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

CONTENTS

Annexes

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. • 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:

Title : 1.725 MW Mini Hydel Scheme on Nagavali River, Andhra Pradesh, India
Version: 03
Date : 01/06/2009

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

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Sardar Power Limited is proposed to be established to utilize the discharge of Nagavali River at the down stream of Thotapalli Reservoir in Vizianagaram District of Andhra Pradesh. The project, envisaged with an installed capacity of 1.725 MW, will generate an average annual energy of 6.57 GWh, operating under a 5.40 meter net head and at a design flow of 33.50 cumecs. The electricity generated will be exported to the State utility, the Andhra Pradesh Transmission Corporation Limited (APTRANSCO).

The project activity would generate electrical energy in a sustainable manner, optimising the utilization of renewable resource (water) in order to meet the local power demand from clean sources in a system already overwhelmed by thermal power production plants, utilizing fossil fuels. In the context of current power and energy shortage in the State of Andhra Pradesh and the ever-increasing demand for more electricity, the implementation of Sardar Power Limited, with its installed capacity of 1.725 MW would contribute, partially, to meeting the shortage of power in the State of Andhra Pradesh.

The project activity would utilise potential energy available in flowing water for power generation. The process would involve converting the kinetic energy available in the water flow into mechanical energy using hydro turbines and then to electrical energy using alternators. Therefore, no fossil fuels are involved in power generation. The project operation would contribute to sustainable development, substituting fossil fuel generated power, reducing emissions of GHGs, while responding to increasing energy demand, contributing to the stabilization of price of power to consumers and reducing the dependence on fossil fuels.

Since the project activity would generate electricity through sustainable means, it would not cause any negative impact on the environment. Therefore, the project would contribute to climate change mitigation efforts.

View of project participant about the project activity's contribution to sustainable development

Ministry of Environment and Forests, Govt. of India has stipulated the following indicators for sustainable development in the interim approval guidelines for CDM projects.

- *Social well-being*. The CDM project activity should lead to alleviation of poverty by generation of additional employment, removal of social disparities and contribution to provision of basic amenities and leading to improvement in quality of life of people.

- *Economic well-being*. The CDM project activity should bring in additional investment consistent with the needs of the people.

- *Environmental well-being*. This should include a discussion of impact of the project activity on resource sustainability and resource degradation, if any, due to proposed activity; bio-diversity friendliness, reduction of levels of pollution in general.

- *Technological well-being*. The CDM project activity should lead to transfer of environmentally safe and sound technologies with a priority to the renewable sector or energy efficiency projects that are comparable to best practices in order to assist in up gradation of technological base.

Each of the above criteria has been studied in the context of project activity to ensure that the project activity contributes to the sustainable development and meets the above criteria.

- In addition to the augmentation of power generation, the proposed project would result in alleviation of poverty by creating direct and indirect benefits through employment opportunities for nearly 200 people during the construction and 15 persons after construction, to take care of regular operations. The project would contribute to the improved economic activities, by strengthening of local grid of the state electricity utility. The infrastructure in and around the project area would also improve due to project activity, which otherwise would not have happened. The project would provide additional source of income for the local people by providing employment.

- Project proponents would mobilise investment to an extent of about Rs. 92.94 millions in the region, which otherwise would not have occurred in the absence of the project activity. This is a significant investment in the rural area. The project activity would also lead to diversification of the national energy supply, which is dominated by conventional fuel based generating units.

- The project proponent has provided funds for construction of local village temple and also provided donation for electrification of the temple.

- This project would help the poor and vulnerable sections of the society, who are often hit by inadequate power supply, load shedding and poor power quality, by providing more reliable supply of power to meet the commercial, residential and agricultural needs.

- The proposed project activity would utilise available water discharge for power generation, which otherwise is dominated by fossil fuels such as coal, lignite and gas. The project would not result in increase in GHG emissions and would cause no negative impact on the environment. The project would generate real, measurable and long-term emissions reductions. Further the project activity would not result in degradation of any natural resources, health standards, etc. at the project area.

- The project would result in utilisation of environmentally safe and sound technology in small-scale hydroelectric power sector

The above benefits arising out of the project activity, would contribute to the sustainable development of the region.

A.3. Project participants:

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Name of the party involved ((Host) indicates a host party)	Private and/or public entity(ies) project participants	Kindly indicate if the party involved wishes to be considered as project participant (Yes/No)
India (Host)	**Private Entity:** Sardar Power Limited, Hyderabad.	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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A.4.1.1. Host Party (ies):

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India

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

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State: Andhra Pradesh

A.4.1.3. City/Town/Community etc:

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District :Vizianagaram
Mandal :Garugubilli
Village :Naguru

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

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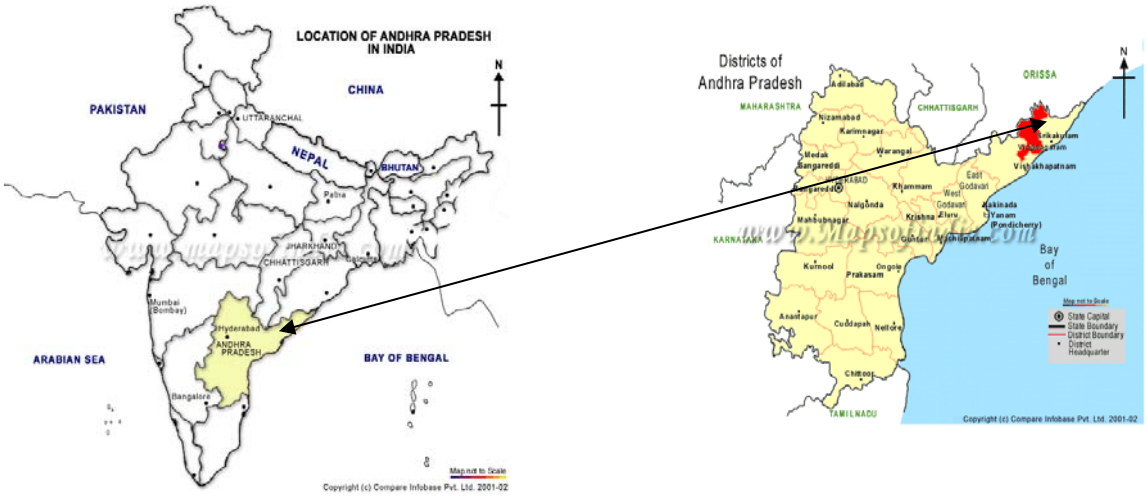
The proposed site is located at Survey No.136 near Naguru village on Nagavali River 8 km downstream of Thotapalli Regulator. The project is 70 km away from Srikakulam town by road. The project is approachable by road from Srikakulam via Palakonda and Veeraghattam besides Parvathipuram town. The nearest railway station is Parvathipuram (15 Kms). The geographical coordinates are: Longitude :83^0-31'-32" and Latitude: 18^0-44'-20".

Physical location of the project is marked in the maps below.



Location of Sardar Power Limited,

Physical location address
Sardar Power Limited,
Survey Nos.136/1 to 6, NaguruVillage,
Garugubilli Mandal, Vizianagaram District
Andhra Pradesh

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

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According to the Appendix B to the simplified modalities and procedures for small-scale CDM project activities, the proposed project activity falls under the following type and category.

Project Type: Type I – Renewable Energy Projects
Category I.D: Grid connected renewable electricity generation

The project activity utilizes renewable hydro potential for power generation and exports the generated power to the regional grid system. Accordingly, the applicable methodology for the project activity shall be AMS I.D/ Version 13, EB 36, which includes hydro electric generation for a grid system.

Application of environmentally sound and safe technology

The technology of power generation process, using hydro resources, involves converting the kinetic energy available in the water flow into mechanical energy with hydro turbines and then to electrical energy with alternators. The generated power will be transformed to match the voltage of nearest grid sub-station for proper interconnection and smooth evacuation of power. In this process there are no greenhouse gas emissions or burning of any fossil fuels. Thus, electricity is generated through sustainable means without causing any negative effect on the environment. Therefore the technology is environmentally safe and sound.

No technology transfer is envisaged for the CDM project activity.

Technical details of the project activity:

The proposed project, Sardar Power Limited, utilises flows from Thotapalli barrage constructed on Nagavali River. Thotaplli Reservoir was constructed by British government in the year 1908. At present the reservoir is being renovated to provide more irrigation facilities.

The essential components of this power project includes construction of a Power House with an installed capacity of 1.725 MW near Naguru village, Un-gated diversion weir across the river along with Intake Head Regulator, Approach channel to Intake structure with gates and trash rack, Tail race Pool and Tail race Channel. The power house will be abetting the intake structure from downstream. An ungated weir is proposed downstream of Thotapalli regulator on Nagavali river. The water will be released back to the river after power generation through the tailrace channel of the scheme.

The project comprises a synchronous generator of capacity 1.725MW coupled to Vertical full Kaplan type turbine. The generated voltage at the generator terminals will be 6.6 kV which will be stepped up to 33 kV by using a 6.6/33 kV step up transformer. The evacuation of power will be through 33 kV transmission line to APTRANSCO's sub station at Naguru village.

Technical Details:

Hydrology
Design Flow : 33.50 cumecs
Design Head : 5.40 m

Energy
Expected annual generation : 6.57 GWh
Auxiliary Consumption : 0.07 GWh
Expected annual export : 6.50 GWh

Generation voltage : 6.6 kV, 3 phase
Grid transmission voltage : 33 kV

Plant Equipment
Hydro Turbine : Vertical full Kaplan type
No. of generating units : One
Frequency : 50 Hz

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

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The crediting period chosen for the proposed project activity is 10 years. The total emission reductions are estimated at 55,590 tCO_2 for the crediting period. Information on the emission reductions are furnished in the table below.

Years	Estimation of annual emission reductions in tonnes of CO_2 e
2009	5,559
2010	5,559
2011	5,559
2012	5,559
2013	5,559
2014	5,559
2015	5,559
2016	5,559
2017	5,559
2018	5,559
Total estimated reductions (tonnes of CO_2e)	**55,590**
Total number of crediting years	**10**
Annual average of the estimated reductions over the crediting period (t CO_2 e)	**5,559**

In the above table the year 2009 corresponds to the period starting from 01.04.2009 to 31.03.2010. Similar interpretation shall apply for remaining years

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

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No public funding from Annex I Party is involved in this project activity.

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

The project proponent declares that the proposed 1.725MW mini hydel scheme is not a debundled component of a larger project activity since there is no registered CDM project activity and there is no application to register another CDM project activity;

- with the same project participants

- in the project category and technology measure and
- registered within the previous 2 years; and
- whose boundary is within 1 km of the project boundary of the proposed small scale activity at the closest point.

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 : **Type I**, Renewable Energy Projects,

Reference : **AMS I.D, Grid connected renewable electricity generation Version 13, EB 36,**

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

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The proposed project activity is a 1.725 MW, hydro electric based power project. The project activity is eligible to use the methodology indicated since project activity generates and exports the renewable electricity to a grid system, which is dominated by thermal energy sources. The capacity of the project activity is well below the qualifying limit of project activity under the small scale methodology AMS.I.D i.e. 15MW. Hence, AMS.I.D 'Grid connected renewable electricity generation' is applied for the proposed small scale project activity.

The Water and power studies carried out for this project as well as by keeping main parameters in view, such as head and discharge available in the river, the project participants declare that the project will be within the limits of the small scale project activity throughout the crediting period. In addition, the design parameters of turbine and generator indicate that the project will be within the small scale limit throughout the crediting period.

B.3. Description of the project boundary:

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As per AMS I.D Version. 13 EB 36, the project boundary encompasses the physical, geographical site of the renewable generation source.

The project boundary is therefore the physical boundary around the diversion structure with intake head regulator, intake channel, intake pool, Trash rack gates, Powerhouse (Turbine, Generator and Gearbox), tailrace pool, tailrace channel and the transmission system till the evacuation point.

In addition, the project boundary also includes the connected electricity system, i.e. the Indian Southern grid, for the purpose of determining the baseline emission factor for displaced grid electricity. The Southern grid covers the Andhra Pradesh, Karnataka, Kerala, Pondicherry and Tamilnadu.

B.4. Description of baseline and its development:

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The baseline of the project activity is determined in accordance with the methodology AMS I.D of Appendix B of Simplified modalities and procedures for small scale CDM project activities. According to the methodology, the baseline for the project activity is the amount of electricity displaced or avoided in grid system shall be calculated as the net electricity avoided from the grid (GWh/y) multiplied by an emission factor for the grid system (tCO_2/GWh).

The Emission factor for Southern regional grid is taken from CEA published Grid Emission Factors for Indian grid systems, which are made publicly available on CEA website. The Emission factors are calculated according to the guidelines of CDM UNFCCC website. The key parameters and data sources are furnished below:

Key Parameter	Value	Data Source	Website
EF	Baseline emission factor for the southern region grid	CEA published baseline emission factor for southern region grid (CM)	www.cea.nic.in
EGy	Net power export to the grid per annum	From Plant and APTRANSCO Records. Ex-post determination.	------

The baseline emission factor has been considered from the "**CO2 Baseline Database**" published by CEA. The emission factor published by CEA for the latest year 2006-07 is 854.69 tCO2/GWh based on combined margin approach.

Actual emission reductions will be calculated ex post based on latest available data at CEA website which is reliable and verifiable.

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:

UNFCCC simplified modalities seek to establish additionality of the project activity as per Attachment A to Appendix B, which lists various barriers, out of which, at least one barrier should be identified due to which the project would not have occurred any way.

Project participants have undertaken the following analysis to demonstrate the additionality.

Barrier Analysis

The proposed project activity is a very small project and was neither planned by state nor central sector utilities in the state. Only a first generation promoter like the project proponent could take up such a small project. Thus, practically the project is a clear additional project, as the project developer (Sardar Power Limited) decided to exploit the possibility of medium head (5.40m) river (Nagavali River) based electricity generation. The project proponent seeks to demonstrate the additionality of the project based on investment barrier, prevailing practice barrier and other barriers.

Investment Barrier:

The project proponent estimated an investment of Rs.92.94 millions (as appraised by bank while sanctioning term loan), which works out to Rs.53.87 million per MW, which is more for a small project, that too located in a plain area. The projected capital cost becomes necessary because of more civil structures in this project than those required for SHPs of general nature.

IRR analysis has been prepared for the project activity for a period of 20 years.

For the purpose of IRR analysis the assumptions are those available from the detailed project report.

Tariff structure for all the renewable energy based projects (like small hydropower projects as project activity) is determined by the State Electricity Regulatory Commission, in this case APERC. The tariff structure assumed in this case, therefore, is based on APERC's Tariff Order dated 07.07.2004 which is much before the investment decision dt.09.06.2006. Though PP signed the Power Purchase Agreement (PPA) with the utility on 06.12.2003, as per the PPA, the tariff for the energy delivered will be the tariff applicable as on the date of commercial operation (Clause 2.2 of the PPA). Copy of the PPA has already been submitted to the DOE during validation. Relevant extract from PPA is attached for reference in annexure-5.

The applicable tariff at the time of investment decision was Rs.2.69 per kWh with about Rs. 0.09 reduction every subsequent year, for 10 years as per APERC Order dt.07.07.2004. Scanned copies of the tariff order (relevant pages) are attached in annexure-6.

The above specified tariff was applicable at the time of project commissioning is evidenced by the fact that the company has been receiving only Rs.2.69/kWh (statement of cost of power purchase from the Transmission Company is attached in annexure-7). This tariff has been used in making projections.

The project activity has chosen project IRR to demonstrate the Additionality of the project. Project IRR, being the return earned by the project during the reference period 20 years, the same has been compared with a benchmark to determine the adequacy of the return.

As per the guidance note issued by CDM EB at its 39th meeting "In case where benchmark approach is used the applied benchmark shall be appropriate to the type of IRR calculated. Local commercial lending rates or weighted average cost of capital (WACC) are appropriate benchmarks for a project IRR" (annex 35, page No.2 of EB 39). The project activity has chosen cost of debt as the benchmark as permitted by the additionality tool.

The project IRR in baseline scenario is working out to 6.04%. The IRR is less compared with bench mark being cost of debt 10.50%. IRR improves to 10.54% after considering CDM revenue.

The robustness of the conclusion drawn above has been tested with reasonable variations in the critical assumptions. The Guidance on the Assessment of Investment Analysis issued by the EB in its 39th Meeting covers two aspects on sensitivity analysis, viz., subjecting only those variables which constitute more than 20% of project cost or total project revenue to sensitivity analysis and considering a +/- 10% variations in the selected variables. Accordingly, two sets of scenarios have been identified, viz., variation in project cost and revenue (generation) by 10% on either side. Sensitivity analysis for variation in tariff is not considered appropriate as the PP has considered tariff based on the Regulatory Commission order and the PPA is for 20 years. Besides analysis is also carried out to indicate at what %age of change in the critical parameters IRR reaches the benchmark return.

Sensitivity analysis has been done for a variation by 10% on either side. The outcome of the sensitivity analysis is given below:

Sensitivity parameters	**-10 %**	**Base Line Scenario%**	**+ 10 %**
Project cost	7.56	6.04	4.79
Revenue (generation)	5.83	6.04	6.17
Tariff	4.63	6.04	7.39
O & M Cost	6.22	6.04	5.77

The sensitivity analysis proves beyond doubt that the project is unlikely to be financially attractive even under the most unrealistic optimistic conditions of project cost going down by 10%, revenue going up by 10%, Tariff going up by 10% or O & M cost reduced by 10%. In either case, the project IRR remains at 7.56%, 6.17%, 7.39 and 6.22 respectively in contrast to the benchmark return of 10.50%. This proves with no uncertainty that the project activity is not a business-as-usual scenario. It was against this background that the PP, while taking a decision to invest in the project activity, considered the CDM benefits. The minutes of the meeting of the board of directors where the essentiality of the CDM benefits was discussed is furnished to the DOE for verification. CDM benefits go to improve the financial attractiveness of the project activity, as evident from the fact that with CDM benefits, the project IRR in the baseline scenario improves to 10.54% in contrast the benchmark return of 10.50%, thus almost reaching the benchmark. Hence, the project requires CDM benefits to make it financially attractive.

The project IRR reaches the benchmark only if the cost of project is reduced by 24.19% and tariff going up by 31.95%. The IRR does not reaches the benchmark even if the PLF goes up by 100% due to restriction on tariff payable after reaching 35% PLF and O & M costs coming down by 100%. Therefore all the four scenarios are not possible since :

- with high inflation there has been a steep increase in the construction material as well as plant and machinery and therefore the possibility of project cost coming down is not plausible.
- there has been uncertainty on hydrology due to construction of new regulator and also increasing the irrigation area the possibility of PLF going up is not plausible.
- The tariff is fixed by Andhra Pradesh Electricity Regulatory Commission (APERC). As per the power purchase agreement executed with the state utility, the tariff is fixed for 10 years and for the subsequent period the tariff will be reworked. Therefore, the tariff going up is not a plausible scenario.
- O & M Costs includes salaries and wages, repairs and maintenance, insurance and various other expenses required for the operation as well as maintenance of the plant. This cost is estimated at 1.5% on capital cost. As the costs are going up every year due to inflation, the costs of O&M coming down is not a practical scenario.

Thus the project justifies the need of CDM funds for the project activity, which will help in improving the project competitiveness and financial sustainability.
The project activity also faces the following perceived risks and barriers that prevent project proponent investing in the proposed project activity.

***Other Barriers*:**

Hydrology risks: This project is dependent on surplus water of Thotapalli Reservoir. The reservoir is located on Nagavali River about 8 km up stream of proposed Sardar Power limited. The surplus water is being let out into the Nagavali River after meeting irrigation requirements. The surplus water over the irrigation requirement at Thotapalli regulator, are let off into Nagavali river for down steam irrigation needs by picking up at Narayanpuram Anicut, about 50 km downstream from Thotapalli reservoir, to feed an ayacut of 39,182 acre and to supply for drinking needs of Palakonda town. However, part of Totapalli reservoir dam got washed away during flash floods occurred in 2006. Presently the repair works are in progress. The PP also understood from local enquiries that the capacity of the reservoir is being increased. This might result in decrease in surplus flows to down stream. Then the flows recorded in DPR might be on higher side than actual flows. Thus, the estimated energy would be higher than the actual energy that would be generated. This might be a risk factor to some extent. Andhra Pradesh irrigation authorities maintain daily record of discharge let out from Thotapalli regulator into the Nagavali river and monthly discharge data is collected for 10 consecutive years from 1995-96 to 2004-05 and are furnished below.

MHES ON NAGAVALI RIVER
(FLOW IN MCUM)

Month/ Year	June	July	August	September	October	November	December	January	February	March	April	May
1995-96	22.93	123.19	77.47	88.76	85.49	64.01	29.16	9.78	2.35	2.12	2.50	7.74
1996-97	23.95	117.72	130.32	69.04	24.17	9.20	13.13	9.36	5.00	2.85	3.67	10.42
1997-98	9.06	10.38	81.19	67.83	4.82	3.97	15.11	7.41	1.53	4.51	4.11	7.22
1998-99	13.08	61.24	53.78	32.22	30.92	65.78	18.46	8.97	0.84	0.37	1.69	2.36
1999-00	18.89	39.49	59.12	64.30	17.37	9.84	9.74	2.06	2.87	0.78	2.68	7.17
2000-01	11.96	37.15	60.90	47.15	3.59	1.49	7.25	4.91	0.00	0.41	6.30	5.38
2001-02	45.31	216.94	161.58	49.19	48.36	21.81	25.02	16.24	4.71	5.13	10.80	6.52
2002-03	21.26	7.05	49.03	31.63	10.43	0.38	6.40	6.33	4.40	5.63	3.69	2.53
2003-04	6.98	54.18	116.00	163.35	151.40	27.60	32.19	25.53	15.90	2.49	10.66	8.66
2004-05	54.26	60.95	221.53	55.52	68.05	25.15	29.20	19.37	14.37	9.95	11.99	13.07

Since the generation of electricity is dependent upon the availability of water in the river, which is controlled by the Department of Irrigation, Govt. of Andhra Pradesh, the project proponent would be dependent upon the irrigation department for the generation of electricity throughout the life of the project. Project Proponent can not claim any compensation for the loss. To this extent the following clauses stipulated in the "NOC" received from the Government dt.11th August 2003 are significant.

"Special Condition No.13 : Since there exists many open head channels on the Nagavali river to supply water to considerable ayacut down below, on completion of the project, water supply through weir gates as well as through power channel will be regulated and controlled by Irrigation department staff only depending on the irrigation needs and not as per the energy production needs.

Special Condition No. 14: After completion of the hydel scheme by the firm, they should obtain clearance of the department for drawl of water from the river for power generator. The firm has to pay the water charges as fixed by the department. For operation of gates, the firm's representative, in-charge of Hydel scheme at sight, representative of the department should maintain the water readings and opening schedules on day to day basis and department's decision shall prevail.

Special Condition No. 16: The department will not assure the water requirement for the generation of power. The generation of power is subject to the extent of water available after meeting all the irrigation requirements and also the requirements of the proposed Thotapalli barrage scheme u/s of Thotapalli regulator or any other scheme proposed in the Nagavali basin. The firm has no right to demand for the release of water and has no claim for compensation of non-release of short at certain periods. The releases of water shall be made based on the irrigation needs and the decision of department is final and binding of the firm.

Special Condition No. 17: The firm shall make all payments on account of any royalties taxes, cess levies etc. imposed by government or consequent statutory authority for utilisation of water for generation of power and approval by Government from time to time.

In addition to this, if the Department of Irrigation fixes any water tariff in due course, the same have to be paid by the project developers. Thus, for this particular project, neither availability of water nor

availability of grid is within the control of the project proponent and thus the dependency on state government would be complete through out the project life (NOC from irrigation department of government of Andhra Pradesh is furnished as an Annexure to the PDD).

New Regulator on the project activity:

Thotapalli regulator, from where water is discharged to the power house, was constructed on Nagavalli River in Vizianagaram District of Andhra Pradesh in the year 1908 by the British Government and this provides irrigation facilities to over 41000 acres. The project activity is located at 8 Kms down stream of existing Thotapalli regulator. Apart from the above regulator, Nagavalli river has open head channels down stream of Thotapalli regulator. The discharges for the open head channel flows through the proposed project activity and the ayacut under open head channel is 22327 acres.

As the old Regulator is showing signs of deterioration, Government of Andhra Pradesh is constructing new regulator 200 meters up stream of old regulator. By new regulator, the government of Andhra Pradesh is increasing ayacut for additional 56000 acres. Government is also planning to link open head channels at the new regulator. As a result of increasing the ayacut facilities from existing 64000 acres to 120000 acres, the discharges available for the project activity for the power generation would get reduced.

Impact of CDM Registration

The project proponent has considered CDM seriously as only with revenue from CDM the project viability improves. The project proponents have discussed the CDM benefits for the project in the DPR and further adopted a resolution during the Board of Directors Meeting for the same. Accordingly a consultant was appointed for developing the project under CDM. The documentary evidence of the minutes of the Board Meeting and the agreement between the project proponent and consultant would be made available during validation process. The chronology of events is furnished below:

- Agreement executed with NEDCAP : 11-11-2003
- Power Purchase Agreement with APTRANSCO : 06-12-2003
- Detailed Project Report : May, 2006
- Serious consideration of CDM : 09-06-2006
- Term loan sanction from Andhra Bank : 23-09-2006
- Purchase order for Blasting of Hard Rock/HDR during Excavation for construction hydro project : 16-11-2006**
- Purchase order for E&M equipment : 10-01-2007
- Work order for construction of Power house and allied structures : 30-01-2007
- Appointment of Consultant for CDM documentation : 20-04-2007
- Proceedings from NEDCAP to develop the project in two phases : 03-05-2007
- Appointment of Validator : 18-02-2008
- Date of Commissioning of the project activity : 17-07-2008

** 16/11/2006 has been identified as the start date of the project activity, as it was on that date PP issued work order for hard rock blasting for excavation of power house and intake structures for the project activity. It is earliest of all real actions hence it is assumed as the day on which the real action of the

project activity began and the project participant committed expenditure related to the construction of the project activity.

The project proponent (PP) is a first generation entrepreneur with meagre financial resources. Therefore, the PP chosen to develop the project in two phases, to be on a conservative way. Though offers were received from the DOE in September, 2007 due to lack of financial resources the PP could not appoint the DOE immediately for whom upfront payment is required at 40% of the agreed remuneration. Only after getting support from the bank, the DOE was appointed and advance payment was released. Otherwise the PP has taken all the necessary steps to get the process initiated for CDM as evident from appointment of consultant in April, 2007 itself.

The registration of the project under CDM would make anthropogenic GHG emission reductions possible to the extent of 55,590 tCO_2 eq. over the crediting period of 10 years and would fetch additional revenues of Rs.5.00 millions per annum and this additional revenue would alleviate some of the said risks to certain extent.

In view of the above, the proposed project is additional and not the same as the baseline scenario.

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

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The project activity is generation of electricity using hydro potential and exporting to the grid system. Emission reductions due to the project activity are considered is equivalent to the emissions avoided in the baseline scenario by displacing the grid electricity. Emission reductions are related to the electricity exported by the project and the actual generation mix in the grid system.

Baseline

As the project activity does not modify or retrofit an existing electricity generation facility, the baseline scenario is electricity exported to the grid by the project that would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources.

The baseline emissions are calculated based on the net energy exported to the grid (in GWh/year), and an emission factor for the displaced grid electricity (in tCO2 /GWh).

$BE_y = EG_y * EF_y$

where,

EG_y = the net electricity exported to the grid system during the year *y*

EF_y = the emission factor of the grid to which the project exports electricity

Central Electricity Authority (CEA) (which is an official source of Ministry of Power, Government of India) have worked out baseline emission factors for various grids in India and made them publicly available i.e "**CO_2 Baseline Database**" at

http://www.cea.nic.in/planning/c%20and%20e/Govertment%20of%20India%20website.htm

The emission factor of the grid for the exante approach is calculated in the following way:

According to the METHODOLOGICAL TOOL, grid emission factor is calculated as Combined Margin (CM), comprising the Operating Margin (OM) emission factor and the Build Margin (BM) emission factor. The following procedure was adopted for estimating the grid electricity emission factor:

Step 1. Identify the relevant electric power system.
Step 2. Select on operating margin (OM) method.
Step 3. Calculate the operating margin emission factor according to the selected method.
Step 4. Identify the cohort of power units to be included in the build margin (BM).
Step 5. Calculate the build margin emission factor.
Step 6 Calculate the combined margin (CM) emission factor.

Step 1 – Identify the relevant electric power system

The CEA of the host country has published a delineation of the project electricity system and connected electricity systems. For identification of relevant electric power system of the project activity the data published by the CEA of the host country is used and the project activity falls under southern regional grid.

Step 2 – Select an operating margin (OM) method

The approved methodological tool recommends the use of one of the following for the calculation of the operating margin emission factor ($EF_{grid,OM,y}$):

a) Simple OM, or
b) Simple adjusted OM; or
c) Dispatch data analysis OM; or
d) Average OM.

The methodological tool recommends the use of dispatch data analysis as the first methodological choice. However, in India availability of accurate data on grid system dispatch order for each power plant in the system and the amount of power dispatched from all plants in the system during each hour is practically not possible. Also, still the merit order dispatch system has not become applicable and is unlikely to be so during the crediting period.

In view of this it is proposed to apply other choices as suggested in the METHODOLOGICAL TOOL. Since the power supplied by low cost must run power plants[1] to the Southern grid during 2006-07 is clearly below 50%, it has been decided to apply the **Simple OM method.**

The data vintage option selected is the *ex-ante* approach, where a 3 year average OM is calculated. The most recent three year CEA data published on the emission factor of southern region is considered.

Step 3 – Calculate the operating margin emission factor according to the selected method.

[1] Defined as Hydro, geothermal, wind, low cost biomass, nuclear and solar generation plants in the METHODOLOGICAL TOOL

a) Simple OM

In the Simple OM method, the emission factor is calculated as generation weighted average CO_2 emissions per unit net electricity generation (tCO_2/MWh) of all generating sources serving the system, not including low-operating cost and must-run power plants. simple OM can be calculated using any of the three available methods. Option A has been selected where the data on fuel consumption and net electricity generation of each power plant/ unit is available. The CEA baseline is derived using the following formulae to calculate simple OM

$$EF_{grid,OMsimple,y} = \frac{\sum_{i,m} FC_{i,m,y} * NCV_{i,y} * EF_{CO2,i,y}}{\sum_{m} EG_{my}} \quad (1)$$

Where:

$EF_{grid,OM,simple,y}$ is simple operating margin CO2 emission factor in year y ($tCO2/MWh$)

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

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

$EFco_{2,I,y}$ is CO2 emission factor of fossil fuel type *i* in year *y* ($tCO2/GJ$)

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

m is all power plants / units serving the grid in year *y* except low-cost / must-run power plants / units

i is all fossil fuel types combusted in power plant /unit m in year y

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

The CEA data published on Baseline emission factor for different regions in Indian electricity system are provided in Annex 3.

Table 1: Operating Margin[2]

Most recent three years	2004/05	2005/06	2006/07
Operating Margin* (OM) in t CO_2 / GWh	1000.88	1007.90	1003.03
Average of 3 years	**1003.93**		

* including imports

Source: CDM Carbon Dioxide Baseline Data base, Version 3, December 2007 (www.cea.nic.in)

Step 4 – Identify the cohort of power units to be included in the build margin

[2] CEA published CO2 data base, http://www.cea.nic.in/planning/c%20and%20e/Government%20of%20India%20website.htm

METHODOLOGICAL TOOL offers two options for determination of build margin emission factor: *ex ante* and *ex post* determination of the Build Margin (BM). Option 1 is selected wherein the build margin emission factor is calculated *ex- ante* based on most recent information available on plants already built for sample group *m* in southern Region. This simplifies the monitoring procedures, but also offers a conservative approach of BM calculation. The sample group *m* shall be the one having higher power generation between (a) five power plants that have been built most recently and (b) the capacity additions in the electricity system that comprises 20% of the system generation built most recently. It is found that the option (b) has higher generation compared to option (a). Hence option (b) is selected.

Step 5 – Calculate the build margin emission factor

The build margin emissions factor is the generation of 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:

$$EF_{grid,BM,y} = \frac{\sum_m EG_{m,y} \times EF_{EL,m,y}}{\sum_m EG_{m,y}}$$

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

Build Margin emission factor is determined as below:

Build Margin (BM)	**705.45**	tCO_2 / GWh

Step 6 – Calculation of the baseline emission factor (Combined Margin)

The baseline emission factor in year *y* is calculated as the simple average of the OM and BM emission factors, i.e. OM and BM are each weighted with 50% for the first crediting period. As noted above, the resulting Combined Margin is fixed ex ante for the duration of the crediting period:

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

Where:

$EF_{grid,BM,y}$ –Build 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 emissions factor(%)

w_{BM} –Weighting of build margin emissions factor(%)

As the proposed project activity is Hydro, the weighting of operating margin emission factor and weighting of build margin emission factor is considered as 0.5 and 0.5 respectively and calculated combined margin as under:

Combined Margin (CM) Simple average of OM and BM	**854.69**	tCO_2 / GWh

Project emissions

No project emissions are applicable to the proposed small scale hydro electric power project, since the electricity generation is based on hydro resources, which does not involve in combustion or generation of emissions from fossil fuels. However, as the project may be equipped with a diesel generator of suitable size to meet the emergency requirements of power house etc., emissions due to usage of fossil fuel (diesel) will be accounted as project emissions based and the following equation will be used for estimating project emissions as provided in the AMS I D, Version 13, EB 36.

$$PE_y = FF_{i,y} \cdot COEF_i$$

Where

PE_y Project emissions from combustion of fossil fuel (DG set) in the project activity during the year *y*

$F_{i,y}$ Quantity of fossil fuel type *i* combusted (DG set) during the year *y*

$COEF_i$ Carbon dioxide emission factor of the fuel type *i*

Leakage:

No leakage emissions are considered for the proposed project activity, since no energy generating equipment is transferred from another activity and/or the existing equipment is transferred to another activity.

Emission Reductions:

Since the project emissions as well as the leakage are zero, the emission reductions are equal to the baseline emissions. These are calculated based on the monitored net amount of electricity supplied to the grid, and the baseline emission factor.

$ER_y = BE_y - PE_y - L_y$

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

Data / Parameter:	EF_y
Data unit:	t CO2/GWh

Description:	CO_2 emission factor for the regional grid system
Source of data used:	CEA published grid emission factors
Value applied:	854.70(2006-07) Average of 3 year OM and BM
Justification of the choice of data or description of measurement methods and procedures actually applied :	Central Electricity Authority (CEA) values have been used for authenticity of the data, available publicly by Govt of India with a view to obtain uniformity of approach in the country towards a common objective.
Any comment:	

Data / Parameter:	$COEF_i$
Data unit:	*kg CO_2/TJ*
Description:	CO_2 emission coefficient of fuel type i
Source of data used:	IPCC 2006 default values
Value applied:	74000
Justification of the choice of data or description of measurement methods and procedures actually applied :	IPCC values have been used for diesel since no country specific data is available.
Any comment:	The project activity may combust only one type of fossil fuel, i.e., diesel during the project operation to meet the emergency power requirement of the project. Hence only emission factor of diesel is provided in the parameter

B.6.3 Ex-ante calculation of emission reductions:

>>

Baseline emissions

Baseline emissions calculated as explained in section B.6.1 above are summarised as below.

BE_y = 6.50 GWh * 854.70 tCO_2

BE_y = 5,559 tCO_2/GWh

Project emissions

The project emissions due to the combustion of diesel are considered as zero for estimation of *ex-ante* calculations of emission reductions. The corresponding emissions from the combustion of diesel for operation of DG set during emergency situation are considered negligible. However the quantity of diesel combusted in the project activity will be monitored during each year of crediting period (B.7.1) and deducted from baseline emissions, provision has been made in Section B.6.1 by providing formula to calculate project emissions. Since estimation of quantity of diesel consumption is unpredictable before actual operation of the project and also to simplify the *ex-ante* calculations of emission reductions, excluding project emissions is considered reasonable.

PE_y = 0 tonnes * 74000 kg CO_2/TJ

PE_y = 0 tCO_2

Leakage

No leakage is applicable

Emission reductions

ER_y = BE_y - PE_y - L_y

ER_y = 5,559 - 0 - 0

ER_y = 5,559 tCO_2/GWh ($ER_y = BE_y$)

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

>>

Summary of the ex ante estimation of emission reductions are furnished below.

Year	Estimation of project activity emissions (t CO_2 e)	Estimation of baseline Emissions (t CO_2 e)	Estimation of Leakage (t CO_2 e)	Estimation of overall emission reductions (t CO_2 e)
2009	0	5,559	0	5,559
2010	0	5,559	0	5,559
2011	0	5,559	0	5,559
2012	0	5,559	0	5,559
2013	0	5,559	0	5,559
2014	0	5,559	0	5,559
2015	0	5,559	0	5,559
2016	0	5,559	0	5,559
2017	0	5,559	0	5,559
2018	0	5,559		5,559
Total (tonnes of CO_2e	**0**	**55,590**	**0**	**55,590**

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

B.7.1 Data and parameters monitored:

Data / Parameter:	EG_{grossy}
Unit:	GWh
Description:	Total electricity generated by the project during the year *y*
Source of data:	On-site measurements
Value of data	6.57 GWh
Brief description of	Measured monthly using calibrated meters and aggregated annually.

measurement methods and procedures to be applied:	
QA/QC procedures to be applied (if any):	Meters will be calibrated as per industry standards.
Any comment:	--

Data / Parameter:	$EG_{Auxiliary}$
Unit:	GWh
Description:	Auxiliary electricity consumption of the project
Source of data:	On-site measurements
Value of data	0.07 GWh (1%)
Brief description of measurement methods and procedures to be applied:	Measured monthly using calibrated meters and aggregated annually or the difference between the gross energy generation and the net electricity export to the grid system, can be arrived as auxiliary consumption of the project activity.
QA/QC procedures to be applied (if any):	Meters will be calibrated as per industry standards. Sales records to the grid and other records are used to ensure consistency. If the data is calculated as the difference between gross and net power export, no QA/ QC procedures are applicable, since, the both parameters are already underwent the QA/QC procedures.
Any comment:	--

Data / Parameter:	EG_y
Unit:	GWh
Description:	Net electricity supplied to the grid by the project
Source of data:	On-site measurements
Value of data	6.50 GWh
Brief description of measurement methods and procedures to be applied:	Measured monthly using calibrated meters and aggregated annually.
QA/QC procedures to be applied (if any):	Meters will be calibrated as per industry standards. Sales records to the grid and other records are used to ensure consistency.
Any comment:	Electric power sold to the grid will be measured by main meter and check meter by both project proponent and APTRANSCO as specified in the PPA and records maintained. To be cross-checked with monthly invoices or receipts of payments.

Data / Parameter:	$EG_{import,y}$
Unit:	GWh
Description:	Grid electricity import to the project activity during the year y
Source of data:	On-site measurements
Value of data	0 GWh
Brief description of measurement methods and procedures to be applied:	Measured monthly using calibrated meters and aggregated annually.
QA/QC procedures to be applied (if any):	Meters will be calibrated as per the industry standards. Project proponent will pay to the APTRANSCO based on the meter reading recorded in the

	import meter. The maintenance and/or other quality control measures are taken by APTRANSCO, since any false reading in the meter is a financial loss to APTRANSCO. Hence, APTRANSCO give high priority in quality control of the import meter. Since, the data item is not under the control of project proponents, no QA/QC procedures are provided here.
Any comment:	--

Data / Parameter:	$COEF_i$
Data unit:	*kg CO_2/TJ*
Description:	CO_2 emission coefficient of fuel type i
Source of data used:	IPCC 2006 default values
Value of data:	74100
Brief description of measurement methods and procedures actually applied :	IPCC value used will be monitored for any revision
QA/QC procedures to be applied (if any):	Project participant has no control on the parameter. Hence, No QA/QC procedures are applicable
Any comment:	--

Data / Parameter:	$F_{i,y}$
Unit:	*Tonnes/ kilo litres*
Description:	Quantity of fossil fuel type *i* combusted in the project plant during year *y*
Source of data:	On-site measurements
Value of data	0 (assumed value for ex-ante calculation of emission reductions)
Brief description of measurement methods and procedures to be applied:	The total number of operating hours of DG set and the corresponding quantity of diesel consumed for the purpose will be recorded in the log book maintained at the DG set room. The operating hours and the quantity of diesel consumption will be recorded.
QA/QC procedures to be applied (if any):	The data recorded can be cross checked against the fuel purchase receipts.
Any comment:	--

B.7.2 Description of the monitoring plan:

>>

This monitoring plan is developed in accordance with the modalities and procedures for small-scale CDM project activities and is proposed for grid-connected small hydroelectric project being implemented in Andhrapradesh state in India. The monitoring plan, which will be implemented by the project proponent, describes the monitoring organisation, parameters to be monitored, monitoring practices, QA and QC procedures, data storage and archiving.

Training procedures for the plant operators:

The project proponent intended that the equipment suppliers would impart necessary training to the plant operators as part of equipment supply and installation.

The schedule of training by the equipment supplier is given as below:

(a)	Main level valve	At site
(b)	Turbine	At site
(c)	Governor shop inspection and test	At site
(d)	Generator & Excitation system	At site
(e)	Transformer	At site
(f)	Switchgear	At site
(g)	Computerized control system	At site

The total training period will be decided mutually by the project proponent and the equipment supplier.

Procedures for training of monitoring personnel

The project would employ qualified and experience persons for plant operation. Basic personnel to deal with monitoring of parameters are plant operators. The project would maintain standard log sheets and formats to record the monitoring parameters. The persons would be given proper training to maintain the plant records. The plant manager is the designated person to verify, compile and archive all the monitored data. The parameters to be monitored during the crediting period would be provided in a table format to the designated person. The designated person would be provided training on monitoring procedures and he would be given all necessary formats for monitoring independently. The training would be provided to the monitoring personnel for monitoring the following parameters:

- Gross energy generated
- Auxiliary consumption
- Energy Export
- Energy Import
- Quantity of diesel used for diesel generator set for lighting & emergency purpose
- Periodical Calibration of monitoring equipment.

Further, any uncertainties in monitoring procedure would be assisted by external experts.

Procedures for documentation and storage:

The Plant operators would record the parameters every day during the operation of the plant. The frequency of monitoring is similar to all types of parameter to be monitored, since the project is a hydro based project, needs to be monitored only the energy related data.

Gross Energy generation, Auxiliary consumption, Energy Export and import: The Energy meter readings would be taken during a particular time of every day to ensure constant recording frequency of parameter. The recorded parameters would be documented every day in the standard log books maintained at the plant.

The total quantity of diesel consumed will be measured on regular basis using dip stick/ level gauge or store issues. The operating hours and the quantity of diesel consumption will be recorded.

The day to day records would be verified by plant manager, compiled and documented for preparation of internal audit reports.

The company will introduce an internal audit system for documentation and safe storage of data. Internal auditing would be carried out as per the monitoring plan and whenever necessary. An internal audit report would be prepared for review by the Board of Directors. The internal auditor could be an outside entity or one of the senior managers of the plant. The internal auditor would be required to verify the records independently with reference to the power exported and imported. The reports would be submitted periodically to the board of directors.

Internal audit reports are the basic documents for monitoring and storage of plant operational data.

Procedures for Corrective actions

The parameters to be monitored during a crediting period would be compiled as internal audit report for every quarter of each crediting year and submitted to the board of directors for review. The parameters include the Gross generation, Auxiliary consumption, Energy export, import. Based on the audit report submitted by plant manager board would asses the performance of plant. Board would discuss and recommend necessary mechanism to improve the operational efficiency of the plant and direct the respective person to rectify the problem.

The report would also cover comments on variations in the records with reference to the above parameters compared to the bills submitted to the utility or records maintained. The board would consider these variations in their review meeting and instruct the concerned person of the plant to rectify the variations and report the action taken in the next review meeting.

Monitoring Organisation

The authority and responsibility for registration, monitoring, measurement, reporting and reviewing of the data rests with the Board of Directors. The Board might delegate the same to a competent person identified for the purpose. The identified person, in the rank of General Manager, would be the in charge of GHG monitoring activities. A team of experienced personnel in various disciplines would assist the General Manager with experience in plant operation, measurements and management. The primary responsibility of the team is to measure, monitor, record and report the information on various data items to the General Manager, in accordance with the applicable standards. Periodic calibration of various instruments used in the monitoring of GHG related data and record keeping of the same also would be the responsibility of the team.

The responsibility of review, storage and archiving of information in good condition lies with the General Manager. General Manager would undertake periodic verifications and onsite inspections to ensure the quality of the data collected by the team and initiate steps in case of any abnormal conditions. The General Manager would review the data collected by the team and suggest corrective actions wherever required. An internal audit report would be prepared for review by the Board of Directors which would be later submitted for verification by an independent entity (DOE). Board of directors would examine the internal audit reports and would in particular take note of any deviations in data over the norms and monitor that the corrective actions have resulted in adherence to the standards.

The team including the General Manager would be appointed by the Boards of Directors of the companies, in advance before the start of project operations. The General Manager would report to the boards of directors and seek guidance in case of conflicts or difficulties in order to maintain the monitoring organisation in good spirit.

Parameters Requiring Monitoring

This monitoring plan requires monitoring of all parameters indicated in section B.7. Necessary documents required for verification of the data would be maintained for later archiving. Using the power exported to the grid, emission reductions would be estimated as illustrated in Section B.6.3. Emission reductions generated by the project would be monitored at regular intervals and would be reported to the board of directors.

QA & QC Procedures

The projects would employ latest state-of-the-art microprocessor based high accuracy monitoring and control equipment that would measure, record, report, monitor and control of various key parameters of the plants. These monitoring and controls would be the part of the Control Systems of hydroelectric plant. Necessary standby meters or check meters as required would be installed, to operate in standby mode or when the main meters are not working. The main and check meters will be of Static type 0.2 class accuracy. The meters will be calibrated and sealed as per industry practices at regular intervals. Records of calibration certificates would be maintained for verification. Hence, high quality is ensured with the above parameters. Sales records would be used and kept for checking the consistency of the recorded data.

Data Storage & Archiving

All the data items monitored under the monitoring plan would be kept for 2 years after the end of crediting period or till the last issuance of CERs for this project activity whichever occurs later.

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 the baseline: 01/03/2008

Name of the person / entity determining the baseline: Zenith Energy Services (P) Ltd., Hyderabad, India,

Contact information of the above entity furnished below:

Organization:	Zenith Energy Services (P) Limited
Street/P.O. Box, Building:	10-5-6/B, My Home Plaza, Masabtank,
City:	Hyderabad
State/Region:	Andhra Pradesh
Postfix/ZIP:	500028
Country:	India
Telephone:	+91- 40- 2337 6630, 2337 6631
FAX:	+91- 40- 2332 2517
E-Mail:	zenith@zenithenergy.com
URL:	www.zenithenergy.com
Represented by:	
Title:	Director
Salutation:	Mr.
Last Name:	Reddy
Middle Name:	Mohan

CDM – Executive Board

First Name:	Attipalli
Mobile	+91- 9849408485
Direct Fax	+91- 40- 2332 2517
Direct Telephone	+91- 40- 2337 6630, 2337 6631
Personal E.mail	mohan@zenithenergy.com

The above entity is not a project participant.

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:

>>
16/11/2006

PP had identified 16/11/2006 as the start date of the project activity, as it was on that date that PP issued work order for hard rock blasting for excavation of Power house and Intake structures for the project activity. This was the day on which the real action of the project activity began and the project participant committed expenditure related to the construction of the project activity.

The start date of the project activity is in conformity with the Glossary of CDM Terms as well as the decision given by EB vide Paragraph 67 of EB 41[3].

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

>>
25 years

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

Fixed crediting period

C.2.1. Renewable crediting period

Not Chosen

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

>>
Not Applicable

[3] The Glossary of CDM (Ver 03) defines start date of the project activity as "….the earliest date at which either the implementation or construction or real action of a project activity begins" (p. 29). To facilitate clear understanding of this term, EB in its 41st meeting had clarified that "the start date shall be considered to be the date on which the project participant has committed to expenditures related to the implementation or related to the construction of the project activity. This, for example, can be the date on which contracts have been signed for equipment or construction/operation services required for the project activity." (Paragraph 67).

C.2.1.2. Length of the first crediting period:

>>
Not Applicable

C.2.2. Fixed crediting period:

The project proponent wishes to select the fixed crediting period.

C.2.2.1. Starting date:

>>
01/04/2009 or from the date of registration of the project activity whichever is later

C.2.2.2. Length:

>>
10 years – 0m

SECTION D. Environmental impacts

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

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As per the prevailing regulations of the Host Party, i.e., India (represented by the Ministry of Environment and Forests (MoEF), Govt. of India and also the line ministry for environmental issues in India), Environmental Impact Assessment (EIA) studies need not to be done for the projects less than Rs. 1000 millions. Since the total cost of the proposed project is only Rs.92.94 millions and also comes under the small scale category of CDM projects as per UNFCCC guidelines, doesn't call for EIA study. As required for implementation of the project activity, project participants had studied the possibility of environmental impacts and concluded that no negative impacts are possible due to the project activity. Hence, no documentation or summary is provided here.

There appears to be no significant environmental impact due to implementation of the project activity as no forest land or archaeologically protected monuments are involved. Furthermore, the project involves no displacement of people living near the project area and hence rehabilitation and re-settlement are not called for. All care would be exercised during construction and subsequently such that the existing flora and fauna are not affected adversely.

The project activity is not likely to have any impact on the environment either during construction phase or post project implementation. During the construction as well operation phase it was ensured that air quality is not effected, noise levels are maintained and there is no effect on water resources, land and ecology.

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:

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No significant environmental impacts considered due to implementation of project activity by the host party, hence, no references or procedures specified here.

SECTION E. Stakeholders' comments

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

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The project proponent has identified the stakeholder for the project activity and approached each one of them for their clearance/approval for setting up of the project activity. Details of stakeholders, their role and involvement in the project activity is provided below:

Stakeholder Name	***Function of Stakeholder***	***Description of Involvement***
NEDCAP	Policy implementation body in respect of renewable energy projects in Andhra Pradesh. NEDCAP reviews the project documentation and accords clearance for utilizing renewable energy sources in the state	Issues clearance for setting up the project in Andhra Pradesh utilizing hydro potential available at the proposed site.
APTRANSCO	The state owned electricity utility company that manages the electricity transmission and distribution in Andhra Pradesh state. Any electricity generation project proposed in Andhra Pradesh shall approach APTRANSCO for power evacuation arrangements. Both APTRANSCO and the project proponent shall sign a Power Purchase Agreement, before implementing the project.	Purchase power from the project proponent by executing Power Purchase Agreement to determine the tariff and other terms.
Revenue Department	Is part of Government and monitors utilization of land	Gives consent to establish the project and registers the project in revenue records of Andhra Pradesh state.
Local Village Panchayat	Elected statutory body of the local populace	Accords permission for setting up of the project under the jurisdiction of the village

The process of obtaining stakeholder comments is either through public announcements or directly approaching the stakeholders as required.

Stakeholders Involvement:

Department of Revenue

Letter dt.5th October, 2006 from Mandal Revenue Officer, Garugubilli Mandal, Vizianagaram District handing over the land to an extent of 3.56 acres.

Department of Irrigation

The project got the clearance for utilising the water resources from Department of Irrigation, Govt. of Andhra Pradesh, vide **G.O.Ms. No. 126** dated 11th August 2003.

APTRANSCO

The project has executed power purchase agreement with Transmission Corporation of Andhra Pradesh Limited (APTRANSCO) on 6th December 2003.

NEDCAP

Non – Conventional Energy Development Corporation of Andhra Pradesh Ltd. (NEDCAP) has issued Technical Clearance Letter No. NEDCAP/MHS/N-45/2003-04/2529 dated 18th October 2003.

Local Village Panchayat

The project has got approval from local village Panchayat vide its letter dated 8th May 2000.

Stakeholder's comments:

All stakeholders have issued their approvals/consents/licenses for setting up the project and no comments were received on the project.

E.2. Summary of the comments received:

>>

No comments are received.

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

>>

Since no comments are received, the question of taking due account on the comments does not arise.

Annex-1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

Organization:	Sardar Power Limited
Street/P.O.Box:	104,Swarganivas Enclave
Building:	7-1-619/A, East Srinivasa Nagar, Ameerpet
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State/Region:	Andhra Pradesh
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Country:	India
Telephone:	+91-040-23738910
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E-Mail:	movvashrinivas@yahoo.co.in
URL:	--
Represented by:	
Title:	Managing Director
Salutation:	Mr.
Last Name:	Shrinivas
Middle Name:	--
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Annex 2

INFORMATION REGARDING PUBLIC FUNDING

No public funding from the parties included in Annex I is involved in the project activity.

Annex-3

BASELINE INFORMATION

This project uses grid emission factor calculations officially published by the Central Electricity Authority (CEA) of India, following the approaches and rules defined in METHODOLOGICAL TOOL. For details and further information on data please see CEA CO_2 data base from the following web link: http://www.cea.nic.in/planning/c%20and%20e/Government%20of%20India%20website.htm

➔ "CDM Carbon Dioxide Baseline Database, Version 3.0 (December 2007)"

Annex 4
MONITORING INFORMATION

Monitoring information is provided in section B.7.2

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Annex-5

Extract from PPA

S.No 35373 Dt. 5.12.2003 Rs. 100/-

Sold to Sri & Smt. For: Sardar Power Limited, Hyderbad

674398

K. GOPALAKRISHNA
STAMP VENDOR,
Gavarajaggayyapalem,
L. No. 2 OF 2002

POWER PURCHASE AGREEMENT
BETWEEN
TRANSMISSION CORPORATION OF ANDHRA PRADESH LIMITED
AND
M/s SARDAR POWER LIMITED

This Power Purchase Agreement (the "Agreement") entered into this 6th day of December 2003 between Transmission Corporation of Andhra Pradesh Limited, incorporated by the Government of Andhra Pradesh in accordance with the Andhra Pradesh Electricity Reform Act 1998 (Act No.30 of 1998), under the provisions of Companies Act, 1956 in place of Andhra Pradesh State Electricity Board, having its office at Vidyut Soudha, Hyderabad – 500 082, India, hereinafter referred to as the "APTRANSCO" (which expression shall, unless repugnant to the context or meaning thereof, include its successors and assigns) as first party, and M/s Sardar Power Limited, a Company incorporated under Indian Company's Act, 1956, having its registered office at Flat No.111, My Home Mount view Apartments, H.No. 8-3-678/42/C/6, Navodaya Colony, Yellareddiguda, Hyderabad – 500 073, Andhra Pradesh, hereinafter referred to as the 'Company' (which expression shall, unless repugnant to the context or meaning thereof, include its successors and assigns) as second party;

Chief Engineer (IPC)
APTRANSCO, Vidyut Soudha
HYDERABAD-500 082.

For SARDAR POWER LIMITED,

MANAGING DIRECTOR

ARTICLE 2
PURCHASE OF DELIVERED ENERGY AND TARIFF

2.1 All the Delivered Energy at the interconnection point for sale to APTRANSCO will be purchased at the tariff provided for in Article 2.2 from and after the date of Commercial Operation of the Project. Title to Delivered Energy purchased shall pass from the Company to the APTRANSCO at the Interconnection Point.

2.2 The Company shall be paid the tariff for the energy delivered at the interconnection point for sale to APTRANSCO as applicable as on date of commercial operation subject to the reviews of the prices by the APERC from time to time. Notwithstanding these reviews there will be a special review of purchase price on completion of 10 years from the date of commissioning of the project, when the purchase price will be reworked on the basis of Return on Equity, O & M expenses, and the Variable Cost.

2.3 The tariff is inclusive of all taxes, duties and levies.

2.4 All future increase in Taxes, Duties and Levies on Energy generated is to be borne by the Company.

2.5 Where in any Billing month, the energy supplied by the APTRANSCO to the Company, as a bilateral arrangement to maintain the Auxiliaries in the power plant in situations of non-generation of power, shall be billed by the APTRANSCO, and the Company shall pay the APTRANSCO for such electricity supplies, at the APTRANSCO's then-effective tariff applicable to High Tension Category-I Consumers. For this purpose, the maximum demand specified in such APTRANSCO's Tariff shall be computed by dividing the amount of such energy supplied by the APTRANSCO by the total hours in the Billing Month.

Explanation: The Mini Hydel Plants during the plant shut down periods shall draw the energy from APTRANSCO only for the essential loads.

Chief Engineer (IPC)
APTRANSCO, Vidyut Soudha
HYDERABAD-500 082.

For SARDAR POWER LIMITED.
MANAGING DIRECTOR

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Annex-6
Extract from Tariff Order

ANDHRA PRADESH ELECTRICITY REGULATORY COMMISSION
11-4-660, 4th & 5th Floors, Singareni Bhavan, Red Hills, Hyderabad.

ORDER

R.P.No. 5 / 2004
R.P.No. 12 / 2004

Dated 07-07-2004

Between
1. Small Hydro Power Developers Association – R.P 5/2004
2. M/s Active Power Corporation Pvt. Limited – R.P 12/2004 ....Petitioners

AND

Transmission Corporation of Andhra Pradesh .... Respondent

1) Andhra Pradesh Electricity Regulatory Commission (Commission) initiated suo-motu proceedings for determination of tariff in R.P. No. 84 / 2003 in O.P. No. 1075 / 2000 applicable to Non-Conventional Energy (NCE) Projects of Andhra Pradesh to take effect from 01-04-2004 onwards.

2) The Commission passed the order dated 20-03-2004, wherein the Commission determined the tariff, terms and conditions for purchase of power by Transmission Corporation of Andhra Pradesh (hereinafter APTRANSCO) from the following categories of Non-Conventional Energy based Power Projects:

i) Biomass-based energy and Biomass-based Co-generation Plants
ii) Bagasse- based Co-generation plants
iii) Mini-Hydel Power Projects
iv) Wind Electricity Generators
v) Industrial Waste based Energy Projects
vi) Municipal Waste based Energy Projects.

3) While deciding on the purchase price and other terms in respect of different categories of Non-Conventional Energy based projects, the Commission adopted a "Cost plus" approach and allowed a fair amount of return compared to the adhoc price earlier fixed based on the guidelines of Ministry of Non-Conventional Energy Sources (MNES) issued in 1993. While

- 1 -

Peoples Monitoring Group also submitted that some of the projects had already recovered their full capital cost or near-full cost, so the payments already made for such projects be also considered while fixing the tariff.

The Commission notes that the project costs of APGENCO's mini-hydel projects – none exceeding 1 MW capacity – as tabulated above range from Rs.1.80 crs. to Rs.3.88 crs. / MW. The Commission, however, adopted the project cost of Rs. 4.5 Crs / MW for the reasons already stated in its Order dated 20-03-2004. The preceding submissions fail to make out any case for review of the project cost. However, it is relevant that the Commission had adjusted the capital subsidy of Rs. 87.5 lakhs / MW based on the information filed by NEDCAP with its letter No. NEDCAP / PD / APERC/2004, dated: 24-02-2004. Now the Petitioner-Association has provided a clarification obtained from MNES vide MNES letter No. 2(13) 2000-SHP dated: 05-04-2004, to the effect that the subsidy for the first 1 MW is only Rs.75 lakhs and thereafter @ Rs. 12.5 lakhs per MW. The Commission takes note of this clarification that capital subsidy progressively decreases with the increase in capacity. The Commission also recognises the fact that the capital cost too tends to decrease with the increase in capacity due to economies of scale. Hence, the Commission revises the last 3 lines of paragraph 65 of its Order dated March 20, 2004 to read as follows:

"The Commission therefore considers that a uniform capital cost of Rs. 3.75 Crs/MW (Rs. 4.5 crs less capital subsidy of Rs. 0.75 crs) would be reasonable for mini-hydel projects, whether small or large".

Similarly, the Table in para 76 of the order is also revised as follows:

Year of operation (n^{th} year)	Tariff Rs / Unit
1st	2.69
2^{nd}	2.60
3^{rd}	2.52
4^{th}	2.43
5^{th}	2.34
6^{th}	2.26
7^{th}	2.17
8^{th}	2.09
9^{th}	2.00
10^{th}	1.92

- 27 -

Vijayawada in 2004-05, the water availability would get reduced substantially and power generation would come down from 12.5 MU to 4 MU. Regular annual maintenance of bund and electrical machinery may cause further reduction in power generation. The Commission passed its order dated 20-03-2004 without considering the above.

APTRANSCO submitted that the allegations of the Petitioner are baseless. It further submitted that the Petitioner's Mini Hydel Power Project was commissioned in April 2000, and from April 2000 to March 2004, the Petitioner's Mini Hydel Project has delivered 42.69 MU (at about 90% PLF) to the grid for sale to APTRANSCO for which APTRANSCO paid Rs. 13.58 Crores to the Petitioner towards cost of power. It further stated that the Petitioner's Mini Hydel Project delivered 0.96 MU in March 2004 at a PLF of above 100%. Even if the assumption that generation comes down due to the factors stated above, the project would safely generate power above the threshold PLF of 35% considered by the Commission.

Notwithstanding what is stated by APTRANSCO, the Commission opines that there would indeed be reduction in power generation when the proposed cooling towers are constructed for three of the six generating units of Vijayawada thermal power station and irrigation scheme mentioned above is completed. However, Commission agrees with the conclusion of APTRANSCO that the PLF of the project is unlikely to fall below 35%. The Commission, therefore, finds no reason to review the threshold PLF of 35%, as fixed in its Order dated 20-03-2004.

32) Incentive:

The Petitioner-Association contends that the fixation of incentive at a low level of 21.5 paise per unit for generation above the PLF of 35% is not rational and reasonable. The criteria for fixing 21.5 paise per unit is not indicated in the Commission's order. The Commission did not even consider allowing shortfall to be recouped in the subsequent year when the PLF is above 35% by allowing full-cost tariff for such additional energy in such subsequent year.

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The reasons for introducing incentive beyond threshold level are explained at paragraph (76) of the Commission's order which reads as under:

> *"As observed earlier, fixation of uniform tariff across all mini hydel power plants with varying operating conditions would lead to unequal tariffs. The Commission therefore proposes a two tier tariff for the mini hydel power plants distinguishing those operating up to 35% PLF and other operating above 35% PLF. The Tariff indicated above will be applicable for the Power Plants up to PLF of 35% and where PLF during a settlement period exceeds 35%, only an amount of 21.5 paise per unit as has been allowed to other categories of NCE developers (in place of the tariff indicated above) shall be paid for every unit delivered in excess of 35% PLF at generator terminals i.e. including captive and auxiliary consumption".*

The incentive scheme has been introduced by the Commission in such a way that while allowing adequate return to the developer and providing necessary motivation to generate beyond the threshold PLF, the consumer is not unduly burdened. This is based on the provisions made by Central Electricity Regulatory Commission (hereinafter CERC) in respect of conventional projects. Any business is fraught with risks. It is, however, not fair to pass on all risks to the consumers. Therefore, the philosophy of payment of full tariff during surplusing years to compensate for shortfall in other years is not rational and cannot be accepted.

Subsequent to the issue of Order dated 20-03-2004, however, CERC in its notification dated 26-03-2004 revised the incentive rate to 25 paise/ unit for ex-bus energy beyond the target PLF. The Commission, taking note of the above, allows revision of incentive from 21.5 paise/ unit to 25 paise / unit on the same lines as CERC order. This will however be effective from 01-04-2004.

33) **Auxiliary consumption:**

The Petitioner-Association pleaded that fixation of Auxiliary Consumption at 1% based on CERC guidelines is not

Annex-7

Statement of cost of power purchase

STATEMENT SHOWING COST OF EXPORT				Sardar Power Limited (Mini Hydel)		
	Date	KwH	KVAH	PLF	KVA	TOTAL
Closing	24-Dec-08	17.5	31.6			
Opening	24-Nov-08	17.1	29.5			
No of Days	30	400.0	2100.0	0.19	2.92	
Demand Charges		2.92	230	=		671
Energy charges						
15% L&F	60	X	4.40	=		264
balance energy	340	X	3.00	=		1020
Total						1955
Low Surcharge		190.5%				
Elecy.Duty	400	X	0.06			24
Customer Charges (Rs.750/-p.m)			750			750
Total						2729.00
			G.TOTAL for	30	days	2729.00

STATEMENT SHOWING COST OF IMPORT (EGY RECD.)				Sardar Power Limited (Mini Hydel)		
	Date	KwH			COD	17-Jul-08
Closing	24-Dec-08	2513.1			CAPACITY	3.00
					AUX	0.03
					CAPTIVE	0.00
Opening	24-Nov-08	1788.8			Fixed CAP	2.97
ENERGY EXPORTED		724300			NET PURCH. CAP	2.97
PURCHASABLE ENERGY		724300			NO OF DAYS	30
Cum Energy Payable			8484520		MAX PUR ENG	2138400
Energy Paid for FC during the month			724300		MF	1000
Cum Energy Payable to next month			7760220		RELvant Tarif.Yr.	0.44
					FC Rate	2.69
Fixed cost	Days	Kwh	@Rs./Kwh		VC RATE	0.00
Units for days	30	724300	2.69	1948367	REVISED TOT COST	2.69
Incentive				0	OLD RATE	0
Variable cost					DIFF	0
Units for days	30	0	0.000	0	50%	0
				0	VC COURT RATE	0
Fixed Cost				1948367	FC PLF	0.35
Variable Cost				0		
Incentive				0	Energy Elig for purchase @35%	9106020
Total				1948367	Already purchased	1720600
Less Reactive energy		2100		210	Balance ava for Nov '08	7385420
Less Cost OF Export Energy				2729		
Net Payable		723900		1945428		

STATEMENT SHOWING COST OF EXPORT				Sardar Power Limited (Mini Hydel)		
	Date	KwH	KVAH	PLF	KVA	TOTAL
Closing	24-Jan-09	17.9	33.3			
Opening	24-Dec-08	17.5	31.6			
No of Days	31	400.0	1700.0	0.24	2.28	
Demand Charges		2.28	230	=		526
Energy charges						
15% L&F	60	X	4.40	=		264
balance energy	340	X	3.00	=		1020
Total						1810
Low Surcharge		175.5%				
Elecy.Duty	400	X	0.06			24
Customer Charges (Rs.750/-p.m)			750			750
Total						2584.00
			G.TOTAL for	31	days	2584.00

STATEMENT SHOWING COST OF IMPORT (EGY RECD.)				Sardar Power Limited (Mini Hydel)		
	Date	KwH			COD	17-Jul-08
Closing	24-Jan-09	3075.2			CAPACITY	3.00
					AUX	0.03
					CAPTIVE	0.00
Opening	24-Dec-08	2513.1			Fixed CAP	2.97
ENERGY EXPORTED		562100			NET PURCH. CAP	2.97
PURCHASABLE ENERGY		562100			NO OF DAYS	31
Cum Energy Payable			6661120		MAX PUR ENG	2209680
Energy Paid for FC during the month			562100		MF	1000
Cum Energy Payable to next month			6099020		RELvant Tarif.Yr.	0.52
Fixed cost	Days	Kwh	@Rs./Kwh		FC Rate	2.69
Units for days	31	562100	2.69	1512049	VC RATE	0.00
Incentive				0	REVISED TOT COST	2.69
Variable cost					OLD RATE	0
Units for days	31	0	0.000	0	DIFF	0
				0	50%	0
Fixed Cost				1512049	VC COURT RATE	0
Variable Cost				0	FC PLF	0.35
Incentive				0	Energy Elig for purchase @35%	9106020
Total				1512049	Already purchased	2444900
Less Reactive energy		1700		170	Balance ava for Nov '08	6661120
Less Cost OF Export Energy				2584		
Net Payable		561700		1509295		