**CLEAN DEVELOPMENT MECHANISM**
**PROJECT DESIGN DOCUMENT FORM (CDM-SSC-PDD)**
**Version 03 - in effect as of: 22 December 2006**

## CONTENTS

**Revision history of this document**

| Version Number | Date | Description and reason of revision |
|---|---|---|
| 01 | 21 January 2003 | Initial adoption |
| 02 | 8 July 2005 | •The Board agreed to revise the CDM SSC PDD to reflect guidance and clarifications provided by the Board since version 01 of this document.<br>•As a consequence, the guidelines for completing CDM SSC PDD have been revised accordingly to version 2. The latest version can be found at <http://cdm.unfccc.int/Reference/Documents>. |
| 03 | 22 December 2006 | •The Board agreed to revise the CDM project design document for small-scale activities (CDM-SSC-PDD), taking into account CDM-PDD and CDM-NM. |

## SECTION A. General description of small-scale project activity

### A.1 Title of the small-scale project activity:

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Mannapitlu Small Hydel Project

Version: 1.6

Date of Completion: 29/03/2010

### A.2. Description of the small-scale project activity:

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Soham Renewable Energy India Pvt. Limited (Soham) is implementing a small run-of-the-river hydro project across the river Puchamoguru in Dakshina Kannada district in Karnataka with an aim of reducing greenhouse gas emissions in the atmosphere. The project activity is being implemented under the name of M/s. Soham Mannapitlu Power Pvt Ltd - SMPPL (formerly known as Bobba Aviation Services Private Limited).

The project activity was originally commenced by M/s. Bobba Aviation Services Private Limited (BASPL), a part of the Bobba group, in the year 2004. However, BASPL could not implement it successfully due to lack of funding, regulatory barriers and faulty construction; and the construction activity was stopped midway in year 2007.

Soham Renewable Energy India Pvt. Ltd. (Soham), took over the BASPL from Bobba Group and the project activity on 28 February 2008[1], with the objective of reviving it with the help of CDM. Soham has already registered a hydro power CDM project (September 2006)[2]. Soham has applied for debt funding of the project activity considering the CDM benefits. The plant was commissioned during July 2009.

The project activity is coming up near Arambodi village in Mangalore taluk in the Dakshin Kannada district. The expected power generation from this project activity is 45 Million KWh annually, and power evacuation to Mudabidri via 110 kV double circuit line, connected to the southern grid Mangalore Electricity Supply Company Limited (MESCOM - part of Karnataka Power Transmission Corporation Limited).

[1] Source : Share Purchase Agreement

[2] Under the name of APPL – part of Soham, http://cdm.unfccc.int/Projects/DB/TUEV-RHEIN1152709432.89/view

The project activity, which has a capacity of 15 MW (3x5 MW), will use three S type horizontal full Kaplan turbines that have a rated design head of 14.9m, and will be coupled with three horizontal synchronous generators that have a rated output of 5000 kW.

**Contribution to Sustainable Development**

Being a renewable energy project, it not only contributes to GHG emission reduction but also contributes towards sustainable development. It can be substantiated broadly under the following heads:

***Social well being:*** The project activity created a general awareness on climate change and its impacts among the surrounding communities. It bridges the gap between demand and supply of electricity in the region.

***Economic well being:*** Local stakeholders such as consultants, suppliers, manufacturers, contractors, local people etc are benefited through the business opportunities arising due to the project activity at various stages of its construction and operation. The project activity does not result in displacement of local people and therefore does not involve rehabilitation and re-settlement.

***Environmental well being:*** Hydel power is a clean and eco friendly method of energy generation. Therefore, the project activity results in savings of fossil fuels and other non renewable resources. It does not lead to GHG emissions into the atmosphere. It will displace an equivalent capacity fossil fuel fired power plant that would have significantly contributed to $CO_2$ emissions.

***Technological well being:*** The project activity entails a clean and eco friendly technology, without the use of any non renewable fuels. Also, this project activity does not involve any displacement since it is a run-of-the-river mini hydel project and not a dam storage hydro project.

## A.3. Project participants:

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| Name of Party involved (host indicates a host party) | Private and/or public entity(ies) project participants (as applicable) | Kindly indicate if the Party involved wishes to be considered as project participant (Yes/No) |
|---|---|---|
| India (Host party) | M/s Soham Mannapitlu Power Pvt Ltd (SMPPL)<br>Private Entity | No |

## A.4. Technical description of the small-scale project activity:

### A.4.1. Location of the small-scale project activity:

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CDM – Executive Board

The project activity is located near Arambodi village, Mangalore Taluk, Dakshina Kannada district, Karnataka.

| A.4.1.1. | Host Party(ies): |
|---|---|

>>

India

| A.4.1.2. | Region/State/Province etc.: |
|---|---|

>>

Karnataka

| A.4.1.3. | City/Town/Community etc: |
|---|---|

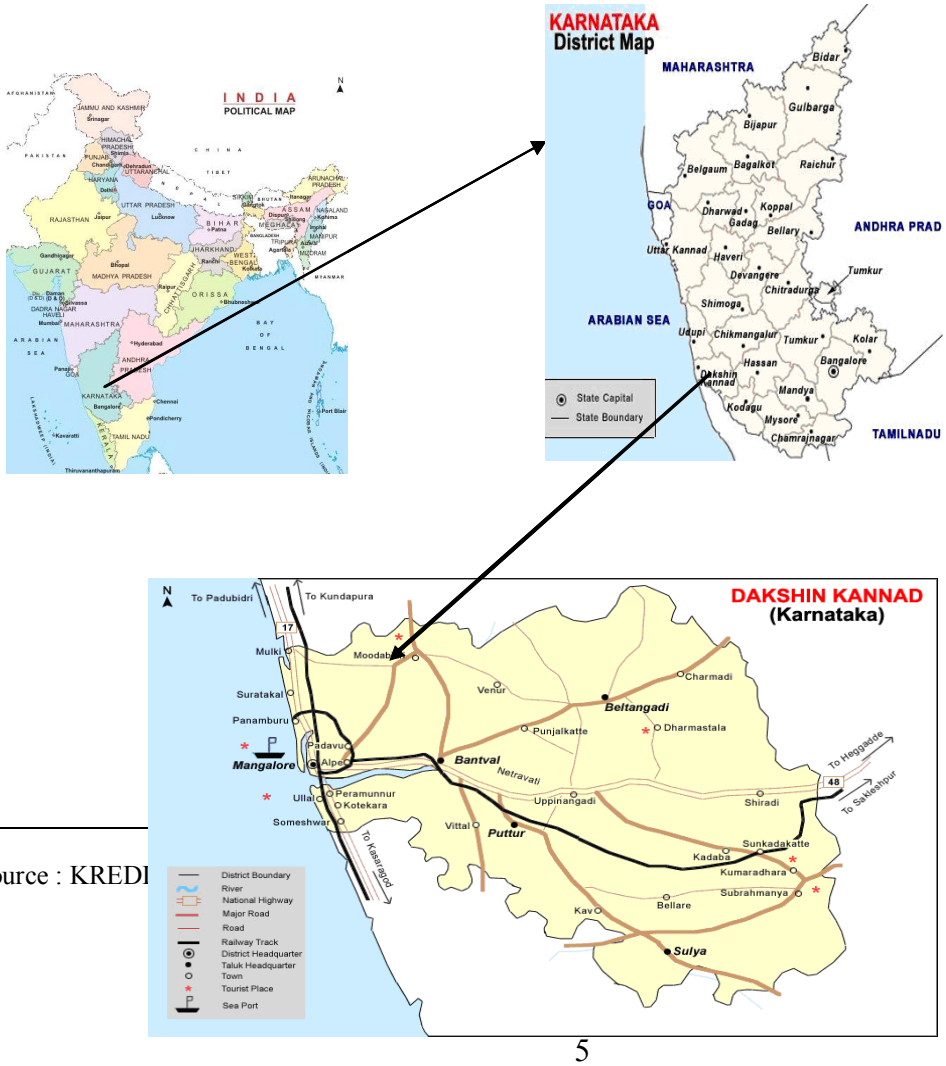
>>

Mangalore Taluk, Dakshin Kannada District

| A.4.1.4. | Details of physical location, including information allowing the unique identification of this small-scale project activity : |
|---|---|

>>

The project activity is on the river Puchamoguru, which is near Arambodi village. The nearest town is Mudabidri and the nearest city is Mangalore, which are located at about 14 km and 40 km respectively, from the project location. The geographical co ordinates of the project activity are 13°01'47" N and 75°03'33" E[3]. The exact location is depicted in the following map.




[3] Source : KREDI

**A.4.2. Type and category(ies) and technology/measure of the small-scale project activity:**

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River Puchamoguru also called as River Gurupur, is a tributary to river Nethravathy, an important west flowing river of Karnataka. The river originates at an elevation of about 1400 m – 1600 m in the Western Ghats, after a confluence with two tributaries it drops by 10 meters at the junction. The project activity will use this natural head and large water flows for clean power generation. Thereby making this project a clean and eco friendly mode of electricity generation.

**Type and category:**

Using the categorization of Appendix B to the simplified modalities and procedures for small-scale CDM project activities, this project activity falls under

Type I – Renewable energy projects as this is a hydel power project; Category D – Electricity generation for a system as the generated electricity will be exported to the grid. Hence, the approved small scale methodology that will be applicable to this project activity is AMS-I.D, version 15.

**Technology**

The Mannapitlu Small Hydel Project with an installed capacity of 15 MW consisting of three units of 5 MW each envisages the construction of the following:

(i) Diversion weir across river Puchamoguru near Mannapitlu/Arambodi village with adequate number of Radial Gates for disposal of Floods.

(ii) Gravity type intake

(iii) 433m long RCC closed conduit as water conductor system

(iv) Forebay

(v) 3 penstocks each 31.87m long; steel penstocks buried in concrete

(vi) Surface powerhouse having three full Kaplan turbine driven generating units, each with a generating capacity of 5 MW

(vii) Concrete lined tail race pool; 35.12m long and unlined tail race channel cut in rock 390.3m

A DG set of capacity 100kVA will also be installed as a back up in case of emergency.

| | |
|---|---|
| *Penstock Intake* | (i) No. of vents: 3 |

| | |
|---|---|
| | (ii) Size of vent: 3.50 (w) x 3.50 (h)<br>(iii) Gates: 3 vertical lift roller gates, screw rod hoist with one set of stop log gate for all 3 vents |
| *Penstocks* | (i) Type: Steel, buried<br>(ii) No. of penstocks: 3<br>(iii) Internal diameter: 3.50 m<br>(iv) Length: 31.87m |
| *Project System (Turbine – Generator combination specifications)* | (i) Maximum Head: 17.21 m<br>(ii) Minimum Head: 12.91m<br>(iii) Design head: 14.90 m<br>(iv) Design Voltage Output: 11kV<br>(v) Configuration: 3 Nos TG Sets of 5000 kW each<br>(vi) Design Maximum Power Output: 15000 kW |
| *Turbine Specifications* | (i) Type: S Type horizontal full Kaplan(ii) Maximum Head: 17.21m<br>(iii) Minimum Head: 12.91m<br>(iv) Design Head: 14.90 m<br>(v) Design power output: 5249.4 kW |
| *Generator (Alternator) specifications* | (i) Design Voltage Output: 11 kV<br>(ii) Design Maximum power output: 5000 kW |

### A.4.3 Estimated amount of emission reductions over the chosen crediting period:

>>

| Years | Annual estimation of emission reduction (in tonnes of $CO_2e$) |
|---|---|
| 2010 | 38,207 |
| 2011 | 38,207 |
| 2012 | 38,207 |
| 2013 | 38,207 |
| 2014 | 38,207 |
| 2015 | 38,207 |

| | |
|---|---|
| 2016 | 38,207 |
| 2017 | 38,207 |
| 2018 | 38,207 |
| 2019 | 38,207 |
| **Total estimated reductions** (tonnes of $CO_2e$) | 382070 |
| **Total number of crediting years** | **10 years** |
| **Annual Average over the crediting period of estimated reduction** (tonnes of $CO_2e$) | **38,207** |

**A.4.4. Public funding of the small-scale project activity:**

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No public funding from Annex I parties has been involved in the project activity.

**A.4.5. Confirmation that the small-scale project activity is not a debundled component of a large scale project activity:**

The guideline for de-bundling mentioned in paragraph 2 of appendix C of the Simplified Modalities and Procedures for Small-Scale CDM project activities is given as follows:

*A proposed small scale project activity shall be deemed to be a de-bundled component of a large project activity, if there is a registered small-scale CDM project activity or an application to register another small-scale CDM project activity.*

- *With the same project participants;*
- *In the same project category and technology/measure; and*
- *Registered within the previous 2 years*
- *Whose project boundary is within 1 km of the project boundary of the proposed small-scale activity at the closest point.*

There is no project activity with the same category and technology within 1 km radius. Therefore, the proposed project is not a de-bundled component of a large project activity.

## SECTION B. Application of a baseline and monitoring methodology

### B.1. Title and reference of the approved baseline and monitoring methodology applied to the small-scale project activity:

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Title: The approved baseline methodology for the project activity is AMS I.D Grid connected renewable electricity generation, version 15.

Reference:

http://cdm.unfccc.int/UserManagement/FileStorage/7QXAZ5036WN8BEYKUDFRPJGL21V4I9

### B.2 Justification of the choice of the project category:

>>

| Applicability of the methodology | Justification of project activity to AMS I.D |
|---|---|
| ➢ *This category comprises renewable energy generation units, such as photovoltaics, hydro, tidal/wave, wind, geothermal and renewable biomass, that supply electricity to and/or displace electricity from an electricity distribution system that is or would have been supplied by at least one fossil fuel fired generating unit* | The project activity is a small hydro project and evacuates power to the Southern Regional Grid, an electricity distribution system that would have been supplied by at least one fossil fuel fired generating unit |
| ➢ *Hydro power plants with reservoirs that satisfy at least one of the following conditions are eligible to apply this methodology:*<br>• *The project activity is implemented in an existing reservoir with no change in the volume of reservoir;*<br>• *The project activity is implemented in an existing reservoir, where the volume of reservoir is increased and the power* | The project is conceived as Run-of-river scheme.<br>The Project activity results in new reservoirs and the power density of the power plant, as per definitions given in the Project Emissions section, is greater than 4W/m2. It creates a small pool of water created by putting up a Gated Weir Structure for the purpose of diverting the water into water conducting system to convey water to Turbines.<br>The capacity of pooled up water is paltry 1,30,000 Cubic Meter of water. |

| | |
|---|---|
| *density of the project activity, as per definitions given in the Project Emissions section, is greater than 4 W/m2;*<br>*• The project activity results in new reservoirs and the power density of the power plant, as per definitions given in the Project Emissions section, is greater than 4 W/m2.* | Power Density of the Power Plant is greater than 4W / m2.<br><br>$A_{PJ}$ = Area of the reservoir measured in the surface of the water, after the implementation of the project activity, when the reservoir is full (m2)<br>$Cap_{PJ}$ = Installed capacity of the hydro power plant after the implementation of the project activity (W)<br>Therefore,<br>$Cap_{PJ}$ = 15000000 W<br>$Cap_{BL}$ = 0<br>$A_{PJ}$ = 68,000[4] $m^2$<br>$A_{BL}$ = 0<br>= 15000000 – 0 / 68,000 – 0<br>= **220.56 W/$m^2$**<br>Which is greater than 4W/m2 |
| ➢ *For project activities that involve the addition of renewable energy generation units at an existing renewable power generation facility, the added capacity of the units added by the project should be lower than 15 MW and should be physically distinct from the existing units* | The project activity involves only a renewable component and the total capacity does not exceed 15 MW[5] |

[4] Plant layout diagram

[5] Source : Energy Secretariat Enhancement Order

| | |
|---|---|
| ➢ *Combined heat and power (co-generation) systems are not eligible under this category* | There is no heat system and hence is not applicable. |
| ➢ *In the case of project activities that involve the addition of renewable energy generation units at an existing renewable power generation facility, the added capacity of the units added by the project should be lower than 15 MW and should be physically distinct[2] from the existing units.* | The project activity is a greenfield project and therefore, there are no existing units |
| ➢ *For project activities that seek to retrofit or modify an existing facility for renewable energy generation are included in this category. To qualify as a small-scale project, the total output of the modified or retrofitted unit shall not exceed the limit of 15 MW* | The project activity is a greenfield project, therefore it does not seek to retrofit or modify an existing facility |

Therefore, the choice of methodology AMS ID for this project activity is justified.

## B.3. Description of the project boundary:

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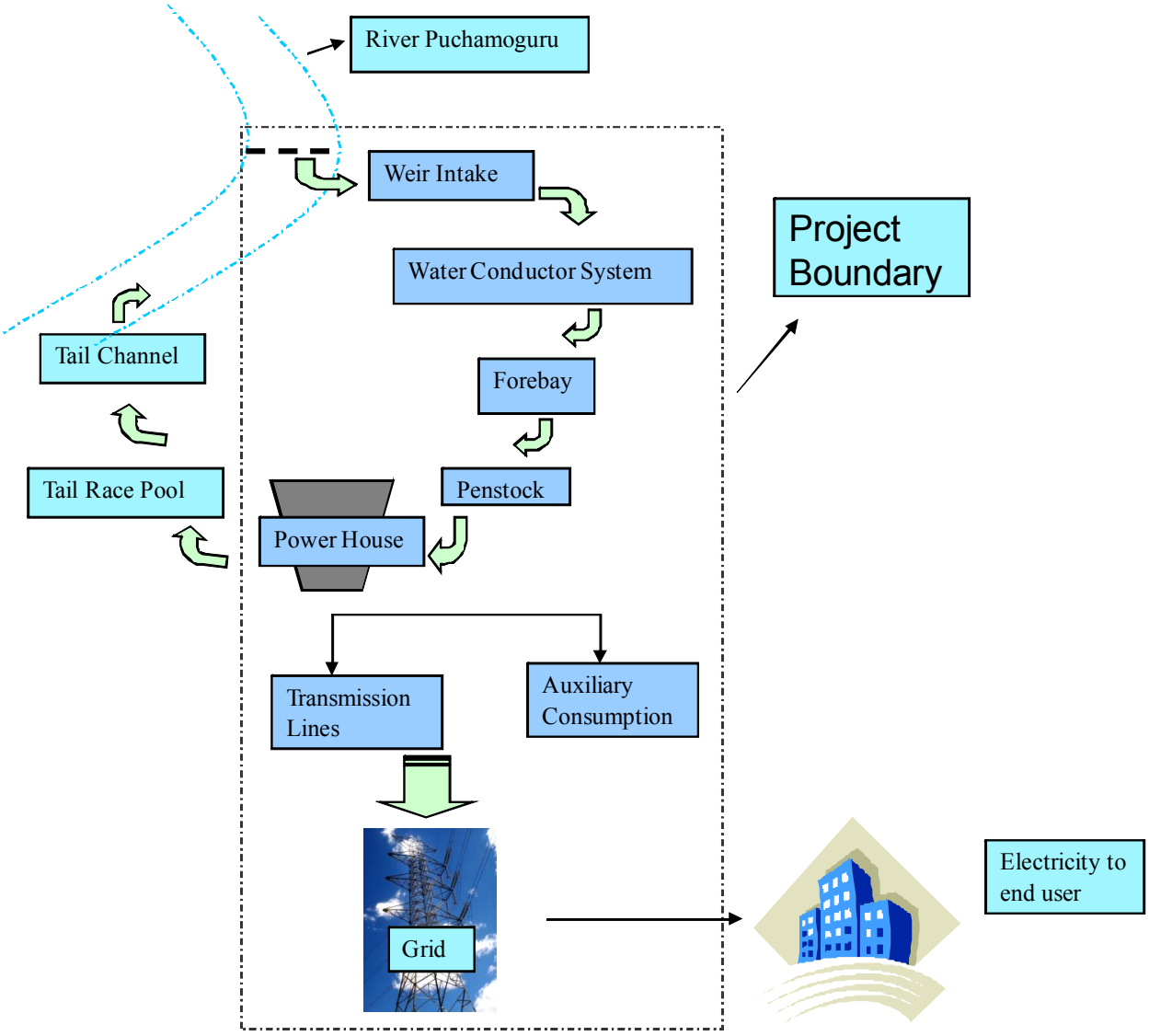
The methodology, AMS ID defines the project boundary as the physical, geographical site of the renewable generation source. A diversion weir diverts part of the river into a water conductor system; the forebay controls the water flow, the water is then let into the power house through the penstocks. After use, the water is let back into the main river through the Tail Channel. The electricity generated is supplied through double circuit lines to Mudabidri, which is connected to the main grid Mangalore Electricity Supply Company Limited (MESCOM). It can be illustrated as below.




**B.4. Description of baseline and its development:**

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Baseline is defined as the situation that would have continued to exist without the project activity. In this case, the baseline will be "State electricity grid supplying equivalent amount of electricity". The southern grid would have supplied an equivalent amount of electricity to the region, in the absence of the project activity. This is a likely baseline scenario, since the region is already receiving electricity from the regional grid (Mudabidri). Mangalore district is supplied by MESCOM. This is the most likely and plausible baseline scenario in the absence of the project activity.

As per the methodology AMS I.D, the baseline is the product of the number of units of electricity (in kWh) produced by the renewable generating unit and an emission coefficient (measured in kg CO2e/kWh) calculated in a transparent and conservative manner as:

(a) A combined margin (CM), consisting of the combination of operating margin (OM) and build margin (BM) according to the procedures prescribed in the 'Tool to calculate the emission factor for an electricity system'

OR

(b) The weighted average emissions (in kg CO2e/kWh) of the current generation mix. The data of the year in which project generation occurs must be used.

The combined margin (CM) consisting of operating margin (OM) and build margin (BM) will be computed according to the tool to calculate the emission factor for an electricity system for this project activity (referenced both in AMS I.D, version 15 and ACM0002, version 07). The OM and BM values for calculation of combined margin have been referred from the latest Central Electricity Authority's (CEA) $CO_2$ database, version 3.0 December 15, 2007. An account of all grid connected energy generation (a single point source in the country for grid operation and management data) and access to the data from these generating stations is maintained by the CEA. Generation from each unit and net inter-state purchases and other details are published by CEA annually. The baseline emission factor for the regional grids, taking into account all required data from the respective grid, is also calculated by the CEA.

The project activity displaces an equivalent quantity of electricity, which would have otherwise been generated by fossil fuel based power plants from the southern grid, to Karnataka Power Transmission Corporation Limited (KPTCL) (MESCOM in this case) that is part of the southern regional grid. Hence, for the calculation of baseline emission factor, all generating sources connected to the southern regional grid of India have been considered as per the tool to calculate the emission factor for an electricity system according to CEA. Therefore the baseline for the project activity would be the product of kWh of electricity generated by the hydel project and the emission factor of the southern region grid.

**B.5. Description of how the anthropogenic emissions of GHG by sources are reduced below those that would have occurred in the absence of the registered small-scale CDM project activity:**

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After analysing the alternatives to the project activity as detailed in the section B.4., this section elaborates the barriers the proponent faced to undertake the 15 MW hydro power project as a CDM project activity.

According to Attachment A to Appendix B of the simplified modalities and procedures for small-scale CDM project activities, the project participant has decided to adopt the Investment Analysis to describe that the proposed project activity is additional and that it would not have occurred in the absence of the CDM project activity.

**Investment Analysis**

Investment Analysis is the concept of judging the financial feasibility of a project activity before taking it forward. This becomes a major deciding factor for the implementation of the project. There are two methods of financial analysis for any project, Project IRR (Internal Rate of Return) and Equity IRR. SMPPL has chosen the project IRR method, since it is the most commonly used method by many of the financial institutions, banks, project promoters etc. Further, the project IRR is a combination of both the debt and equity component and this project activity involves both these components.

The assumptions for the financial analysis are as follows –

| | | | |
|---|---|---|---|
| Location | | Mangalore, Karnataka | Supporting Documents |
| Project size | MW | 15 | |
| **Break-up of project cost** | | | Audited Balance sheet and estimated escalated cost |
| Land | Rs in Lakhs | 41.77 | |
| Power plant civil works | Rs in Lakhs | 4,926.62 | |
| Hydromechanical equipment | Rs in Lakhs | 894.23 | |
| Electromechanical equipment | Rs in Lakhs | 2,839.06 | |
| Power evacuation | Rs in Lakhs | 1,088.15 | |
| Preliminary, pre-operative expenses | Rs in Lakhs | 366.40 | |
| **Total** | **Rs in** | | |

| | | | |
|---|---|---|---|
| | **Lakhs** | **10,156.23** | |
| No. of operating days a year | Days | 365 | DPR |
| Plant Load Factor | % | 34.38 | |
| Gross annual generation | MWh | 45,175.32 | KERC |
| Auxiliary consumption | MWh | 225.88 | |
| Net generation | MWh | 44,949.44 | |
| Electricity export to Grid | MWh | 44,949.44 | |
| O & M Expenses (includes insurance cost) | Rs. In lakhs | 1.50% | KERC |
| Escalation in O & M charges | Rs. In lakhs | 153.97<br>5.00% | KERC |
| MNRE Subsidy | Rs. In lakhs | 262.50 | MNRE Guidelines |
| Sales realisation per kWh | | Rs. 3.60 | Based on Quotation from Power Purchaser |

As per the **Additionality Tool, version 5.2**

*"Discount rates and benchmarks shall be derived from:*

*Estimates of the cost of financing and required return on capital (e.g. commercial lending rates and guarantees required for the country and the type of project activity concerned), based on bankers views and private equity investors/funds' required return on comparable projects;*"

Further, the **Guidance on Assessment of Investment Analysis, Version 02 (Annex 45, EB 41)** suggests that while adopting the above approach, the following can be used.

"*Selection and Validation of Appropriate Benchmarks*

*11. Guidance: In cases where a benchmark approach is used the applied benchmark shall be appropriate to the type of IRR calculated. Local commercial lending rates or weighted average costs of capital (WACC) are appropriate benchmarks for a project IRR.*

The project activity has been financed by a consortium of banks namely, Andhra Bank and Axis Bank. The Prime Lending Rate (PLR) of each of these banks is Andhra Bank – 14% and Axis Bank – 14.75%. Therefore, 14% can be considered as the benchmark for comparison.

The analysis reveals that this project has a project IRR of only 11.58% calculated over a period of 30 years, which is below the benchmark of 14%.

The project activity was initially conceived and constructed by another promoter. Due to various reasons, both technical and financial mismanagement (elaborated below), it was halted. The earlier promoter could not take this project forward, due to these escalated costs. Also, CDM was not considered by the earlier promoter. The project activity was then taken over by Soham at a half completed stage, which involved a huge cost escalation to re-engineer and re-structure the project.

A sensitivity analysis has been carried out to further strengthen the financial additionality for this project. It can be noted that the IRR does not cross this benchmark even if the important techno-commercial parameters are modified.

Therefore, this analysis clearly projects that without CDM revenue Mannapitlu will be a financially unattractive project.

| **Parameters** | **Project IRR** |
|---|---|
| **10% increase in PLF** | **12.97%** |
| **10% decrease in PLF** | **10.15%** |
| **10% increase in O&M cost** | **11.38%** |
| **10% decrease in O&M cost** | **11.79%** |
| **10% increase in project cost** | **10.29%** |
| **10% decrease in project cost** | **13.14%** |
| **10% increase in Tariff** | **12.97%** |
| **10% decrease in Tariff** | **10.15%** |

To summarize, CDM is a mandatory requirement to take the project activity forward. Taking into consideration the financial analysis and the other barriers as detailed above, Soham had considered CDM while taking over the project from the earlier promoter.

| | |
|---|---|
| **Project IRR (with CDM)** | **14.24%** |
| **Project IRR (without CDM)** | **11.58%** |
| **Benchmark**<br>**PLR** | **14%** |

It can be noted, that only with CDM revenue incorporated into the IRR computation, does the project become financially viable. Further, the proponent has applied for more loans to complete the construction of the project activity. The only way to revive the BASPL hydro project was through CDM. Due to the prior experience of Soham in CDM, they were confident to take this project forward.

**Construction Delays**

The construction for this project activity started on 17, December 2004[6]. However, various delays prolonged the commissioning of the project, also increasing the total project cost. The proponent faced issues with raw material mobility (cement, reinforcement steel etc needs to be transported from Mangalore). Availability of labour was another issue. All these barriers led to halting the construction work for about a year during 2007, further delaying the whole process.

**Summary of the construction delays:**

| Year | Event |
|---|---|
| 2003 | All Clearances obtained by BASPL (irrigation, PCB, RD, Fisheries, Power Evacuation Scheme etc)[7] |
| 26, November 2004 | PPA signed[8] |
| 17, December 2004 | Letter of Acceptance with civil works contractor |
| May, 2005 | Construction work halted due to issues with forest clearances |
| 27, December 2004 | Financial closure[9] |
| January 2006 | Forest Clearance obtained[10] |
| February 2006 | Issues with contractors – due to delay in construction process. Contractors demanded compensation |

[6] Source : Agreement copy with the Civil Works Contractor - SSJV

[7] Source : Copy of Clearances

[8] Source : Copy of PPA

[9] Source : Copy of Financial Closure

[10] Source : Copy of Clearance from the forest department

| | |
|---|---|
| March 2006 | New contractors hired |
| June 2006 | Floods – construction work halted |
| December 2006 | Construction resumed[11] |
| January 2007 – March 2007 | Shortage of funds – loans applied to respective banks[12].<br>Loan disbursements delayed<br>Funds exhausted[13] |
| March 2007 onwards | Construction activity completely stopped due to non release of funds |
| February – March 2008 | Soham took over BASPL[14] |
| 2, June 2008 | CDM Consultant appointed[15] |
| 6, June 2008 | Stakeholder Consultation Process |
| July 2008 | Appointment of Validator |

The earlier proponent had sub contracted the designing and construction work. However, this was inappropriately carried out. When Soham took over this project, the construction had been halted for over a year. That year the area had experienced a good amount of rainfall, leading to flooding of the power house that was under construction. The promoter had to de-water and de-silt the entire power house and only then start re-work. Not only did this escalate the cost but it also led to a lot of re-engineering and re-structuring of the plant. Beginning with the chipping off of bad concrete, using shear connectors to increasing the thickness on both sides of the end walls was the re-construction that was involved. In fact, one of the power house walls constructed has completely bent causing a huge threat to the power house itself. Now, a new power house wall against the existing wall will be constructed, to ensure no load on this wall.

The usual practice for any small hydro project is to include one trash rack, one set of service gates and a common stop log gates for the entire project[16]. However, for this project two trash racks, two sets of stop log gates and two sets of service gates have been installed. These have been designed in the interest of emergency preparedness in case of floods. This has involved an additional cost for the promoters.

[11] Source : Purchase order to start construction

[12] Source : Share Purchase Agreement – Annexure 2

[13] Source : Copy of minutes of meeting – Bank Consortium

[14] Source : Share Purchase Agreement – Schedule 1

[15] Source : Contract Copy

[16] Source : Letter from technical consultant

CDM – Executive Board

Consideration of CDM

| | |
|---|---|
| February – March 2008 | Soham took over BASPL[17] |
| 2, June 2008 | CDM Consultant appointed[18] |
| 6, June 2008 | Stakeholder Consultation Process |
| July 2008 | Appointment of Validator |

Since, Soham already has a registered CDM project, they were confident that though there were many barriers with this project, if taken through the CDM way it can be successfully implemented. Construction work resumed in the year April 2008, after the proponent sorted these issues by making advance purchases, opting for ready mix concretes and so on. This has imposed an additional cost to the project activity. The revenue obtained through CDM will help overcome the loss incurred.

Impact of CDM registration

The above detailed analysis demonstrates explicitly that Mannapitlu Small Hydro Power project will be feasible only with CDM revenue. Upon including CDM funds, the IRR raises from 11.58% to 14.24%. Registering this project activity and availing CDM funds will make the project feasible and also help in promoting other proponents to take up such clean and renewable initiatives for power generation.

***The project activity meets all the criteria prescribed in the baseline methodology and demonstrates that it is additional.***

## B.6. Emission reductions:

### B.6.1. Explanation of methodological choices:

>>

According to the methodology, "the baseline is the kWh produced by the renewable generating unit multiplied by an emission coefficient measured in (kg $CO_2$e/kWh) calculated in a transparent and conservative manner".

**Calculation of baseline emissions ($BE_y$):**

[17] Source : Share Purchase Agreement – Schedule 1

[18] Source : Contract Copy

$BE_y = (EG_y \times BEF_y)$

Where,

| | |
|---|---|
| $BE_y$ | Baseline emissions in year 'y' represented in $tCO_2e$ |
| $EG_y$ | Baseline energy generation, which is equal to the electricity generated by the hydel plant constituting the project activity represented in MWh[19] per year. This parameter is monitored continuously. |
| $BEF_y$ | Emission co-efficient calculated as per AMS I.D and represented in $tCO_2e/MWh$ |

**Calculation of emission co-efficient ($BEF_y$):**

As described in Section B.4, the southern regional grid is considered as the baseline reference grid for the project activity and the method combined margin (CM), consisting of the combination of operating margin (OM) and build margin (BM) according to the procedures prescribed in the 'Tool to calculate the emission factor for an electricity system" prescribed by AMS I.D has been adopted to calculate the baseline emission factor.

As prescribed by the 'Tool to calculate the emission factor for an electricity system', combined margin emission factor of the grid is calculated as follows:

$$\mathbf{BEF_y = w_{OM}.EF_{OM,\,y} + w_{BM}.EF_{BM,\,y}}$$

Where,

| | |
|---|---|
| $w_{OM}$ | Weight of the operating margin emission factor (0.5 as per the tool to calculate the emission factor for an electricity system, Ref: version 01, page 15) |
| $EF_{OM,\,y}$ | Operating margin emission factor calculated as per the tool to calculate the emission factor for an electricity system |
| $w_{BM}$ | Weight of the build margin emission factor (0.5 as per the tool to calculate the emission factor for an electricity system, Ref: version 01, page 15) |
| $EF_{BM,y}$ | Build margin emission factor calculated as per the tool to calculate the emission factor for an electricity system |
| $BEF_y$ | Combined margin baseline emission factor of the grid |

***Operating margin (OM):***

The tool to calculate the emission factor for an electricity system provides four options for calculating OM, viz.

(a) Simple OM, or

(b) Simple adjusted OM, or

(c) Dispatch data analysis OM, or

(d) Average OM

.Option (a) "Simple OM" using the ex-ante option has been adopted here and the formula for calculating same is described below:

$$EF_{grid,OMsimple,y} = \sum_{i,m} FC_{i,m,y} . NCV_{i,y} . EF_{CO2,i,y} / \sum_{m} EG_{m,y}$$

where,

$EF_{grid,OMsimple,y}$ = simple operating margin $CO_2$ emission factor in year y ($tCO_2/MWh$)

$FC_{i,m,y}$ = amount of fossil fuel type *i* consumed by power plant/unit *m* in year *y* (mass or volume unit)

$NCV_{i,y}$ = net calorific value (energy content) of fossil fuel type *i* in year *y* (GJ/mass or volume unit)

$EF_{CO2,i,y}$ = $CO_2$ emission factor of fossil fuel type *i* in year *y* ($tCO_2/GJ$)

$EG_{m,y}$ = Net electricity generated and delivered to the grid by power plant / unit *m* in year *y* (MWh)

M = All power plants / units serving the grid in year y except low-cost / must-run power plants / units

i = All fossil fuel types combusted in power plant / unit m in year y

y = the three most recent years for which data is available at the time of submission of the PDD to the DOE for validation (ex ante option)

For calculations, local values of $NCV_i$ and $EFCO_{2i}$ have been used. The ex-ante data vintage of 3-year average, based on the most recent statistics available with the CEA database version 3.0, have been used for the calculation.

Build Margin (BM):

The build margin emissions factor is the generation-weighted average emission factor ($tCO_2/MWh$) of all power units m during the most recent year y for which power generation data is available, calculated as follows:

The ex-ante option (Option 1) for calculation of build margin emission factor has been adopted in this PDD

$$EF_{grid,BM,y} = \sum_{m} EG_{m,y} \, x \, EF_{EL,m,y} / \sum_{m} EG_{m,y}$$

where,

$EF_{grid,BM,y}$ = Build margin $CO_2$ emission factor in year *y* ($tCO_2/MWh$)

$EG_{m,y}$ = Net quantity of electricity generated and delivered to the grid by power unit *m* in year *y* (MWh)

$EF_{EL,m,y}$ = $CO_2$ emission factor of power unit *m* in year *y* ($tCO_2/MWh$)

m = Power units included in the build margin

y = Most recent historical year for which power generation data is available

Further, power plant capacity additions registered as CDM project activities have been excluded from the sample group *m*.

Combined margin emissions factor:

The combined margin emissions factor is calculated as follows:

$EF_{grid,CM,y} = EF_{grid,OM,y} \text{ x } w_{OM} + EF_{grid,BM,y} \text{ x } w_{BM}$

Where,

$EF_{grid,CM,y}$ = Combined margin $CO_2$ emission factor in year *y* ($tCO_2/MWh$)

$EF_{grid,OM,y}$ = Operating margin $CO_2$ emission factor in year *y* ($tCO_2/MWh$)

$w_{OM}$ = Weighting of operating margin emission factor (%) = 0.5 as per the tool to calculate the emission factor for an electricity system (Ref: version 1.1, page 15)

$EF_{grid,BM,y}$ = Build margin $CO_2$ emission factor in year *y* ($tCO_2/MWh$)

$w_{BM}$ = Weighting of build margin emission factor (%) = 0.5 as per the tool to calculate the emission factor for an electricity system (Ref: version 1.1, page 15)

**Emission Reductions ($ER_y$):**

The emission reductions from the project activity are equal to the baseline emissions (BEy) minus project emissions (PEy) and leakage (Ly).

ERy = BEy – PEy – Ly

**Baseline Emissions (BEy)**

The electricity imported from the grid will be subtracted from the total electricity exported (Gross Generation – Auxiliary Consumption) to the grid by the project activity. The archived data would be kept for at least 2 years after end of the crediting period.

**BEy = EGy * BEFy**

**EGy = EGexport,y – EGimport,y**

**Project emissions**

14. For most renewable energy project activities, PEy = 0. However, for the following categories of project activities, project emissions have to be considered following the procedure described in the most recent version of ACM0002.

• Emissions related to the operation of geothermal power plants (e.g. non-condensable gases, electricity/fossil fuel consumption)

• Emissions from water reservoirs of hydro power plants

**PEy = PEFF,y + PEGP,y + PEHP,y**

**Where:**

PEy = Project emissions in year y (tCO2e/yr)

PEFF,y = Project emissions from fossil fuel consumption in year y (tCO2/yr)

PEGP,y = Project emissions from the operation of geothermal power plants due to the release of non-condensable gases in year y (tCO2e/yr)

PEHP,y = Project emissions from water reservoirs of hydro power plants in year y (tCO2e/yr)

PEFF,y shall be calculated as per the latest version of the "Tool to calculate project or leakage CO2 emissions from fossil fuel combustion

Since the project activity is a hydel power, a zero emission source, there are no associated project emissions, therefore, $PE_{GP,y}$ is not applicable. However, there is a DG set of 100 **KVA** capacity, to be used as a back up, in case of any emergency. Therefore, when in use this will be monitored and considered as project emissions. The Emission Reductions will be then calculated accordingly ($PE_{FF,y}$) using the tool.

As per the tool,

$PE_y = \Sigma FC_{f,y} * COEF_{f,y}$

Where,

$FC_{f,y}$ : is the total volume of diesel combusted in the project plant in year(s) 'y'

$COEF_{f,y}$ : is the $CO_2$ emission coefficient ($tCO2/m^3$ or similar) in year(s) for each fuel and is obtained as:

$$\mathbf{COEF_{f,y} = \Sigma NCV_y * EF_{CO2f,f,y}}$$

Where:

$NCV_{f,y}$ : is the net calorific value (energy content) per volume unit of diesel in year 'y' (TJ/Gg) as determined from the fuel supplier, wherever possible, otherwise from local or national data;

$EF_{CO2,f,y}$: is the $CO_2$ emission factor per unit of energy diesel in year 'y' ($tCO_2/TJ$) as determined from the fuel supplier, wherever possible, otherwise from local or national data;

**Emissions from water reservoirs of hydro power plants ($PE_{HP,y}$)**

For hydro power project activities that result in new reservoirs and hydro power project activities that result in the increase of existing reservoirs, project proponents shall account for CH4 and CO2 emissions from the reservoir, estimated as follows:

(b) If the power density of the project activity (PD) is greater than 10 W/m2:

$PE_{HP,y} = 0$

The power density of the project activity (PD) is calculated as follows:

$$\mathbf{PD = Cap_{PJ} – Cap_{BL} / A_{PJ} - A_{BL}}$$

Where:

PD = Power density of the project activity (W/m2)

$Cap_{PJ}$ = Installed capacity of the hydro power plant after the implementation of the project activity (W)

$Cap_{BL}$ = Installed capacity of the hydro power plant before the implementation of the project activity (W). For new hydro power plants, this value is zero

$A_{PJ}$ = Area of the reservoir measured in the surface of the water, after the implementation of the project activity, when the reservoir is full (m2)

$A_{BL}$ = Area of the reservoir measured in the surface of the water, before the implementation of the project activity, when the reservoir is full (m2). For new reservoirs, this value is zero

As per AMS I.D, leakage need not be considered since there is no transfer of energy generating equipment from another activity or transfer of existing equipment to another activity.

Therefore, emission reductions from the project activity will be -

**ERy = BEy**

**B.6.2. Data and parameters that are available at validation:**

*(Copy this table for each data and parameter)*

| **Data / Parameter:** | **$BEF_y$** |
|---|---|
| Data unit: | $tCO_2/MWh$ |
| Description: | $CO_2$ Baseline emission factor of the grid |
| Source of data used: | Calculated according to the tool to calculate the emission factor for an electricity system, fixed ex-ante |
| Value applied: | 0.85 |
| Justification of the choice of data or description of measurement methods and procedures actually applied : | Data used from CEA database which accounts for data from various plant sources (version 3) |
| Any comment: | |

| **Data / Parameter:** | **$EF_{OM, y}$** |
|---|---|
| Data unit: | $tCO_2/MWh$ |
| Description: | Operating margin emission factor of the grid |
| Source of data used: | Central Electricity Authority (CEA) database |
| Value applied: | 1.00 |
| Justification of the choice of data or description of measurement methods and procedures actually applied : | Data used from CEA database which accounts for data from various plant sources from the southern region (version 3) |
| Any comment: | |

| Data / Parameter: | $EF_{BM, y}$ |
|---|---|
| Data unit: | $tCO_2/MWh$ |
| Description: | Build margin emission factor of the grid |
| Source of data used: | Central Electricity Authority (CEA) database (version 3) |
| Value applied: | 0.71 |
| Justification of the choice of data or description of measurement methods and procedures actually applied : | Data used from CEA database which accounts for data from various plant sources from the southern region |
| Any comment: | |

| Data / Parameter: | $EF_{Diesel}$ |
|---|---|
| Data unit: | Kg/TJ |
| Description: | Diesel Oil Emission factor |
| Source of data used: | Table 2.2 of Chapter 2, Volume 2 of 2006 IPCC Guideline. |
| Value applied: | 74100 |
| Justification of the choice of data or description of measurement methods and procedures actually applied : | Standard value as prescribed by the IPCC |
| Any comment: | Constant Value |

| Data / Parameter: | NCV |
|---|---|
| Data unit: | TJ/Gg |
| Description: | Net Calorific Value of Diesel Oil |
| Source of data used: | Page 1.18 of Chapter 1, Volume 2 of 2006 IPCC Guideline. |
| Value applied: | 43.0 |
| Justification of the choice of data or description of measurement methods and procedures actually applied : | Standard value as prescribed by the IPCC |
| Any comment: | Constant Value |

| Data / Parameter: | Density |
|---|---|
| Data unit: | Kg/l |
| Description: | Density of Diesel Oil |
| Source of data used: | As per IOC |
| Value applied: | 0.82 |
| Justification of the | Project promoter will procure the FSHD from the market, supplied by Indian Oil |

| | |
|---|---|
| choice of data or description of measurement methods and procedures actually applied : | Corporation. http://www.iocl.com/Products/HighSpeedDiesel.aspx |
| Any comment: | Constant Value |

### B.6.3 Ex-ante calculation of emission reductions:

>>

As mentioned in B.6.1, the combined margin emission factor of the southern grid is calculated from the corresponding operating margin (OM) and build margin (BM) emission factor. The values for the emission factor of OM and BM that have been calculated ex-ante using the three year average data by the Central Electricity Authority (CEA), a statutory organisation that comes under the purview of the Central Government of India - - version 3.0, September 2008 that uses ACM0002 version 7.0 & "Tool to calculate the emission factor for an electricity system version 1.1. These values are tabled below:

| Region | Year | Operating Margin emission factor ($tCO_2/MWh$) | Build Margin emission factor ($tCO_2/MWh$) |
|---|---|---|---|
| South | 2006-2007 | 1.00 | 0.71 |

Therefore, according to the formula described in B.6.1, the combined margin emission factor is calculated as follows:

$\mathbf{EF_y = EF_{grid,CM,\,y}}$

$EF_y = (0.5*1) + (0.5*0.71)$

$= 0.85\ tCO_2/MWh$

The combined margin emission factor to calculate the baseline emissions is, therefore, 0.85 $tCO_2/MWh$. and will be fixed ex-ante as baseline emission factor for the entire crediting period.

The baseline emissions is calculated using the formula -

$BE_y = (EG_y \times BEF_y)$

Where,

EGy = EGexport,y – EGimport,y

EGimport,y = 0

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Therefore,

$EG_y$ = 44949.44 MWh/year

$BEF_y$ = 0.85 $tCO_2$/MWh

**$BE_y$ = 38,207.03 $tCO_2$/year**

**ERy = BEy – PEy- Ly**

For this project activity, the emissions reductions are the same as baseline emissions. Therefore,

$ER_y$ = **38,207.03 $tCO_2$/year**.

If the power density of the project activity (PD) is greater than 10 W/m2:

$PE_{HP,y}$ = 0

The power density of the project activity (PD) is calculated as follows:

**$PD = Cap_{PJ} – Cap_{BL} / A_{PJ} - A_{BL}$**

Where:

PD = Power density of the project activity (W/m2)

$Cap_{PJ}$ = Installed capacity of the hydro power plant after the implementation of the project activity (W)

$Cap_{BL}$ = Installed capacity of the hydro power plant before the implementation of the project activity (W). For new hydro power plants, this value is zero

$A_{PJ}$ = Area of the reservoir measured in the surface of the water, after the implementation of the project activity, when the reservoir is full (m2)

$A_{BL}$ = Area of the reservoir measured in the surface of the water, before the implementation of the project activity, when the reservoir is full (m2). For new reservoirs, this value is zero

Therefore,

$Cap_{PJ}$ = 15000000 W

$Cap_{BL}$ = 0

$A_{PJ}$ = 68,000[20] $m^2$

$A_{BL}$ = 0

= 15000000 – 0 / 68,000 – 0

= **220.56 W/$m^2$**

Therefore, project emissions due to reservoirs is 0.

Values for Energy Import and Project Emissions will be included as per the actual reading, after the commissioning of the project activity.

**B.6.4 Summary of the ex-ante estimation of emission reductions:**

>>

| Years | Estimation of project activity emissions (t $CO_2e$) | Estimation of baseline emissions (t $CO_2e$) | Estimation of leakage (t $CO_2e$) | Estimation of overall emission reductions (t $CO_2e$) |
|---|---|---|---|---|
| 2010 | 0 | 38,207 | 0 | 38,207 |
| 2011 | 0 | 38,207 | 0 | 38,207 |
| 2012 | 0 | 38,207 | 0 | 38,207 |
| 2013 | 0 | 38,207 | 0 | 38,207 |
| 2014 | 0 | 38,207 | 0 | 38,207 |
| 2015 | 0 | 38,207 | 0 | 38,207 |
| 2016 | 0 | 38,207 | 0 | 38,207 |
| 2017 | 0 | 38,207 | 0 | 38,207 |
| 2018 | 0 | 38,207 | 0 | 38,207 |
| 2019 | 0 | 38,207 | | 38,207 |
| **Total (tonnes of $CO_2e$)** | **0** | 382070 | **0** | 382070 |

**B.7 Application of a monitoring methodology and description of the monitoring plan:**

[20] Plant layout diagram

| B.7.1 Data and parameters monitored: | |
|---|---|
| *(Copy this table for each data and parameter)* | |
| **Data / Parameter:** | **$EG_{export,y}$** |
| Data unit: | MWh |
| Description: | Total electricity supplied to the grid by the project activity |
| Source of data to be used: | Records maintained by SMPPL |
| Value applied: | To be measured after commissioning |
| Description of measurement methods and procedures to be applied: | This parameter will be measured in MWh from SMPPL records on an hourly basis and the data would be archived and kept electronically for at least 2 years after the end of crediting period.<br>Two sets of energy meters, main meter and check meter, would be used for monitoring the electricity supplied to the grid. The Indian electricity standards shall be followed for the maintenance of energy meters. Each meter would be jointly inspected and sealed on behalf of SMPPL and MESCOM and shall not be interfered with by either party except in the presence of the other party. |
| QA/QC procedures to be applied: | All energy meters used would be electronic trivector meters of accuracy class 0.2%. Annual calibration of all energy meters, with reference to a portable meter, shall be carried out for checking the accuracy |
| Any comment: | |

| **Data / Parameter:** | $EG_{import,y}$ |
|---|---|
| Data unit: | MWh |
| Description: | Total electricity imported from the grid by the project activity |
| Source of data to be used: | Records maintained by SMPPL |
| Value of data | To be measured after commissioning |
| Description of measurement methods | This parameter will be measured in MWh from SMPPL records on an hourly basis and the data would be archived and kept electronically for at least 2 years |

| | |
|---|---|
| and procedures to be applied: | after the end of crediting period.<br>Two sets of energy meters, main meter and check meter, would be used for monitoring the electricity imported from the grid. The Indian electricity standards shall be followed for the maintenance of energy meters. Each meter would be jointly inspected and sealed on behalf of SMPPL and MESCOM and shall not be interfered with by either party except in the presence of the other party. |
| QA/QC procedures to be applied: | All energy meters used would be electronic trivector meters of accuracy class 0.2%. Annual calibration of all energy meters, with reference to a portable meter, shall be carried out for checking the accuracy, which shall be of accuracy class 0.1 %. |
| Any comment: | |

| | |
|---|---|
| **Data / Parameter:** | FHSD |
| Data unit: | Litres |
| Description: | Fuel Consumption of High Speed Diesel |
| Source of data to be used: | Records maintained by SMPPL |
| Value of data | To be measured when in use after commissioning |
| Description of measurement methods and procedures to be applied: | The DG set will serve as a back up and will not be in use regularly. This parameter will be measured in litres from SMPPL records whenever in use and the data would be archived and kept electronically for at least 2 years after the end of crediting period. |
| QA/QC procedures to be applied: | |
| Any comment: | |

| | |
|---|---|
| **Data / Parameter:** | EGy |
| Data unit: | MWh |

| | |
|---|---|
| Description: | Net Energy Generation by the project activity |
| Source of data to be used: | = EGexport – EGimport |
| Value of data | Calculated |
| Description of measurement methods and procedures to be applied: | The Difference in Energy exported and Energy Imported will be calculated as Net Energy Generation. |
| QA/QC procedures to be applied: | |
| Any comment: | |

**B.7.2 Description of the monitoring plan:**

>>

Both main meter and check meter would be used to monitor the electricity supplied to and imported from the grid. The invoice copies of electricity sold will serve as a back up for the electricity generated. If, during annual test check, as already mentioned in B.7.1, the main meter is found to be within permissible limits of error and check meter is found to be beyond permissible limits, energy data would be considered as per main meter as usual. The check meter would, however, be calibrated immediately. If during annual test check, the main meter is found to be beyond permissible limits of error but check meter is found to be within permissible limits, then energy data up to the date and time of such test shall be considered as per check meter. The main meter would be immediately calibrated where after energy data would be taken as per main meter.

If, during any of the monthly joint meter readings taken by SMPPL and MESCOM, the variation between the main meter and check meter is more than the permissible limit for meters of accuracy class 0.2%, all the meters shall be re-tested and calibrated immediately.

The Meter and Relay Testing (MRT) lab of KPTCL will be ensure the annual calibration and testing of the main and check meters. The MRT would follow the Indian Standards (IS) for conducting the calibration.

A CDM Manual that has been prepared by the project proponent contains a management structure, monitoring frequency, maintenance, calibration, record keeping and emergency preparedness procedures.

The manual includes a robust project management structure that identifies engineers who would be in charge of calibration and data monitoring.

**B.8 Date of completion of the application of the baseline and monitoring methodology and the name of the responsible person(s)/entity(ies)**

>>

Date of completion of baseline and monitoring methodology: 26/03/2010

Name of the responsible person(s)/entity(ies):

Soham Mannapitlu Power Projects Pvt Ltd

Residency Road, #137, HMG Ambassador Building, 7th Floor

Bangalore - 560 025

Karnataka, India

080 41474800/ 080 41474804

## SECTION C. Duration of the project activity / crediting period

### C.1 Duration of the project activity:

#### C.1.1. Starting date of the project activity:

>>
28/2/2008 – Share Purchase Agreement between Soham and BASPL[21].

#### C.1.2. Expected operational lifetime of the project activity:

>>
30 years, 0 months

### C.2 Choice of the crediting period and related information:

#### C.2.1. Renewable crediting period

##### C.2.1.1. Starting date of the first crediting period:

>>
Not Applicable

##### C.2.1.2. Length of the first crediting period:

>>
Not Applicable

#### C.2.2. Fixed crediting period:

##### C.2.2.1. Starting date:

>>
1/11/2010 or upon registration with UNFCCC. SMPPL will claim CERs only after registration of the project activity.

##### C.2.2.2. Length:

>>
10 years and 0 months

[21] Source : Share Purchase Agreement

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## SECTION D. Environmental impacts

>>

**D.1. If required by the host Party, documentation on the analysis of the environmental impacts of the project activity:**

>>

EIA (Environmental Impact Assessment) clearance is not required as this project activity neither falls under Category A nor Category B according to the Ministry of Environment & Forests EIA Notification, 2006 (which has replaced EIA Notification 1994 and its various amendments).

**D.2. If environmental impacts are considered significant by the project participants or the host Party, please provide conclusions and all references to support documentation of an environmental impact assessment undertaken in accordance with the procedures as required by the host Party:**

>>

Not Applicable

## SECTION E. Stakeholders' comments

>>

### E.1. Brief description how comments by local stakeholders have been invited and compiled:

>>

Stakeholders form an integral part of the CDM process. The project activity has an indirect or direct effect on the stakeholders, therefore making it imperative to consider their suggestions. The stakeholder consultation process was held on 6th June, 2008 at the project site, Mannapitlu. Personal invites were sent out a week in advance to the various representatives from the community with the objective of keeping them informed on the social and environmental impacts of the project activity and invite their opinion on the same. The presentation was made in English as well as in the regional language, Kannada. SMPPL representatives presented the key aspects of the project activity and the stakeholder responses were documented.

### E.2. Summary of the comments received:

>>

The stakeholder comments have been summarised as follows:

*Employees:* The employees of SMPPL were happy to be part of this project, since it is a form of clean energy generation, since no fossil fuels have been used and will improve the power scenario in the region. They also felt that it would increase the water table in this area.

*Electricity Board:* Members from KPTCL felt that there were no negative impacts due to this project activity, but that it will lead to pollution control. Also, they mentioned that such clean projects will provide surplus power in the coming years.

*Local Panchayat representatives:* Panchayat members from the nearby villages were part of the stakeholder process. They were glad that such initiatives are being undertaken, since they will be the need of the hour in future. Also, such projects are not only beneficial for the present generation but also beneficial to our future generation.

*NGO:* They felt that such activities create employment opportunities in the region.

*Consultants:* There were no negative comments made by the consultants on the project activity.

*Local Residents:* A few local residents were invited to the stakeholder meet; they felt that this project activity creates employment opportunities for the community. This way it acts as a means of earning a living and helps them raise their standard of living.

*Equipment suppliers:* Equipment suppliers to SMPPL were also among the invited stakeholders. They were pleased to be part of such an initiative. They also felt that such initiatives not only provide employment opportunities for the community but also reduce pollution.

**E.3. Report on how due account was taken of any comments received:**

>>

As stated in section E.2, no concerns were raised against the project activity. Therefore, no corrective action was needed.

## Annex 1

## CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

| | |
|---|---|
| Organization: | Soham Mannapitlu Power Pvt Ltd |
| Street/P.O.Box: | Residency Road |
| Building: | #137, HMG Ambassador Building, 7th Floor |
| City: | Bangalore |
| State/Region: | Karnataka |
| Postfix/ZIP: | 560 025 |
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| Telephone: | +91 80 41474800 |
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| E-Mail: | suchindra@sohamenergy.in |
| URL: | www.sohameenergy.in |
| Represented by: | Suchindra |
| Title: | Director |
| Salutation: | Mr |
| Last Name: | Shetty |
| Middle Name: | S |
| First Name: | Suchindra |
| Department: | Projects |
| Mobile: | +91 09900221177 |
| Direct FAX: | |
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| Personal E-Mail: | suchindra@sohamenergy.in |

**Annex 2**

**INFORMATION REGARDING PUBLIC FUNDING**

NO PUBLIC FUNDING AVAILABLE FOR THIS PROJECT ACTIVITY.

## Annex 3

## BASELINE INFORMATION

As already mentioned in Section B.6, the latest data from Central Electricity Authority (CEA) shall be used for calculating the build margin (BM) and operating margin (OM) emission factors. These values shall, in turn, be used to arrive at the baseline emission factor, according to ACM0002. The emission factor values from the CEA database are produced below:

### Emission Factors

**Simple Operating Margin ($tCO_2$/MWh) (excl. Imports)**

| | 2000-01 | 2001-02 | 2002-03 | 2003-04 | 2004-05 | 2005-06 | 2006-07 |
|---|---|---|---|---|---|---|---|
| North | 0.98 | 0.98 | 1.00 | 0.99 | 0.97 | 0.99 | 0.99 |
| East | 1.22 | 1.22 | 1.20 | 1.23 | 1.20 | 1.16 | 1.13 |
| **South** | **1.02** | **1.00** | **1.01** | **1.00** | **1.00** | **1.01** | **1.00** |
| West | 0.98 | 1.01 | 0.98 | 0.99 | 1.01 | 0.99 | 0.99 |
| North-East | 0.74 | 0.71 | 0.74 | 0.74 | 0.71 | 0.70 | 0.69 |
| India | 1.02 | 1.02 | 1.02 | 1.03 | 1.03 | 1.02 | 1.01 |

**Build Margin ($tCO_2$/MWh) (excl. Imports)**

| | 2000-01 | 2001-02 | 2002-03 | 2003-04 | 2004-05 | 2005-06 | 2006-07 |
|---|---|---|---|---|---|---|---|
| North | | | | | 0.53 | 0.60 | 0.63 |
| East | | | | | 0.90 | 0.97 | 0.93 |
| **South** | | | | | **0.70** | **0.71** | **0.71** |
| West | | | | | 0.77 | 0.63 | 0.59 |
| North-East | | | | | 0.15 | 0.15 | 0.23 |
| India | | | | | 0.69 | 0.68 | 0.68 |

**Combined Margin ($tCO_2$/MWh) (excl. Imports)**

| | 2000-01 | 2001-02 | 2002-03 | 2003-04 | 2004-05 | 2005-06 | 2006-07 |
|---|---|---|---|---|---|---|---|
| North | 0.76 | 0.76 | 0.77 | 0.76 | 0.75 | 0.80 | 0.81 |
| East | 1.06 | 1.06 | 1.05 | 1.07 | 1.05 | 1.06 | 1.03 |
| **South** | **0.86** | **0.85** | **0.86** | **0.85** | **0.85** | **0.86** | **0.85** |
| West | 0.87 | 0.89 | 0.88 | 0.88 | 0.89 | 0.81 | 0.79 |
| North-East | 0.44 | 0.43 | 0.44 | 0.44 | 0.43 | 0.42 | 0.46 |
| India | 0.86 | 0.86 | 0.86 | 0.86 | 0.86 | 0.85 | 0.85 |

### Generation Data

**Gross Generation Total (GWh)**

| | 2000-01 | 2001-02 | 2002-03 | 2003-04 | 2004-05 | 2005-06 | 2006-07 |
|---|---|---|---|---|---|---|---|
| North | 144,292 | 151,185 | 155,385 | 165,735 | 168,438 | 179,751 | 191,104 |
| East | 58,936 | 64,048 | 66,257 | 75,374 | 85,776 | 93,902 | 101,959 |
| **South** | **129,035** | **131,902** | **136,916** | **138,517** | **144,086** | **147,355** | **161,897** |
| West | 162,329 | 165,805 | 177,399 | 172,682 | 183,955 | 188,606 | 199,346 |
| North-East | 5,319 | 5,332 | 5,808 | 5,867 | 7,883 | 7,778 | 6,970 |
| India | 499,911 | 518,272 | 541,764 | 558,175 | 590,138 | 617,392 | 661,277 |

**Net Generation Total (GWh)**

| | 2000-01 | 2001-02 | 2002-03 | 2003-04 | 2004-05 | 2005-06 | 2006-07 |
|---|---|---|---|---|---|---|---|
| North | 135,230 | 141,415 | 144,743 | 155,043 | 157,291 | 168,206 | 179,223 |
| East | 53,350 | 58,097 | 59,841 | 68,428 | 77,968 | 86,014 | 93,818 |
| **South** | **121,158** | **123,630** | **127,789** | **128,373** | **134,676** | **138,329** | **152,206** |
| West | 150,412 | 153,125 | 164,448 | 159,780 | 170,726 | 176,003 | 185,493 |
| North-East | 5,195 | 5,213 | 5,671 | 5,752 | 7,762 | 7,655 | 6,828 |
| India | 465,345 | 481,479 | 502,492 | 517,376 | 548,423 | 576,206 | 617,567 |

**Share of Must-Run (Hydro/Nuclear) (% of Net Generation)**

| | 2000-01 | 2001-02 | 2002-03 | 2003-04 | 2004-05 | 2005-06 | 2006-07 |
|---|---|---|---|---|---|---|---|
| North | 25.9% | 25.7% | 26.1% | 28.1% | 26.8% | 28.1% | 27.1% |
| East | 10.8% | 13.4% | 7.5% | 10.3% | 10.5% | 7.2% | 9.0% |
| **South** | **28.1%** | **25.5%** | **18.3%** | **16.2%** | **21.6%** | **27.0%** | **28.3%** |
| West | 8.2% | 8.5% | 8.2% | 9.1% | 8.8% | 12.0% | 13.9% |
| North-East | 42.2% | 41.7% | 45.8% | 41.9% | 55.5% | 52.7% | 44.1% |
| India | 19.2% | 18.9% | 16.3% | 17.1% | 18.0% | 20.1% | 20.9% |

## Annex 4

## MONITORING INFORMATION

The monitoring plan has been prepared in accordance with AMS ID. The project proponent has a well defined project management structure for monitoring the project activity. The monitoring plan is discussed in section B7.2.

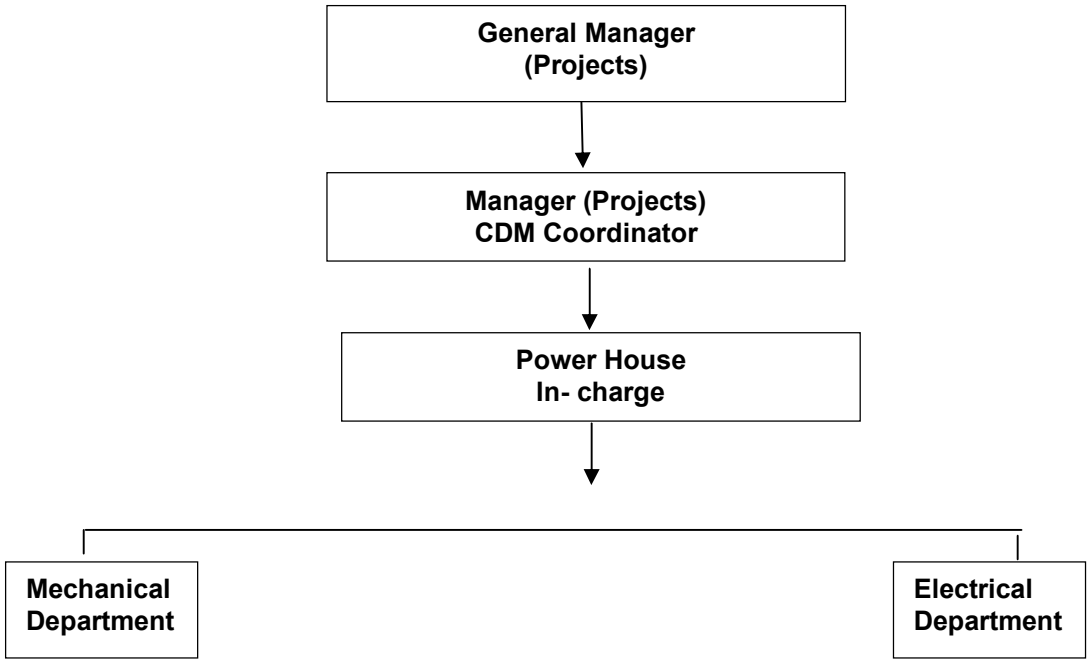
The monitoring methodology will essentially aim at measuring and recording through devices, which will enable verification of the emission reductions achieved by the project activity that qualifies as Certified Emission Reductions (CERs). The monitoring procedure for the project activity is given as follows:

**Objective of Monitoring Procedure:**

This procedure will set guidelines for the project proponent to monitor the parameters regularly and to ensure quality and accuracy in monitoring. It elaborates on the functions of the Monitoring team and procedures to be followed in monitoring of the CDM parameters.

**CDM Team**

The CDM team comprises of personnel from the various departments at the plant. Operators from the mechanical and electrical divisions in the plant will report to respective (shift engineers) who in turn will report to the Plant Manager. The Plant Manager will provide necessary inputs to the CDM Co-ordinator. The team is headed by GM (Projects). The organization structure of the CDM Team is given below.



CDM – Executive Board


**Functions of CDM Team**

- Ensure operation of the project activity to comply with the CDM Project Design Document
- Log periodically the data relevant to project activity
- Ensure accuracy of data by proper maintenance and calibration of monitoring equipment
- Take necessary permission from GM (Projects) before changing any monitoring equipment related to project activity
- Monitor emissions reduction generated by the project activity and maintain records of relevant data for verification of CERs
- Review performance of the project activity periodically

**Data Monitoring:**

In order to ensure delivery of CERs, relevant data identified will be monitored

**Data to be Monitored**

1. Total electricity supplied to the grid, EGexport. Recorded once in six hours
2. Electricity imported from the grid, EGimport. Recorded once in six hours
3. Diesel Consumption in DG set, if any, FHSD. Recorded when in use.

**List of Monitoring Equipments**

1. Check Meters
2. Main Meters
3. Tube Gauge Indicators

**Frequency of Monitoring and Recording**

1. *Electricity Supplied to grid*: Hourly. Meter readings will be recorded by personnel in the Power House on an hourly basis. Everyday, daily production will be arrived. The daily report will be aggregated to arrive at monthly production and monthly report will be generated
2. *Electricity Imported from the grid:* Hourly. Meter readings will be recorded by personnel in the Power House on an hourly basis. Daily production will be arrived at. The daily report will be aggregated to arrive at monthly production and monthly report will be generated
3. *Diesel Oil Consumption:* Tube Gauge Indicator. When in use. Log books will be maintained to record quantity consumed. The daily report will be aggregated to arrive at monthly production and monthly report will be generated

**Data Archiving**

Log sheets and the other records archiving will be done for crediting period plus two years

**Review Procedures & Frequency**

Plant Manager will review the implementation of documented procedures and maintain necessary records. CDM Co-ordinator will review the procedures once a month for the first one year and once in three months thereafter. GM (Projects) will review once in six months.

**Calibration Frequency**

Periodic calibration schedule which spreads over the year for all electrical, electronic and field instruments are prepared and maintained. As per the schedule, calibration of instruments and equipments will be carried out annually and recorded in calibration reports.

**Quality Assurance:**

All energy meters used would be electronic trivector meters of accuracy class 0.2%. Annual testing of all energy meters shall be carried out, with reference to a portable meter, for checking the accuracy, which shall be of accuracy class 0.1 %.

**Emergency Preparedness**

No emergency situations, which can lead to unintended GHG emissions, are envisaged since there are no fuels involved in this project activity.

CDM – Executive Board

**Responsibilities under CDM:**

- Take necessary steps to smoothly operate & maintain the hydel power plant.
- Log everyday / six hours the electricity exported / imported.
- Compile the daily data of electricity generation, on monthly basis and send the report to GM (Projects) and CDM Co-ordinator
- Ensure functioning of the CDM instruments every time and arrange calibration, as per procedures
- Report to GM (Projects) and CDM Co-ordinator in case of any major break-down of the hydel power system.

**CDM responsibilities of the Mechanical Department Team**

- Ensure that all the instruments related to the project activity, especially the CDM monitoring meters, are working properly.
- Calibrate the meters as per standard procedures
- Take approval of GM (Projects) and CDM Co-ordinator if any set value of the instrument is to be altered/changed

**CDM responsibilities of the CDM Coordinator**

- Be focal point for all CDM activities
- Ensure that all CDM related parameters are monitored and reports obtained from respective department teams
- Calculate the CERs generated and report to GM (Projects)
- Archive the reports for CDM Verification
- Review and guide various departmental CDM teams of their functions related to CDM
- Arrange Management Review Meeting (MRM) once a month for the first year and once in 3 months thereafter. Ensure implementation of all points arising from MRM
- Prepare a monitoring report at the end of the year to be submitted to the UNFCCC

**CDM Committee Review Meeting**

The committee meets once a month in the first year and once in 3 months thereafter to review the CDM performance of the plant. The CERs generated are compared with the expected CERs and corrective actions are taken.

**Uncertainties Related To GHG Emissions**

No uncertainties are envisaged / foreseen relating to GHG emission.

**Training Of Personnel**

Currently, six people have been recruited for the project activity. These employees have been trained in-house by SMPPL. To gain experience, the trainees are first posted in the other hydro projects. After gaining hands on experience on the operation of hydro plants, they will be transferred to the project activity. Another six members are to be recruited once the current batch has completed training. Apart from this training, various member of the CDM team will be trained time to time according to the departmental needs.

## Appendix 1

### Abbreviations

| | |
|---|---|
| BEF | Baseline Emission Factor |
| BM | Build Margin |
| OM | Operating Margin |
| CDM | Clean Development Mechanism |
| CEA | Central Electricity Authority |
| DOE | Designated Operational Entity |
| GHG | Greenhouse Gas |
| IPCC | Intergovernmental Panel on Climate Change |
| kWh | kilo Watt hour |
| M&V | Measurement & Verification |
| MoEF | Ministry of Environment and Forests |
| MW | Mega Watt |
| NGO | Non Governmental Organisation |
| PDD | Project Design Document |
| QA | Quality Assurance |
| QC | Quality Control |
| UNFCCC | United Nations Framework Convention on Climate Change |

## Appendix 2

### References


| | |
|---|---|
| 1 | Kyoto Protocol to the United Nations Framework Convention on Climate Change |
| 2 | Website of United Nations Framework Convention on Climate Change (UNFCCC), http://unfccc.int |
| 3 | UNFCCC Approved consolidated baseline methodology AMS ID / Version 15, Sectoral Scope: 01. |
| 4 | http://envfor.nic.in/legis/eia/so-60(e).html |
| 5 | 2006 IPCC Guidelines for National Greenhouse Gas Inventories. |
| 6 | Central Electricity Authority of India (2009) |
| 7 | Report of Expert committee on fuels for power generation by CEA-Planning Wing. |

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