility. Starting information is the information gathered in section 2.1. For systems that can be operated in different operation modes, one needs to specify: which operation modes are possible, which conditions determine the operation modes, and the expected frequency of the various operation modes. Seasonal and/or daily pattern of production has to be shown.

For determining a conservative estimate of the annual activity level, if feasible, the lower parameter value based on a 95% confidence interval (the expected average value minus twice the standard deviation if a normal distribution applies) should be used.

2.5.7 Calculation of baseline carbon emissions

Baseline carbon emissions (kton CO_2/yr) are calculated by multiplying the baseline carbon emission factor (kton CO_2/GWh) with the activity level (GWh/yr). All the relevant data and the formulas used to calculate the baseline emissions should be presented in a clear manner, so that the validator can redo all the calculations if considered necessary. The preferred way to present the baseline emissions is in a spreadsheet model making a clear distinction between the input variables (the key factors), the calculation formula (usually the central feature of the spreadsheet model), and the output (the actual emission values).

> Instruction
>
> Calculate the baseline carbon emission factor and the project activity level per year
>
> Present the baseline emissions per year by multiplying the baseline carbon emission factor with the activity level
>
> Use reporting form in Annex A.5.

2.6 Estimation of project emissions

2.6.1 Project carbon emission factors

In order to calculate the project carbon emission factor, some default values may be used for monitoring purposes. Typically this includes: IPCC default factors for the greenhouse gases, specific analysis of natural gas that is sustained well enough by statistics to determine them as default values, as well as industrial standards for efficiencies or other standardised values from recognised sources.

However, it is up to the project developer to determine that he wants to use default values rather than project-specific values for estimation of the project emissions. In the latter cases, the specific values should be presented in a transparent manner, and sustained by statistics that give a conservative confidence level at 95% or more (conservative means the use of high values for real emissions vs. low values for the baseline).

2.6.2 Calculation of activity level

In order to get consistency between the methodology used for the estimation of baseline emissions on the one hand and the estimation of project emissions, the same activity level (expected yearly production of project) and equivalent project boundaries should be used as an input for both calculations. See section 2.5.6

2.6.3 Estimation of direct project emissions (on-site and off-site)

Project emissions need to be estimated for the full period starting from the first operation of the project until the end of the relevant crediting time. Project emissions need to be estimated using the expected activity level as a starting point.

Calculation of on-site emissions is usually fairly straightforward as it involves a multiplication of activity levels (*e.g.* amount of fuel used) and greenhouse gas emission factors.

In order to guide the reader through the calculation of project emissions, the flowchart of the project needs to be used and referred to. Literature and data sources, technical descriptions, *etc.* that have been used for determining key parameter values and assumptions should be clearly referred to.

All the calculation steps need to be reported in a transparent manner. This applies to *e.g.*: information about efficiency of transport of energy carriers, conversion efficiency of equipment, emission factors of fuels and activities, *etc.* Where efficiencies of conversion processes are reported, it needs to be made clear if the report reflects such efficiencies under lower, higher, or average heating values. It is recommended to report in terms of lower heating values.

If emission factors are uncertain, one should take the high end of the generally accepted range to calculate the emissions from the project.

Unless better methodologies and emission factors are available, the Revised 1996 IPCC Guidelines for National greenhouse gas Inventories should be used to calculate emissions. All information sources used for quantitative data need to be provided.

Instruction

> Estimate the project carbon emission factor for direct emissions and the project activity level per year
>
> Calculate direct on-site and off-site emissions from the project within the project boundaries.
>
> Use reporting form in Annex A.6

2.6.4 Prediction of indirect emission effects (leakage)

Both on-site and off-site indirect greenhouse gas emission effects (see also Section 2.2) can be significant and therefore need to be estimated. Indirect greenhouse gas emission effects are considered to occur outside the project boundary. They will be called leakages, because the latter are defined as the net change of anthropogenic greenhouse gas emissions which occur outside the project boundary, and that are measurable and attributable to the project activity.

On-site indirect emission effects can be important if the project leads to a change in activity level that would otherwise not have occurred. This is the case *e.g.* for energy conservation projects (the so-called rebound effect). The installation of such projects usually lowers the marginal cost of the product or service provided, inducing additional demand. Then emission reductions are less than foreseen. The size of such rebound effects depends on: the kind of service or product provided, the kind of users, and the market characteristics. Project developers may refer to earlier surveys estimating the rebound effect of similar project types.

Off-site indirect emission effects play a role if the project causes emissions to increase elsewhere, *e.g.* due to stimulating similar activities now taking place at other locations. If the project developer expects on-site or off-site indirect emission effects not to apply, he/she needs to motivate this expectation, *i.e.* by conducting consumer surveys, or by referring to such surveys. Note: the direct and indirect emission effects mentioned above can by definition only relate to effects foreseeable in the project design phase. Any unforeseeable emission effects will be reported in the monitoring phase.

> Instruction
>
> Estimate the size of on-site and off-site indirect greenhouse gas emission effects.
> If such effects are believed not to apply for the project, motivate clearly why.
>
> Use reporting form in Annex A.6

2.6.5 Calculation of total project emissions

The project's estimated emissions' total is the sum of the calculated direct and indirect emissions (the latter can be negative).

> Instruction

Calculate the project greenhouse gas emissions' total based on direct and indirect emissions.

Use reporting form in Annex A.6

2.7 Estimation of emission reductions & determining additionality

Yearly emission reductions can be calculated by calculating the difference between baseline emissions (as calculated in section 2.5.7) and the project emissions (as calculated in section 2.6.5. If the baseline emissions are higher than the project emissions, emission reductions are additional.

Instruction

Estimate the emission reductions by determining the difference between baseline emissions and project emissions.

Use reporting form in Annex A.7

ANNEX A. REPORTING FORM FOR BASELINE STUDIES FOR GRID CONNECTED ELECTRICITY PROJECTS

The following tables are provided as general guidance, and should only be filled in when they apply to project specific situations

A.1 Project characteristics

See Section 2.1

Project characteristics

- Supplier's name and address
- Company name
- Address
- Zip code + city address
- Postal address
- Zip code + city postal address
- Country
- Contact person
- Job title
- Telephone number
- Fax number
- E-mail address
- Date of registration

The same information for:

- Local contact
- Other parties involved (co-investor, owner, operator, user, *etc.*)

Project Abstract

- Project Title (maximum 40 positions)
- Abstract (maximum 100 words; most important features of the project)
- Project location
- Project starting date
- Construction starting date
- Construction finishing date

Background and justification

Describe the background of your project, the history and the problems that this project has to solve. Describe the core business of the project partners and the relation between them, how long contacts have been going on, and what activities have been carried out so far. Describe related financial commitments.

Intervention (maximum 2 pages A4)

Describe the GOALS of the project: these refer to the long-term strategic objectives to which this project has to contribute. What commercial and other spin-offs do you expect in the long term?

Describe the PURPOSE of the project: what is the one reason you are carrying out the project for? What effect should be realised by the end of the project? Ideally, a project has one purpose only.

Describe the RESULTS of the project: what are the concrete outputs produced by the project for it to achieve the purpose?

Describe ACTIVITIES of the project: which activities are you going to carry out in order to realise the results?

Provide detailed project description:

- description of technology
- technical capacity
- expected availability
- expected capacity factor
- expected project activity level (production per year)

A.2 Greenhouse gas sources and project boundaries

See Section 2.2

Draw a flow chart of the project with its main processes and connections.

Draw the project boundaries in the flowchart excluding processes beyond control or influence of the project, but include the relevant beyond-control processes one-step up and one-step downstream of the physical project.

List the greenhouse gas emission sources and sinks due to the project and give a brief description, including determination of significance of non CO_2 emissions
Direct on-site emissions
Direct off-site emissions
Indirect on-site emissions
Indirect off-site emissions

General comments on flow chart and project boundaries.

A.3 Grid connected power sector

See Section 2.3

Draw a flowchart of the current delivery system (power sector) with its main components and their connections.

Give a description of the power sector organization:
- Which organization is responsible for the power sector policy
- Who organizes dispatch and how is this organised

Send along a spreadsheet with the following calculations for all relevant grid connected plants.

		Unit	Calculation	Source	Plant 1	Plant 2	Plant n	Total/ Average
1	Capacity	MW		Reference				
2	Maximum Availabillity	h/yr		Reference				
3	Conversion factor	GWh/MWh			1000	1000	1000	
4	Maximum production	GWh/yr	=1*2/3					
5	Efficiency	%		Reference				
6	Conversion factor	GJ/GWh			3600	3600	3600	
7	Maximum Heat input	GJ/yr	=4/5*6					
8	Fuel & technology			Name				
9	Fuel emission factor	tonne CO2/GJ		Annex B.1				
10	Maximum CO2 emission	tonne CO2/yr	=7*9					
11	Average production	GWh/yr		Reference				
12	Maximum heat input	GJ/yr	=11/5*6					
13	Average CO2 emission	tonne CO2/yr	=12*9					
14	Average CO2 emission	tonne CO2/GWh	=13/11					
	Start-up yr							

A.4 Key factors

See section 2.4

List all legal, economic, political, socio-demographic, environmental and technical factors that will influence:
- baseline development
- the project's activity level and greenhouse gas emissions
- risks for the project.

Clearly mention all references of data used.
- Legislation development
- Sectoral reform projects
- Economic growth, socio demographic factors, the economic situation in the

electricity sector and resulting predicted power demand

- Fuel prices and availability
- Capital availability (investment barrier)
- Rate of return alternative projects
- Available local technology, skills and knowledge, availability best available technologies in the future
- Social effects and local support
- National expansion plan

A.5 Identification of the most likely baseline scenario and the associated greenhouse gas emissions

See Section 2.5.

Key factors

Describe what is most likely to happen to the key factors. Give also ranges in time for these as applicable, and provide supporting information.

Vary the key factors identified in A.4 to get more insight in the robustness and likeliness of the baseline that is finally selected.

Carry out sensitivity analysis to substantiate the baseline selection process, given the credible ranges of the key factor parameter values.

Indicate clearly how the various baseline specifications identified in the sensitivity analysis above vary in terms of their greenhouse gas emission effects, both on-site and off-site (to be specified separately).

Construction of the baseline scenario

Determine – based on the key factor analysis – whether an investment analysis or scenario analysis will be used.

Different applications

Select the – based on the key factor analysis – the most appropriate application of the methodology :

- Displacing next new investment analysis
- Dispatch Analysis
- Extrapolation

Explain this choice extensively.

Give a detailed description and calculations of how the baseline scenario is determined.

Describe the baseline scenario selected

Check whether the scenario is realistic and probable using the questions in section 2.5.4.

Calculation of the baseline emissions

Indicate clearly what the on-site and off-site greenhouse gas emissions implications of the baseline choice are (baseline carbon emission factor). Use the expected activity level of the proposed project as a base for determining the emissions associated with the baseline case. Give activity levels for all years from the start of the project until the end of the crediting time: Expected annual production Expected range in annual production Provide evidence why the annual production (activity level) is expected at this level. Unless clearly not feasible, give a 95% confidence interval range for the activity level during the project lifetime. Give the baseline emission figures for all years from the start of the project until the end of the crediting time.

A.6 Estimation of project emissions

See Section A.6.

Estimation of direct project emissions

Calculation of direct project emissions

Calculate in a transparent manner the direct on-site and off-site greenhouse gas emissions from the project within the project boundaries. Use the expected activity level as a starting point. Give emission figures for all years from the start of the project until the end of the crediting time.
Direct on-site emissions
Direct off-site emissions

Calculation of indirect project emission effects (leakage)

Estimate the indirect on-site and off-site greenhouse gas emission effects (leakage) from the project. This estimate should in any case cover the full spectrum of the project boundary. If leakage effects outside the project boundaries are disregarded, a clear motivation why is required. Use the expected activity level as a starting point. Give figures on leakage for all years from the start of the project until the end of the crediting time.
Indirect on-site emissions

Indirect off-site emissions

Calculation of total project emissions

Calculate the total project emissions by adding all direct emissions and all indirect emission effects caused by the project. Give emission figures for all years from the start of the project until the end of the crediting time.

A.7 Estimation of emission reductions & determining additionality

See Section 2.7

Calculate the yearly emission reduction from the project by subtracting the total project emissions (as calculated under A.6.4) from the baseline emissions (as calculated under A.5.2). Give emission reduction figures for all years from the start of the project until the end of the crediting time.

ANNEX B. UNITS AND DATA TABLES

B.1 CO_2 Emission factors for fuels in kton CO_2/TJ

These emission factors are taken from IPCC publications and are expressed in kton CO_2 per TJ (10^{12} J) fuel input. They are recommended for use when projects do not have data available from own operations that can determine their project emissions or emission reductions. NB. 1 kton/TJ equals 3,600 g/kWh.

	Energy carrier	Kton CO_2/TJ
Solid Fossil		
Primary fuels		
	Anthracite	0.0983
	Coking Coal	0.0946
	Other bituminous coal	0.0946
	Sub-bituminous coal	0.0961
	Lignite	0.1012
	Oil Shale	0.1067
	Peat	0.1060
Secondary fuel/products		
	Coke oven/Gas coke	0.1082
	Coke Oven Gas	0.0477
	Blast furnace gas	0.2420
	Patent fuel and BKB	0.0946
Liquid fossil		
Primary fuels	Crude oil	0.0733
	Orimulsion	0.0807
	Liquefied natural gas (LNG)	0.0631
Secondary fuel/products		
	Gasoline	0.0693
	Jet kerosene	0.0715
	Other kerosene	0.0719
	Shale oil	0.0733
	Gas/diesel oil	0.0741
	Residual fuel oil LPG	0.0774 0.0631
	Ethane	0.0616
	Naphtha	0.0733
	Bitumen	0.0807
	Lubricants	0.0807
	Petroleum coke	0.1008
	Refinery feedstock	0.0807
	Refinery gas	0.0667
	Other oil	0.0733
Gaseous fossil		
	Natural gas	0.0561
	Methane	0.0551

B.2 Global Warming Potential of the most common greenhouse gases

Global Warming Potential (GWP) factors are used in the guidelines to calculate the CO_2 equivalent impact of greenhouse gases. It allows adding up effects of different greenhouse gases. For example, the emission of one ton of methane has the same GWP as 21 tons of carbon dioxide.

Chemical substance	Energy carrier	CO_2 Equivalent
CO_2	Carbon dioxide	1
CH_4	Methane	21
N_2O	Nitrous oxide	310
HFC-23		11700
HFC-32		650
HFC-41		150
HFC-43-10mee		1300
HFC-125		2800
HFC-134 HFC-134a		1000 1300
HFC-152a		140
HFC-143		300
HFC-143a		3800
HFC-227ea		2900
HFC-236fa		6300
HFC-245ca		560
CF_4		6500
C_2F_6		9200
C_3F_8		7000
C_4F_{10}		7000
$c\text{-}C_4F_8$		8700
C_5F_{12}		7500
C_6F_{14}		7400
SF_6		23900

ANNEX C. REFERENCES

The following documents and papers have been used in the development of the set of guidelines.

Anonymous (1999), *Technical Operation Protocols: Carbon Monitoring, Leakage Monitoring, Accounting and Reporting, Verification and Certification*, Noel Kempff Climate Action Project, Bolivia.

Bandsma, J., C.J. Jepma and W.P. van der Gaast (2001), *Baseline Determination: Aspects, Options and Consequences of Choices*, Foundation JIN, Paterswolde, The Netherlands.

Begg, K.G, and S.D. Parkinson (2000), *Initial Evaluation of CDM Type of Projects in DC*, Centre for environmental Strategy, Univ. of Surrey, England.

Brodman, U. (2000), *Criteria and Guidelines for CDM/CDM Baselines*, Factor Consulting+Management, Zürich, Switzerland.

Ellis, J. (2000a), *Setting Emission Baselines for Project-based Mechanisms*, Position paper, OECD, Paris, France.

Ellis, J. (1999a), *Experience with Emission Baselines under the AIJ Pilot Phase*, OECD, Paris, France.

Ellis, J. (1999b), *Options for project emission baselines.* OECD, Paris, France.

Ellis, J. (2000b), *Draft Framework for Baseline Guidelines*, OECD, Paris, France.

EU (1999), Directive 1999/31/EG, Brussels, Belgium.

Global Industrial and Social Progress Research Institute (1999), *Discussions at the CDM Workshop on Baseline Issues*, Tokyo, Japan.

IEA (2000), Bioenergy, *International Perspective on Energy Recovery from Landfill Gas*, CADDET Renewable Energy.

IEA (199x), EWG on Landfill gas, Modeling of Landfill gas Potentials, preprint version.

IGPO (1999), Workbook for calculating greenhouse gas reductions from Projects which Capture Fugitive Emissions.

IGPO (1999), Workbook for Calculating greenhouse gas Reductions from Projects using Renewable Energy.

IPCC (1996), Revised guidelines for national greenhouse gas inventories (online available on http://www.ipcc-nggip.iges.or.jp/public/gl/invs1.htm).

ISO/IEC Guide 66 (1999), General Requirements for Bodies Operating Assessment and Certification/Registration of Environmental Management Systems (EMS).

ISO 8402 (1994), Quality management and quality assurance, Vocabulary.

ISO 14001 (1996), Environmental management systems. Specification with guidance for use.

ISO 14010 (1996), Guidelines for environmental auditing – General principles.

ISO 14011 (1996), Guidelines for environmental auditing – Audit procedures – Auditing of environmental management systems.

ISO 14012 (1996), Guidelines for environmental auditing – Qualification criteria for environmental auditors.

ISO 14050 (1998), Environmental management – Vocabulary.

Jepma, C.J., W. van der Gaast and E. Woerdman (1998), *The Compatibility of Flexible*

Instruments under the Kyoto Protocol, JIN Foundation, Paterswolde, The Netherlands.

Jepma, C.J. and W. van der Gaast (1999), *On the Compatability of Flexible Instruments*, Kluwer, Dordrecht, The Netherlands.

Jepma, C.J., R. Dixon and M. Eisma (1999), *Overview of the UN FCCC Activities Implemented Jointly Pilot: COP-1, Decision 5, Reporting Guidelines and Case Studies*, in: R.K. Dixon, ed., The U.N. Framework Convention on Climate Change Activities Implemented Jointly (AIJ) Pilot: Experiences and Lessons Learned , Kluwer, pp. 15-37.

JIN Foundation (1999), *Editor's note*, by C.J. Jepma, JIQ, Vol.5, No.1, p.1, Paterswolde, The Netherlands.

JIN Foundation (1998), B. Hare, *Letter to the Editor*, JIQ, Vol.4, No.4, p.2, Paterswolde, The Netherlands.

JIRC (1999), *Setting a Standard for Joint Implementation Projects. Recommendations on Baselines and Certification based on AIJ Learning Experience.*

JIRC (2000), *Criteria and Guidelines for Baselines: Outcomes of Expert Workshop,* Amsterdam.

Klarer, J., O. Kolehmainen and J.N. Swisher (1999), *Synthesis Study of the National AIJ/CDM/CDM Strategy Studies Program.*

Lazarus, M., S. Kartha, M. Ruth, S. Bernow and C. Dunmire (1999), *Evaluation of Benchmarking as an Approach for Establishing Clean Development Mechanism Baseline*, Boston, USA.

Matsuo, N. (2000a), *Proposal for Step-by-Step Baseline Standardisation for CDM*, Version 2. Inst. For Global Environmental Studies, Tokyo, Japan.

Matsuo, N. (2000b), *Towards reliable Baseline Determination*, Position paper, Inst. for global env. Studies, Tokyo, Japan.

Michaelowa, A. (1998), *Joint Implementation – the baseline issue. Economic and Political Aspects*, Global Environmental Change, pp. 81-92.

Michaelowa, A. (1999), *Baseline setting in the AIJ pilot phase*, in: Bundesumweltministerium, Wuppertal-Institut (eds.), Reports on AIJ projects and Contributions to the Discussion of the Kyoto Mechanisms, Berlin, Germany, pp. 82-93.

Michaelowa. A., K. Begg, S. Parkinson and R. Dixon (1999), *Interpretation and Application of UNFCCC AIJ Pilot Project Development Criteria*, in: R.K. Dixon ed., The U.N. Framework Convention on Climate Change Activities Implemented Jointly (AIJ) pilot: Experiences and Lessons Learned, Kluwer, pp. 39-72.

Moura Costa, P., M. Stuart, M. Pinard and G. Phillips, 2000: *Issues related to Monitoring, Verification and Certification of Forestry-based Carbon Offset Projects*, in: Mitigation and Adaptation Strategies for Global Warming. In Print.

NEDO, GISPRI (1999), *Proceedings CDM Workshop, Workshop on Baseline for CDM*, 25-26 February 1999, Tokyo, Japan.

Puhl, I. (2000), Generating Guideline Options to Support Decision-making on Baseline Setting and Additionality Assessment for Industrial Projects, UNIDO, Vienna, Austria.

SGS (2000) *Eligibility Criteria for Carbon Offset Projects.* http://www.sgs.co.uk/download/carbon.pdf. April, 2000.

Telnes, E. (1999), *Some Thoughts on Structures for Cost-effective and Transparent Verification and Certification of greenhouse gas Projects*, Det Norske Veritas, Hoevik, Norway.

UNFCCC (2000), Submissions to Proposals on Modalities.

Vine, E. and J. Sathaye (1999), *Guidelines for the Monitoring, Verification and Certification of Energy-Efficiency Projects for Climate Change Mitigation*, LBNL-41543.

World Bank: *Baseline Methodologies for PCF Projects*, Prototype Carbon Fund, Washington D.C., USA.

ANNEX D. LIST OF ABBREVIATIONS

CHP	Combined heat and power generation
CDM	Clean Development Mechanism
CER	Certified Emission Reduction
CERUPT	Certified Emission Reduction Unit Purchasing Procurement Tender
CoP	Conference of the Parties to the Convention of the UNFCCC
EIA	Environmental Impact Assessment
GHG	Greenhouse gas
GDP	Gross Domestic Product
GWP	Global Warming Potential, as defined by decision 2/CP.3 or as subsequently revised in accordance with Art. 5 (FCCC/CP/2000/5/Add.3 [Vol V] para d, page 33)
IPCC	Intergovernmental Panel on Climate Change
KP	Kyoto Protocol
LHV	Lower Heating Value
LoA	Letter of Approval
LoI	Letter of Intent
MoU	Memorandum of Understanding
NCV	Net Caloric Value or Lower Heating Value LHV
TJ	Terra-Joule (1012 Joule)
UNFCCC	United Nations Framework Convention on Climate Change