

**CDM Feasibility Study (FS) 2012
Final Report**

**「Rural Electrification through Expansion of Electric Grid
mainly composed of Hydropower」**

(implemented by Mitsubishi UFJ Morgan Stanley Securities, Co., Ltd.)

FS Partner(s)	Bhutan Power Corporation (BPC), Department of Renewable Energy (DRE), Ministry of Economic Affairs of Bhutan, Karma Namkhai Consultants
Location of Project Activity	Bhutan
Category of Project Activity	Renewable Energy
Targeted GHG	CO2
Description of Project Activity	The Project involves the electrification of approximately 30,000 households in non-electrified areas by grid extension, implemented by the Royal Government of Bhutan utilizing the funding from through ODA. The Project aims to reduce consumption of fossil fuels such as kerosene and achieve GHG emissions by supplying electricity from hydropower plants within Bhutan to non-electrified areas of the country.
Methodology to be applied	“AMS-III.AW, ver. 01.0. Electrification of rural communities by grid extension”
Baseline Scenario	Under AMS-III.AW, ver. 01.0., the baseline scenario is that the rural households targeted by the Project will use fossil fuels such as diesel or kerosene to generate the equivalent quantity of electricity required before project.
Monitoring Plan	Under AMS-III.AW, ver. 01.0., amount of electricity distributed by the Project will be monitored. Also, to confirm the project applicability to the methodology, amount of electricity export and import from Bhutan to other countries will be monitored.
Estimation of GHG Emission Reductions	For ex-ante estimation, amount of electricity distribution was based on the assumption in the master plan. It is assumed that 33,436 households targeted in the Project each consume 60kWh/month electricity. Approximately, 19,260tCO ₂ /year of emission reduction is expected from the Project.
Duration of Project Activity/ Crediting Period	The starting date of project activity is July 25, 2008 with 30 years duration. Renewal crediting has been chosen for 21 years.
Environmental Impact Analysis	The “Environmental Assessment (EA) Act 2000”, together with the “Regulation for the Environmental Clearance of Projects” and “Regulation in Strategic Environmental Assessment” comprises the legislation relating to environmental impact assessment (EIA) in Bhutan. Project has obtained Environment Clearance and Forestry Clearance to comply with local regulation.
Demonstration of Additionality	<p>Additionality of the project is demonstrated following the Guidelines for demonstrating additionality of microscale project activities ver. 04.</p> <ul style="list-style-type: none"> • Estimated annual emission reduction is below 20 kt/year. • The geographic location of the project activity is an LDC/SIDS

Project Feasibility	<p>The project construction has started in September 2009 and scheduled to be completed by June 2013. Although there is a slight delay in some project component, final completion is expected by the end of 2013.</p> <table border="1" data-bbox="587 360 1305 618"> <thead> <tr> <th>Project component</th> <th>Donor</th> <th>Number of household</th> <th>Status of implementation</th> </tr> </thead> <tbody> <tr> <td>JICA I</td> <td>JICA</td> <td>15,000</td> <td>Started in Sep. 2009, completed in Dec. 2012</td> </tr> <tr> <td>JICA II</td> <td>JICA</td> <td>3,700</td> <td>Started in May 2012, completed in June 2013</td> </tr> <tr> <td>ADB IV</td> <td>ADB</td> <td>8,800</td> <td>Started in Oct. 2009, completed in Dec. 2012</td> </tr> <tr> <td>ADB V</td> <td>ADB</td> <td>5,000</td> <td>Started in Dec. 2011, completed in June 2013</td> </tr> <tr> <td>ADA VI</td> <td>ADA</td> <td>800</td> <td>Started in Apr. 2010, completed in Apr. 2012</td> </tr> <tr> <td>ADA VII</td> <td>ADA</td> <td>200</td> <td>Started in Feb. 2012, completed in June 2013</td> </tr> <tr> <td colspan="4" style="text-align: right;">Total project duration: From Sep. 2009 to June 2013</td> </tr> </tbody> </table>	Project component	Donor	Number of household	Status of implementation	JICA I	JICA	15,000	Started in Sep. 2009, completed in Dec. 2012	JICA II	JICA	3,700	Started in May 2012, completed in June 2013	ADB IV	ADB	8,800	Started in Oct. 2009, completed in Dec. 2012	ADB V	ADB	5,000	Started in Dec. 2011, completed in June 2013	ADA VI	ADA	800	Started in Apr. 2010, completed in Apr. 2012	ADA VII	ADA	200	Started in Feb. 2012, completed in June 2013	Total project duration: From Sep. 2009 to June 2013			
Project component	Donor	Number of household	Status of implementation																														
JICA I	JICA	15,000	Started in Sep. 2009, completed in Dec. 2012																														
JICA II	JICA	3,700	Started in May 2012, completed in June 2013																														
ADB IV	ADB	8,800	Started in Oct. 2009, completed in Dec. 2012																														
ADB V	ADB	5,000	Started in Dec. 2011, completed in June 2013																														
ADA VI	ADA	800	Started in Apr. 2010, completed in Apr. 2012																														
ADA VII	ADA	200	Started in Feb. 2012, completed in June 2013																														
Total project duration: From Sep. 2009 to June 2013																																	
Contribution to Sustainable Development in Host Country	<p>The Project is expected to contribute to the sustainable development of Bhutan and improving the level Gross National Happiness (GNH) as defined in the four strategic areas; Sustainable and equitable socio-economic development, Environmental conservation, Preservation and promotion of culture, and Good governance.</p>																																

**FS Title: CDM Feasibility Study
“Rural Electrification through Expansion of Electric Grid mainly composed of Hydropower”**

FS Entity: Mitsubishi UFJ Morgan Stanley Securities Co., Ltd. (MUMSS)

1. FS Implementation Scheme

- Bhutan Power Corporation (BPC)
BPC is a project implementation agency and responsible for gathering necessary data and information for PDD production. BPC also assists coordination between local authorities and MUMSS.

- Karma Namkhai Consultants
Karma Namkhai Consultants is a local consultant with expertise in forestry responsible for data and information collection to analyze potential leakage emission by the project. Also provide assistance in coordination between relevant local authorities and experts and MUMSS.

- Department of Renewable Energy (DRE), Ministry of Economic Affairs of Bhutan
DRE provide overall support to the study team as an authority responsible for development of policy and strategy related to renewable power.

2. Outline of CDM Project

(1) Description of Project:

The Project involves the electrification of approximately 30,000 households in non-electrified areas by grid extension, implemented by the Royal Government of Bhutan utilizing the funding from through ODA. The Project aims to reduce consumption of fossil fuels such as kerosene and achieve GHG emissions by supplying electricity from hydropower plants within Bhutan to non-electrified areas of the country.

Nearly all of the electricity supplying the existing grid in Bhutan is generated by hydropower, and the country supplies surplus electricity to neighboring India. As of 2008, however, the rate of rural electrification in Bhutan remained at 54%. This low rate has become a contributing factor to disparities between urban and rural areas. In the interests of rectifying urban and rural disparities, reducing poverty, and promoting industry, etc., the Bhutanese government has identified rural electrification as an important policy objective. In its 9th Five-Year Plan (2002-2007), it laid out the goal of achieving 100% household electrification by 2020. To achieve this goal, a Rural Electrification Master Plan to be implemented across the entirety of Bhutan was formulated with assistance from the Japan International Cooperation Agency (JICA), and was completed in October 2005.

The Project is to cover about 30,000 non-electrified households located in all 20 dzongkhags (administrative districts). The extension of the grid spans a total distance of 2,000 km, and the work began in 2009. The Project is supported with financial assistance from three agencies: JICA, the Asian Development Bank (ADB), and the Austrian Development Agency (ADA).

Completion of the Project will not take until the initial goal of 2020; instead, rural electrification by grid extension is scheduled to be completed within the year 2013.

(2) CDM Methodology to be applied to the Project:

AMS-III.AW, ver. 01.0. Electrification of rural communities by grid extension

3. Study Contents

(1) Issues to be Addressed in FS:

Amongst various subjects covered in the study, there are two major issues need to deal with in the study: estimation of leakage emissions due to deforestation occurred by project implementation and demonstration of non-diversion of ODA.

- Calculation of baseline emissions
 - Determining the amount of electricity distributed under the Project and confirming validity
 - Confirming the situation regarding replacement under the Project of electricity generated with existing renewable mini-grids
 - Confirming the validity of the estimated amount of electricity consumed annually per household.
- Calculation of Project emissions
 - Confirming Bhutan's electricity import/export balance based on the country's electricity import/export data; ascertaining the period during which the country is a net electricity importer
- Calculation of leakage emissions
 - Specifying the actual area of deforestation associated with the construction of the electricity distribution network
 - Calculating carbon stocks per unit area of where the electricity distribution network is constructed
- Demonstration that the Project does not result in diversion of ODA
 - Obtaining letters from each donor affirming that, regarding the funds received from the Japan International Cooperation Agency (JICA), the Asian Development Bank (ADB), and the Austrian Development Agency (ADA), the Project does not constitute a diversion of ODA.

(2) Process to Solve the Issues in FS:

- Calculation of baseline emissions
 - Estimates of the amount of electricity consumed annually

It was confirmed with Bhutan Power Corporation (BPC) that the 60 kWh/month figure applied to ex-ante calculations is the national average, and that this takes into account the

demand for electricity per household as a result of future economic growth. In addition, it was confirmed that, in rural areas in particular, even after work on the electricity distribution network is completed, the demand for electricity is expected to be limited in the short term such as for lights at night, and that 60 kWh/month is a reasonable estimate.

➤ Emission factor

It was confirmed with Department of Energy's hydropower agency that nearly all of the population in rural areas use firewood, kerosene, etc., and meet their daily energy demands. It was also confirmed that in areas without access to grid power, of which hydroelectric generation accounts for at least 99%, people have no other choice but to use kerosene, etc.

➤ Replacement of electricity from stand-alone renewable energy generation facilities

It was confirmed that renewable based mini-grids are non-existent. On the other hand, it was confirmed that there are multiple stand-alone hydroelectric power generating facilities, and if these facilities were connected to the grid in the future, adjustments would become necessary according to the requirement under the methodology.

● Calculation of project emissions

➤ Confirming the electricity import balance and ascertaining the period during which the country is a net electricity importer

It was confirmed that for the whole year of 2011, Bhutan was a net electricity exporter. It was confirmed that the relevant data is compiled every year, and that continual verification of such data will be possible.

● Calculation of leakage emissions

➤ Estimating amounts of temporary carbon loss

Through the Department of Forests and Park Services of the Ministry of Agriculture and Forests, a letter was sent to the Territorial Divisions and Parks officers in charge in 20 dzongkhags in Bhutan. After data was collected on the number of trees felled as a result of Project implementation, the tree types, and their trunk circumferences, a calculation of the amount of carbon loss was performed, the result of which was over 500,000 tonnes of CO₂.

During the stage in which the gathered data was being compiled, it became clear that there was a very high degree of uncertainty in the data, which will likely lead to the validity of the calculation result being questioned.

➤ Actual situation of deforestation due to project implementation

It became clear that according Bhutan Power Corporation (BPC), the estimated area of deforestation in the Master Plan included areas where roads had already been built, areas where project implementation did not necessitate any deforestation, and areas that were not covered by forest to begin with. Ultimately, it became evident that there was a major gap between the estimate and the actual extent of deforestation that ultimately took place.

In addition, it was learned that the Constitution of Bhutan contains provisions aimed at forest conservation and ecosystem protection which mandate that a forest coverage rate of 60% be maintained in the country as a whole, and that when wood materials necessary for commercial activities and other purposes are procured, Bhutan employs a system whereby an Annual Allowable Cut (AAC) is set according to the purpose of the wood, and does not permit trees to be felled outside of this framework. Furthermore, it was

confirmed that the trees felled in the implementation of the Project were distributed according to the AAC, and as a result, they are offset from trees that would have been felled regardless of the project implementation.

During the site visit conducted for validation of the project by Designated Operational Entity (DOE), the data and information gathered in the study were presented at the interviews with the Department of Forests and Park Services and other related agencies in Bhutan. Based on these it was successful to convince DOE to conclude that there has been no substantial leakage resulting from the implementation of The Project.

- Non-diversion of ODA
Proof in writing was obtained from the Austrian Development Agency (ADA) regarding verification that the Project does not entail a diversion of ODA funds.

For Asian Development Bank (ADB), it was confirmed that ADB itself is not an ODA implementing agency, so they are not in a position to confirm the case of non-diversion of ODA.

As to Japan Bank for International Cooperation (JICA), during the validation site visit interview, Designated Operational Entity (DOE) confirmed that there was no case of diversion of ODA. However, affirmation in writing was requested. Further communication will be made with JICA in order to try to receive relevant documentation from Japanese Ministry of Foreign Affairs.

- Validation of the Project
TUV Nord was contracted as Designated Operational Entity (DOE) for the project to conduct validation. Validation site visit was carried out from Feb. 4 to Feb. 8, 2013. Draft validation report was issued on February 17, 2013.

Most of the findings listed in the draft validation were the issues that have been discussed and confirmed during the site visit. There seems to be no major issues in improvement of project design document and compilation of formal responses to them in the draft validation for completion of the validation process.

Regarding the issue of estimation of the leakage emissions, it was successful to convince DOE, however, it is CDM Executive Board who will make final decision on this matter. Therefore, it will continue to remain as important issue until successful registration of the project.

Although, the validation of the Project has not completed during the study period, Bhutan Power Corporation (BPC), Department of Renewable Energy (DRE), Ministry of Economic Affairs of Bhutan, and Mitsubishi UFJ Morgan Stanley (MUMSS) are committed to continue to cooperate toward the registration of the project.

4. Results of CDM FS

(1) Application of CDM Methodology:

The Project meets all the applicability conditions listed in the methodology as follows:

Applicability conditions	Project
1. This methodology comprises electrification of a rural community through extension of a national grid/regional grid (grid hereafter).	The project activity involves the electrification of villages through extension of the existing low carbon electricity distribution network in Kingdom of Bhutan.
2. The applicability is limited to households and users that do not have access to a grid.	The Project is to provide access to electricity to the communities where there is no access to a grid prior to the project activity.
3. Emission reductions can only be claimed if the share of electricity generation from renewable energy plants connected to the grid of the host country is greater than or equal to 99% in total electricity generation in the grid of that host country in each year during the crediting period.	The share of electricity generation from renewable energy plants connected to the grid in Bhutan is 100 % which is greater than 99% in total electricity generation in the grid in Bhutan. Supporting data is provided in Appendix 3. Electricity generation data by grid connected power plants will be monitored as per the monitoring plan in Section B.7.
4. Cross border electricity export and import by the host country is quantifiable, and the data on import/export is available to the project developer.	Cross border electricity export and import by the host country is quantifiable as per the BPC statistics, and the data on import/export is available to BPC. Bhutan is a net exporter of electricity, with a total of 5,269.69 GWh of net electricity exported in 2011 to the Assam Electricity Board and West Bengal Electricity Board, both in India. The relevant data for 2001 is provided in Appendix 3. Import and export data will be additionally monitored as per the provisions of the monitoring plan in Section B.7.
5. The project does not involve construction of new power plants/units, but involves only the extension of the existing power distribution network in the host country.	The Project does not involve construction of new power plants/units. Moreover, the Project involves only extension of existing power distribution network to supply electricity to remote rural areas in Bhutan.
6. The project does not displace existing renewable based mini-grid electricity. To ensure compliance with this condition, existing renewable based mini-grid system and their service area shall be identified and it is confirmed that the project does not provide electricity to the area serviced by the renewable based existing mini-grid system.	There are no renewable based mini-grid systems in Bhutan, therefore, the Project does not provide electricity to areas serviced by renewable based existing mini-grid system. However, there are stand alone HPPs, as described in Appendix 3. In case areas supplied by them are connected to the grid as part of the Project, adjustments will be made as per paragraph 14 of AMS – III.AW., ver. 01.0.

<p>7. To avoid possible double counting of emission reduction claims from electricity generation companies, transmission companies, distribution companies, either all relevant parties are listed as participants to the project activity, or the project developer shall obtain a written consent from other relevant entities stating voluntary release of their right to develop CDM project activity and to claim emission reductions from the same electrification project activity. End users of the electricity distributed as a result of project activity are not eligible to apply this methodology to claim emission reductions from consumption of electricity distributed by the project activity.</p>	<p>As per its statute, BPC is responsible for generation, transmission and distribution of electricity in Bhutan. There are no other relevant parties who could be listed as participants to the project activity. Additionally, end users will not claim emission reductions.</p>
<p>8. Measures are limited to those that result in emission reductions of less than or equal to 60 kt CO₂ equivalent annually.</p>	<p>The expected emission reductions from the project activity are approximately 19,259 tCO₂e annually, which is less than the limit of 60 ktCO₂ for Type III projects.</p>

(2) Baseline Scenario and Project Boundary:

The baseline scenario is that the rural households targeted by the Project will use fossil fuels such as diesel or kerosene to generate the equivalent quantity of electricity required before project.

The spatial extent of the project boundary encompasses the following:

- (a) The spatial extent of the project boundary includes all power plants within the host country physically connected through transmission and distribution lines to the national electricity system to which the CDM project is connected to;
- (b) The physical sites of the households, public services and other facilities that are supplied with electricity by the project activity (i.e. project region).

An illustration of the project boundary is provided in the figure below.

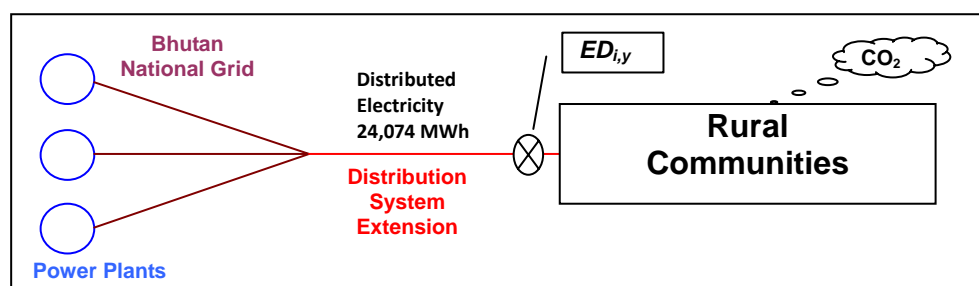


Figure 1: Project Boundary

(3) Monitoring Plan:

Following data and parameters will be monitored.

- (a) Amount of electricity distributed by the extended electricity distribution system to the project region i in year y (MWh/yr)

Data / Parameter	$ED_{i,y}$
Measurement methods and procedures	Measured with multiple electricity meters that are installed by BPC for monitoring of electricity distributed by the project activity (i.e. meters are installed for each household). The meters will be the same as the meters used for billing each household and the information will be collected by the billing department of BPC. All meters will belong to class 2 (accuracy of +/-2%). Applicable standards: IEC 60521, IEC 62053 No sampling will be used for determining the value of this data, as it will be based on the electricity sales records of Bhutan Power Corporation (BPC) for each household.
Monitoring frequency	Measured continuously by energy meters, recorded at least monthly. Recorded data is aggregated and maintained by Bhutan Power Corporation (BPC).

- (b) The amount of electricity the host country imported from other countries in year y (MWh/yr)

Data / Parameter	$EG_{import,month}$
Measurement methods and procedures	Data sourced from Bhutan Power Corporation (BPC) / Department of Renewable Energy (DRE), Ministry of Economic Affairs of Bhutan
Monitoring frequency	Monthly

- (c) The amount of electricity the host country exported to other countries in year y (MWh/yr)

Data / Parameter	$EG_{export,month}$
Measurement methods and procedures	Data sourced from Bhutan Power Corporation (BPC) / Department of Renewable Energy (DRE), Ministry of Economic Affairs of Bhutan
Monitoring frequency	Monthly

- (d) Electricity generation in year y from all the power plants (renewable and others), that are within the host country, and are physically connected to the grid to which the CDM Project is connected to. (MWh/yr)

Data / Parameter	-
Measurement methods and procedures	Data sourced from Bhutan Power Corporation (BPC) / Department of Renewable Energy (DRE), Ministry of Economic Affairs of Bhutan
Monitoring frequency	Monthly

- (e) Renewable electricity generated from existing stand-alone generation units in the project region expected to be replaced by the project activity. (MWh/yr)

Data / Parameter	$EG_{renewable,y}$
Measurement methods and procedures	Confirmation of the project implementation data and grid connections. All meters will belong to class 2 (accuracy of +/-2%). Applicable standards: IEC 60521, IEC 62053
Monitoring frequency	Monthly

(4) GHG Emission Reductions:

As stipulated in AMS-III.AW, ver. 01.0., the energy baseline of the Project is the fossil fuel consumption of the technology in use or that would have been used in the absence of the project activity to generate the equivalent quantity of energy.

The emission baseline based on the fuel consumed to generate equivalent quantity of electricity distributed by the project activity is calculated as follows:

$$BE_{CO_2,y} = \sum_i ED_{i,y} * EF_{CO_2}$$

$EB_{CO_2,y}$	Emissions in the baseline in year y , tCO ₂ e/yr	19,259
EF_{CO_2}	CO ₂ emission factor, tCO ₂ e/MWh	0.8
\sum_i	The sum of the group of Project regions i	-
$ED_{i,y}$	Electricity distributed by the extended electricity distribution network to the project region i in year y , MWh/yr	24,074

The project activity does not plan to replace electricity from renewable stand-alone facilities existing in the project region. Therefore, CO₂ emission factor for the project activity is set to the default value (0.8 tCO₂e/MWh) stipulated in the methodology.

However, after the project implementation, the emission factor will be adjusted following the

procedures outlined in AMS-III.AW ver. 01.0, in case where the project replaces electricity from stand-alone renewable sources, as shown in equation below:

$$EF_{CO_2,y} = (1 - \beta) * 0.8$$

$$\beta = EG_{renewable,y} / \sum_i ED_{i,y}$$

$EF_{CO_2,y}$	CO ₂ emission factor, tCO ₂ e/MWh	0
β	Discount fraction for electricity distributed by the project activity that replaces renewable electricity generated by the existing stand-alone renewable power generation units.	0
$EG_{renewable,y}$	Renewable electricity generated from existing stand-alone generation units in the project region expected to be replaced by the project activity, MWh/yr	0
\sum_i	The sum over the group of Project regions i	-
$ED_{i,y}$	Electricity distributed by the extended electricity distribution system to the project region i in year y , MWh/yr	24,074

For the period where the host country is a net importer, the project emissions will be calculated for that period at least on a monthly basis using the equation below. Project emissions are zero during the period the host country is net exporter.

$$PE_y = \sum_t^P ED_{i,t} \times EF_{CO_2,import,y}$$

If $EG_{export,t} > EG_{import,t}$, then $EF_{CO_2,import,y} = 0$

PE_y	Project emissions in year y , tCO ₂ e/yr	0
\sum_t^P	The sum of the period when the host country is a net importer	0
$EG_{import,t}$	Amount of electricity imported into the grid from other countries and monitored hourly or daily or monthly in a given year y , MWh	3,408
$EG_{export,t}$	Amount of electricity exported from the grid to other countries and monitored hourly or daily or monthly in a given year y , MWh	5,273,100
$ED_{i,t}$	Amount of electricity distributed by the extended electricity distribution system to project region i , monitored hourly or daily or monthly in a given year y , MWh	24,074
$EF_{CO_2,import,y}$	CO ₂ emission factor for the electricity the host country procured internationally, tCO ₂ e/MWh (default value of 1.3 tCO ₂ e/MWh)	1.3

As per AMS-III.AW, ver. 01.0, leakage on account of construction of new transmission/distribution lines (e.g. carbon stock loss due to deforestation) shall be calculated using the method indicated in baseline and monitoring methodology AM0045 “Grid connection of isolated electricity systems”. If the estimated leakage is within 5% of the estimated emission reductions of the Project, then this leakage source may be neglected, otherwise the leakage will be deducted from the emissions reductions.

$$LE_1 = A_{def} \times L_C$$

LE_1	Leakage emissions to be accounted in the first year of Project crediting period (tCO ₂ e)	0
A_{def}	Area of land deforested (ha)	-
L_C	Carbon stock per unit area (tCO ₂ /ha)	-

During the validation, project participant demonstrated to Designated Operational Entity (DOE) no leakage on account of construction of new transmission/distribution lines (e.g. carbon stock loss due to deforestation) has been occurred.

The table below shows ex-ante estimates of emission reductions.

Table 1 Ex-ante estimates of emission reductions

Year	Baseline emissions (tCO ₂ e)	Project emissions (tCO ₂ e)	Leakage (tCO ₂ e)	Emission reductions (tCO ₂ e)
2013-2014	19,259	0	0	19,259
2014-2015	19,259	0	0	19,259
2015-2016	19,259	0	0	19,259
2016-2017	19,259	0	0	19,259
2017-2018	19,259	0	0	19,259
2018-2019	19,259	0	0	19,259
2019-2020	19,259	0	0	19,259
Total	134,813	0	0	134,813

(5) Duration of Project and Crediting Period:

- **Duration of project**

The starting date of the Project is on July 25, 2008. This is the date when the first disbursement of funds to the project was made.

- **Crediting period**

Renewable crediting period, starting from the date of registration.

(6) Environmental Impact Analysis:

The “Environmental Assessment (EA) Act 2000”, together with the “Regulation for the Environmental Clearance of Projects” and “Regulation in Strategic Environmental Assessment” comprises the legislation relating to environmental impact assessment (EIA) in Bhutan. The “Sectoral Guideline for Transmission and Distribution Lines” in its 2003 version defines the necessary information and shows the format to be used in applications for environmental clearance. Thus, for each site where rural electrification will occur, the project should prepare applications for environmental clearance and submit them to the National Environment Commission of Bhutan (NEC) and receive the clearance of NEC. Additionally, whenever tree felling is involved, the particular site should receive forestry clearance, that specifies the exact number of trees that are allowed to be felled.

The project has successfully obtained Environmental Clearances including Forest Clearances from NEC for the planned sites, concluding that the Project can satisfy the conditions defined in the Environmental Assessment Act 2000 and that negative environmental impacts will be mitigated and acceptable. Among others, the environmental clearances require that:

(7) Stakeholder Consultation:

Comments from stakeholders were solicited as part of an extensive process from the preparation of the master plan to the start of construction.

- Preparation of the Master Plan (2003 – 2005)

During the preparation of the master plan, a series of consultations in the form of workshops were conducted with relevant government officials, dzongkhag officers, BPC staff and other stakeholders. The workshops were conducted in Thimphu as well as in other cities. The first workshop series involved presentation on the approach on the preparation of the master plan and allowed stakeholders to receive information about the project implementation and the benefits that it will bring. The second series of workshops were targeted at the discussion on the progress of the development of the master plan. Finally, the last series of the workshops were conducted to present the results of the master plan to a wide range of stakeholders in all dzongkhags in Bhutan.

For all workshops the stakeholders were invited through personal invitations as well as through public announcements made by the then-Department of Energy (DOE). Additionally, information on the Project and the preparation of the master plan was regularly provided to the media.

- Project implementation (from 2008 onwards)

Under Bhutan law, as part of the project implementation, BPC had to obtain public clearance from the residents of all sites where the electrification took place. For that purpose, public hearing is organized in all villages, where the villagers are informed about the Project, its benefits and risks. At the end of the public consultation, public clearance signed by representatives of all households is issued.

Additionally, BPC organized a public awareness campaign throughout all dzongkhags.

Information on the public meeting's date and time was spread through the local media, as well as banners and posters.

(8) CDM Project Implementation Scheme:

CDM project implementation scheme is shown in below figure.

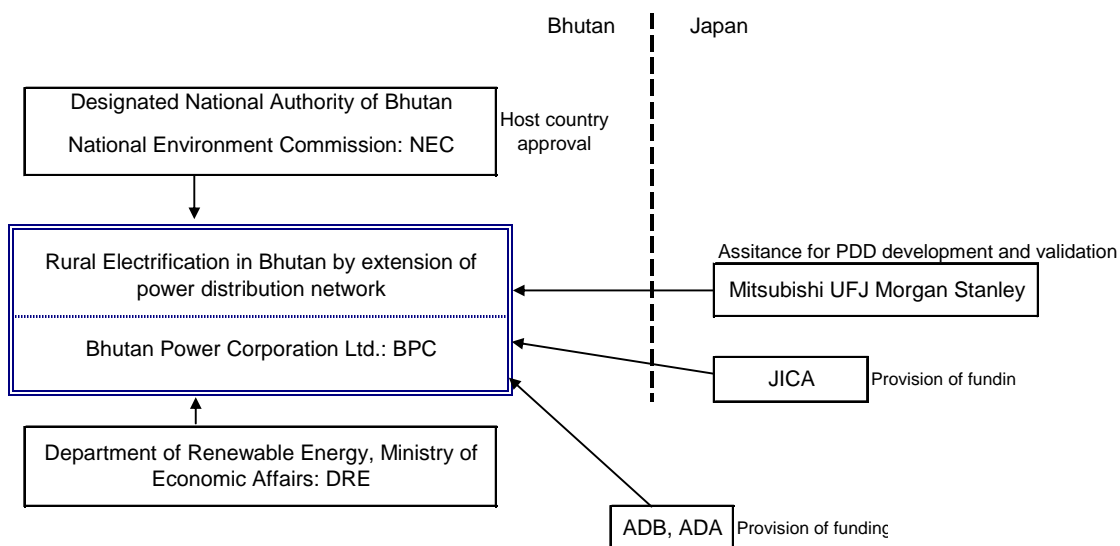


Figure 2: Project implementation scheme

(9) Financial Plan:

The Project is an ODA project financed by the Japan International Cooperation Agency (JICA), the Asian Development Bank (ADB), and the Austrian Development Agency (ADA). Initial investments were covered by funds provided by these donors, and all of the loans and grants by each of the donors have already been executed. The initial investment for the Project amounted to about ¥11 billion.

(10) Analysis of Project Profitability:

The Project is a rural electrification project by the Bhutanese government utilizing ODA, and as such does not pursue profitability. Furthermore, no demonstration of additionality via investment barrier analysis was done in the PDD.

(11) Demonstration of Additionality:

The additionality of this Project is demonstrated in accordance with the CDM Guidelines for demonstrating additionality of microscale project activities, ver. 04 (EB68, Annex 26).1 According to these guidelines, the project categorized in a Type III ("other project activity") can be recognized as a "microscale" project if estimated emission reduction per year is no

¹ http://cdm.unfccc.int/Reference/Guidclarif/ssc/methSSC_guid22.pdf

more than 20 ktCO₂e per year. Also, additionality is automatically demonstrated if either one of the following conditions is satisfied by the project

(a) The geographic location of the project activity is an LDC/SIDS or special underdeveloped zone of the host country as identified by the government before 28 May 2010;

(b) The project activity is an emission reduction activity with both conditions (i) and (ii) below satisfied:

(i) Each of the independent subsystems/measures in the project activity achieves an estimated annual emission reduction equal to or less than 600 tCO₂e per year; and

(ii) End users of the subsystems or measures are households/communities/SMEs.

Bhutan was classified as a least developed country (LDC) in 1971 according to criteria set forth by the UN, and it continues to be recognized as a LDC. The LDC list is reviewed once every three years in accordance with criteria set forth by the UN Committee for Development Policy (CDP).

As of 2009, if a country meets the following three criteria and consents to being placed on the list, is recognized as a LDC. With a GNI per capita of US \$1,487, Bhutan does not meet the GNI criteria, however, satisfy condition under the Human Assets Index (HAI) or Economic Vulnerability Index (EVI) criteria.

(1) GNI per capita of less than US \$905 (2005-2007 average)

(2) Human Assets Index (HAI): an index set by the UNCDP that reflects the level of development of human capital using indicators measuring the percentage of the population undernourished, the mortality rate for children aged five years or under, the gross secondary school enrolment ratio, and the adult literacy rate

(3) Economic Vulnerability Index (EVI): an index indicates the economic vulnerability to exogenous shocks

Based on the current ex-ante calculations of 19,259 tonnes, the emissions reduction scale of this Project has already come close to the 20 ktCO₂e per year upper limit that serves as a requirement for additionality demonstration exemption.

For this reason, by the time the second half of the credit period arrives in 2021, it is possible to assume a scenario in which this is exceeded. If such an event happens, it will become necessary to rewrite the PDD as a Small Scale CDM Project and to study ways of demonstrating its additionality.

When receiving the financing to implement the Project, Bhutan Power Corporation (BPC) calculated the estimated internal rate of return (EIRR) for each of the six components of the project. These rates range from 8.1% to 14%. While it is necessary to find out how these figures were arrived at and to check documents showing the foundations for the calculations, these averages fall below the shareholder default return on equity (ROE) given in the UNFCCC's Guidelines on Assessment of Investment Analysis. In addition, for countries like Bhutan, it would be impossible to realize large scale infrastructure development projects without public funding, i.e. relying only on private investors, so for this reason as well, we do

not foresee any problems in demonstrating investment barriers.

(12) Project Feasibility:

The Project has already started construction and although there is a slight delay in some project component, whole the Project is nearly complete.

Project component	Donor	Number of household	Status of implementation
JICA I	JICA	15,000	Started in Sep. 2009, completed in Dec. 2012
JICA II	JICA	3,700	Started in May 2012, completed in June 2013
ADB IV	ADB	8,800	Started in Oct. 2009, completed in Dec. 2012
ADB V	ADB	5,000	Started in Dec. 2011, completed in June 2013
ADA VI	ADA	800	Started in Apr. 2010, completed in Apr. 2012
ADA VII	ADA	200	Started in Feb. 2012, completed in June 2013
			Total project duration: From Sep. 2009 to June 2013

5. Contribution to Sustainable Development in Host Country

The Project activity contributes to the sustainable development of Bhutan and improving the level Gross National Happiness as defined in the four strategic areas (the “pillars” of GNH) of the 10th FYP:

- Sustainable and equitable socio-economic development

The Project significantly contributes to the development of rural areas in Bhutan by providing opportunities for their more equitable development, reducing poverty and narrowing the living standards gap between rural and urban areas.

- Environmental conservation

Many of the residents in the rural areas of Bhutan use firewood or fossil fuels for meeting their daily energy needs such as cooking, heating or lighting. The implementation of the Project will contribute to environmental conservation through allowing these needs to be met through use of carbon free renewable electricity, thus reducing deforestation, emissions of CO₂ from fossil fuel and firewood combustion and other negative environmental effects.

- The preservation and promotion of culture

Bhutan possesses unique culture that has been preserved for many generations. Developing and preserving the traditional culture for the future, while promoting economic development and cushioning some of the negative impacts of modernization, is one of the priorities of Bhutanese government.

The promotion of rural electrification will allow various basic services to be met through the use of electricity. This will help residents in the Project areas to allocate more time engaging in cultural and social activities and preservation of traditional arts and crafts, that would otherwise be used for more time consuming wood collection, traditional cooking and other activities. Additionally, electrification will make rural areas more attractive and will contribute to slowing down the process of migration towards urban areas.

- Good governance

Availability of electricity will allow Bhutanese households to gain more access to information, especially regarding various political processes within and outside their country, their political freedoms, and their role as citizens in a democratic society. Thus, the Project implementation will also contribute to improvement of good governance.