'DOE's Perspective to Energy Efficiency CDM Projects'

By

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DOE's Position in CDM

Designated Operational Entity is

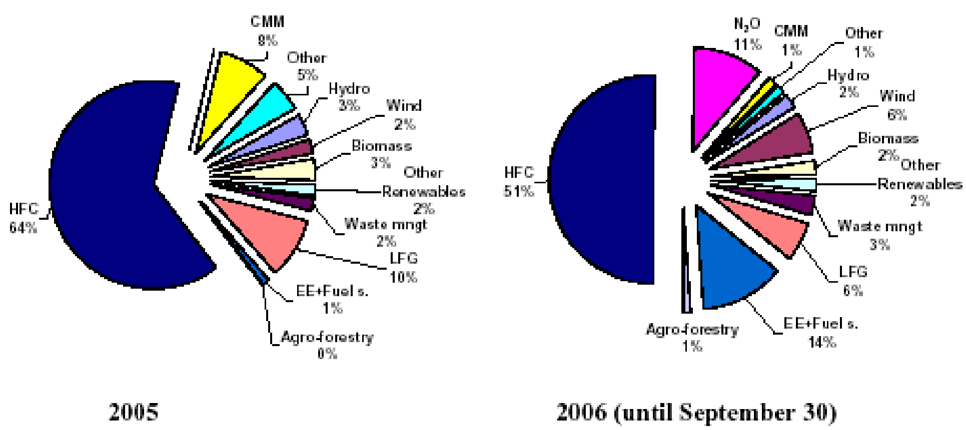
- a neutral organization facilitating the first step of determining the project activity as a valid CDM project activity
- a body that decides the amount of certified emission reductions generated by a project activity
- a link between the project proponent and UNFCCC
- responsible for true value of CER in the project activity

DOE's Position in CDM

Duties of DOE

- Checks the format of the PDD
- Checks the applicability criteria of the proposed methodology applicable to the project activity
- Checks the baseline for the proposed project activity
- Checks the additionality of the project activity
- Checks the monitoring plan
- Checks the calculation algoritham
- Checks the sustainable development criteria of the host country
- Checks the environmental aspects of the proposed project activity
- Considers' stakeholders' consultation process for the project activity
- Invites comments from the global stakeholder on project activity

Share of Energy Efficiency projects in CDM



Technology Share of CDM Projects (as a share of volume contracted).

Source: State and trends of the Capital Market –2006 (Update Q3' 06) by World bank and International Emission Trading Emission

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Approved Small Scale Methodologies Under Energy Efficiency in CDM Projects and their title

Normal Scale

Sr. No.	Methodology Number	Title of Methodology	Sectoral Scope
1	AM0017-Version 02	Steam System efficiency improvement by replacing steam traps and returning condensate	3
2	AM0018	Steam optimization system	3
3	AM0020	Baseline methodology for water pumping and improvement	3

Small Scale

Sr. No.	Methodology Number	Title of Methodology	Sectoral Scope
1	AMS.II-A	Supply side Transmission and Distribution efficiency improbement	2
2	AMS.II-B	Supply side efficiency improvement in generation	1
3	AMS.II-C	Demand side efficiency improvement for specific technologies	3
4	AMS.II-D	Energy Efficency and fuel switching measures for industrial facilities	4
5	AMS.II-E	Energy efficiency and fuel switching measures for buildings	3
	AMS.II-F	Energy efficiency and fuel switching measures for agricultural facilities and activities	3
	AMS.III.B	Switching fossil fuels	1

Small Scale Energy Efficiency Projects

Category II A

This category comprises technologies or measures to improve the energy efficiency of an electricity or district heating transmission and distribution system by up to the equivalent of 15 Gwhe per year. Examples include upgrading the voltage on a transmission line, replacing a transformer, and increased insulation of the pipes in a district heating system. The technologies or measures may be applied to existing transmission or distribution systems or be part of an expansion of a transmission or distribution system. A total saving of 15 GWhe per year is equivalent to a maximal saving of 45 GWhth per year in fuel input.

Category II B

This category comprises technologies or measures to improve the efficiency of fossil fuel generating units that supply an electricity or thermal system by reducing energy or fuel consumption by up to the equivalent of 15 GWhe per year.1 Examples include efficiency improvements at power stations and district heating plants and co-generation.2 The technologies or measures may be applied to existing stations or be part of a new facility. A total saving of 15 GWhe is equivalent to maximal saving of 45 GWhth in the fuel input to the generation unit.

Category II C

This category comprises programmes that encourage the adoption of energy-efficient equipment, lamps, ballasts, refrigerators, motors, fans, air conditioners, appliances, etc. at many sites. These technologies may replace existing equipment or be installed at new sites. The aggregate energy savings by a single project may not exceed the equivalent of 15 GWh per year.

Category II D

This category comprises any energy efficiency and fuel switchin g measure implemented at a single industrial facility. This category covers project activities aimed primarily at energy efficiency; a project activity that involves primarily fuel switching falls into category III.B.1 Examples include energy efficiency measures (such as efficient motors), fuel switching measures (such as switching from steam or compressed air to electricity) and efficiency measures for specific industrial processes (such as steel furnaces, paper drying, tobacco curing, etc.). The measures may replace existing equipment or be installed in a new facility. The aggregate energy savings of a single project may not exceed the equivalent of 15 GWhe per year. A total saving of 15 GWhe per year is equivalent to a maximal saving of 45 GWhth per year in fuel input.

Category II E

This category comprises any energy efficiency and fuel switching measure implemented at a single building, such as a commercial, institutional or residential building, or group of similar buildings, such as a school, district or university. This category covers project activities aimed primarily at energy efficiency; a project activity that involves primarily fuel switching falls into category III.B.1 Examples include technical energy efficiency measures (such as efficient appliances, better insulation and optimal arrangement of equipment) and fuel switching measures (such as switching from oil to gas). The technologies may replace existing equipment or be installed in new facilities. The aggregate energy savings of a single project may not exceed the equivalent of 15 GWh per year.

Category II F

1. This category comprises any energy efficiency and/or fuel switching measure implemented in agricultural activities of facilities or processes. This category covers project activities that encourage energy efficiency or involves fuel switching. Examples of energy-efficient practices include efficiency measures for specific agricultural processes (such as less irrigation, etc.), and measures leading to a reduced requirement of farm power per unit area of land, reflected in less and smaller tractors, longer lifetime of tractors and less farm equipment. Further energy efficient measures would be reducing fuel use in agriculture, such as reduced machinery use through, e.g. the elimination of tillage operations, reduction of irrigation, use of lighter machinery, etc.
2. The measures may be a replacement on existing equipment or equipment being installed in a new facility. The aggregate energy savings of a single project may not exceed the equivalent of 15 GWh per year.

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Category III B

1. This category comprises fossil fuel switching in existing1 industrial, residential, commercial, institutional or electricity generation applications. Fuel switching may change efficiency as well. If the project activity primarily aims at reducing emissions through fuel switching, it falls into this category. If fuel switching is part of a project activity focussed primarily on energy efficiency, the project activity falls in category II.D or II.E. Measures shall both reduce anthropogenic emissions by sources and directly emit less than 15 kilotonnes of carbon dioxide equivalent annually.
2. This category is applicable for project activities resulting in annual emission reductions lower than 25,000 ton CO2e. If the emission reduction of a project activity exceeds the reference value of 25,000 ton CO2e in any year of the crediting period, the annual emission reduction for that particular year is capped at 25,000 ton CO2e.

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Revision to approved baseline methodology AM0017

"Steam system efficiency improvements by replacing steam traps and returning condensate"

Applicability

This methodology is applicable to steam efficiency improvement project activities with the following conditions:.

- Steam efficiency is improved by replacement and/or repair of steam traps and the return (collection and reutilization) of condensate;
- Steam is generated in a boiler fired with fossil fuels;
- The regular maintenance of steam traps or the return of condensate is not common practice or required under regulations in the respective country;
- Data on the condition of steam traps and the return of condensate is accessible in at least five similar other plants.

Project Activity

The project activity addresses energy efficiency improvements by reducing losses in steam traps and by increasing the return of condensate. Efficiency improvements are achieved through the installation of additional equipment, the repair and/or replacement of steam traps and the application of O&M practices.

Additionality

The additionality of the project activity is addressed in four steps, which are

(i) demonstrating that it is not common industry practice;
(ii) there are no legal or regulatory requirements;
(iii) there exist barriers to the implementation of the project activities; and
(iv) the registration of the project as CDM allow it to overcome barriers.

Emission Reduction Calculations

(i) Step 1: Steam trap survey
(ii) Step 2: Steam savings due to repair and/or replacement of steam traps
(iii) Step 3: Steam savings due to return of condensate
(iv) Step 4: CO2 emissions reductions due to steam savings
(v) Step 5: Changes in electricity consumption due to return of condensate
(vi) Step 6: CO2 emission changes due to changes in electricity consumption

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Approved baseline methodology AM0018

Baseline methodology for steam optimization systems"

Applicability

This methodology is applicable to steam optimization projects in production processes with homogeneous and relatively constant outputs with continuous monitoring of steam output. This baseline methodology shall be used in conjunction with the approved monitoring methodology AM0018 ("Monitoring methodology for steam optimization systems").

Project activity

Steam optimization projects.

Additionality

The additionality of the project activity shall be demonstrated and assessed using the latest version of the "Tool for the demonstration and assessment of additionality" agreed by the CDM Executive Board, which is available on the UNFCCC CDM web site1.

Baseline

(i) Step 1: Benchmarking baseline output
(ii) Step 2: Benchmarking baseline steam consumption
(iii) Step 3: Benchmarking of Process Specific Steam Consumption Ratio (SSCR)
(iv) Step 4: Determine average steam consumption
(v) Step 5: Determine the Specific Steam Consumption Ratio for the day
(vi) Step 6: Estimate the difference in SSCR of baseline and project scenarios.
(vii) Step 7: Estimate net daily reduction in steam consumption
(viii) Step 8: Estimate the net daily reduction in energy due to reduction in steam consumption
(ix) Step 9: Estimate daily reduction in input energy to the boiler
(x) Step 10: Estimate CO2 emission reductions (Cer) in the boiler per day
(xi) Step 11: Estimate additional CO2 emissions due to additional electrical load in project scenario
(xii) Step 12: Estimate the net CO2 emission reductions due to project

Monitoring of the boiler efficiency by direct or indirect way is required Appropriate code may be used to measure the boiler efficiency.

Steam enthalpy may be calculated based on steam tables

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Approved baseline methodology AM0020

"Baseline methodology for water pumping efficiency improvements"

Applicability

This methodology is applicable to project activities that:

- Seek to reduce GHG emissions by explicitly reducing the amount of energy required to deliver a unit of water to end-users in municipal water utilities;
- Improve energy efficiency in the overall water pumping, including reducing technical losses and leaks as well as the energy efficiency of the pumping scheme, which consume electricity from the electricity grid, where:
  - The efficiency (water and energy) of existing schemes[1] is being improved; or
  - A new scheme is being developed to completely replace the old scheme, which will no longer be used. This methodology will apply to the new scheme only up to the measured delivery capacity (annual amount of delivered water) of the old scheme;

This methodology is NOT applicable to project activities cases where entirely new schemes are built to augment existing capacity. This will ensure that only emissions reductions up to the existing capacity of the system will be considered.

Project activity

Efficiency improvement in water pumping using electrical pumps using electricity from the grid.

Project boundary

The project developer will need to clearly define the boundary on the system in question. This could be the boundary of an entire municipal water system, just the water supply system, or a major pumping station. Defining the boundaries of the system in question allows the project implementers to develop an adequate metering and monitoring system to determine water entering the boundaries of the system, water being delivered out of the system and the energy used to move it from start to finish. It also allows the project developer to ensure that the project boundaries do not change significantly over the course of the project. In situations were multiple schemes are being upgraded, the project developer must monitor each scheme separately and calculate the emissions reductions for each separately.

The project boundary will extend from the point of water intake to the system in question, including all pumping stations (major pumping station if the project boundary is the last one) to the delivery point from the system in question. Supplemental pumps, booster stations and other sources of power consumption are included. It is to be noted that pumps not metered or covered by the water utility, as in bulk supplier, will be included in the project boundary only if they are (1) subject to the project implementation and

(2) exclusive to the defined water system.

Project boundary in terms of gases and sources is CO_2 from electricity generation. To determine the project boundaries, the project developers will have to provide the validator with a map of the system covered by the project. This should include all inflows and outflows to the system

that must be metered. The map and related materials should also provide the size of all of the major pipelines. For electricity, the grid is the system boundary.

Baseline

Once additionality has been established using the “Tool for the demonstration and assessment of additionality”, a typical carbon emissions baseline is established by multiplying the pre-project efficiency ratio with the total post-project water volume delivered and the carbon emission factor. Baseline emissionsy = M3y * PPER * EFy
In which:
Baseline emissionsy = CO2 emissions in the baseline scenario in year y (kg CO2)
M3y = Total post-project water volume delivered in year y (m3)
PPER = Pre-project efficiency ratio (kWh/m3)
EFy = Carbon emission factor for the electricity grid in year y (kg CO2/kWh)
Where:
M3 y = ‡”M3 i,y (M3i,y - Total post-project water volume delivered in year y from the scheme i)
PPER = kWhb / M3b
In which:
kWh b = Total amount of electricity required to move water (kWh) to its destination in the baseline period3
M3b = Total volume of water (m3) moved to its destination in the baseline period3

Project

Project emissions$_y$ = kWh$_{y*}$ EF$_y$,
Where kWh$_y$ = Total post-project amount of electricity required to move water (kWh) to its destination in year y
EF$_y$ is the carbon emission factor for grid electricity of year y, calculated using the approach outlined in the consolidated methodology - ACM002 (as outlined above).

Emission Reductions

Annual emission reductions arising from the project activity (ERy) are calculated as:
Ery = Baseline emissionsy – Project emissionsy
= (M3y * PPER * EF y) - (kWhy* EFy)

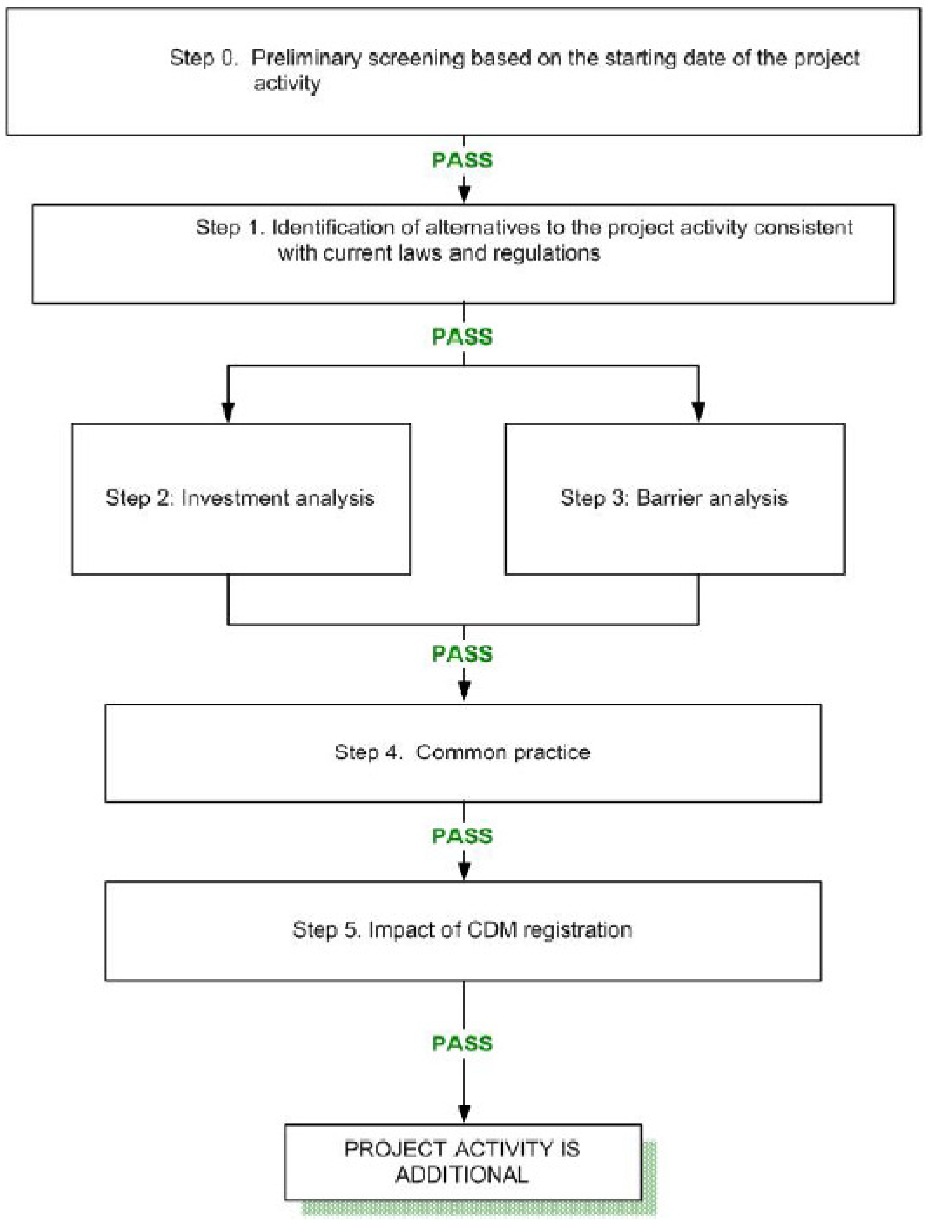
Validation process for project activity having new methodology

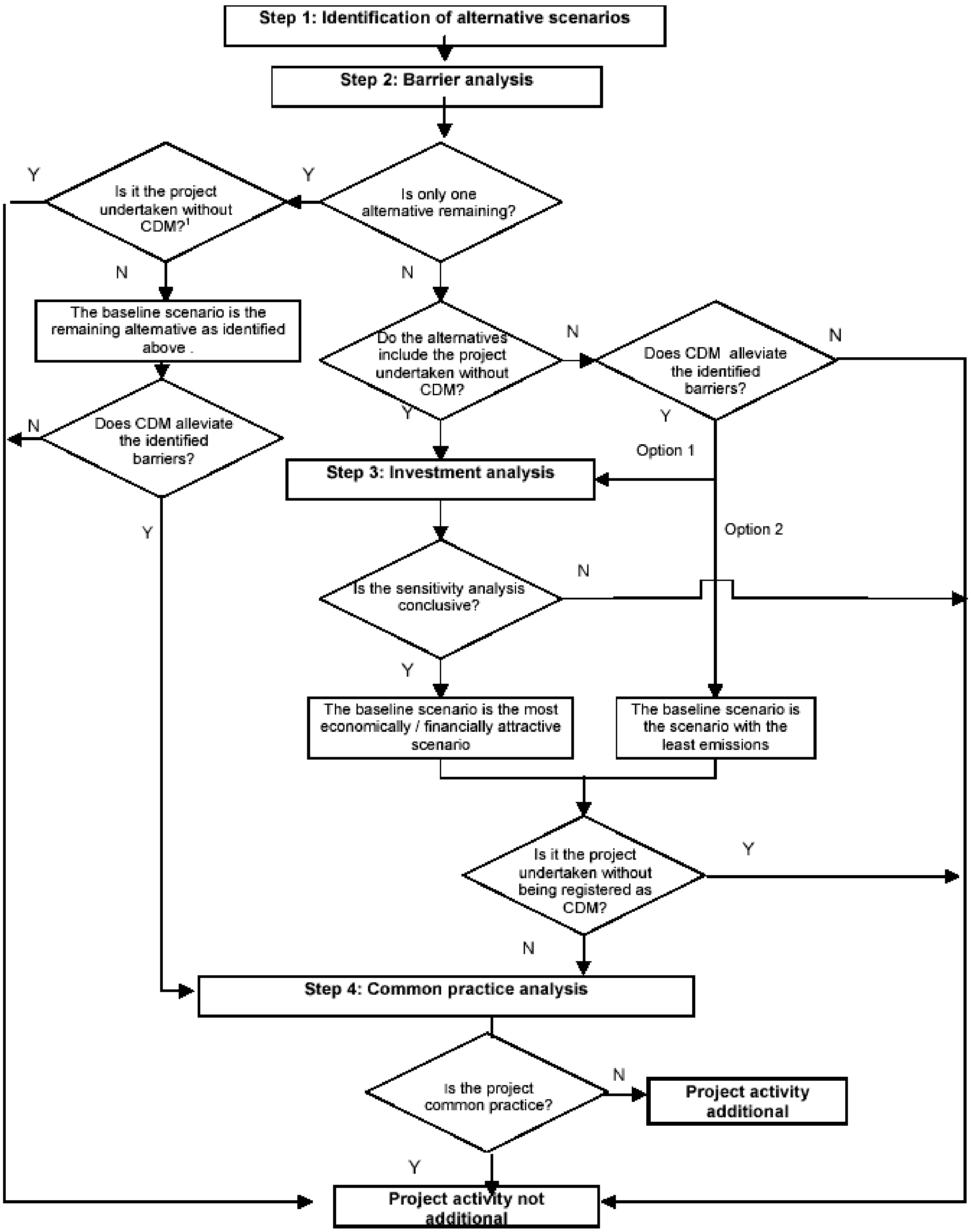
- Send new methodology to UNFCCC in F_CDM-NMB, F-CDM-NMM and a draft CDM PDD
- The methodology need to be as far as possible generic in nature an not specific to a location / industry
- The methodology is put for a public view for comments
- The methodology is sent to experts with comments
- Preliminary recommendations are made
- Response to preliminary recommendation from the project proponent is taken
- Methodology goes to the meth panel
- Meth panel recommendations are sent to EB for consideration

Some of the areas of concern while validating an energy efficiency projects:

- Data used to determine the baseline. It needs to cover
    - Seasonal fluctuations
    - Production level variation
    - Production type variation
- Emission reduction estimates need to be conservative i.e lower estimation of emission saved through assuming higher project emission and lower baseline emission
- Realistic emission factor should be used
- Consideration of appropriate fuel mix
- Application of methodololgy should be as per guidance of methodology
- Calculation of the GHG emission reduction should be transparent
- All the aspects of addtionality should be used properly including template and especially the common practice analysis
- All the alternatives including project activity not undertaken as CDM project activity should be available
- Monitoring equipment handling, calibration, maintenance, record keeping should be proper
- Monitoring equipment specification such as range, least count, uncertainty, should be specified clearly to avoid confusion at a later stage
- Local stakeholder consultation process should be supplied properly.

Flowchart: Additionality scheme





"Combined tool to identify the baseline scenario and demonstrate additionality"

Ref EB 27 report (Annex 9)