**CLEAN DEVELOPMENT MECHANISM**
**PROJECT DESIGN DOCUMENT FORM (CDM-PDD)**
**Version 03 - in effect as of: 28 July 2006**

**CONTENTS**

## SECTION A. General description of project activity

### A.1 Title of the project activity:

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Title: "100 MW Malana – II, Hydro – Electric Power Project (Malana – II HEP)" at Kullu district of Himachal Pradesh State, India, by M/s Everest Power Private Limited.

Version: 2, 28th December, 2007

### A.2. Description of the project activity:

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The Malana – II Hydro Electric Power Project is a Run-of-the-river Hydro Power project, located in the Malana Nallah, a tributary of Parbati River in the Beas Basin, near the Malana village of Kullu District, State of Himachal Pradesh, India. This Project envisages an exploitation of hydro power potential in the upper reaches of Malana Nallah, to produce environment friendly power with Run-of-the-river technology to be feed up in the Northern Regional Grid of India. Malana – II HEP is essentially a peaking station utilizing the flow of Malana Nallah to harness about 590 m drop in the riverbed available around 3 km upstream of Malana village. The proposed project will envisage to a concrete gravity dam of only 45 m height above the river bed, across the Malana Nallah with 2 numbers of breast wall type Spillway bays of size 4 m x 5 m to spill down the design flood of the order of 650 cumecs. The water will be diverted through a 5.13 km long power tunnel on left bank, with an under ground Power House. The discharge from Power house will be discharged back into Malana Nallah by a 0.415 km long Tail Race Tunnel (TRT). The Malana-II hydroelectric project is proposed to generate (2 x 50) 100 MW of power, with an energy generation of 428 GWh at 90% dependable year. Due to the construction of the above mentioned dam, which will serve as diurnal storage (storage capacity of 4 hrs) of about 0.2875 Million cum, which will provide a power draft of 18.65 cumecs for peaking. Due to the live storage, an increase in submergence of 3.5 hector will be occurred. The power density of the project is calculated 2857 watt/$m^2$, far above the threshold limit of 4 watt/$m^2$, as specified in the *"Applicability"* section of the Approved Consolidated CDM Methodology ACM 0002, Version 07, 14th December, 2007. (Web link: http://cdm.unfccc.int/UserManagement/FileStorage/CDMWF_AM_BW759ID58ST5YEEV6WUCN5744MN763 )

Malana Nallah originates at about EL± 6200 m from Dudhan Glacier in the Pir Panjal range of Greater Himalaya. It is joined by several nallah and glaciers on it course. The catchment area of Malana Nallah is about 158 Sq Km. Out of the total catchment area 76.2 Sq. Km is under glacier / above permanent snow line. The shape of the catchment area is elongated leaf shaped and the Nallah course is parallel to course of Parbati River. Malana Nallah is a major tributary of Parbati River and it catchment adjoins catchment of Tosh Nallah, which is also a tributary of Parbati River.

The main component of the project comprises a concrete gravity dam of 45 m high. A, 3 m dia and 100 m long, intake from the non overflow section of the dam to Desilting Basin. A surface

Desilting Tank, of size 8 m x 6 m and 130 m long, design to exclude silt particulates down to 0.2 mm size. A, 3 m x 2.75 m, D shaped 4.847 Km long, Head Race Tunnel (HRT) on the left bank of Malana Nallah, designed to carry 20 cumecs discharge at 2.75 m/sec velocity. An underground surge shaft with 6 m dia and 90 m deep, at the end of HRT; a Valve chamber, of size 6 m x 10 m x 10 m, located between the Surge Shaft and the Pressure Shaft for emergency closure of flow. A single Pressure Shaft, 2.5 m dia and 666 m long, designed to carry 20 cumecs discharge into the Power House. An underground Power House, of size 20.25 m wide 68 m long and 31 m high on left bank of the Malana Nallah, houses 2 nos. of Vertical Axis Pelton wheel driven generating units of 50 MW each, with an energy generation capacity of 428 GWh at 90% dependable year.

The power generated would be evacuated through one double circuit 220KV transmission line taking off Malana-II HEP and fed into 400KV substation of Power Grid Corporation of India Limited (PGCIL) at Panarsa. The power would be further transmitted to other states of Northern Region through Power Grid/ respective state transmission systems. Power Line Carrier Communication (PLCC) system would be established between Malana-II HEP and Parbati's PGCIL substation. In line with the modern practice, each of the 220KV transmission lines will be provided with high speed distance protection as primary protection and back up protection as well. Some part of the transmission line would be passing through the area which experience snowfall in the winter season. This part of the transmission line would be suitably designed considering snow loading. The length of the transmission line between Malana – II and Panarsa PGCIL substation is expected to be about 38 km.

The Northern Region of India comprises of States of Delhi, Haryana, Himachal Pradesh, Jammu & Kashmir, Punjab, Rajasthan, Uttar Pradesh, Uttaranchal, and Union Territory of Chandigarh, who shares the Grid Power generated in the area through Northern Regional Grid. This network also obtains proportions of the electricity from the Central sector. The North Regional Load Despatch Centre (NRLDC) is the energy distribution centre, through which the allocated power to each state is transmitted. The purpose of the project activity is to supply clean and environment friendly power to feed the Northern Regional State through NRLDC. The project has signed a Power Purchase Agreement (PPA) with PTC India Limited (Formerly Known as Power Trading Corporation of India Limited) to evacuate the power to the Northern Regional Grid.

**Contribution towards Sustainable Development:**

The Project falls in one of the economically underdeveloped regions of the country. The proposed HEP will bring in substantive economical activities, which in turn lead to development of infrastructures, livelihood generation, provision of basic civic amenities to the villagers around the Project activity, hence, will improve the status of living standards of the villagers.

The direct beneficiaries of this project (apart from the project proponent) shall be the villagers of Malana village, which is a small village of about 500 families situated on a plateau of Chandrakhani mountain at a height of about 12000 ft. It is surrounded by the lush-green forests, rugged mountainous ranges and difficult tract not easy to climb. This village can only be approached through three difficult tracking routes, which is through steep terrains. There is no

such road connected to the village from the mainland, preventing any sort of business and development activities. The main occupation of the villagers is cultivation but the produced is not enough to suffice the needs of the inhabitants, thus cattle rearing and collection of medicinal herbs are the other sources of livelihood.

At the National level the project will contribute to country's sustainable development goal through generation of environmentally clean, carbon neutral, power to support the growing demand of commercial energy in the country. The project being a typically a peaking station will help in mitigating the substantial peaking power deficit of 12.2 % (www.cea.nic.in) in the Northern Grid of the country, will improve the power availability and quality and make the Grid more stable and less prone to massive grid failures, which the country use to experience in extreme weather conditions when the power demand suddenly shoots ups.

The Project, when implemented, will support the development of rural part of the country and help in successful demonstrating of similar type of initiatives at remote and high altitude terrain, thus will be encourage business sector's participations in such type of initiatives and help the country to achieve its overall development goal and providing access of power to all by 2012. (www.powermin.nic.in).

The Project will help in addressing the sustainable development criteria of India, through effectively contributing in Social, Economical, Environmental and Technological well being as described below:

**Social & Economical Wellbeing:**

- The proposed Project will be employed around 800 people during the construction stage and 100 people during the operation stage. Most of the labour forces, except the very skilled and technical labour, will be comprises from the people from the local area, which will support the requirement of employment generation and help in rural poverty alleviation in the region.
- The Project activities and its auxiliaries around the project area will be able to develop various alternative livelihoods for the villagers, helping them to improve their standard of living.
- The project will facilitate development of communication and infrastructure like Road, Telecommunication, Post-office, Medical Camp, Training centres etc. in the area, which will improve the economical index and help in livelihood generation.
- The power generation from the project activity will be used by the State / Region, to enhance the access of power to the remote villages like Malana, help in developing small / cottage industries and stop rural to urban migration. The power will also be utilized at the mechanization of the farming activities through irrigation and other means; will help in getting higher yields by the farmers.
- This project conserving conventional resources like coal/gas/oil and promoting non-renewable primary natural resources, reduces dependency on imported petroleum and thus addressing the energy security of India.

- The hydro projects need large area for its installation. As project proponents of hydro energy developers procured land, the cost of land appreciated benefits the landowners, local community and the forest department directly. This can further be utilized in Local Area Development Programme, Catchment Area Treatment and Afforestation activities, leading to addressing the Development & Environment agenda of the State.

**Environmental & Technological Wellbeing:**

- The electricity to be generated will be replacing the thermal energy dominated Grid Power in the Northern Region by environment friendly hydro power and hence improves the supply quality of power.
- The Project activity will supply the power to the grid particularly at the peak hours and helps in reducing the peaking gap between power demand and supply in the region in a very environment friendly manner, thus meeting the development needs of the country.
- The generated electricity from the project will help in reducing the carbon intensity in Indian power sector.
- Successful implementation of the project will attract the business sectors and other stakeholders like Financial Institutions and will enhance their participations in the similar types of projects leading to technological development and will help Indian power sector to meet the increasing demand of power in coming decades to fuel the development of the country.
- The project being Run-of-the-river peaking hydro with small diurnal reservoirs, and will be having minimum impacts on the local environment and the community leaving around.
- The project developers proposed to take up substantive plantation activities which will further contribute to enhance the area's environmental and economical well being.
- A detailed Environmental Impact Study (EIA) has been carried out and subsequent Environmental Management Plan (EMP) has been prepared and approved by the Ministry of Environment & Forests, Government of India, which has detailed out sufficient measures to mitigate the whatsoever small environmental impacts during construction and operation of the project.
- Highly efficient vertical axis Pelton turbine and generators are being used in the project, and further the power transmission will be at high voltage to ensure low losses.
- The project will be a technical excellence as planned at an elevation of 1910 m (power house site) to 2500 m (wire site).

In addition the project is consistent with the $10^{th}$ Five Year plan of Government of India to add on an aggregate of 13,280 MW installed capacity at the Northern Regional Grid among which total 1270 MW has been earmarked from the development led by Private Entrepreneur.

**A.3. Project participants:**

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Please refer to the Table A.1 below:

**Table A1: Parties Involved in the Project**

| 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) | Private Entity: Everest Power Private Limited (EPPL) | No |
| (*) In accordance with the CDM modalities and procedures, at the time of making the CDM-PDD public at the stage of validation, a Party involved may or may not have provided its approval. At the time of requesting registration, the approval by the Party (ies) involved is required. | | |

**A.4. Technical description of the project activity:**

**A.4.1. Location of the project activity:**

>>

| | |
|---|---|
| Country: | India |
| State: | Himachal Pradesh |
| River: | Malana Nallah, a tributary of Parbati River in the Beas Basin. |
| Vicinity: | Wire site located in Malana valley (3 Km upstream of Malana village) at EL ± 2500 m and Power House on the left bank of Malana Nallah, at EL ± 1910 m. |
| Location: | Latitude – between $32^0$5'06" N to $32^0$02'15" N<br>Longitude – between $77^0$16'51" E to $77^0$15'26" E |

**A.4.1.1. Host Party (ies):**

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India

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

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| | |
|---|---|
| Region: | Northern India |
| State: | Himachal Pradesh |
| District: | Kullu |

**A.4.1.3. City/Town/Community etc:**

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| | |
|---|---|
| Village: | Malana Village (3 km) |

**A.4.1.4. Detail of physical location, including information allowing the unique identification of this project activity (maximum one page):**

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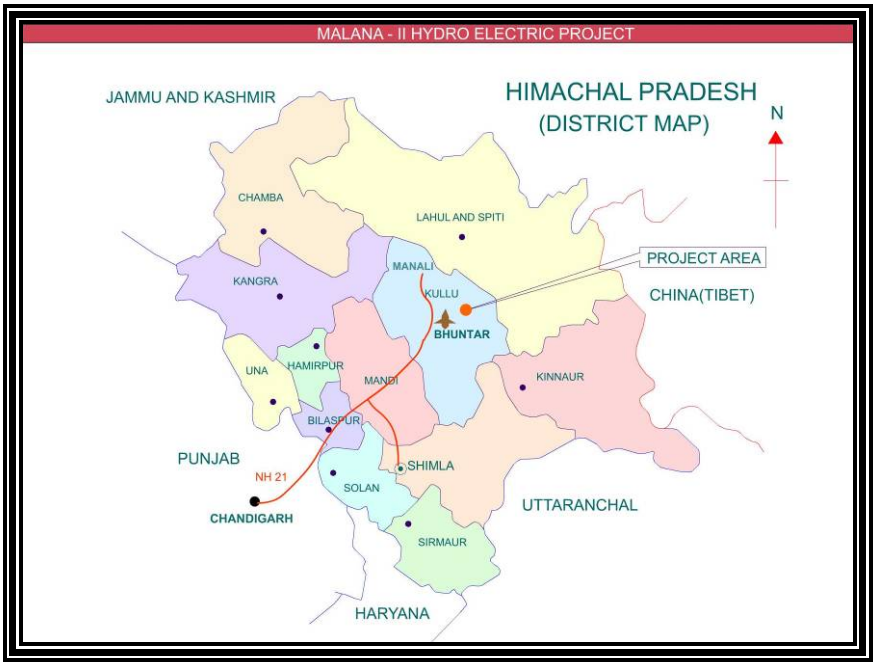
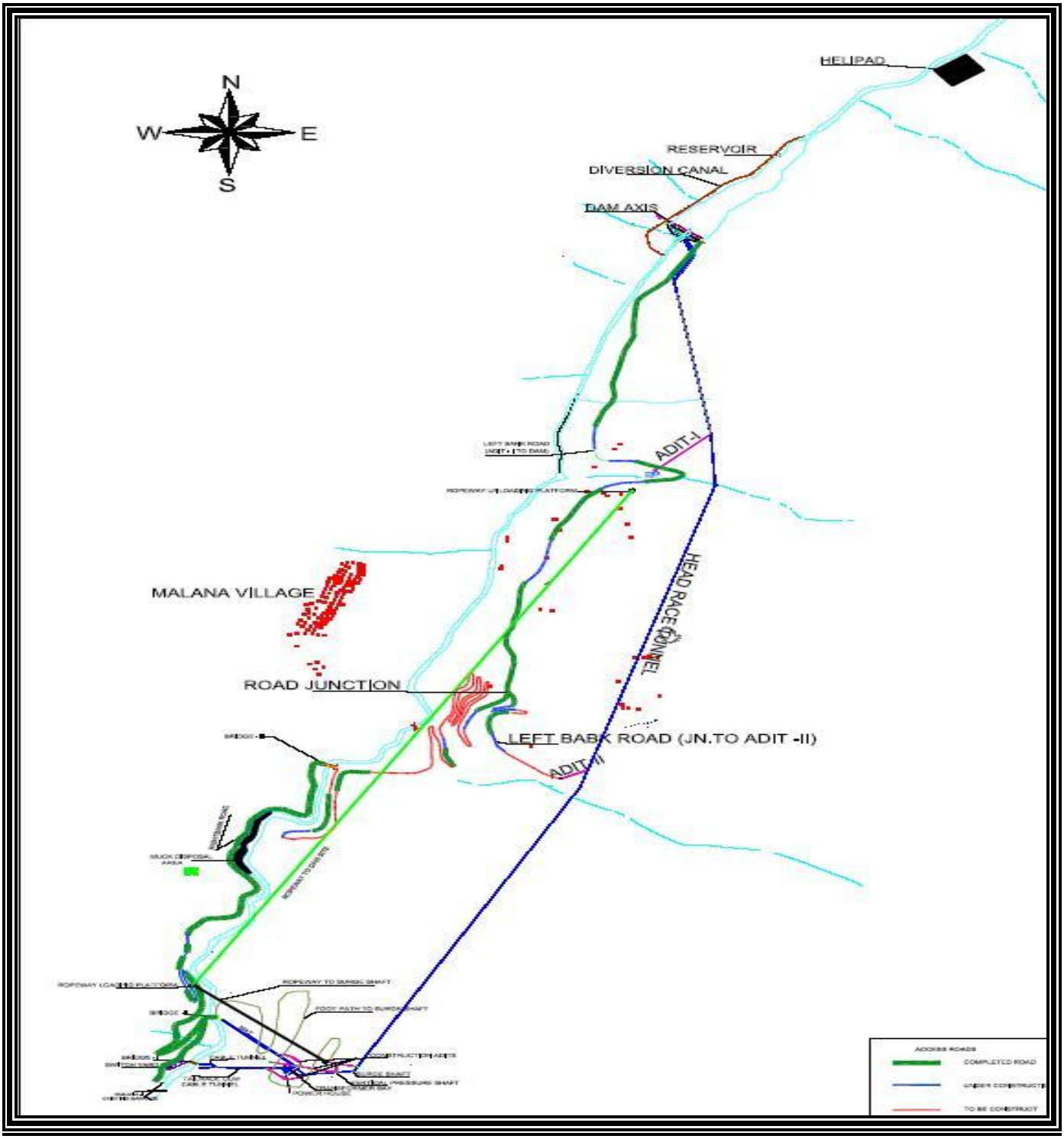
The 100 MW Malana – II Hydro Electric Power Project (Malana – II HEP) is located in District Kullu of Himachal Pradesh and envisages exploitation of Hydro Power Potential in the Upper Reaches of Malana Nallah, a tributary of the Parbati River which in turn flows into Beas River below Bhunter. The project site is approached by road about 10 Km from Jari Village on Bhuntar Manikiran road at a distance 22 Km from Bhunter. The nearest rail head is Kiratpurshahib about 200 Km from the project site. There is an air field at Bhunter, about 22 Km from project site. The project area located between Latitude $32^0$05'06" to $32^0$02'15" and Longitude $77^0$16'51" to $77^0$15'26". The details of the physical location of the project are shown below:

# Location


MALANA - II HYDRO ELECTRIC PROJECT
INDIA
JAMMU & KASHMIR
SRINAGAR
PROJECT AREA
N
HIMACHAL PRADESH
CHINA (TIBET)
PAKISTAN
CHANDI GARH
PUNJAB
UTTARANCHAL
DEHRADUN
HARYANA
DELHI
NEPAL
SIKKIM
ARUNACHAL PRADESH
UTTAR PRADESH
BHUTAN
ITANAGAR
RAJASTHAN
GANGTOK
ASSAM
DISPUR
NAGALAND
KOHIMA
JAIPUR
LUCHNOW
PANTA
BIHAR
SHILLONG
IMPHAL
MANIPUR
MECHALAYA
AGARTALA
GUJARAT
BHOPAL
RANCHI
TRIPURA
AIZAWL
MIZORAM
GANDHINAGAR
MADHYA PRADESH
JHARKHAND
WEST BENGAL
CHHATTISGARH
CALCUTTA
SHILLONG
BANGLADESH
RAIPUR
ORISSA
MAHARASHTRA
BHUBANESHWAR
MUMBAI
HYDERABAD
ANDHRA PRADESH
ARABIAN SEA
BAY OF BANGAL
PANAJI
GOA
KARNATAKA
BANGALORE
CHENNAI
MADRAS
PORT BLAIR
LAKSHADWEEP
TAMILNADU
ANDMAN & NICOBAR ISLANDS
KERALA
THIRUVANANTHAPURAM


MALANA - II HYDRO ELECTRIC PROJECT
JAMMU AND KASHMIR
HIMACHAL PRADESH
(DISTRICT MAP)
N
CHAMBA
LAHUL AND SPITI
PROJECT AREA
MANALI
KANGRA
KULLU
CHINA(TIBET)
BHUNTAR
UNA
HAMIRPUR
MANDI
KINNAUR
BILASPUR
PUNJAB
SHIMLA
NH 21
SOLAN
UTTARANCHAL
CHANDIGARH
SIRMAUR
HARYANA

# General Layout



**A.4.2. Category (ies) of project activity:**

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100 MW Malana – II Hydroelectric Project is a run-of-the-river hydropower technology project, and categorized in Scope 1, Sectoral Scope: Energy Industries (renewable / non-renewable sources).

**A.4.3. Technology to be employed by the project activity:**

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100 MW Malana – II HEP is essentially a peaking station utilizing the flows of Malana Nallah to harness about 590 m drop in the river available between the proposed head-works located about ± 3 Km upstream of Malana village. The proposed project construction of a concrete gravity dam 45 m high above river bed to create a reservoir for diurnal pondage of about 0.2825 cum between FRL EL ± 2543 m and MDDL EL ± 2528 m, which will provide a Power Draft of 18.65 cumecs for peaking. The water so stored are diverted on the left bank through a 5.130 Km long water conductor system comprising 3.0 m dia 100 m long pipe, a Desilting Basin, 75 m long cut & cover conduit and 4.847 Km long Head Race Tunnel of size 3 m x 2.75 m terminating at 6 m dia Surge Shaft. From Surge Shaft, a 2.5 m dia and 646 m long Pressure Shaft, bifurcating into two of 1.8 m dia and 22 m long Penstock near Power House, will convey the Power Draft to generate 100 MW of power over a maximum gross head of 626 m in a underground powerhouse having 2 units of 50 MW, Vertical Axis Pelton wheel turbine, each. The water from power house will be discharged back into the Malana Nallah. The project will generate 428 MU annually on 90% dependable year basis. The power generated will be evacuated through a 38 Km long 220 KV transmission line and fed into Power Grid Corporation of India Limited (PGCIL) sub-station at Panarsa. The power evacuated from this project will be fed to Northern Grid.

**A.4.4 Estimated amount of emission reductions over the chosen crediting period:**

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The emission reduction crediting period selected as a single span of ten years. The project is expected to start generation by April, 2009 and likely to reduce 345, 622 tonnes of $CO_2$ per year over the crediting period 2009 to 2019. This value is based on the projected net power generation of 428 GWh / year and a Combined Margin emission factor of 807.53 t $CO_2$ / GWh.

**Table A2: Emission reductions during the crediting period**

| Year | Annual Estimation of Emission Reduction in tones of $CO_2$ Equivalent |
|---|---|
| 2009-2010 | 345, 622 |
| 2010-2011 | 345, 622 |
| 2011-2012 | 345, 622 |
| 2012-2013 | 345, 622 |
| 2013-2014 | 345, 622 |
| 2014-2015 | 345, 622 |
| 2015-2016 | 345, 622 |
| 2016-2017 | 345, 622 |
| 2017-2018 | 345, 622 |

| | |
|---|---|
| 2018-2019 | 345, 622 |
| Total Emission Reduction in the full Crediting Period | 3,456,220 |
| Total Number of Crediting Years | 10 Years |

**A.4.5. Public funding of the project activity:**

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The Project is not utilizing any public fund other than term loans from various public funding institutions and banks amount to INR 41.72 Billion. The contributions of loan have been received from Rural Electrification Corporation (REC), State Bank of Patiala and Punjab National Bank. All the above funds do not create any diversion to ODA.

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

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

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The baseline methodology selected for this project is

| | |
|---|---|
| Title: | "Consolidated baseline methodology for grid-connected electricity generation from renewable sources" |
| Sectoral Scope: | 1 |
| Reference: | ACM 0002 |
| Version: | "Version 07", 14th December, 2007 |

### B.2 Justification of the choice of the methodology and why it is applicable to the project activity:

>>

The project is a renewable energy based project, Run of the river hydro power technology plant, will be generating energy and feeding into the Northern Regional Grid of India.

As specified in the methodology ACM0002, Version 07, of 14th December, 2007, in the "Applicability" Section, that this methodology is applicable to grid-connected renewable power generation project activities under the following conditions:

*"Applies to electricity capacity additions from:*

- *New hydro electric power projects with reservoirs having power densities (installed power generation capacity divided by the surface area at full reservoir level) greater than 4 W/m$^2$."*

The project is ideally addressing the point; being a totally new project with diurnal storage facility, with a submergence at the Full Reservoir Level (FRL) amounting to 3.5 hector with an installed capacity of 100 MW, resulting in power density 2857 Watt / m$^2$, much above the specified lower limitation of 4 Watt / m$^2$. The project activity also envisages using the approved monitoring methodology of ACM 0002, as stipulated in the provision of ACM0002, Version 07.

The project is a renewable energy project with no fuel switch involved.

The project activity supplies power to Northern Regional Grid of India which manages the supply of electricity among the Northern States of India. It is connected to all the power plants supplying power to the state grids of Delhi, Haryana, Himachal Pradesh, Jammu & Kashmir, Punjab, Rajasthan, Uttar Pradesh, Uttaranchal and Union Territory of Chandigarh. Adequate data and information is available to estimate the grid emission factor. Central Electricity Authority (CEA) of India, has already compiled and published *"$CO_2$ Baseline Database of Indian Power Sector"* and whose latest version 3.0 has been out for public consumption on December 15, 2007.

## B.3. Description of the sources and gases included in the project boundary

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As per the instruction provided in the Consolidated Methodology ACM 0002, Version 07, in the Project Boundary chapter, the project will account only the following emission sources for the project activity:

> *"For new hydroelectric projects with reservoirs, the project boundary includes the physical site of the plant as well as the reservoir area."*

Considering the above instruction the following sources and related Greenhouse gasses have been considered:

1. As the project does not consume any fuel in its operation the project is not having any GHG emission from its operation.

2. The project has a diurnal storage (storage capacity for 4 hrs), concrete gravity dam, which will have an extra submergence of 3.5 hector. The submergence area is having a vegetation cover, with species like Rai, Tosh, Chimmu, Mapple Kail, Khanor, Walnut, Moharu, Jammu Popular, Tharbal etc. Total 91 trees in these species category will be cut before the submergences, and an compensatory afforestation as proposed in the Environment Management Plan (EMP), as approved by Ministry of Environment & Forest, Government of India, total 62.6 hector of degraded land will be taken for new plantation which will materialize development of fresh forest amounting more than 93 thousand trees in major species categorization. The above information establishes that the emission of Greenhouse Gasses (GHGs) like Carbon-di-oxide ($CO_2$) and Methane ($CH_4$) due to enumerations of 91 trees and the submergences, will be many fold compensated by the afforestation activity of the project.

The forest loss due to various project activities has been compensated as a part of compensatory afforestation.

The Indian Forest Conservation Act (1980) stipulates:

- If non-forest land is not available, compensatory afforestation is to be established on degraded forest lands, which must be twice the forest area affected or lost;
- If non-forests land is available, compensatory forest are to be raised over an area equivalent to the forests area affected or lost.

The total forests loss is about 51.4136 ha. It is proposed to afforest double the amount of forest land being acquired for the project. Thus, a total of (51.4136 × 2) 102.8272 ha of land can be afforested. The total cost of the afforestation works out to approximately Rs. 4.9 million.

An amount of Rs. 30.33 million as estimated by the Forest Department has been earmarked for NPV of forests land to be acquired.

Though the forest loss due to the reservoir submergence and other projects activities have been compensated, it is also proposed to develop greenbelt around the periphery of various project activities along with the reservoir periphery. About 1100 trees per hectare are to be planted. The maintenance of the plantation area will be also be done by the project proponents.

The various criteria considered while developing the greenbelt are:

- Local/nature trees growing upto 10 m or above in height with perennial plant life should be planted around the proposed project.
- Planting of trees should be undertaken in appropriate encircling rows around the project site.
- Generally fast growing trees should be planted.
- Since, the tree trunk area is normally devoid of foliage upto a height of 3 m, it may be useful to have shrubbery in front of the trees so as to give coverage to this portion.

The cost of the plantation per hectare is estimated as Rs. 50,000. It is proposed to afforest about 5 ha of land as a part of Greenbelt Development Plan. The total cost works out approximately to 0.25 million.

So, for the sake of conservative estimation of GHGs Emission Reduction and reduction in uncertainties in the calculation, monitoring and verification procedure, both $CH_4$ and $CO_2$ emission reduction calculation from the afforestation activity of the project has been excluded.

**B.4. Description of how the baseline scenario is identified and description of the identified baseline scenario:**

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The project activity applies the consolidated methodology as per ACM 0002, Version 07, as described below:

*"For the baseline determination, project participants shall only account $CO_2$ emissions from electricity generation in fossil fuel fired power that is displaced due to the project activity.*

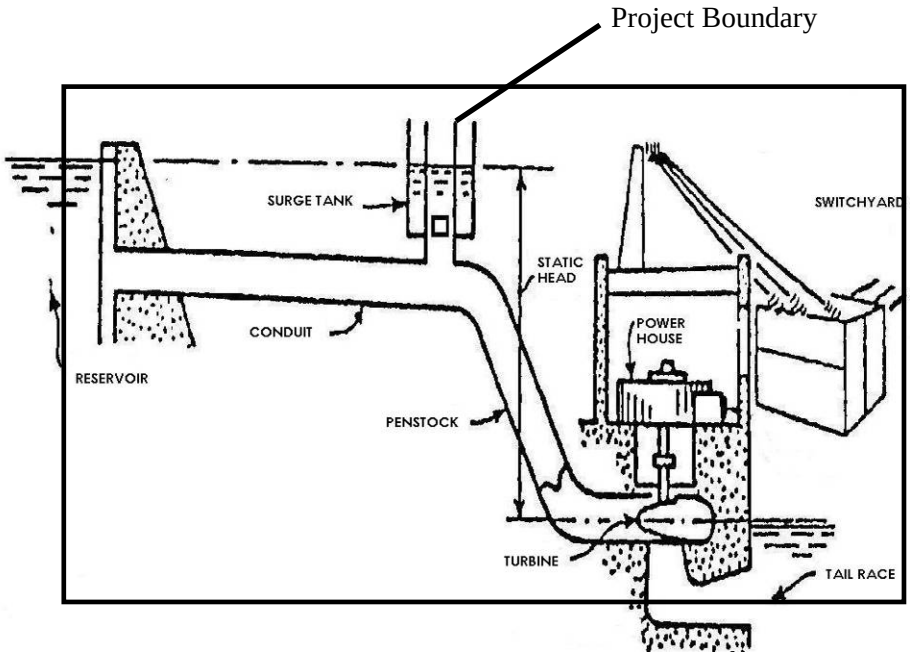
*The spatial extent of the project boundary includes the project site and all power plants connected physically to the electricity system that the CDM project power plant is connected to."*

**Boundary and Grid definition**

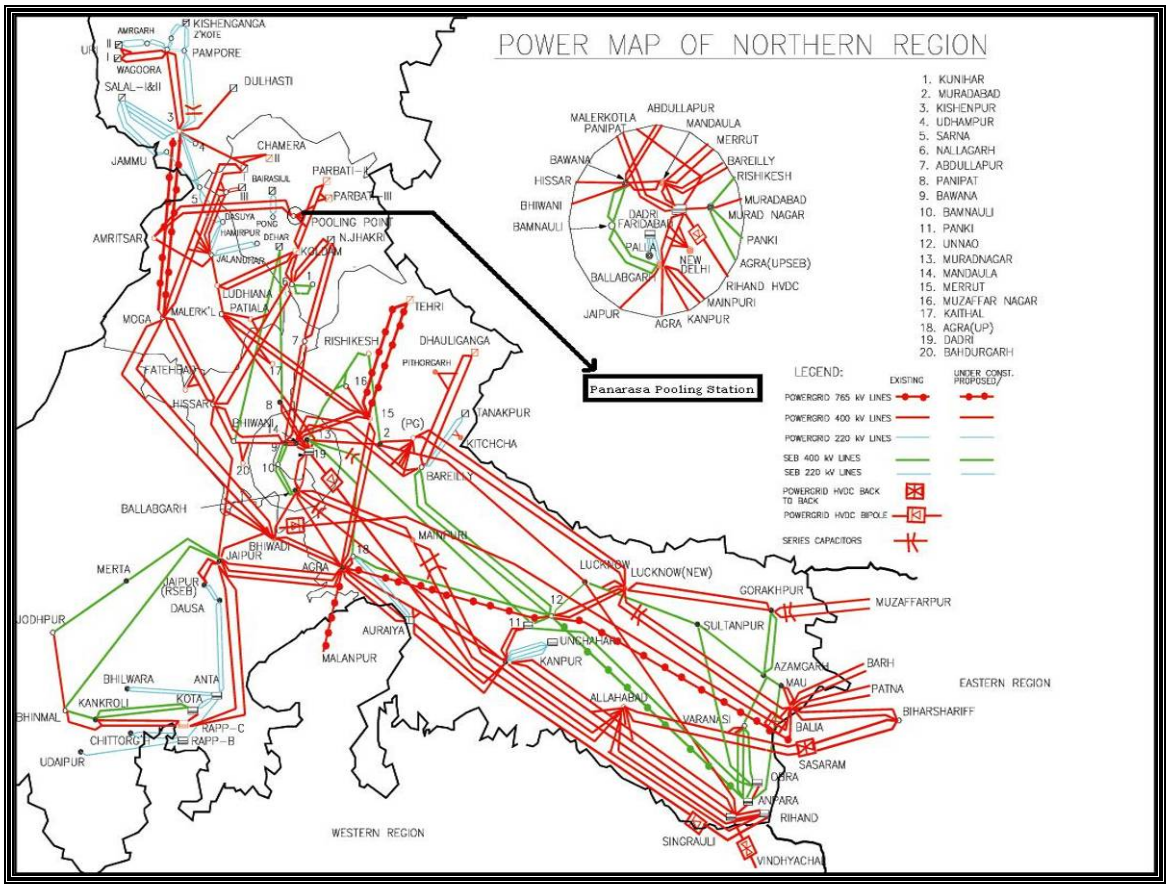
The baseline scenario for the project is the continued production of power from all the grid connected power stations of the Northern Regional Grid of India. According to the methodology ACM0002 Version 07, the baseline emissions are the amount of electricity produced times the grid emission factor which is the Combined Margin (CM), calculated as the simple average of the Operating Margin (OM) emission factor and the Build Margin (BM) emission factor.

The electricity transmission & distribution system in India are divided into five region, Northern, Southern, Eastern, Western, and North Eastern. This project is connected to the Northern Regional Grid, which comprises of the states Delhi, Haryana, Himachal Pradesh, Jammu & Kashmir, Punjab, Rajasthan, Uttar Pradesh, Uttaranchal, and Union Territory of Chandigarh, which shares the Grid Power generated in the area through Northern Regional Grid. This network also obtains proportions of the electricity from the Central sector. The North Regional Load Despatch Centre (NRLDC) of the Power Grid Corporation of India Ltd (PGCIL) is the energy distribution centre, through which the allocated power to each state is transmitted. The purpose of the project activity is to supply clean and environment friendly power to feed the Northern Regional Grid, which will be shared by Northern Regional States through NRLDC. Hence the project boundary has been selected as Northern Regional Grid of India. This also includes the power plants within the region owned by public sector units (PSUs); like National Thermal Power Corporation (NTPC) and National Hydroelectric Power Corporation (NHPC). Under the power sharing formula, the states within the region (and sometimes in other states) share power generated by these PSU plants. These plants are also considered like the plants of the states. The overall power flows are managed by the NRLDC.

## Project Boundary Layout




## Northern Region Grid Layout:



**Application of Baseline Methodology**

As described in the Consolidated Methodology ACM0002, Version 07, the baseline emissions are the amount of electricity produced times the grid emission factor which is the Combined Margin (CM), calculated as the simple average of the Operating Margin (OM) emission factor and the Build Margin (BM) emission factor.

So to calculate the Baseline the following steps has been followed:

1. Calculation of the Operating Margin (OM)
2. Calculation of the Build Margin (BM)
3. Calculation of the Combined Margin (CM)
4. Calculation of the Baseline Emissions

**1. Calculation of the Operating Margin (OM)**

The Approved Consolidated Methodology (ACM) recommends the use of dispatch data analysis as per first methodological choice. However, in India, 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 not available. Also, the merit order dispatch system has not become applicable and is not likely to be so in the crediting period. In view of this, it is proposed to apply other choices as suggested in the ACM0002.

Since the power supplied by low cost/ must-run power plants to the Northern Regional Grid in the last three years ranges from 26% to 29% and is clearly below 50%, it was decided to apply the **Simple OM method** as suggested in ACM0002.

| Selected Years | 2004-05 | 2005-06 | 2006-07 |
|---|---|---|---|
| Low cost/ must-run power plants to the Northern Regional Grid | 26.8% | 28.1% | 27.1% |

*(Source: $CO_2$ baseline database published by Central Electricity Authority)*

In the Simple OM method, the emission factor is calculated as generation weighted average emissions per electricity unit ($tCO_2/MWh$) of all generating sources serving the system, not including low-operating cost and must-run power plants as defined in ACM0002. The data vintage option selected is the ex ante approach, where a 3-year-average OM is calculated based on the most recent Northern grid power production statistics available at the time of the PDD submission (FY 2002/03 – FY 2004/05).

The Central Electricity Authority (CEA) of India has recently published the official emission factors for all regional grids in India, in order to facilitate CDM projects and offer consistent data for all project developers. These official figures are calculated according to the procedures given in ACM0002 and AMS I.D, and are updated yearly. Using these officially published values represents the most accurate approach, and hence was now applied in this project activity.

Values, underlying data and additional information for validation and verification are available at CEA website (www.cea.nic.in), described in Table B1:

**Table B1: Average Operating Margin (OM)**

| Selected Years | 2004-05 | 2005-06 | 2006-07 |
|---|---|---|---|
| Operating Margin (OM) in tonnes $CO_2$ / GWh | 974.48 | 993.65 | 992.02 |
| Average of the Three years in t $CO_2$ / GWh | 986.72 | | |

Source: Carbon Dioxide Baseline Database, Version 3, 15th December, 2007 (www.cea.nic.in)

## 2. Calculation of the Build Margin (BM)

The ACM0002 offers two options: ex ante and ex post determination of the Build Margin (BM). In the ex post determination of the Build Margin the emission factor is required to be updated annually in the first crediting period. It has been observed that the power plants built in the past few years and those expected to be built in the next couple of years are mostly big thermal plants based on coal, diesel or natural gas. It has been observed that the Build Margin emission factors have increased steadily in the past and are likely to continue so in the near future.

In consideration of the above facts, option 1 is selected wherein the Build Margin emission factor is fixed ex ante based on most recent information available on plants already built for the sample group m at the time of PDD submission. 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 those have been built most recently and (b) the capacity additions in the electricity system that comprises 20% of the system generation built most recently. However, here as well, selecting figures officially published by CEA reflects best and accurate practice.

| | |
|---|---|
| Build Margin (BM) | 628.34 tonnes $CO_2$ / GWh |

## 3. 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%. As noted above, the resulting Combined Margin is fixed ex ante for the duration of the crediting period:

$EF_y = W_{OM} \times EF_{OM,y} + W_{BM} \times EF_{BM,y}$

Where
- $EF_y$ Combined Margin Emission Factor determined above
- $W_{OM}$ Weight Operating Margin
- $EF_{OM,y}$ Operating Margin Emission Factor
- $W_{BM}$ Weight Build Margin
- $EF_{BM,y}$ Build Margin Emission Factor

| | | |
|---|---|---|
| Combined Margin (CM) | 807.53 ( For Northern Grid ) | tonnes $CO_2$ / GWh |

## 4. Calculation of the Baseline Emission

The baseline emission in year y is calculated as:

BEy = EFy x EGy

Where BEy is the baseline emission for the year y (Combined Margin)
EGy is the electricity produced by the project activity in year y,
EFy is the baseline emission factor determined above.

**Emission Reduction**

The project activity reduces carbon dioxide through substitution of grid electricity generation with fossil fuel fired power plants by electricity from a renewable source. The emission reductions for a given year are calculated as baseline emissions minus the project emissions and leakage:

ERy = BEy – PEy – Ly

Where ERy is the Emission Reduction for the year y
BEy is the baseline emission for the year y (Combined Margin)
PEy is the Project Emissions
Ly is the Leakage

According to the ACM0002 methodology, the project emissions (PEy) as well as the leakage (Ly) are zero for run-of-river hydro power projects, and therefore the emission reductions (ERy) are equal to the (BEy) baseline emissions:

ERy = BEy = EFy x EGy

**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 CDM project activity (assessment and demonstration of additionality):**

>>

In the absence of the project activity, an equivalent amount of electricity would be produced by other power stations in the Northern Grid of India. The baseline scenario is therefore increased generation in the Northern Grid. This grid is heavily dominated by coal-fired stations, contributing 60.3 % (and total thermal contribution is 71.86 %) (Source: www.cea.nic.in) of the total generation with trends towards further increase. Consequently, the project activity results in displacement of a carbon-intensive grid-mix by electricity from a renewable source.

The project activity is not the baseline scenario, and the emission reductions would therefore not occur in the absence of the project activity, due to the following reasons:

- The project activity is not required by law.
- The project activity is not sufficiently profitable in the absence of CDM revenues, and it faces important geological, institutional and investment barriers.
- The CDM revenues help to reach the benchmark profitability for the project, and to mitigate the institutional and geological risks. In addition, the CDM offers qualitative benefits which help make the project economically attractive. These include (i) potential for increased revenues if CER prices increase above the best-estimate level; (ii) revenues in foreign currency and from credible counterparties, and (iii) entrance in the global carbon market, which is of strategic interest for the project promoters.
- For details on the baseline, please refer to Sections B.2, B.3 & B 4. The following paragraphs describe selected national and sectoral policies and circumstances relevant for additionality assessment.

The project activity is additional compared to baseline scenario, which is discussed by using the "Tool for the demonstration and assessment of additionality - version 03" in the following paragraphs:

**Step 1: Identification of alternatives to the project activity consistent with current laws and regulations**

***Sub-step 1a. Define alternative to the project activity:***

The alternatives available for this project activity which are realistic, credible and provide outputs comparable with this activity are

1) The project activity not undertaken as a CDM project;
2) A gas based power project with equivalent power output;
3) A coal based power project with equivalent power output;
4) Continuation of the current situation in the Northern Grid with no project activity or alternatives undertaken.

**Alternative 1: The project activity not undertaken as a CDM project**

As the project faces various barriers as described in the Barriers Analysis, this alternative cannot be undertaken without CDM consideration.

**Alternative 2: A gas based power project with equivalent power output**

In this scenario, the end users will draw electricity from Northern region grid with inclusive of equivalent capacity of gas based power project. The addition of 100 MW gas based thermal power plant in the Northern Grid increases the amount of $CO_2$ in the atmosphere. Further this

alternative is viable if gas is available as fuel along with the required infrastructure for uninterrupted supply of gas. But this project is located in the remote hilly region where the infrastructure for reliable supply of gas in an uninterrupted manner is not available. So this alternative is not economically viable.

**Alternative 3: A coal based power project with equivalent power output**

In this scenario, the users will draw electricity from Northern region grid with addition of 100 MW capacity of Coal based power project. But again the feasibility of this project is not viable as the availability of coal as fuel at the hilly project site is not practical and cost efficient being located at huge distance from the nearest coal filed and the infrastructure, i.e. road or railway approach at the project site is not available. Hence this alternative also cannot be considered.

**Alternative 4: Continuation of the current situation in the Northern Grid with no project activity**

In this scenario, the present grid mix will continue without any addition of power plant. This option is the most likely alternative in the absence of the project activity.

**Outcome of Step 1a:**

From the above discussions, it is clear that the realistic and credible alternative option to the project activity is:

Alternative 4 – Continuation of the current situation in the northern grid with no project activity.

***Sub-step 1b. Enforcement of applicable laws and regulations:***

The alternative mentioned above is in any way not violating any applicable legal and regulatory requirements.

**Step 2. Investment analysis**

The barriers which increase the amount of investment in the project as listed below:

a) This project activity comes under Seismic Zone IV. So installation of such civil structure on this type of area creates substantive amount of uncertainty. So to make the civil structure earthquake resistant additional investment is essential which makes the project capital intensive than other power plant project.

b) There is no approach road from the locality to project site. So such type of infrastructural development in the project site due to the project activity causes additional investment.

c) Power evacuation system in the hilly project site is absent. So installation of power evacuation system produces additional burden to the project developer.

d) The IRR of the project activity is low from the benchmark value, but increases due to the CER revenue.

All the above barriers are discussed in the Step 3.

**Outcome of Step 2:**

The outcomes of the Step 2 are the followings:

a) The Project is having sufficient amount of Geological Risk and Infrastructural Risk associated with the project development
b) The additional investment required to mitigate those risk make the Project IRR below the benchmark and less attractive.
c) Inclusion of CER revenue will have a positive impact on Project IRR, will make it investment friendly.

**Step 3. Barrier analysis**

Barrier analysis has been undertaken to indicate that the proposed project activity faces some barriers that prevent the implementation of the project activity.

In this step it has been shown that this proposed project activity faces the following barriers:

(a) Prevent the implementation of this type of proposed project activity; and
(b) Do not prevent the implementation of at least one of the alternatives.

***Sub-step 3a. Identify barriers that would prevent the implementation of type of the proposed project activity.***

The following barriers have been identified that would prevent the implementation of this project from being carried out if the project activity were not to be registered as a CDM activity:

**Investment barriers**
The risk associated with this project which intern increase the investment requirements are as follows:

- **High Capital Cost:**

The development of hydro power projects bearing high capital investment, long constructional period, difficult natural condition (like hilly region), hydrological uncertainty, rehabilitation and interstate governmental problem etc. Due to these reasons nearly 20.7% (*source:http://www.cea.nic.in/hydro/Status%20of%20Hydroelectric%20Potential%20Development.pdf)* of total hydro power potential is explored in India. Further, the hydro power having low operation and maintenance cost during it's operation times and most favorable alternative for peak hour generation.

**Table B2: Typical capital costs for power projects in India**

| Type of power project | Capital Cost (USD Mn / MW) |
|---|---|
| Gas based | 0.88 |
| Coal based | 0.88 |
| Wind | 1.01 |
| Co-generation | 0.99 |
| Malana – II HEP | 1.397 (6.33*10 / 45.33) |

@ USD 1= INR 45.33 (source: IDFC Research, Power line)

- **Low return on the investment**:

Total cost of setting up of the project is estimated at Rs.633.47 Crores. The project is funded by way of term loan to an extent of 70% and share capital to an extent of 30%.

IRR for the project activity without CDM revenue is 12.5%. The project IRR has been increased to 16.8% considering CDM revenue. This is compared to the bench mark value of 14% (*Source: Central Electricity Regulatory Commission (CERC); Power Policy 2003*) indicating that CDM revenues enable the project to achieve bench mark return on investment. Therefore it is evident that the project is not the baseline scenario and attractive only with CDM revenues.

- **Geological Risk:**

The project is located in the lesser Himalayan within the Banjar and Jutogh formations. The factors that add burden to investment is as follows:

- The dam complex and part of Head Race Tunnel fall within the Kullu and Khamrada member of Jutogh Formation. The Jutogh and the Banjar formation are separated by a regional tectonic feature known as the Jutogh thrust. This project activity comes under Seismic Zone IV. So the installation of such multi Billion project on this type of seismic zone is a very risky affair and very much prone to demolition of civil structure due to earthquakes.

- The 4.5 km long Head Race Tunnel will go through a 1.5 km very poor tunnelling strata which need higher support for maintaining stability. These will increase the overall project cost.

- The proposed powerhouse is underground in nature. The power house complex will be excavated in very strong rock structure which is abrasive in nature. Drilling in this rock structure will result high wear and tear for drill bits which increases the drilling cost.

- The approach road from the power house to the dam site has been excavated across steep escarpment. All these zones would be unstable during monsoons and will need regular treatment and maintenance for which extra investment is required.

- The project requires approximately 12 km new motorable road construction to connect the wire and power site. This road also helps the local inhabitant of Malana Village (Total population approx. 2000 people) to get connected with the main stream of the state.

➢ **Power Evacuation System:**

This project is located at the hilly region and surrounded by the forest also. The generated power is fed into Power Grid Corporation of India Limited (PGCIL) sub-station at Panarsa. This sub-station is under Northern Grid. So the project proponent has to set up 38 Km long 220 KV transmission line which automatically produces a burden to the project developer. Further the transmission and distribution line lies in hilly region. So this infrastructural development to set up this transmission line in hilly region requires comparatively higher investment than as usual.

**Policy related barriers**

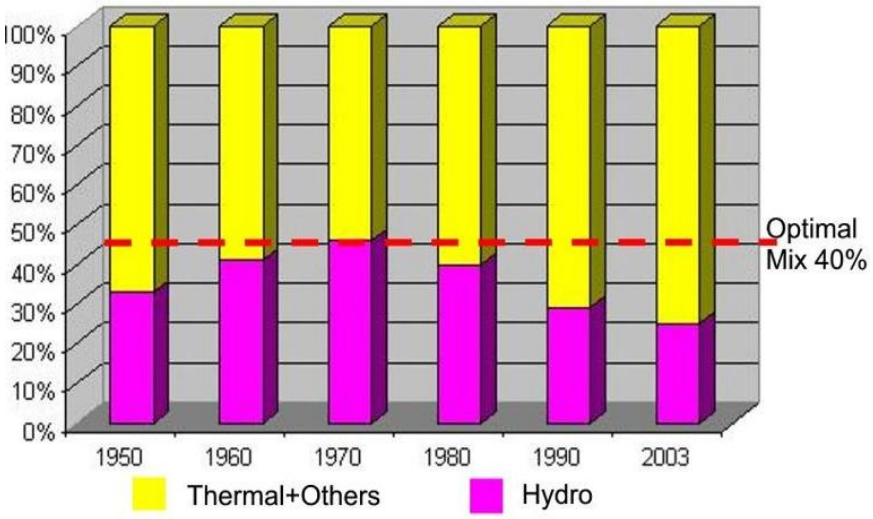
➢ **Evaluation of the Prevailing Practise in Indian Power Planning:**

The investment and development plan in Indian power sector is dominated by medium and large scale power plants mainly based on coal based thermal power technology. This has further strengthens by easy availability of finances, economy of scale and high returns for thermal power stations based on coal. The table below shows that the domination of coal based thermal power in National Planning process during last 50 years. It also shows how the share of Hydro power is constantly declining in the national planning allocation during the last 40 years.

**Table B3: Share of Energy Generation according to Five Year National Plan**

| National Plan | Thermal (%) | Hydro (%) | Others (Nuclear & Wind) (%) |
|---|---|---|---|
| 1st Five Year Plan | 65 | 35 | 0 |
| 3rd Five Year Plan | 54 | 46 | 0 |
| 5th Five Year Plan | 57 | 41 | 2 |
| 7th Five Year Plan | 69 | 29 | 2 |
| 9th Five Year Plan | 71 | 25 | 4 |

Further more it has been observed that the differences between planned hydro power development and actual achievement has been increased severely causing a substantial drop of hydro power mix in Indian grid energy, leads to various techno commercial problem in demand side management, which affects the quality and reliability of the power supply. The following table shows how the share of hydro power is constantly declining during last 40 years in India.




*(Sources: http://ntpckoldam.nic.in/scenario.htm)*

The percentage of targeted hydro power generation achieved was lower across the central, state and private sector initiatives than that of thermal power. It has also been observed that percentage of targeted hydro power generation achieved through private sector participation is less than half than that of thermal power.

- **National Perspective on Power Supply**

The Ministry of Power (MoP), Government of India has set an agenda of providing power for all by the year 2012. To meet the present national deficit of 12.2 % and to achieve the above target, about 100,000 MW of new capacity needs to be added by the end of 2012 to the existing installed capacity of 107,583 MW (source: www.cea.nic.in). In line with the Five Year Plan system being followed by the Planning Commission of India, the MoP decided to add about 46,000 MW during the period 2002-2007 and about 61,000 MW during the period 2008-2012. Emphasis has been laid on setting up large pithead stations to avoid high costs associated with transporting high ash bearing Indian coal and over-straining the already stretched rail network.

At the start of the power sector reforms during the early nineties, huge private sector investments were expected in the power sector. However, actual participation from the private sector has been very poor, for various reasons. A number of measures have been taken by the National government from time to time to encourage investments in the power sector.

The Electricity Act 2003 approved by the Parliament, has provisions for removal of licensing requirements for power projects except hydro, open access system in transmission and distribution, entry of the private sector into the distribution sector, phasing out cross subsidies, encouraging power trading, defining regulator responsibilities and stringent anti-theft controls. The Union Budget 2003 with an objective of creating a more conducive environment for

investments in the power sector and continued power sector reforms, offered incentives for the power sector such as extension of the "Mega Power Policy" to all projects above 1000 MW (thermal) and 500 MW (hydro) capacities. The features of this policy are waiver of customs duty (normally 21.8%) as well as excise duty on all project imports, relaxation of sales tax, tax holiday for 10 years and quicker clearances. As a result, capital costs of projects are likely to decline by a significant 15%, which would translate into lowering the fixed cost component and ultimately reducing the cost of generation. Some specific measures are:

1. Reduction in duty for high voltage transmission equipment from the previous 25% to 5%.
2. Reduction in import duty on LNG equipment from previous 25% to 5%
3. Complete exemption from import duty on capital goods for water treatment for power plants.
4. In view of the above initiatives it is expected that more investments will flow into large power projects rather than to small power projects.

- **National policy on Coal, Lignite, Oil and Natural Gas**

To push forward the power sector reforms further, the Government of India has opened up the coal sector for private participation. Captive coal mining is allowed by the Ministry of Coal to facilitate coal mining by power generating units for their fuel needs. In addition, coal imports are allowed for power projects. This has significantly strengthened the preference of the private sector for coal-based mega power projects over other energy sources.

The Government of India has also opened oil and natural gas exploration for private sector participation. In the oil and natural gas sector, both central sector and private sector organisations are involved and already exploring the potential available in India. The discovery of new reserves is not significant enough to meet the increasing demand for natural gas. As yet the natural gas consumption is limited to a small extent and significant investments are required for natural gas infrastructure. Hence, the natural gas contribution to the installed capacity is expected to be small during the crediting period.

**Barriers due to prevailing practices**

- There are only 6 numbers small (<25 MW) hydropower stations and 12 numbers of Large Hydro Unit of having generating capacity more than 25 MW in the Himachal Pradesh state are in operation. Further in case of Northern Region Grid there are only 17 numbers small (<25 MW) and 43 numbers of Large Hydro Unit of having generating capacity more than 25 MW (Total list is attached to ANNEX – 3 and its source is www.cea.nic.in)
- Most of the projects are owned and operated by the public sector, and were mostly commissioned well before the year 2000. Since then, there has been a clear trend towards thermal generation and, as far as hydropower is concerned, large stations exceeding 100 MW.

**Outcome of Step 3a:**

The outcomes of Step 3a are as follows:

- The project becomes capital intensive due to long constructional period, adverse natural condition and other associated reasons. Further this project activity belongs to 'Seismic Zone IV'. So to mitigate this risk and make the civil structure earthquake resistant additional investment is required.
- The generated power is fed into Power Grid Corporation of India Limited (PGCIL) sub-station at Panarsa. So high voltage transmission line is also set up which automatically produces a financial burden.
- The investment in power plant in Indian power sector is dominated by coal based thermal power technology. This domination of coal based thermal power is reflected in National Planning process during last 50 years. It also shows that the share of Hydro power is constantly declining in the national planning allocation during the last 40 years.
- In Himachal Pradesh 6 numbers small and 12 numbers of large hydropower stations are operating. Further the involvement of private player in Northern Grid is very low due to different difficulties faced by them.

**Step 4. Common Practice analysis**

Malana- II hydro power project is one of the large hydro power projects in the Northern Grid and this 100 MW project is promoted by private developer. From total power plants data list (www.cea.nic.in) it is clearly showed that the share of private player in Northern Grid is only 3.33% and 5.97% in total India.

**STATUS OF HYDRO ELECTRIC POTENTIAL DEVELOPMENT**
In terms of installed capacity (As on 31.3.2007)

| Region/ State | Identified Capacity as Region / State per reassessment study) | Capacity Developed | | Capacity under construction | | Capacity Developed + Under Development | | Capacity yet to to be developed | |
|---|---|---|---|---|---|---|---|---|---|
| | (MW) | (MW) | % | (MW) | % | (MW) | % | (MW) | % |
| NORTHERN | | | | | | | | | |
| J&K | 14146 | 1864.2 | 13.18 | 899.9 | 6.36 | 2763.2 | 19.53 | 11382.9 | 80.47 |
| **HP** | 18820 | 6073.5 | 32.27 | 4361 | 23.17 | 10434.5 | 55.44 | 8385.6 | 44.56 |
| Punjab | 971 | 1297.7 | 100 | 0 | 0 | 1297.7 | 133.64 | 0.00 | 0.00 |
| Haryana | 64 | 62.4 | 97.5 | 0 | 0 | 62.4 | 97.5 | 1.6 | 2.50 |
| Rajasthan | 496 | 430 | 86.69 | 0 | 0 | 430 | 86.69 | 66 | 13.31 |
| Uttaranchal | 18175 | 2752.1 | 15.14 | 2574 | 14.16 | 5329.1 | 29.3 | 12849 | 70.70 |
| Uttar Pradesh | 723 | 510.2 | 70.57 | 0 | 0 | 510.2 | 70.57 | 212.8 | 29.43 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Sub Total NR | 53395 | 12389.9 | 24.33 | 7834 | 14.67 | 20823.9 | 39.0 | 32571.1 | 62.00 |
| Sub Total WR | 8928 | 5261.8 | 58.94 | 920 | 10.3 | 6181.8 | 69.24 | 2746.2 | 30.76 |
| Sub Total SR | 16458 | 9028.8 | 54.86 | 837 | 5.09 | 9865.8 | 59.95 | 6592.3 | 40.05 |
| Sub Total ER | 10949 | 2389.4 | 21.82 | 1111 | 10.15 | 3500.4 | 31.97 | 7448.7 | 68.03 |
| Sub Total NER | 58971 | 1202.7 | 2.04 | 2744 | 4.65 | 9646.7 | 6.69 | 55024.3 | 93.31 |
| **ALL INDIA** | 148701 | 30872.5 | 20.76 | 13446 | 9.04 | 44318.5 | 29.8 | 104382.5 | 70.2 |

(Source:http://www.cea.nic.in/hydro/Status%20of%20Hydroelectric%20Potential%20Development.pdf)

The main reason behind the lack of private participation is due to the difficulties in arranging fund for their project. Financial Organizations are not investing their money in the hydro power sector due to large amount of uncertainty in the project execution, low rate of return etc.

From the above table it is clear that nearly 71% of the total potential is yet to be developed in India. The same situation is observed in Himachal Pradesh also. Here 45% of the total potential in HP is yet to be developed.

The above analysis clearly indicates that hydro power projects are not the common practice in India. Further these type of projects are able to attract the private developers in India.

## B.6. Emission reductions:

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

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The proposed project comprises run-of-the-river hydro electric project with reservoir, and will supply power to the Northern Region Grid which is now mostly fed by thermal power plants with further future plans for fossil fuel based generating projects. Thus, the project comes under the methodology which is applicable to grid-connected renewable power generation project activities under the following conditions:

- New Hydro-Electric Power Projects with reservoirs having power densities (installed power generation capacity divided by the surface area at full reservoir level) greater than 4 $W/m^2$.

Therefore, the applicable baseline is "Consolidated Baseline Methodology for Grid-connected electricity Generation from Renewable Sources" - ACM 0002 / Version 07/ Sectoral Scope 1, December 14, 2007".

For Northern Region Grid, the calculated Baseline Emission Factor (Combined Margin) is 807.53 $tCO_2$/GWh, the Average Operating Margin is 986.72 $tCO_2$/ GWh calculated based on a three year average operating margin (OM) and the Build margin is 628.34 $tCO_2$/ GWh based on the data from Central Electricity Authority (CEA) publication of "$CO_2$ Baseline Database for Indian Power Sector", User Guide, Version 3, published in 15th December, 2007.

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

| **Data / Parameter:** | EGy |
|---|---|
| Data unit: | MWh |
| Description: | Electricity supplied to the grid by the project activity. |
| Source of data used: | Malana II HEP reports / Invoice records |
| Value applied: | Directly measured. |
| Justification of the choice of data or description of measurement methods and procedures actually applied : | This data is measured from the meter and is collected on hourly basis. The total data is electronically archived.<br><br>Recording frequency: Directly measured |
| Any comment: | Meter installed at the switchyard would accurately monitor electricity supplied to the grid. Invoice details of this sale to various customers could also be used for cross-checking the data. |

| **Data / Parameter:** | EFy |
|---|---|
| Data unit: | $tCO_2$/ MWh |
| Description: | $CO_2$ emission factor of the grid |
| Source of data used: | Baseline Carbon Dioxide Emission Database/ Version 3.0 dated 15th December, 2007, as published by Central Electricity Authority of Government of India |
| Value applied: | 0.8075 |
| Justification of the choice of data or description of measurement methods and procedures actually applied : | Information available from Central Electricity Authority of Government of India has been used. The same is calculated as a weighted sum of Operating margin emission factor and Build Margin emission factor as per step 3 in ACM0002.<br>Recording frequency – Once at the time of the submission of PDD. |
| Any comment: | Total data is electronically archived. |

| **Data / Parameter:** | $EF_{OM},y$ |
|---|---|
| Data unit: | $tCO_2$/ MWh |
| Description: | $CO_2$ Simple Operating Margin emission factor of the grid |
| Source of data used: | Baseline Carbon Dioxide Emission Database/ Version 3.0 dated 15th December, 2007, as published by Central Electricity Authority of Government of India |
| Value applied: | 0.9867 |
| Justification of the choice of data or description of measurement methods and procedures actually applied : | Calculated as step 1 of ACM0002, a 3-year average, based on the most recent statistics available at the time of the PDD submission.<br><br>Recording frequency – Once at the time of PDD submission. |
| Any comment: | The total data is electronically archived. |

| **Data / Parameter:** | $EF_{BM},y$ |
|---|---|
| Data unit: | $tCO_2$/ MWh |
| Description: | $CO_2$ Build Margin emission factor of the grid |
| Source of data used: | Baseline Carbon Dioxide Emission Database/ Version 3.0 dated 15th December, 2007, as published by Central Electricity Authority of Government of India |
| Value applied: | 0.6283 |
| Justification of the choice of data or description of measurement methods and procedures actually applied : | Information available from Central Electricity Authority of Government of India has been used. The Build Margin emission factor is based on the most recent information available on plants already built at the time of PDD submission.<br><br>Recording frequency – Once at the time of the PDD submission. |
| Any comment: | The total data is electronically archived. |

| **Data / Parameter:** | Plant Name |
|---|---|
| Data unit: | Text |
| Description: | Name of the plant |
| Source of data used: | Identification of power sources / plants for the OM |
| Value applied: | Malana – II Hydro – Electric Power Project (Malana – II HEP) |
| Justification of the choice of data or description of measurement methods and procedures actually applied : | Identification of the power plant for simple OM<br><br>Recording frequency – At the time of Simple OM calculation, Once at the time of the PDD submission. |
| Any comment: | The data is estimated and electronically archived. |

| **Data / Parameter:** | Plant Name |
|---|---|
| Data unit: | Text |
| Description: | Name of the plant |
| Source of data used: | Identification of power sources / plants for the BM |
| Value applied: | Malana – II Hydro – Electric Power Project (Malana – II HEP) |
| Justification of the choice of data or description of measurement methods and procedures actually applied : | Identification of the power plant for BM<br><br>Recording frequency – At the time of BM calculation, Once at the time of the PDD submission. |
| Any comment: | The data is estimated and electronically archived. |

| **Data / Parameter:** | Area |
|---|---|
| Data unit: | $M^2$ |
| Description: | Surface area of full reservoir level |
| Source of data used: | Project DPR |

| | |
|---|---|
| Value applied: | 3.5 hector |
| Justification of the choice of data or description of measurement methods and procedures actually applied : | This data is measured directly.<br><br>Recording frequency – Once at the time of the PDD submission. |
| Any comment: | As per survey and design estimation of the project |

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

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With reference to ACM0002 ver 6, emission reductions are estimated as under

*STEP 1: Calculation of Electricity Baseline Emission factor:*

The electricity baseline emission factor is calculated from the Operating Margin emission factor (*EFOM,y*) and the Build Margin emission factor (*EFBM,y*). The electricity baseline emission factor is the weighted average of the Operating Margin emission factor (*EFOM,y*) and the Build Margin emission factor (*EFBM,y*) .
The applied value of the Operating Margin emission factor and Build Margin emission factor is taken from the section B.4.

So, $EF_y = W_{OM} \text{ X } EF_{OM,\,y} + W_{BM} \text{ X } EF_{BM,\,y}$

Where
EFy = Combined Margin emission factor
$W_{OM}$ = Weight Operating Margin
$EF_{OM,\,y}$ = Operating Margin Emission Factor = 986.72 tonnes $CO_2$ / GWh
$W_{BM}$ = Weight Build Margin
$EF_{BM,\,y}$ = Build Margin Emission Factor = 628.34 tonnes $CO_2$ / GWh

Where the weights $W_{OM}$ and $W_{BM}$, by default, are 50% (i.e., $W_{OM} = W_{BM} = 0.5$)

So, $EF_y = 0.5 \text{ X } 986.72 + 0.5 \text{ X } 628.34 = 807.53$ tonnes $CO_2$ / GWh
Further the baseline emissions in year y are calculated as

BEy = EFy x EGy

Where
BEy is the baseline emission for the year y (Combined Margin)
EGy is the electricity produced by the project activity in year y,
EFy is the baseline emission factor determined above.

So, BEy = 807.53 X 428 = 345, 622 tonnes $CO_2$

The project activity reduces carbon dioxide emission through substitution of fossil fuel based grid electricity by a renewable electricity source. The emission reductions for a given year are calculated as the difference of baseline emissions with the project emissions and leakage:

So, ERy = BEy – PEy – Ly

Where ERy is the Emission Reduction for the year y
BEy is the baseline emission for the year y (Combined Margin)
PEy is the Project Emissions
Ly is the Leakage

According to the ACM0002 methodology, the project emissions (PEy) as well as the leakage (Ly) are zero for run-of-river hydro power projects, and therefore the emission reductions (ERy) are equal to the (BEy) baseline emissions:

Therefore, ERy = BEy = EFy x EGy = 345, 622 tonnes $CO_2$

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

>>

The project is expected to reduce 345, 623 tonnes of $CO_2$ per year over the crediting period of 2009 to 2019. This value is based on the projected Net power generation of 428 GWh / year and a Combined Margin emission factor of 807.53 t $CO_2$ / GWh.

**Table B 4 : Summary of the Estimated Emission Reduction**

| Year | Expected Generation at 90% dependable year (MU) | Baseline Emission ($tCO_2$/ GWh) | Equivalent Emission Reduction ($tCO_2$ / MU) | Annual Estimation of Emission Reduction in ($tCO_2$) |
|---|---|---|---|---|
| 2009-2010 | 428 | 807.53 | 807.53 | 345, 622 |
| 2010-2011 | 428 | 807.53 | 807.53 | 345, 622 |
| 2011-2012 | 428 | 807.53 | 807.53 | 345, 622 |
| 2012-2013 | 428 | 807.53 | 807.53 | 345, 622 |
| 2013-2014 | 428 | 807.53 | 807.53 | 345, 622 |
| 2014-2015 | 428 | 807.53 | 807.53 | 345, 622 |
| 2015-2016 | 428 | 807.53 | 807.53 | 345, 622 |
| 2016-2017 | 428 | 807.53 | 807.53 | 345, 622 |
| 2017-2018 | 428 | 807.53 | 807.53 | 345, 622 |
| 2018-2019 | 428 | 807.53 | 807.53 | 345, 622 |
| **Total Emission Reduction in the full Crediting Period** | | | | 3,456,220 |
| **Total Number of Crediting Years** | | | | 10 |

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

### B.7.1 Data and parameters monitored:

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

| | |
|---|---|
| **Data / Parameter:** | Amount of electricity sale |
| Data unit: | Million Unit (MU) |
| Description: | Amount of electricity supplied to the Northern Region Grid by the project. |
| Source of data to be used: | Energy Meter |
| Value of data applied for the purpose of calculating expected emission reductions in section B.5: | These data will be directly used for calculation of emission reductions. Sales record to the grid and other records are used to ensure consistency. |
| Description of measurement methods and procedures to be applied: | The data is collected directly from the energy meter and it is cross-checked from the electricity bill send by power grid corporation. Meter reading of the of the Main Meters and Check Meters installed at the Inter-connection Point shall be taken as at 24:00 hours on each day and the data furnished by the company to the Power Trading Corporation . |
| QA/QC procedures to be applied: | Each Meter shall be of static type of 0.2% accuracy class confirming to latest IEC-687 and shall meet the requirements of IEGC. One complete spare set of tested, calibrated and sealed Meters shall be kept in safe custody of the Company. All such Meters shall be sealed in the presence of the CTU, PTC and the Company, which seal shall remain intact unless it is broken by the Testing Laboratory for testing and calibration. |
| Any comment: | Electricity meters would be properly maintained with regular testing and calibration schedules developed as per the technical specification requirements to ensure accuracy. |

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

>>

EPPL will form an operational and management structure in order to monitor emission reductions due to project activity. A particular unit will be responsible for the monitoring and recording of the electricity supplied as per the monitoring plan. All the experienced technicians with 5-10 years of experience in operating power generation equipment, will be responsible for this and the monthly monitoring reports will be checked and discussed with the plant manager, who is a qualified engineer with 10-15 years of experience. In case of any irregularity observed, immediate action will be taken. The energy generation reports prepared by the plant manager will be further submitted to the Management on monthly basis.

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

>>

The information on power plants included in the project boundary is available in the public domain on the websites of Central Electricity Authority (www.cea.nic.in), Ministry of Power (www.powermin.nic.in), Government of India.

**Date of completing this baseline study: 18/09/2007**
**Name of person / entity determining the baseline:**
Mr. Samrat Sengupta, Sr. Manager
**Energy Infratech Private Limited.**

**Contact information of the above entity is furnished below:**

| | |
|---|---|
| Organization: | Energy Infratech Private Limited |
| Street/P.O. Box, | 145-146, Udyog Vihar, Phase - IV |
| City: | Gurgaon |
| State/Region: | Haryana - 122015 |
| Country: | India |
| Telephone: | +91-124-4341617 (D) |
| Fax: | +91-124-4356747 |
| Mobile: | +91-9818025744 |
| Email: | ssengupta@eruditee.com |
| Represented By: | |
| Last Name: | Sengupta |
| Middle Name: | |
| First Name: | Samrat |
| Designation: | Senior Manager (CDM & Carbon Trading) |

## 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:

>>

1st January, 2006

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

>>

40 Years

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

The project has chosen a fixed crediting period

#### C.2.1. Renewable crediting period

Not Applicable

##### 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:

10 Years (April 2009 to March 2019)

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

>>

April 01, 2009

##### C.2.2.2. Length:

>>

10 Years

## SECTION D. Environmental impacts

>>

### D.1. Documentation on the analysis of the environmental impacts, including transboundary impacts:

>>

Under the requirement of the regulatory framework on India, the project has carried out comprehensive Environmental Impacts Study of the project area during its construction and operation phase and develops a suitable Environmental Management Plan (EMP) to mitigate the impacts to its minimum level. The detailed Environmental Impact Assessment (EIA) studies were completed after obtaining the "site clearances" of the project from Ministry of Environment and Forest, Government of India, and submitted to the Himachal Pradesh Paryavaran Protection and Pollution Control Board (HPPPPCB), who after being satisfied, convened a Public Hearing on May 18th & 19th, 2004. **The Public Hearing was successfully completed and on Government of Himachal Pradesh's recommendation, the Ministry of Environment & Forests, Government of India, has approved the EIA on 21st June 2005, vide letter no: J - 12011/21/2005-IA-I.**

Various other statutory and regulatory clearances are obtained as described below in the context of Environment:

- No Objection Certificate (NOC) from Irrigation & Public Health Department of Government of Himachal Pradesh
- No Objection Certificate (NOC) from Himachal Pradesh Paryavaran Protection and Pollution Control Board (HPPPCB)
- Diversion of Forest Land from Ministry of Environment & Forests, Government of India

**The Study Area for the EIA study is briefly described below:**

| | |
|---|---|
| 1. Upstream of the Dam Site | 7 Km on either side from the periphery of the reservoir submergence |
| 2. Downstream of the Dam Site | 7 Km on either side of the river up to the Power House |
| 3. Catchment Area | Rivers draining into the reservoir |

The mitigation or enhancement measures in this project as found appropriate to the nature of impacts are stated below:

- Environmental Management during construction phase
- Compensatory afforestation for the loss of forests land and cost of trees and NPV for loss of environmental values
- Maintenance of water quality

- Wildlife conservation
- Air pollution control
- Sustenance and enhancement of fisheries potential
- Greenbelt development
- Roadside Plantation
- Biodiversity conservation
- Public health delivery system
- Catchment area treatment plan
- Muck management plan
- Reservoir Rim Treatment Plan
- Forest protection plan
- Disaster Management Plan

**A summary of impacts and proposed measures along with the implementing agencies is given below:**

**Summary of Impacts, suggested management measures and implementing agency**

| SL. No. | Parameters | Impact | Management Measures | Implementing Agency |
|---|---|---|---|---|
| **1.** | **Land Environment** | | | |
| | **Construction phase** | • Soil erosion due to the extraction of construction material from various quarry sites. | • Proper treatment of quarry site with muck, re-vegetation. etc. | • EPPL |
| | | • Increase in turbidity in the river downstream of dam and power house sites | • Proper collection and disposal of construction spoils. | • EPPL |
| | | • Creation of stagnant water pool in the dry stretch of river. | • Minimum flow of water to avoid the stagnation of water. | • EPPL |
| | | • Generation of muck due to tunnelling operations & roads. | • Disposal at designated sites and provision of suitable check dams. | • EPPL |
| | **Operation phase** | • Acquisition of forest and pasture lands. | • Compensatory afforestation has been suggested. | • Forest Department/ EPPL |

| SL. No. | Parameters | Impact | Management Measures | Implementing Agency |
|---|---|---|---|---|
| | | • Increased incidence of water- related diseases and other health problems | • Development of dispensary, first- aid, post spraying of insecticides, etc. | • EPPL & District Public Health Department |
| | | • Generation of solid wastes from labour camps/colonies. | • Disposal at Designated landfill site. | • EPPL |
| **2.** | **WATER RESOURCES** | | | |
| | **Operation phase** | • River stretch from dam site to tail race outfall will have reduced flow during lean season. | • Minimum flow will be released to maintain the riverside ecology & dilution of domestic effluent. | • EPPL |
| | | • Siltation and sedimentation of reservoir storage. | • Catchment Area Treatment | • Forest Department |
| **3.** | **WATER QUALITY** | | | |
| | **Construction phase** | • Water pollution due to disposal of sewage from labour colonies. | • Provision of community toilets<br>• Provision of septic tanks & absorption trenches for treatment of effluents from labour camps.<br>• Minimum flow will be released. | • EPPL |
| | **Operation phase** | • Deterioration of water quality in the dry stretch of river due to reduced flow during the lean season. | • Provision of Aerated lagoon | • EPPL |
| | | • Disposal of sewage from project colony. | | • EPPL |
| | | • Eutrophication | • Eutrophication risks | |

| SL. No. | Parameters | Impact | Management Measures | Implementing Agency |
|---|---|---|---|---|
| | | problems. | are minimal, hence, specific management measures are not required. | |
| **4.** | **TERRESTRIAL FLORA** | | | |
| | **Construction phase** | • Cutting of trees for meeting fuel wood requirements by labour. | • Provision of community kitchen by the contractors engaged in project construction. | • Project Contractor/ EPPL |
| | **Operation phase** | • Acquisition of 33.72362ha of forest and pasture land for various project appurtenances<br>• Acquisition of 17.69 ha of forest land for alignment of transmission line. | • Compensatory afforestation as per the Indian Forest Conservation Act (1980) | • Forest Department |
| **5.** | **TERRESTRIAL FAUNA** | | | |
| | **Construction phase** | • Disturbance to wildlife due to operation of various construction equipments. | • No major wildlife is found, hence, impact is not expected to be significant. | |
| | **Operation phase** | • Disturbance to wildlife due to increased accessibility in the area. | • No major wildlife is found, hence impact is not expected to be significant. | |
| **6.** | **AQUATIC ECOLOGY** | | | |
| | **Construction phase** | • Marginal decrease in aquatic productivity due to increased turbidity and lesser light penetration. | • Marginal impact, hence no specific management measures are suggested. | |
| | **Operation phase** | • Obstruction in the path of migratory fishes. | • Development of hatchery for artificial seed production and | • Department of Fisheries, Govt. of Himachal |

| SL. No. | Parameters | Impact | Management Measures | Implementing Agency |
|---|---|---|---|---|
| | | | stocking of reservoir & river stretch | Pradesh. |
| | | • Profiling of species adapted to the lacustrine environment. | • Release of minimum flow (0.5 cumecs). | • EPPL |
| | | • Drying of river stretch downstream of dam up to tail race outfall | • Release of minimum flow | • EPPL |
| 7. | **NOISE ENVIRONMENT** | | | |
| | **Construction phase** | • Increase in noise levels due to operation of various construction equipments. | • Marginal impact, hence no management measures are suggested. | |
| 8. | **AIR ENVIRONMENT** | | | |
| | **Construction phase** | • Increase in air pollution due to use of machinery and other civil activities. | • Cyclones will be provided near the power house site and crushers. | • Project contractor/ EPPL |
| 9. | **SOCIO-ECONOMIC ENVIRONMENT** | | | |
| | **Construction phase** | • Increase in employment potential. | | |
| | | • Acquisition of land for alignment of transmission lines submergence and other project appurtenances. | • Compensation as per applicable norms | • EPPL |
| | **Operation phase** | • Increased power generation | | |
| | | • Greater employment opportunities. | | |

About 1.1741 ha of private land in village Malana needs to be acquired. About 35-40 families are likely to lose land. Adequate compensation @ Rs. 1 million/ ha is proposed to be paid and also 14% registration fees has been taken into consideration. Thus, total amount of approximately Rs. 1.338 million needs to be earmarked for compensation in lieu of acquisition of private land for various project activities.

The total expenditure on land acquisition works out to about Rs. 4.81 million.

For the affected population, the following rehabilitation measures have been suggested:

- Construction of permanent Hospital building at Malana village;
- Construction of storage tank for drinking water at Malana village;
- Strengthening of the existing pathway between Malana village and the dam site;
- Construction of the community toilets in Malana village;
- Renovation of the existing building of Malana Gram Panchayat;
- Construction of sarai for pilgrims to Malana village;
- Promotion of cable network into the village premises;
- Necessary training facilities shall be provided for development of entrepreneurship to take up self-employment projects as part of R&R benefits. For the purpose of creating self-reliance and economic independence among the PAFs, certain economic activities are suggested. Some training options are Bamboo Furniture Making, Dhaba & Restaurant, Fruit & Vegetable shop, Horticulture, Minor Forest Product, Piggery, Poultry, etc. It is also suggested that the project authority makes a sincere effort in this direction;
- One member from each household would be imparted Vocational Training at the project cost to avail training for development of entrepreneurship to take up self-employment projects at the resettlement zone as part of R&R benefits.

An independent Environmental Management group shall be developed at the project site by the project proponent. The task of the group will be to coordinate specific studies to carry out environmental monitoring and to evaluate implementation of environmental mitigatory measures. One Environmental Officer can be posted at the project site who would report to the project in-charge. The Environment Officer would report to the appropriate authority having adequate power to implement the required measures. The other responsibilities include liaison with relevant departments at the state Government level for effective implementation of the Environmental Management Plan.

**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:**

>>

The environmental impacts as envisaged through the study of EIA for the project construction and operation stage in the project area, has not been substantial and alarming. The design of the EMP has been taken into consideration of all possible mitigative measures to minimize the impacts.

## SECTION E. Stakeholders' comments

>>

Proposed project activity is a large scale hydro power project and has drawn attention of a large section of stakeholders. But as it is a run-of-river project there is no major resettlement and rehabilitation issues involved. But taking on the social responsibility, the project proponent has completed the social impact survey with the help of the consultants along with stakeholders' participations from the society.

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

>>

The mandatory Public Hearings according to Notification No. SO-318 (E) dated 10-04-1997 issued by the Ministry of Environment & Forests, Govt. of India as a requirement for the Environmental Clearance which will also be granted by the Ministry of Environment & Forests, Government of India, were convened by the HP State Environmental Protection & Pollution Control Board near the dam site in Ochin area in village Malana. District Kullu, (H.P.) on 18'h May, 2004. Besides the common people of the project area the public hearing has been attended by experts and officials from Department of Science & Technology, Government of India, District Collector, Fisheries Department of Himachal Pradesh State Government, Himachal Pradesh State Electricity Board, Himachal Pradesh State Pollution Control Board, Group of Senior Citizen, various Gram Panchayat (village administration).

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

>>

The detailed of the comments received and response has been document and is attached separately.

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

>>

The detailed of the comments received and response has been document and is attached separately.

## Annex 1

## CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

| | |
|---|---|
| Organization: | Everest Power Private Limited |
| Street/P.O.Box: | Sushant Lok, Phase – I |
| Building: | A-297 |
| City: | Gurgaon |
| State/Region: | Haryana |
| Postfix/ZIP: | 122 002 |
| Country: | India |
| Telephone: | +91 (0) 124 4356758 |
| FAX: | +91 (0) 124 4356757 |
| E-Mail: | eppl@sify.com |
| URL: | |
| Represented by: | Everest Power Private Limited |
| Title: | Director |
| Salutation: | |
| Last Name: | Jamwal |
| Middle Name: | |
| First Name: | Sudhir Singh |
| Department: | |
| Mobile: | +91 9810137430 |
| Direct FAX: | +91 124 4356757 |
| Direct tel: | +91 124 4356775 |
| Personal E-Mail: | jamwal_ssc@yahoo.com |

## Annex 2

**INFORMATION REGARDING PUBLIC FUNDING**

(Sanction Letter from all the Banks is attached separately)

## Annex 3

## BASELINE INFORMATION

### Calculation of Operating Margin Emission Factor

The following table gives a step by step approach for calculating the Simple Operating Margin emission for Northern Regional electricity Grid for the most recent 3 years at the time of the PDD submission i.e. 2007.

### Generation from Northern Region based Thermal Power Plants (state wise) in 2005-2006

(source: www.cea.nic.in)

### 1) DELHI :

| S_NO | NAME | UNIT NO | DT COMM | CAPACITY MW AS ON 31/03/2006 | SECTOR | SYSTEM | TYPE | FUEL 1 | 2005-06 Net Generation GWh |
|---|---|---|---|---|---|---|---|---|---|
| **1** | **BADARPUR** | **0** | | **720** | **CENTER** | **NTPC** | **THERMAL** | **COAL** | **4,866** |
| 1 | BADARPUR | 1 | 26-Jul-73 | 100 | CENTER | NTPC | THERMAL | COAL | |
| 1 | BADARPUR | 2 | 5-Aug-74 | 100 | CENTER | NTPC | THERMAL | COAL | |
| 1 | BADARPUR | 3 | 29-Mar-75 | 100 | CENTER | NTPC | THERMAL | COAL | |
| 1 | BADARPUR | 4 | 2-Dec-78 | 210 | CENTER | NTPC | THERMAL | COAL | |
| 1 | BADARPUR | 5 | 25-Dec-81 | 210 | CENTER | NTPC | THERMAL | COAL | |
| **2** | **I.P.STATION** | **0** | | **247.5** | **STATE** | **IPGPCL** | **THERMAL** | **COAL** | **838** |
| 2 | I.P.STATION | 1 | 31-Dec-67 | 62.5 | STATE | IPGPCL | THERMAL | COAL | |
| 2 | I.P.STATION | 2 | 29-Feb-68 | 62.5 | STATE | IPGPCL | THERMAL | COAL | |
| 2 | I.P.STATION | 3 | 31-Mar-68 | 62.5 | STATE | IPGPCL | THERMAL | COAL | |
| 2 | I.P.STATION | 4 | 31-Dec-71 | 60 | STATE | IPGPCL | THERMAL | COAL | |
| **3** | **RAJGHAT** | **0** | | **135** | **STATE** | **IPGPCL** | **THERMAL** | **COAL** | **495** |
| 3 | RAJGHAT | 1 | 10-Mar-89 | 67.5 | STATE | IPGPCL | THERMAL | COAL | |
| 3 | RAJGHAT | 2 | 24-Nov-89 | 67.5 | STATE | IPGPCL | THERMAL | COAL | |
| **4** | **I.P.GT** | **0** | | **282** | **STATE** | **IPGPCL** | **THERMAL** | **GAS** | **1,697** |
| 4 | I.P.GT | 1 | 28-May-86 | 30 | STATE | IPGPCL | THERMAL | GAS | |
| 4 | I.P.GT | 2 | 24-Jun-86 | 30 | STATE | IPGPCL | THERMAL | GAS | |
| 4 | I.P.GT | 3 | 31-Jul-86 | 30 | STATE | IPGPCL | THERMAL | GAS | |
| 4 | I.P.GT | 4 | 10-Sep-86 | 30 | STATE | IPGPCL | THERMAL | GAS | |
| 4 | I.P.GT | 5 | 15-Nov-86 | 30 | STATE | IPGPCL | THERMAL | GAS | |
| 4 | I.P.GT | 6 | 14-May-86 | 30 | STATE | IPGPCL | THERMAL | GAS | |
| 4 | I.P.WHP 1 | 7 | 29-Mar-95 | 34 | STATE | IPGPCL | THERMAL | GAS | |
| 4 | I.P.WHP 2 | 8 | 31-Oct-95 | 34 | STATE | IPGPCL | THERMAL | GAS | |
| 4 | I.P.WHP 3 | 9 | 26-Mar-96 | 34 | STATE | IPGPCL | THERMAL | GAS | |
| **5** | **PRAGATI CCGT** | **0** | | **330.4** | **STATE** | **IPGPCL** | **THERMAL** | **GAS** | **2,227** |
| 5 | PRAGATI CCGT | 1 | 15-Mar-02 | 104.6 | STATE | IPGPCL | THERMAL | GAS | 716 |
| 5 | PRAGATI CCGT | 2 | 9-Nov-02 | 104.6 | STATE | IPGPCL | THERMAL | GAS | 722 |
| 5 | PRAGATI CCGT | 3 | 31-Jan-03 | 121.2 | STATE | IPGPCL | THERMAL | GAS | 789 |

## 2) HARYANA:

| S_NO | NAME | UNIT NO | DT COMM | CAPACITY MW AS ON 31/03/2006 | SECTOR | SYSTEM | TYPE | FUEL 1 | 2005-06 Net Generation GWh |
|---|---|---|---|---|---|---|---|---|---|
| **6** | **F_BAD EXTN.** | **0** | | **180** | **STATE** | **HPGCL** | **THERMAL** | **COAL** | **696** |
| 6 | F_BAD EXTN. | 1 | 15-Nov-74 | 60 | STATE | HPGCL | THERMAL | COAL | |
| 6 | F_BAD EXTN. | 2 | 6-Mar-76 | 60 | STATE | HPGCL | THERMAL | COAL | |
| 6 | F_BAD EXTN. | 3 | 1-Apr-81 | 60 | STATE | HPGCL | THERMAL | COAL | |
| **7** | **PANIPAT** | **0** | | **1360** | **STATE** | **HPGCL** | **THERMAL** | **COAL** | **7,330** |
| 7 | PANIPAT | 1 | 30-Mar-79 | 110 | STATE | HPGCL | THERMAL | COAL | |
| 7 | PANIPAT | 2 | 21-Feb-80 | 110 | STATE | HPGCL | THERMAL | COAL | |
| 7 | PANIPAT | 3 | 1-Nov-85 | 110 | STATE | HPGCL | THERMAL | COAL | |
| 7 | PANIPAT | 4 | 11-Jan-87 | 110 | STATE | HPGCL | THERMAL | COAL | |
| 7 | PANIPAT | 5 | 28-Mar-89 | 210 | STATE | HPGCL | THERMAL | COAL | |
| 7 | PANIPAT | 6 | 1-Apr-01 | 210 | STATE | HPGCL | THERMAL | COAL | 1,536 |
| 7 | PANIPAT | 7 | 26-Sep-04 | 250 | STATE | HPGCL | THERMAL | COAL | 839 |
| 7 | PANIPAT | 8 | 28-Jan-05 | 250 | STATE | HPGCL | THERMAL | COAL | 1,668 |
| **8** | **F_BAD CCGT** | **0** | | **430** | **CENTER** | **NTPC** | **THERMAL** | **GAS** | **2,885** |
| 8 | F_BAD CCGT | 1 | 29-Jun-99 | 143 | STATE | NTPC | THERMAL | GAS | 928 |
| 8 | F_BAD CCGT | 2 | 18-Oct-99 | 143 | STATE | NTPC | THERMAL | GAS | 904 |
| 8 | F_BAD CCGT | 3 | 31-Jul-00 | 144 | STATE | NTPC | THERMAL | GAS | 1,053 |

## 3) PUNJAB

| Sl NO | NAME | UNIT NO | DT COMM | CAPACITY MW AS ON 31/03/2006 | SECTOR | SYSTEM | TYPE | FUEL 1 | 2005-06 Net Generation GWh |
|---|---|---|---|---|---|---|---|---|---|
| **9** | **GNDTP(BHATINDA)** | **0** | | **440** | **STATE** | **PSEB** | **THERMAL** | **COAL** | **2,071** |
| 9 | GNDTP(BHATINDA) | 1 | 22-Sep-74 | 110 | STATE | PSEB | THERMAL | COAL | |
| 9 | GNDTP(BHATINDA) | 2 | 19-Sep-75 | 110 | STATE | PSEB | THERMAL | COAL | |
| 9 | GNDTP(BHATINDA) | 3 | 29-Mar-78 | 110 | STATE | PSEB | THERMAL | COAL | |
| 9 | GNDTP(BHATINDA) | 4 | 31-Jan-79 | 110 | STATE | PSEB | THERMAL | COAL | |
| **10** | **GHTP (LEH.MOH.)** | **0** | | **420** | **STATE** | **PSEB** | **THERMAL** | **COAL** | **2,864** |
| 10 | GHTP (LEH.MOH.) | 1 | 29-Dec-97 | 210 | STATE | PSEB | THERMAL | COAL | |
| 10 | GHTP (LEH.MOH.) | 2 | 16-Oct-98 | 210 | STATE | PSEB | THERMAL | COAL | 1,546 |
| **11** | **ROPAR** | **0** | | **1260** | **STATE** | **PSEB** | **THERMAL** | **COAL** | **8,535** |
| 11 | ROPAR | 1 | 26-Sep-84 | 210 | STATE | PSEB | THERMAL | COAL | |
| 11 | ROPAR | 2 | 29-Mar-85 | 210 | STATE | PSEB | THERMAL | COAL | |
| 11 | ROPAR | 3 | 31-Mar-88 | 210 | STATE | PSEB | THERMAL | COAL | |
| 11 | ROPAR | 4 | 29-Jan-89 | 210 | STATE | PSEB | THERMAL | COAL | |
| 11 | ROPAR | 5 | 29-Mar-92 | 210 | STATE | PSEB | THERMAL | COAL | |
| 11 | ROPAR | 6 | 30-Mar-93 | 210 | STATE | PSEB | THERMAL | COAL | |

## 4) RAJASTHAN:

| SI NO | NAME | UNIT NO | DT COMM | CAPACITY MW AS ON 31/03/2006 | SECTOR | SYSTEM | TYPE | FUEL 1 | 2005-06 Net Generation GWh |
|---|---|---|---|---|---|---|---|---|---|
| **12** | **KOTA** | **0** | | **1045** | **STATE** | **RRVUNL** | **THERMAL** | **COAL** | **7,525** |
| 12 | KOTA | 1 | 17-Jan-83 | 110 | STATE | RRVUNL | THERMAL | COAL | |
| 12 | KOTA | 2 | 13-Jul-83 | 110 | STATE | RRVUNL | THERMAL | COAL | |
| 12 | KOTA | 3 | 25-Sep-88 | 210 | STATE | RRVUNL | THERMAL | COAL | |
| 12 | KOTA | 4 | 1-May-89 | 210 | STATE | RRVUNL | THERMAL | COAL | |
| 12 | KOTA | 5 | 26-Mar-94 | 210 | STATE | RRVUNL | THERMAL | COAL | |
| 12 | KOTA | 6 | 30-Jul-03 | 195 | STATE | RRVUNL | THERMAL | COAL | 1,543 |
| **15** | **SURATGARH** | **0** | | **1250** | **STATE** | **RRVUNL** | **THERMAL** | **COAL** | **9,041** |
| 15 | SURATGARH | 1 | 10-May-98 | 250 | STATE | RRVUNL | THERMAL | COAL | |
| 15 | SURATGARH | 2 | 28-Mar-00 | 250 | STATE | RRVUNL | THERMAL | COAL | 1,920 |
| 15 | SURATGARH | 3 | 29-Oct-01 | 250 | STATE | RRVUNL | THERMAL | COAL | 1,732 |
| 15 | SURATGARH | 4 | 25-Mar-02 | 250 | STATE | RRVUNL | THERMAL | COAL | 1,761 |
| 15 | SURATGARH | 5 | 30-Jun-03 | 250 | STATE | RRVUNL | THERMAL | COAL | 1,847 |
| **16** | **RAMGARH GT** | **0** | | **113.8** | **STATE** | **RRVUNL** | **THERMAL** | **GAS** | **404** |
| 16 | RAMGARH GT | 1 | 15-Nov-94 | 3 | STATE | RRVUNL | THERMAL | GAS | |
| 16 | RAMGARH GT | 2 | 12-Jan-96 | 35.5 | STATE | RRVUNL | THERMAL | GAS | |
| 16 | RAMGARH GT | 3 | 7-Aug-02 | 37.5 | STATE | RRVUNL | THERMAL | GAS | 0 |
| 16 | RAMGARH ST 1 | 4 | 31-Mar-03 | 37.8 | STATE | RRVUNL | THERMAL | GAS | 0 |
| **17** | **ANTA GT** | **0** | | **413** | **CENTER** | **NTPC** | **THERMAL** | **GAS** | **2,739** |
| 17 | ANTA GT | 1 | 20-Jan-89 | 88 | CENTER | NTPC | THERMAL | GAS | |
| 17 | ANTA GT | 2 | 4-Mar-89 | 88 | CENTER | NTPC | THERMAL | GAS | |
| 17 | ANTA GT | 3 | 4-May-89 | 88 | CENTER | NTPC | THERMAL | GAS | |
| 17 | ANTA GT | 4 | 5-Mar-90 | 149 | CENTER | NTPC | THERMAL | GAS | |

## 5) UTTAR PRADESH

| SI NO | NAME | UNIT NO | DT COMM | CAPACITY MW AS ON 31/03/2006 | SECTOR | SYSTEM | TYPE | FUEL 1 | 2005-06 Net Generation GWh |
|---|---|---|---|---|---|---|---|---|---|
| **18** | **OBRA-A** | **0** | | **1550** | **STATE** | **UPRVUNL** | **THERMAL** | **COAL** | **4,733** |
| 18 | OBRA | 1 | 1-Jul-92 | 50 | STATE | UPRVUNL | THERMAL | COAL | |
| 18 | OBRA | 2 | 11-Mar-68 | 50 | STATE | UPRVUNL | THERMAL | COAL | |
| 18 | OBRA | 3 | 13-Oct-68 | 50 | STATE | UPRVUNL | THERMAL | COAL | |
| 18 | OBRA | 4 | 16-Jul-69 | 50 | STATE | UPRVUNL | THERMAL | COAL | |
| 18 | OBRA | 5 | 30-Jul-71 | 50 | STATE | UPRVUNL | THERMAL | COAL | |
| 18 | OBRA | 6 | 31-Oct-73 | 100 | STATE | UPRVUNL | THERMAL | COAL | |
| 18 | OBRA | 7 | 14-Dec-74 | 100 | STATE | UPRVUNL | THERMAL | COAL | |
| 18 | OBRA | 8 | 15-Sep-75 | 100 | STATE | UPRVUNL | THERMAL | COAL | |
| 18 | OBRA | 9 | 26-Jan-80 | 200 | STATE | UPRVUNL | THERMAL | COAL | |
| 18 | OBRA | 10 | 14-Jan-79 | 200 | STATE | UPRVUNL | THERMAL | COAL | |
| 18 | OBRA | 11 | 31-Dec-77 | 200 | STATE | UPRVUNL | THERMAL | COAL | |
| 18 | OBRA | 12 | 28-Mar-81 | 200 | STATE | UPRVUNL | THERMAL | COAL | |
| 18 | OBRA | 13 | 21-Jul-82 | 200 | STATE | UPRVUNL | THERMAL | COAL | |
| **19** | **PANKI** | **0** | | **252** | **STATE** | **UPRVUNL** | **THERMAL** | **COAL** | **864** |
| 19 | PANKI | 1 | 19-Feb-85 | 32 | STATE | UPRVUNL | THERMAL | COAL | |
| 19 | PANKI | 2 | 10-Nov-76 | 110 | STATE | UPRVUNL | THERMAL | COAL | |
| 19 | PANKI | 3 | 24-Mar-77 | 110 | STATE | UPRVUNL | THERMAL | COAL | |
| **20** | **H_GANJ B** | **0** | | **450** | **STATE** | **UPRVUNL** | **THERMAL** | **COAL** | **432** |
| 20 | H_GANJ B | 1 | 29-Feb-68 | 50 | STATE | UPRVUNL | THERMAL | COAL | |
| 20 | H_GANJ B | 2 | 1-Jul-92 | 50 | STATE | UPRVUNL | THERMAL | COAL | |
| 20 | H_GANJ B | 3 | 22-Jan-72 | 60 | STATE | UPRVUNL | THERMAL | COAL | |
| 20 | H_GANJ B | 4 | 18-Sep-72 | 60 | STATE | UPRVUNL | THERMAL | COAL | |
| 20 | H_GANJ B | 5 | 21-Mar-77 | 60 | STATE | UPRVUNL | THERMAL | COAL | |
| 20 | H_GANJ B | 6 | 26-Aug-81 | 60 | STATE | UPRVUNL | THERMAL | COAL | |
| 20 | H_GANJ B | 7 | 31-Mar-78 | 110 | STATE | UPRVUNL | THERMAL | COAL | |

| Sl NO | NAME | UNIT NO | DT COMM | CAPACITY MW AS ON 31/03/2006 | SECTOR | SYSTEM | TYPE | FUEL 1 | 2005-06 Net Generation GWh |
|---|---|---|---|---|---|---|---|---|---|
| **21** | **PARICHA** | **0** | | **430** | **STATE** | **UPRVUNL** | **THERMAL** | **COAL** | **679** |
| 21 | PARICHA | 1 | 31-Mar-84 | 110 | STATE | UPRVUNL | THERMAL | COAL | |
| 21 | PARICHA | 2 | 25-Feb-85 | 110 | STATE | UPRVUNL | THERMAL | COAL | |
| 21 | PARICHA | 3 | 29-Mar-06 | 210 | STATE | UPRVUNL | THERMAL | COAL | 4 |
| **22** | **ANPARA** | **0** | | **1630** | **STATE** | **UPRVUNL** | **THERMAL** | **COAL** | **10,547** |
| 22 | ANPARA | 1 | 24-Mar-86 | 210 | STATE | UPRVUNL | THERMAL | COAL | |
| 22 | ANPARA | 2 | 28-Feb-87 | 210 | STATE | UPRVUNL | THERMAL | COAL | |
| 22 | ANPARA | 3 | 12-Mar-88 | 210 | STATE | UPRVUNL | THERMAL | COAL | |
| 22 | ANPARA | 4 | 19-Jul-93 | 500 | STATE | UPRVUNL | THERMAL | COAL | |
| 22 | ANPARA | 5 | 4-Jul-94 | 500 | STATE | UPRVUNL | THERMAL | COAL | |
| **23** | **SINGRAULI STPS** | **0** | | **2000** | **CENTER** | **NTPC** | **THERMAL** | **COAL** | **14,401** |
| 23 | SINGRAULI STPS | 1 | 13-Feb-82 | 200 | CENTER | NTPC | THERMAL | COAL | |
| 23 | SINGRAULI STPS | 2 | 25-Nov-82 | 200 | CENTER | NTPC | THERMAL | COAL | |
| 23 | SINGRAULI STPS | 3 | 28-Mar-83 | 200 | CENTER | NTPC | THERMAL | COAL | |
| 23 | SINGRAULI STPS | 4 | 2-Nov-83 | 200 | CENTER | NTPC | THERMAL | COAL | |
| 23 | SINGRAULI STPS | 5 | 26-Feb-84 | 200 | CENTER | NTPC | THERMAL | COAL | |
| 23 | SINGRAULI STPS | 6 | 23-Dec-86 | 500 | CENTER | NTPC | THERMAL | COAL | |
| 23 | SINGRAULI STPS | 7 | 24-Nov-87 | 500 | CENTER | NTPC | THERMAL | COAL | |
| **24** | **RIHAND** | **0** | | **2000** | **CENTER** | **NTPC** | **THERMAL** | **COAL** | **9,866** |
| 24 | RIHAND | 1 | 31-Mar-88 | 500 | CENTER | NTPC | THERMAL | COAL | |
| 24 | RIHAND | 2 | 5-Jul-89 | 500 | CENTER | NTPC | THERMAL | COAL | |
| 24 | RIHAND | 3 | 31-Jan-05 | 500 | CENTER | NTPC | THERMAL | COAL | 2,807 |
| 24 | RIHAND | 4 | 24-Sep-05 | 500 | CENTER | NTPC | THERMAL | COAL | 1,446 |
| **25** | **UNCHAHAR** | **0** | | **840** | **CENTER** | **NTPC** | **THERMAL** | **COAL** | **6,451** |
| 25 | UNCHAHAR | 1 | 21-Nov-88 | 210 | CENTER | NTPC | THERMAL | COAL | |
| 25 | UNCHAHAR | 2 | 22-Mar-89 | 210 | CENTER | NTPC | THERMAL | COAL | |
| 25 | UNCHAHAR | 3 | 27-Jan-99 | 210 | CENTER | NTPC | THERMAL | COAL | 1,587 |
| 25 | UNCHAHAR | 4 | 22-Oct-99 | 210 | CENTER | NTPC | THERMAL | COAL | 1,619 |
| **26** | **DADRI (NCTPP)** | **0** | | **840** | **CENTER** | **NTPC** | **THERMAL** | **COAL** | **6,268** |
| 26 | DADRI (NCTPP) | 1 | 21-Dec-91 | 210 | CENTER | NTPC | THERMAL | COAL | |
| 26 | DADRI (NCTPP) | 2 | 18-Dec-92 | 210 | CENTER | NTPC | THERMAL | COAL | |
| 26 | DADRI (NCTPP) | 3 | 16-Jun-92 | 210 | CENTER | NTPC | THERMAL | COAL | |
| 26 | DADRI (NCTPP) | 4 | 24-Mar-94 | 210 | CENTER | NTPC | THERMAL | COAL | |
| **27** | **TANDA** | **0** | | **440** | **CENTER** | **NTPC** | **THERMAL** | **COAL** | **2,935** |
| 27 | TANDA | 1 | 23-Jan-88 | 110 | CENTER | NTPC | THERMAL | COAL | |
| 27 | TANDA | 2 | 11-Mar-89 | 110 | CENTER | NTPC | THERMAL | COAL | |
| 27 | TANDA | 3 | 28-Mar-90 | 110 | CENTER | NTPC | THERMAL | COAL | |
| 27 | TANDA | 4 | 20-Feb-98 | 110 | CENTER | NTPC | THERMAL | COAL | |
| **28** | **AURAIYA GT** | **0** | | **652** | **CENTER** | **NTPC** | **THERMAL** | **GAS** | **4,204** |
| 28 | AURAIYA GT | 1 | 29-Mar-89 | 112 | CENTER | NTPC | THERMAL | GAS | |
| 28 | AURAIYA GT | 2 | 21-Jul-89 | 112 | CENTER | NTPC | THERMAL | GAS | |
| 28 | AURAIYA GT | 3 | 9-Aug-89 | 112 | CENTER | NTPC | THERMAL | GAS | |
| 28 | AURAIYA GT | 4 | 29-Sep-89 | 112 | CENTER | NTPC | THERMAL | GAS | |
| 28 | AURAIYA GT | 5 | 29-Dec-89 | 102 | CENTER | NTPC | THERMAL | GAS | |
| 28 | AURAIYA GT | 6 | 12-Jun-90 | 102 | CENTER | NTPC | THERMAL | GAS | |
| **29** | **DADRI GT** | **0** | | **817** | **CENTER** | **NTPC** | **THERMAL** | **GAS** | **5,269** |
| 29 | DADRI GT | 1 | 21-Feb-92 | 131 | CENTER | NTPC | THERMAL | GAS | |
| 29 | DADRI GT | 2 | 26-Mar-92 | 131 | CENTER | NTPC | THERMAL | GAS | |
| 29 | DADRI GT | 3 | 6-Jun-92 | 131 | CENTER | NTPC | THERMAL | GAS | |
| 29 | DADRI GT | 4 | 14-Oct-92 | 131 | CENTER | NTPC | THERMAL | GAS | |
| 29 | DADRI GT | 5 | 26-Feb-94 | 146.5 | CENTER | NTPC | THERMAL | GAS | |
| 29 | DADRI GT | 6 | 27-Mar-93 | 146.5 | CENTER | NTPC | THERMAL | GAS | |

## 6) JAMMU & KASHMIR :

| SI NO | NAME | UNIT NO | DT COMM | CAPACITY MW AS ON 31/03/2006 | SECTOR | SYSTEM | TYPE | FUEL 1 | 2005-06 Net Generation GWh |
|---|---|---|---|---|---|---|---|---|---|
| **30** | **PAMPORE GT** | **0** | | **175** | **STATE** | **JKEB** | **THERMAL** | **DISL** | **9** |
| 30 | PAMPORE GT | 1 | 31-Mar-89 | 25 | STATE | JKEB | THERMAL | DISL | |
| 30 | PAMPORE GT | 2 | 20-Jul-89 | 25 | STATE | JKEB | THERMAL | DISL | |
| 30 | PAMPORE GT | 3 | 11-Dec-89 | 25 | STATE | JKEB | THERMAL | DISL | |
| 30 | PAMPORE GT | 4 | 7-Jan-94 | 25 | STATE | JKEB | THERMAL | DISL | |
| 30 | PAMPORE GT | 5 | 7-Feb-94 | 25 | STATE | JKEB | THERMAL | DISL | |
| 30 | PAMPORE GT | 6 | 4-Apr-94 | 25 | STATE | JKEB | THERMAL | DISL | |
| 30 | PAMPORE GT | 7 | 30-Mar-95 | 25 | STATE | JKEB | THERMAL | DISL | |

## Generation from Northern Region based Thermal Power Plants in 2004-05

## 1) DELHI :

| SI NO | NAME | UNIT NO | DT COMM | CAPACITY MW AS ON 31/03/2006 | SECTOR | SYSTEM | TYPE | FUEL 1 | 2004-05 Gross Generation GWh |
|---|---|---|---|---|---|---|---|---|---|
| **1** | **BADARPUR** | **0** | | **720** | **CENTER** | **NTPC** | **THERMAL** | **COAL** | **5,463** |
| 1 | BADARPUR | 1 | 26-Jul-73 | 100 | CENTER | NTPC | THERMAL | COAL | 685 |
| 1 | BADARPUR | 2 | 5-Aug-74 | 100 | CENTER | NTPC | THERMAL | COAL | 737 |
| 1 | BADARPUR | 3 | 29-Mar-75 | 100 | CENTER | NTPC | THERMAL | COAL | 688 |
| 1 | BADARPUR | 4 | 2-Dec-78 | 210 | CENTER | NTPC | THERMAL | COAL | 1,672 |
| 1 | BADARPUR | 5 | 25-Dec-81 | 210 | CENTER | NTPC | THERMAL | COAL | 1,682 |
| **2** | **I.P.STATION** | **0** | | **247.5** | **STATE** | **IPGPCL** | **THERMAL** | **COAL** | **920** |
| 2 | I.P.STATION | 1 | 31-Dec-67 | 62.5 | STATE | IPGPCL | THERMAL | COAL | 237 |
| 2 | I.P.STATION | 2 | 29-Feb-68 | 62.5 | STATE | IPGPCL | THERMAL | COAL | 150 |
| 2 | I.P.STATION | 3 | 31-Mar-68 | 62.5 | STATE | IPGPCL | THERMAL | COAL | 284 |
| 2 | I.P.STATION | 4 | 31-Dec-71 | 60 | STATE | IPGPCL | THERMAL | COAL | 249 |
| **3** | **RAJGHAT** | **0** | | **135** | **STATE** | **IPGPCL** | **THERMAL** | **COAL** | **697** |
| 3 | RAJGHAT | 1 | 10-Mar-89 | 67.5 | STATE | IPGPCL | THERMAL | COAL | 343 |
| 3 | RAJGHAT | 2 | 24-Nov-89 | 67.5 | STATE | IPGPCL | THERMAL | COAL | 354 |
| **4** | **I.P.GT** | **0** | | **282** | **STATE** | **IPGPCL** | **THERMAL** | **GAS** | **1,540** |
| 4 | I.P.GT | 1 | 28-May-86 | 30 | STATE | IPGPCL | THERMAL | GAS | 230 |
| 4 | I.P.GT | 2 | 24-Jun-86 | 30 | STATE | IPGPCL | THERMAL | GAS | 58 |
| 4 | I.P.GT | 3 | 31-Jul-86 | 30 | STATE | IPGPCL | THERMAL | GAS | 209 |
| 4 | I.P.GT | 4 | 10-Sep-86 | 30 | STATE | IPGPCL | THERMAL | GAS | 236 |
| 4 | I.P.GT | 5 | 15-Nov-86 | 30 | STATE | IPGPCL | THERMAL | GAS | 213 |
| 4 | I.P.GT | 6 | 14-May-86 | 30 | STATE | IPGPCL | THERMAL | GAS | 216 |
| 4 | I.P.WHP 1 | 7 | 29-Mar-95 | 34 | STATE | IPGPCL | THERMAL | GAS | 87 |
| 4 | I.P.WHP 2 | 8 | 31-Oct-95 | 34 | STATE | IPGPCL | THERMAL | GAS | 152 |
| 4 | I.P.WHP 3 | 9 | 26-Mar-96 | 34 | STATE | IPGPCL | THERMAL | GAS | 140 |
| **5** | **PRAGATI CCGT** | **0** | | **330.4** | **STATE** | **IPGPCL** | **THERMAL** | **GAS** | **2,552** |
| 5 | PRAGATI CCGT | 1 | 15-Mar-02 | 104.6 | STATE | IPGPCL | THERMAL | GAS | 841 |
| 5 | PRAGATI CCGT | 2 | 9-Nov-02 | 104.6 | STATE | IPGPCL | THERMAL | GAS | 796 |
| 5 | PRAGATI CCGT | 3 | 31-Jan-03 | 121.2 | STATE | IPGPCL | THERMAL | GAS | 914 |

## 2) HARYANA:

| SI NO | NAME | UNIT NO | DT COMM | CAPACITY MW AS ON 31/03/2006 | SECTOR | SYSTEM | TYPE | FUEL 1 | 2004-05 Gross Generation GWh |
|---|---|---|---|---|---|---|---|---|---|
| **6** | **F_BAD EXTN.** | **0** | | **180** | **STATE** | **HPGCL** | **THERMAL** | **COAL** | **868** |
| 6 | F_BAD EXTN. | 1 | 15-Nov-74 | 60 | STATE | HPGCL | THERMAL | COAL | 286 |
| 6 | F_BAD EXTN. | 2 | 6-Mar-76 | 60 | STATE | HPGCL | THERMAL | COAL | 233 |
| 6 | F_BAD EXTN. | 3 | 1-Apr-81 | 60 | STATE | HPGCL | THERMAL | COAL | 350 |
| **7** | **PANIPAT** | **0** | | **1360** | **STATE** | **HPGCL** | **THERMAL** | **COAL** | **5,757** |
| 7 | PANIPAT | 1 | 30-Mar-79 | 110 | STATE | HPGCL | THERMAL | COAL | 507 |
| 7 | PANIPAT | 2 | 21-Feb-80 | 110 | STATE | HPGCL | THERMAL | COAL | 572 |
| 7 | PANIPAT | 3 | 1-Nov-85 | 110 | STATE | HPGCL | THERMAL | COAL | 674 |
| 7 | PANIPAT | 4 | 11-Jan-87 | 110 | STATE | HPGCL | THERMAL | COAL | 625 |
| 7 | PANIPAT | 5 | 28-Mar-89 | 210 | STATE | HPGCL | THERMAL | COAL | 1,467 |
| 7 | PANIPAT | 6 | 1-Apr-01 | 210 | STATE | HPGCL | THERMAL | COAL | 1,481 |
| 7 | PANIPAT | 7 | 26-Sep-04 | 250 | STATE | HPGCL | THERMAL | COAL | 431 |
| 7 | PANIPAT | 8 | 28-Jan-05 | 250 | STATE | HPGCL | THERMAL | COAL | 0 |
| **8** | **F_BAD CCGT** | **0** | | **430** | **CENTER** | **NTPC** | **THERMAL** | **GAS** | **3,162** |
| 8 | F_BAD CCGT | 1 | 29-Jun-99 | 143 | STATE | NTPC | THERMAL | GAS | 1,001 |
| 8 | F_BAD CCGT | 2 | 18-Oct-99 | 143 | STATE | NTPC | THERMAL | GAS | 1,028 |
| 8 | F_BAD CCGT | 3 | 31-Jul-00 | 144 | STATE | NTPC | THERMAL | GAS | 1,133 |

## 3) PUNJAB

| SI NO | NAME | UNIT NO | DT COMM | CAPACITY MW AS ON 31/03/2006 | SECTOR | SYSTEM | TYPE | FUEL 1 | 2004-05 Gross Generation GWh |
|---|---|---|---|---|---|---|---|---|---|
| **9** | **GNDTP(BHATINDA)** | **0** | | **440** | **STATE** | **PSEB** | **THERMAL** | **COAL** | **1,992** |
| 9 | GNDTP(BHATINDA) | 1 | 22-Sep-74 | 110 | STATE | PSEB | THERMAL | COAL | 631 |
| 9 | GNDTP(BHATINDA) | 2 | 19-Sep-75 | 110 | STATE | PSEB | THERMAL | COAL | 0 |
| 9 | GNDTP(BHATINDA) | 3 | 29-Mar-78 | 110 | STATE | PSEB | THERMAL | COAL | 696 |
| 9 | GNDTP(BHATINDA) | 4 | 31-Jan-79 | 110 | STATE | PSEB | THERMAL | COAL | 667 |
| **10** | **GHTP (LEH.MOH.)** | **0** | | **420** | **STATE** | **PSEB** | **THERMAL** | **COAL** | **3,309** |
| 10 | GHTP (LEH.MOH.) | 1 | 29-Dec-97 | 210 | STATE | PSEB | THERMAL | COAL | 1,773 |
| 10 | GHTP (LEH.MOH.) | 2 | 16-Oct-98 | 210 | STATE | PSEB | THERMAL | COAL | 1,535 |
| **11** | **ROPAR** | **0** | | **1260** | **STATE** | **PSEB** | **THERMAL** | **COAL** | **9,083** |
| 11 | ROPAR | 1 | 26-Sep-84 | 210 | STATE | PSEB | THERMAL | COAL | 1,600 |
| 11 | ROPAR | 2 | 29-Mar-85 | 210 | STATE | PSEB | THERMAL | COAL | 1,391 |
| 11 | ROPAR | 3 | 31-Mar-88 | 210 | STATE | PSEB | THERMAL | COAL | 1,502 |
| 11 | ROPAR | 4 | 29-Jan-89 | 210 | STATE | PSEB | THERMAL | COAL | 1,608 |
| 11 | ROPAR | 5 | 29-Mar-92 | 210 | STATE | PSEB | THERMAL | COAL | 1,437 |
| 11 | ROPAR | 6 | 30-Mar-93 | 210 | STATE | PSEB | THERMAL | COAL | 1,545 |

## 4) RAJASTHAN:

| SI NO | NAME | UNIT NO | DT COMM | CAPACITY MW AS ON 31/03/2006 | SECTOR | SYSTEM | TYPE | FUEL 1 | 2004-05 Gross Generation GWh |
|---|---|---|---|---|---|---|---|---|---|
| **12** | **KOTA** | **0** | | **1045** | **STATE** | **RRVUNL** | **THERMAL** | **COAL** | **7,431** |
| 12 | KOTA | 1 | 17-Jan-83 | 110 | STATE | RRVUNL | THERMAL | COAL | 783 |
| 12 | KOTA | 2 | 13-Jul-83 | 110 | STATE | RRVUNL | THERMAL | COAL | 847 |
| 12 | KOTA | 3 | 25-Sep-88 | 210 | STATE | RRVUNL | THERMAL | COAL | 1,672 |
| 12 | KOTA | 4 | 1-May-89 | 210 | STATE | RRVUNL | THERMAL | COAL | 1,663 |
| 12 | KOTA | 5 | 26-Mar-94 | 210 | STATE | RRVUNL | THERMAL | COAL | 1,316 |
| 12 | KOTA | 6 | 30-Jul-03 | 195 | STATE | RRVUNL | THERMAL | COAL | 1,470 |
| **15** | **SURATGARH** | **0** | | **1250** | **STATE** | **RRVUNL** | **THERMAL** | **COAL** | **9,362** |
| 15 | SURATGARH | 1 | 10-May-98 | 250 | STATE | RRVUNL | THERMAL | COAL | 1,876 |
| 15 | SURATGARH | 2 | 28-Mar-00 | 250 | STATE | RRVUNL | THERMAL | COAL | 1,705 |
| 15 | SURATGARH | 3 | 29-Oct-01 | 250 | STATE | RRVUNL | THERMAL | COAL | 1,876 |
| 15 | SURATGARH | 4 | 25-Mar-02 | 250 | STATE | RRVUNL | THERMAL | COAL | 1,951 |
| 15 | SURATGARH | 5 | 30-Jun-03 | 250 | STATE | RRVUNL | THERMAL | COAL | 1,955 |
| **16** | **RAMGARH GT** | **0** | | **113.8** | **STATE** | **RRVUNL** | **THERMAL** | **GAS** | **360** |
| 16 | RAMGARH GT | 1 | 15-Nov-94 | 3 | STATE | RRVUNL | THERMAL | GAS | 341 |
| 16 | RAMGARH GT | 2 | 12-Jan-96 | 35.5 | STATE | RRVUNL | THERMAL | GAS | 1 |
| 16 | RAMGARH GT | 3 | 7-Aug-02 | 37.5 | STATE | RRVUNL | THERMAL | GAS | 1 |
| 16 | RAMGARH ST 1 | 4 | 31-Mar-03 | 37.8 | STATE | RRVUNL | THERMAL | GAS | 17 |
| **17** | **ANTA GT** | **0** | | **413** | **CENTER** | **NTPC** | **THERMAL** | **GAS** | **2,785** |
| 17 | ANTA GT | 1 | 20-Jan-89 | 88 | CENTER | NTPC | THERMAL | GAS | 588 |
| 17 | ANTA GT | 2 | 4-Mar-89 | 88 | CENTER | NTPC | THERMAL | GAS | 568 |
| 17 | ANTA GT | 3 | 4-May-89 | 88 | CENTER | NTPC | THERMAL | GAS | 597 |
| 17 | ANTA GT | 4 | 5-Mar-90 | 149 | CENTER | NTPC | THERMAL | GAS | 1,033 |

## 5) UTTAR PRADESH

| SI NO | NAME | UNIT NO | DT COMM | CAPACITY MW AS ON 31/03/2006 | SECTOR | SYSTEM | TYPE | FUEL 1 | 2004-05 Gross Generation GWh |
|---|---|---|---|---|---|---|---|---|---|
| **18** | **OBRA-A** | **0** | | **1550** | **STATE** | **UPRVUNL** | **THERMAL** | **COAL** | **5,553** |
| 18 | OBRA | 1 | 1-Jul-92 | 50 | STATE | UPRVUNL | THERMAL | COAL | 0 |
| 18 | OBRA | 2 | 11-Mar-68 | 50 | STATE | UPRVUNL | THERMAL | COAL | 0 |
| 18 | OBRA | 3 | 13-Oct-68 | 50 | STATE | UPRVUNL | THERMAL | COAL | 0 |
| 18 | OBRA | 4 | 16-Jul-69 | 50 | STATE | UPRVUNL | THERMAL | COAL | 171 |
| 18 | OBRA | 5 | 30-Jul-71 | 50 | STATE | UPRVUNL | THERMAL | COAL | 108 |
| 18 | OBRA | 6 | 31-Oct-73 | 100 | STATE | UPRVUNL | THERMAL | COAL | 142 |
| 18 | OBRA | 7 | 14-Dec-74 | 100 | STATE | UPRVUNL | THERMAL | COAL | 0 |
| 18 | OBRA | 8 | 15-Sep-75 | 100 | STATE | UPRVUNL | THERMAL | COAL | 123 |
| 18 | OBRA | 9 | 26-Jan-80 | 200 | STATE | UPRVUNL | THERMAL | COAL | 1,039 |
| 18 | OBRA | 10 | 14-Jan-79 | 200 | STATE | UPRVUNL | THERMAL | COAL | 1,009 |
| 18 | OBRA | 11 | 31-Dec-77 | 200 | STATE | UPRVUNL | THERMAL | COAL | 737 |
| 18 | OBRA | 12 | 28-Mar-81 | 200 | STATE | UPRVUNL | THERMAL | COAL | 1,169 |
| 18 | OBRA | 13 | 21-Jul-82 | 200 | STATE | UPRVUNL | THERMAL | COAL | 1,054 |
| **19** | **PANKI** | **0** | | **252** | **STATE** | **UPRVUNL** | **THERMAL** | **COAL** | **1,043** |
| 19 | PANKI | 1 | 19-Feb-85 | 32 | STATE | UPRVUNL | THERMAL | COAL | 0 |
| 19 | PANKI | 2 | 10-Nov-76 | 110 | STATE | UPRVUNL | THERMAL | COAL | 578 |
| 19 | PANKI | 3 | 24-Mar-77 | 110 | STATE | UPRVUNL | THERMAL | COAL | 466 |

| SI NO | NAME | UNIT NO | DT COMM | CAPACITY MW AS ON 31/03/2006 | SECTOR | SYSTEM | TYPE | FUEL 1 | 2004-05 Gross Generation GWh |
|---|---|---|---|---|---|---|---|---|---|
| **20** | **H_GANJ B** | **0** | | **450** | **STATE** | **UPRVUNL** | **THERMAL** | **COAL** | **631** |
| 20 | H_GANJ B | 1 | 29-Feb-68 | 50 | STATE | UPRVUNL | THERMAL | COAL | 0 |
| 20 | H_GANJ B | 2 | 1-Jul-92 | 50 | STATE | UPRVUNL | THERMAL | COAL | 0 |
| 20 | H_GANJ B | 3 | 22-Jan-72 | 60 | STATE | UPRVUNL | THERMAL | COAL | 104 |
| 20 | H_GANJ B | 4 | 18-Sep-72 | 60 | STATE | UPRVUNL | THERMAL | COAL | 174 |
| 20 | H_GANJ B | 5 | 21-Mar-77 | 60 | STATE | UPRVUNL | THERMAL | COAL | 0 |
| 20 | H_GANJ B | 6 | 26-Aug-81 | 60 | STATE | UPRVUNL | THERMAL | COAL | 0 |
| 20 | H_GANJ B | 7 | 31-Mar-78 | 110 | STATE | UPRVUNL | THERMAL | COAL | 354 |
| **21** | **PARICHA** | **0** | | **430** | **STATE** | **UPRVUNL** | **THERMAL** | **COAL** | **967** |
| 21 | PARICHA | 1 | 31-Mar-84 | 110 | STATE | UPRVUNL | THERMAL | COAL | 390 |
| 21 | PARICHA | 2 | 25-Feb-85 | 110 | STATE | UPRVUNL | THERMAL | COAL | 576 |
| 21 | PARICHA | 3 | 29-Mar-06 | 210 | STATE | UPRVUNL | THERMAL | COAL | 0 |
| **22** | **ANPARA** | **0** | | **1630** | **STATE** | **UPRVUNL** | **THERMAL** | **COAL** | **11,509** |
| 22 | ANPARA | 1 | 24-Mar-86 | 210 | STATE | UPRVUNL | THERMAL | COAL | 1,407 |
| 22 | ANPARA | 2 | 28-Feb-87 | 210 | STATE | UPRVUNL | THERMAL | COAL | 1,284 |
| 22 | ANPARA | 3 | 12-Mar-88 | 210 | STATE | UPRVUNL | THERMAL | COAL | 1,474 |
| 22 | ANPARA | 4 | 19-Jul-93 | 500 | STATE | UPRVUNL | THERMAL | COAL | 3,828 |
| 22 | ANPARA | 5 | 4-Jul-94 | 500 | STATE | UPRVUNL | THERMAL | COAL | 3,518 |
| **23** | **SINGRAULI STPS** | **0** | | **2000** | **CENTER** | **NTPC** | **THERMAL** | **COAL** | **15,803** |
| 23 | SINGRAULI STPS | 1 | 13-Feb-82 | 200 | CENTER | NTPC | THERMAL | COAL | 1,671 |
| 23 | SINGRAULI STPS | 2 | 25-Nov-82 | 200 | CENTER | NTPC | THERMAL | COAL | 1,510 |
| 23 | SINGRAULI STPS | 3 | 28-Mar-83 | 200 | CENTER | NTPC | THERMAL | COAL | 1,569 |
| 23 | SINGRAULI STPS | 4 | 2-Nov-83 | 200 | CENTER | NTPC | THERMAL | COAL | 1,659 |
| 23 | SINGRAULI STPS | 5 | 26-Feb-84 | 200 | CENTER | NTPC | THERMAL | COAL | 1,615 |
| 23 | SINGRAULI STPS | 6 | 23-Dec-86 | 500 | CENTER | NTPC | THERMAL | COAL | 3,746 |
| 23 | SINGRAULI STPS | 7 | 24-Nov-87 | 500 | CENTER | NTPC | THERMAL | COAL | 4,036 |
| **24** | **RIHAND** | **0** | | **2000** | **CENTER** | **NTPC** | **THERMAL** | **COAL** | **7,988** |
| 24 | RIHAND | 1 | 31-Mar-88 | 500 | CENTER | NTPC | THERMAL | COAL | 4,066 |
| 24 | RIHAND | 2 | 5-Jul-89 | 500 | CENTER | NTPC | THERMAL | COAL | 3,921 |
| 24 | RIHAND | 3 | 31-Jan-05 | 500 | CENTER | NTPC | THERMAL | COAL | 0 |
| 24 | RIHAND | 4 | 24-Sep-05 | 500 | CENTER | NTPC | THERMAL | COAL | 0 |
| **25** | **UNCHAHAR** | **0** | | **840** | **CENTER** | **NTPC** | **THERMAL** | **COAL** | **6,781** |
| 25 | UNCHAHAR | 1 | 21-Nov-88 | 210 | CENTER | NTPC | THERMAL | COAL | 1,625 |
| 25 | UNCHAHAR | 2 | 22-Mar-89 | 210 | CENTER | NTPC | THERMAL | COAL | 1,718 |
| 25 | UNCHAHAR | 3 | 27-Jan-99 | 210 | CENTER | NTPC | THERMAL | COAL | 1,691 |
| 25 | UNCHAHAR | 4 | 22-Oct-99 | 210 | CENTER | NTPC | THERMAL | COAL | 1,747 |
| **26** | **DADRI (NCTPP)** | **0** | | **840** | **CENTER** | **NTPC** | **THERMAL** | **COAL** | **6,831** |
| 26 | DADRI (NCTPP) | 1 | 21-Dec-91 | 210 | CENTER | NTPC | THERMAL | COAL | 1,748 |
| 26 | DADRI (NCTPP) | 2 | 18-Dec-92 | 210 | CENTER | NTPC | THERMAL | COAL | 1,669 |
| 26 | DADRI (NCTPP) | 3 | 16-Jun-92 | 210 | CENTER | NTPC | THERMAL | COAL | 1,713 |
| 26 | DADRI (NCTPP) | 4 | 24-Mar-94 | 210 | CENTER | NTPC | THERMAL | COAL | 1,700 |
| **27** | **TANDA** | **0** | | **440** | **CENTER** | **NTPC** | **THERMAL** | **COAL** | **3,317** |
| 27 | TANDA | 1 | 23-Jan-88 | 110 | CENTER | NTPC | THERMAL | COAL | 809 |
| 27 | TANDA | 2 | 11-Mar-89 | 110 | CENTER | NTPC | THERMAL | COAL | 841 |
| 27 | TANDA | 3 | 28-Mar-90 | 110 | CENTER | NTPC | THERMAL | COAL | 836 |
| 27 | TANDA | 4 | 20-Feb-98 | 110 | CENTER | NTPC | THERMAL | COAL | 831 |
| **28** | **AURAIYA GT** | **0** | | **652** | **CENTER** | **NTPC** | **THERMAL** | **GAS** | **4,118** |
| 28 | AURAIYA GT | 1 | 29-Mar-89 | 112 | CENTER | NTPC | THERMAL | GAS | 801 |
| 28 | AURAIYA GT | 2 | 21-Jul-89 | 112 | CENTER | NTPC | THERMAL | GAS | 798 |
| 28 | AURAIYA GT | 3 | 9-Aug-89 | 112 | CENTER | NTPC | THERMAL | GAS | 782 |
| 28 | AURAIYA GT | 4 | 29-Sep-89 | 112 | CENTER | NTPC | THERMAL | GAS | 432 |
| 28 | AURAIYA GT | 5 | 29-Dec-89 | 102 | CENTER | NTPC | THERMAL | GAS | 754 |
| 28 | AURAIYA GT | 6 | 12-Jun-90 | 102 | CENTER | NTPC | THERMAL | GAS | 553 |
| **29** | **DADRI GT** | **0** | | **817** | **CENTER** | **NTPC** | **THERMAL** | **GAS** | **5,457** |
| 29 | DADRI GT | 1 | 21-Feb-92 | 131 | CENTER | NTPC | THERMAL | GAS | 962 |
| 29 | DADRI GT | 2 | 26-Mar-92 | 131 | CENTER | NTPC | THERMAL | GAS | 791 |
| 29 | DADRI GT | 3 | 6-Jun-92 | 131 | CENTER | NTPC | THERMAL | GAS | 890 |
| 29 | DADRI GT | 4 | 14-Oct-92 | 131 | CENTER | NTPC | THERMAL | GAS | 823 |
| 29 | DADRI GT | 5 | 26-Feb-94 | 146.5 | CENTER | NTPC | THERMAL | GAS | 1,030 |
| 29 | DADRI GT | 6 | 27-Mar-93 | 146.5 | CENTER | NTPC | THERMAL | GAS | 963 |

## 6) JAMMU & KASHMIR :

| SI NO | NAME | UNIT NO | DT COMM | CAPACITY MW AS ON 31/03/2006 | SECTOR | SYSTEM | TYPE | FUEL 1 | 2004-05 Gross Generation GWh |
|---|---|---|---|---|---|---|---|---|---|
| **30** | **PAMPORE GT** | **0** | | **175** | **STATE** | **JKEB** | **THERMAL** | **DISL** | **24** |
| 30 | PAMPORE GT | 1 | 31-Mar-89 | 25 | STATE | JKEB | THERMAL | DISL | 21 |
| 30 | PAMPORE GT | 2 | 20-Jul-89 | 25 | STATE | JKEB | THERMAL | DISL | 3 |
| 30 | PAMPORE GT | 3 | 11-Dec-89 | 25 | STATE | JKEB | THERMAL | DISL | 0 |
| 30 | PAMPORE GT | 4 | 7-Jan-94 | 25 | STATE | JKEB | THERMAL | DISL | 0 |
| 30 | PAMPORE GT | 5 | 7-Feb-94 | 25 | STATE | JKEB | THERMAL | DISL | 0 |
| 30 | PAMPORE GT | 6 | 4-Apr-94 | 25 | STATE | JKEB | THERMAL | DISL | 0 |
| 30 | PAMPORE GT | 7 | 30-Mar-95 | 25 | STATE | JKEB | THERMAL | DISL | 0 |

## Generation from Northern Region based Thermal Power Plants in 2003-04

## 1) DELHI :

| S_NO | NAME | UNIT_NO | DT_ COMM | CAPACITY MW AS ON 31/03/2006 | SECTOR | SYSTEM | TYPE | FUEL 1 | 2003-04 Net Generation GWh |
|---|---|---|---|---|---|---|---|---|---|
| **1** | **BADARPUR** | **0** | | **720** | **CENTER** | **NTPC** | **THERMAL** | **COAL** | **4,943** |
| 1 | BADARPUR | 1 | 26-Jul-73 | 100 | CENTER | NTPC | THERMAL | COAL | |
| 1 | BADARPUR | 2 | 5-Aug-74 | 100 | CENTER | NTPC | THERMAL | COAL | |
| 1 | BADARPUR | 3 | 29-Mar-75 | 100 | CENTER | NTPC | THERMAL | COAL | |
| 1 | BADARPUR | 4 | 2-Dec-78 | 210 | CENTER | NTPC | THERMAL | COAL | |
| 1 | BADARPUR | 5 | 25-Dec-81 | 210 | CENTER | NTPC | THERMAL | COAL | |
| **2** | **I.P.STATION** | **0** | | **247.5** | **STATE** | **IPGPCL** | **THERMAL** | **COAL** | **669** |
| 2 | I.P.STATION | 1 | 31-Dec-67 | 62.5 | STATE | IPGPCL | THERMAL | COAL | |
| 2 | I.P.STATION | 2 | 29-Feb-68 | 62.5 | STATE | IPGPCL | THERMAL | COAL | |
| 2 | I.P.STATION | 3 | 31-Mar-68 | 62.5 | STATE | IPGPCL | THERMAL | COAL | |
| 2 | I.P.STATION | 4 | 31-Dec-71 | 60 | STATE | IPGPCL | THERMAL | COAL | |
| **3** | **RAJGHAT** | **0** | | **135** | **STATE** | **IPGPCL** | **THERMAL** | **COAL** | **683** |
| 3 | RAJGHAT | 1 | 10-Mar-89 | 67.5 | STATE | IPGPCL | THERMAL | COAL | |
| 3 | RAJGHAT | 2 | 24-Nov-89 | 67.5 | STATE | IPGPCL | THERMAL | COAL | |
| **4** | **I.P.GT** | **0** | | **282** | **STATE** | **IPGPCL** | **THERMAL** | **GAS** | **1,189** |
| 4 | I.P.GT | 1 | 28-May-86 | 30 | STATE | IPGPCL | THERMAL | GAS | |
| 4 | I.P.GT | 2 | 24-Jun-86 | 30 | STATE | IPGPCL | THERMAL | GAS | |
| 4 | I.P.GT | 3 | 31-Jul-86 | 30 | STATE | IPGPCL | THERMAL | GAS | |
| 4 | I.P.GT | 4 | 10-Sep-86 | 30 | STATE | IPGPCL | THERMAL | GAS | |
| 4 | I.P.GT | 5 | 15-Nov-86 | 30 | STATE | IPGPCL | THERMAL | GAS | |
| 4 | I.P.GT | 6 | 14-May-86 | 30 | STATE | IPGPCL | THERMAL | GAS | |
| 4 | I.P.WHP 1 | 7 | 29-Mar-95 | 34 | STATE | IPGPCL | THERMAL | GAS | |
| 4 | I.P.WHP 2 | 8 | 31-Oct-95 | 34 | STATE | IPGPCL | THERMAL | GAS | |
| 4 | I.P.WHP 3 | 9 | 26-Mar-96 | 34 | STATE | IPGPCL | THERMAL | GAS | |

## 2) HARYANA:

| S_NO | NAME | UNIT_NO | DT_ COMM | CAPACITY MW AS ON 31/03/2006 | SECTOR | SYSTEM | TYPE | FUEL 1 | 2003-04 Net Generation GWh |
|---|---|---|---|---|---|---|---|---|---|
| **5** | **PRAGATI CCGT** | **0** | | **330.4** | **STATE** | **IPGPCL** | **THERMAL** | **GAS** | **2,345** |
| 5 | PRAGATI CCGT | 1 | 15-Mar-02 | 104.6 | STATE | IPGPCL | THERMAL | GAS | |
| 5 | PRAGATI CCGT | 2 | 9-Nov-02 | 104.6 | STATE | IPGPCL | THERMAL | GAS | |
| 5 | PRAGATI CCGT | 3 | 31-Jan-03 | 121.2 | STATE | IPGPCL | THERMAL | GAS | |
| **6** | **F_BAD EXTN.** | **0** | | **180** | **STATE** | **HPGCL** | **THERMAL** | **COAL** | **689** |
| 6 | F_BAD EXTN. | 1 | 15-Nov-74 | 60 | STATE | HPGCL | THERMAL | COAL | |
| 6 | F_BAD EXTN. | 2 | 6-Mar-76 | 60 | STATE | HPGCL | THERMAL | COAL | |
| 6 | F_BAD EXTN. | 3 | 1-Apr-81 | 60 | STATE | HPGCL | THERMAL | COAL | |
| **7** | **PANIPAT** | **0** | | **1360** | **STATE** | **HPGCL** | **THERMAL** | **COAL** | **5,350** |
| 7 | PANIPAT | 1 | 30-Mar-79 | 110 | STATE | HPGCL | THERMAL | COAL | |
| 7 | PANIPAT | 2 | 21-Feb-80 | 110 | STATE | HPGCL | THERMAL | COAL | |
| 7 | PANIPAT | 3 | 1-Nov-85 | 110 | STATE | HPGCL | THERMAL | COAL | |
| 7 | PANIPAT | 4 | 11-Jan-87 | 110 | STATE | HPGCL | THERMAL | COAL | |
| 7 | PANIPAT | 5 | 28-Mar-89 | 210 | STATE | HPGCL | THERMAL | COAL | |
| 7 | PANIPAT | 6 | 1-Apr-01 | 210 | STATE | HPGCL | THERMAL | COAL | |
| 7 | PANIPAT | 7 | 26-Sep-04 | 250 | STATE | HPGCL | THERMAL | COAL | |
| 7 | PANIPAT | 8 | 28-Jan-05 | 250 | STATE | HPGCL | THERMAL | COAL | |
| **8** | **F_BAD CCGT** | **0** | | **430** | **CENTER** | **NTPC** | **THERMAL** | **GAS** | **2,727** |
| 8 | F_BAD CCGT | 1 | 29-Jun-99 | 143 | STATE | NTPC | THERMAL | GAS | |
| 8 | F_BAD CCGT | 2 | 18-Oct-99 | 143 | STATE | NTPC | THERMAL | GAS | |
| 8 | F_BAD CCGT | 3 | 31-Jul-00 | 144 | STATE | NTPC | THERMAL | GAS | |

## 3) PUNJAB :

| S_NO | NAME | UNIT_NO | DT_ COMM | CAPACITY MW AS ON 31/03/2006 | SECTOR | SYSTEM | TYPE | FUEL 1 | 2003-04 Net Generation GWh |
|---|---|---|---|---|---|---|---|---|---|
| **9** | **GNDTP(BHATINDA)** | **0** | | **440** | **STATE** | **PSEB** | **THERMAL** | **COAL** | **2,308** |
| 9 | GNDTP(BHATINDA) | 1 | 22-Sep-74 | 110 | STATE | PSEB | THERMAL | COAL | |
| 9 | GNDTP(BHATINDA) | 2 | 19-Sep-75 | 110 | STATE | PSEB | THERMAL | COAL | |
| 9 | GNDTP(BHATINDA) | 3 | 29-Mar-78 | 110 | STATE | PSEB | THERMAL | COAL | |
| 9 | GNDTP(BHATINDA) | 4 | 31-Jan-79 | 110 | STATE | PSEB | THERMAL | COAL | |
| **10** | **GHTP (LEH.MOH.)** | **0** | | **420** | **STATE** | **PSEB** | **THERMAL** | **COAL** | **3,079** |
| 10 | GHTP (LEH.MOH.) | 1 | 29-Dec-97 | 210 | STATE | PSEB | THERMAL | COAL | |
| 10 | GHTP (LEH.MOH.) | 2 | 16-Oct-98 | 210 | STATE | PSEB | THERMAL | COAL | |
| **11** | **ROPAR** | **0** | | **1260** | **STATE** | **PSEB** | **THERMAL** | **COAL** | **7,612** |
| 11 | ROPAR | 1 | 26-Sep-84 | 210 | STATE | PSEB | THERMAL | COAL | |
| 11 | ROPAR | 2 | 29-Mar-85 | 210 | STATE | PSEB | THERMAL | COAL | |
| 11 | ROPAR | 3 | 31-Mar-88 | 210 | STATE | PSEB | THERMAL | COAL | |
| 11 | ROPAR | 4 | 29-Jan-89 | 210 | STATE | PSEB | THERMAL | COAL | |
| 11 | ROPAR | 5 | 29-Mar-92 | 210 | STATE | PSEB | THERMAL | COAL | |
| 11 | ROPAR | 6 | 30-Mar-93 | 210 | STATE | PSEB | THERMAL | COAL | |

## 4) RAJASTHAN:

| S_NO | NAME | UNIT_NO | DT_ COMM | CAPACITY MW AS ON 31/03/2006 | SECTOR | SYSTEM | TYPE | FUEL 1 | 2003-04 Net Generation GWh |
|---|---|---|---|---|---|---|---|---|---|
| **12** | **KOTA** | **0** | | **1045** | **STATE** | **RRVUNL** | **THERMAL** | **COAL** | **5,792** |
| 12 | KOTA | 1 | 17-Jan-83 | 110 | STATE | RRVUNL | THERMAL | COAL | |
| 12 | KOTA | 2 | 13-Jul-83 | 110 | STATE | RRVUNL | THERMAL | COAL | |
| 12 | KOTA | 3 | 25-Sep-88 | 210 | STATE | RRVUNL | THERMAL | COAL | |
| 12 | KOTA | 4 | 1-May-89 | 210 | STATE | RRVUNL | THERMAL | COAL | |
| 12 | KOTA | 5 | 26-Mar-94 | 210 | STATE | RRVUNL | THERMAL | COAL | |
| 12 | KOTA | 6 | 30-Jul-03 | 195 | STATE | RRVUNL | THERMAL | COAL | |
| **15** | **SURATGARH** | **0** | | **1250** | **STATE** | **RRVUNL** | **THERMAL** | **COAL** | **7,419** |
| 15 | SURATGARH | 1 | 10-May-98 | 250 | STATE | RRVUNL | THERMAL | COAL | |
| 15 | SURATGARH | 2 | 28-Mar-00 | 250 | STATE | RRVUNL | THERMAL | COAL | |
| 15 | SURATGARH | 3 | 29-Oct-01 | 250 | STATE | RRVUNL | THERMAL | COAL | |
| 15 | SURATGARH | 4 | 25-Mar-02 | 250 | STATE | RRVUNL | THERMAL | COAL | |
| 15 | SURATGARH | 5 | 30-Jun-03 | 250 | STATE | RRVUNL | THERMAL | COAL | |
| **16** | **RAMGARH GT** | **0** | | **113.8** | **STATE** | **RRVUNL** | **THERMAL** | **GAS** | **206** |
| 16 | RAMGARH GT | 1 | 15-Nov-94 | 3 | STATE | RRVUNL | THERMAL | GAS | |
| 16 | RAMGARH GT | 2 | 12-Jan-96 | 35.5 | STATE | RRVUNL | THERMAL | GAS | |
| 16 | RAMGARH GT | 3 | 7-Aug-02 | 37.5 | STATE | RRVUNL | THERMAL | GAS | |
| 16 | RAMGARH ST 1 | 4 | 31-Mar-03 | 37.8 | STATE | RRVUNL | THERMAL | GAS | |
| **17** | **ANTA GT** | **0** | | **413** | **CENTER** | **NTPC** | **THERMAL** | **GAS** | **2,702** |
| 17 | ANTA GT | 1 | 20-Jan-89 | 88 | CENTER | NTPC | THERMAL | GAS | |
| 17 | ANTA GT | 2 | 4-Mar-89 | 88 | CENTER | NTPC | THERMAL | GAS | |
| 17 | ANTA GT | 3 | 4-May-89 | 88 | CENTER | NTPC | THERMAL | GAS | |
| 17 | ANTA GT | 4 | 5-Mar-90 | 149 | CENTER | NTPC | THERMAL | GAS | |

## 5) UTTAR PRADESH:

| S_NO | NAME | UNIT_NO | DT_ COMM | CAPACITY MW AS ON 31/03/2006 | SECTOR | SYSTEM | TYPE | FUEL 1 | 2003-04 Net Generation GWh |
|---|---|---|---|---|---|---|---|---|---|
| **18** | **OBRA-A** | **0** | | **1550** | **STATE** | **UPRVUNL** | **THERMAL** | **COAL** | **5,509** |
| 18 | OBRA | 1 | 1-Jul-92 | 50 | STATE | UPRVUNL | THERMAL | COAL | |
| 18 | OBRA | 2 | 11-Mar-68 | 50 | STATE | UPRVUNL | THERMAL | COAL | |
| 18 | OBRA | 3 | 13-Oct-68 | 50 | STATE | UPRVUNL | THERMAL | COAL | |
| 18 | OBRA | 4 | 16-Jul-69 | 50 | STATE | UPRVUNL | THERMAL | COAL | |
| 18 | OBRA | 5 | 30-Jul-71 | 50 | STATE | UPRVUNL | THERMAL | COAL | |
| 18 | OBRA | 6 | 31-Oct-73 | 100 | STATE | UPRVUNL | THERMAL | COAL | |
| 18 | OBRA | 7 | 14-Dec-74 | 100 | STATE | UPRVUNL | THERMAL | COAL | |
| 18 | OBRA | 8 | 15-Sep-75 | 100 | STATE | UPRVUNL | THERMAL | COAL | |
| 18 | OBRA | 9 | 26-Jan-80 | 200 | STATE | UPRVUNL | THERMAL | COAL | |
| 18 | OBRA | 10 | 14-Jan-79 | 200 | STATE | UPRVUNL | THERMAL | COAL | |
| 18 | OBRA | 11 | 31-Dec-77 | 200 | STATE | UPRVUNL | THERMAL | COAL | |
| 18 | OBRA | 12 | 28-Mar-81 | 200 | STATE | UPRVUNL | THERMAL | COAL | |
| 18 | OBRA | 13 | 21-Jul-82 | 200 | STATE | UPRVUNL | THERMAL | COAL | |
| **19** | **PANKI** | **0** | | **252** | **STATE** | **UPRVUNL** | **THERMAL** | **COAL** | **985** |
| 19 | PANKI | 1 | 19-Feb-85 | 32 | STATE | UPRVUNL | THERMAL | COAL | |
| 19 | PANKI | 2 | 10-Nov-76 | 110 | STATE | UPRVUNL | THERMAL | COAL | |
| 19 | PANKI | 3 | 24-Mar-77 | 110 | STATE | UPRVUNL | THERMAL | COAL | |

| S_NO | NAME | UNIT_NO | DT_ COMM | CAPACITY MW AS ON 31/03/2006 | SECTOR | SYSTEM | TYPE | FUEL 1 | 2003-04 Net Generation GWh |
|---|---|---|---|---|---|---|---|---|---|
| **20** | **H_GANJ B** | **0** | | **450** | **STATE** | **UPRVUNL** | **THERMAL** | **COAL** | **615** |
| 20 | H_GANJ B | 1 | 29-Feb-68 | 50 | STATE | UPRVUNL | THERMAL | COAL | |
| 20 | H_GANJ B | 2 | 1-Jul-92 | 50 | STATE | UPRVUNL | THERMAL | COAL | |
| 20 | H_GANJ B | 3 | 22-Jan-72 | 60 | STATE | UPRVUNL | THERMAL | COAL | |
| 20 | H_GANJ B | 4 | 18-Sep-72 | 60 | STATE | UPRVUNL | THERMAL | COAL | |
| 20 | H_GANJ B | 5 | 21-Mar-77 | 60 | STATE | UPRVUNL | THERMAL | COAL | |
| 20 | H_GANJ B | 6 | 26-Aug-81 | 60 | STATE | UPRVUNL | THERMAL | COAL | |
| 20 | H_GANJ B | 7 | 31-Mar-78 | 110 | STATE | UPRVUNL | THERMAL | COAL | |
| **21** | **PARICHA** | **0** | | **430** | **STATE** | **UPRVUNL** | **THERMAL** | **COAL** | **523** |
| 21 | PARICHA | 1 | 31-Mar-84 | 110 | STATE | UPRVUNL | THERMAL | COAL | |
| 21 | PARICHA | 2 | 25-Feb-85 | 110 | STATE | UPRVUNL | THERMAL | COAL | |
| 21 | PARICHA | 3 | 29-Mar-06 | 210 | STATE | UPRVUNL | THERMAL | COAL | |
| **22** | **ANPARA** | **0** | | **1630** | **STATE** | **UPRVUNL** | **THERMAL** | **COAL** | **10,997** |
| 22 | ANPARA | 1 | 24-Mar-86 | 210 | STATE | UPRVUNL | THERMAL | COAL | |
| 22 | ANPARA | 2 | 28-Feb-87 | 210 | STATE | UPRVUNL | THERMAL | COAL | |
| 22 | ANPARA | 3 | 12-Mar-88 | 210 | STATE | UPRVUNL | THERMAL | COAL | |
| 22 | ANPARA | 4 | 19-Jul-93 | 500 | STATE | UPRVUNL | THERMAL | COAL | |
| 22 | ANPARA | 5 | 4-Jul-94 | 500 | STATE | UPRVUNL | THERMAL | COAL | |
| **23** | **SINGRAULI STPS** | **0** | | **2000** | **CENTER** | **NTPC** | **THERMAL** | **COAL** | **14,479** |
| 23 | SINGRAULI STPS | 1 | 13-Feb-82 | 200 | CENTER | NTPC | THERMAL | COAL | |
| 23 | SINGRAULI STPS | 2 | 25-Nov-82 | 200 | CENTER | NTPC | THERMAL | COAL | |
| 23 | SINGRAULI STPS | 3 | 28-Mar-83 | 200 | CENTER | NTPC | THERMAL | COAL | |
| 23 | SINGRAULI STPS | 4 | 2-Nov-83 | 200 | CENTER | NTPC | THERMAL | COAL | |
| 23 | SINGRAULI STPS | 5 | 26-Feb-84 | 200 | CENTER | NTPC | THERMAL | COAL | |
| 23 | SINGRAULI STPS | 6 | 23-Dec-86 | 500 | CENTER | NTPC | THERMAL | COAL | |
| 23 | SINGRAULI STPS | 7 | 24-Nov-87 | 500 | CENTER | NTPC | THERMAL | COAL | |
| **24** | **RIHAND** | **0** | | **2000** | **CENTER** | **NTPC** | **THERMAL** | **COAL** | **7,347** |
| 24 | RIHAND | 1 | 31-Mar-88 | 500 | CENTER | NTPC | THERMAL | COAL | |
| 24 | RIHAND | 2 | 5-Jul-89 | 500 | CENTER | NTPC | THERMAL | COAL | |
| 24 | RIHAND | 3 | 31-Jan-05 | 500 | CENTER | NTPC | THERMAL | COAL | |
| 24 | RIHAND | 4 | 24-Sep-05 | 500 | CENTER | NTPC | THERMAL | COAL | |
| **25** | **UNCHAHAR** | **0** | | **840** | **CENTER** | **NTPC** | **THERMAL** | **COAL** | **5,868** |
| 25 | UNCHAHAR | 1 | 21-Nov-88 | 210 | CENTER | NTPC | THERMAL | COAL | |
| 25 | UNCHAHAR | 2 | 22-Mar-89 | 210 | CENTER | NTPC | THERMAL | COAL | |
| 25 | UNCHAHAR | 3 | 27-Jan-99 | 210 | CENTER | NTPC | THERMAL | COAL | |
| 25 | UNCHAHAR | 4 | 22-Oct-99 | 210 | CENTER | NTPC | THERMAL | COAL | |
| **26** | **DADRI (NCTPP)** | **0** | | **840** | **CENTER** | **NTPC** | **THERMAL** | **COAL** | **5,683** |
| 26 | DADRI (NCTPP) | 1 | 21-Dec-91 | 210 | CENTER | NTPC | THERMAL | COAL | |
| 26 | DADRI (NCTPP) | 2 | 18-Dec-92 | 210 | CENTER | NTPC | THERMAL | COAL | |
| 26 | DADRI (NCTPP) | 3 | 16-Jun-92 | 210 | CENTER | NTPC | THERMAL | COAL | |
| 26 | DADRI (NCTPP) | 4 | 24-Mar-94 | 210 | CENTER | NTPC | THERMAL | COAL | |
| **27** | **TANDA** | **0** | | **440** | **CENTER** | **NTPC** | **THERMAL** | **COAL** | **2,650** |
| 27 | TANDA | 1 | 23-Jan-88 | 110 | CENTER | NTPC | THERMAL | COAL | |
| 27 | TANDA | 2 | 11-Mar-89 | 110 | CENTER | NTPC | THERMAL | COAL | |
| 27 | TANDA | 3 | 28-Mar-90 | 110 | CENTER | NTPC | THERMAL | COAL | |
| 27 | TANDA | 4 | 20-Feb-98 | 110 | CENTER | NTPC | THERMAL | COAL | |
| **28** | **AURAIYA GT** | **0** | | **652** | **CENTER** | **NTPC** | **THERMAL** | **GAS** | **4,122** |
| 28 | AURAIYA GT | 1 | 29-Mar-89 | 112 | CENTER | NTPC | THERMAL | GAS | |
| 28 | AURAIYA GT | 2 | 21-Jul-89 | 112 | CENTER | NTPC | THERMAL | GAS | |
| 28 | AURAIYA GT | 3 | 9-Aug-89 | 112 | CENTER | NTPC | THERMAL | GAS | |
| 28 | AURAIYA GT | 4 | 29-Sep-89 | 112 | CENTER | NTPC | THERMAL | GAS | |
| 28 | AURAIYA GT | 5 | 29-Dec-89 | 102 | CENTER | NTPC | THERMAL | GAS | |
| 28 | AURAIYA GT | 6 | 12-Jun-90 | 102 | CENTER | NTPC | THERMAL | GAS | |
| **29** | **DADRI GT** | **0** | | **817** | **CENTER** | **NTPC** | **THERMAL** | **GAS** | **4,930** |
| 29 | DADRI GT | 1 | 21-Feb-92 | 131 | CENTER | NTPC | THERMAL | GAS | |
| 29 | DADRI GT | 2 | 26-Mar-92 | 131 | CENTER | NTPC | THERMAL | GAS | |
| 29 | DADRI GT | 3 | 6-Jun-92 | 131 | CENTER | NTPC | THERMAL | GAS | |
| 29 | DADRI GT | 4 | 14-Oct-92 | 131 | CENTER | NTPC | THERMAL | GAS | |
| 29 | DADRI GT | 5 | 26-Feb-94 | 146.5 | CENTER | NTPC | THERMAL | GAS | |
| 29 | DADRI GT | 6 | 27-Mar-93 | 146.5 | CENTER | NTPC | THERMAL | GAS | |

## 6) JAMMU & KASHMIR :

| S_NO | NAME | UNIT_NO | DT_ COMM | CAPACITY MW AS ON 31/03/2006 | SECTOR | SYSTEM | TYPE | FUEL 1 | 2003-04 Net Generation GWh |
|---|---|---|---|---|---|---|---|---|---|
| **30** | **PAMPORE GT** | **0** | | **175** | **STATE** | **JKEB** | **THERMAL** | **DISL** | **29** |
| 30 | PAMPORE GT | 1 | 31-Mar-89 | 25 | STATE | JKEB | THERMAL | DISL | |
| 30 | PAMPORE GT | 2 | 20-Jul-89 | 25 | STATE | JKEB | THERMAL | DISL | |
| 30 | PAMPORE GT | 3 | 11-Dec-89 | 25 | STATE | JKEB | THERMAL | DISL | |
| 30 | PAMPORE GT | 4 | 7-Jan-94 | 25 | STATE | JKEB | THERMAL | DISL | |
| 30 | PAMPORE GT | 5 | 7-Feb-94 | 25 | STATE | JKEB | THERMAL | DISL | |
| 30 | PAMPORE GT | 6 | 4-Apr-94 | 25 | STATE | JKEB | THERMAL | DISL | |
| 30 | PAMPORE GT | 7 | 30-Mar-95 | 25 | STATE | JKEB | THERMAL | DISL | |

## Annex 4

### MONITORING INFORMATION

A CDM project team will be constituted along with participation of Project Manager, Site Supervisor and Shift Incharge after suitable training on CDM and its related monitoring activities. This team will be responsible and review periodically all the requirements of monitoring the CDM projects and maintain logbooks.

**Monitoring:**

Monitoring methodology for Electricity generation from the project activities are as below;

**Completeness:**

One set of Meters comprising (a) a set of Main Meters and (b) a set of Check Meters shall be installed by the Company on each circuit of the transmission lines at each end so as to record both (a) energy exported by the Project to the Grid and (b) energy imported by the Project from the Grid.

**Reliability:**

All Meters shall be installed by the Company at its own cost. Each Meter shall be of static type. 0.2% accuracy class confirming to latest IEC-687 and shall meet the requirements of IEGC. The recording of each Meter include, as a minimum:

(a) Energy Output during each Settlement Period,
(b) Average Power Output during each Settlement Period.
(c) Frequency during each Settlement Period, and
(d) Year, Month, day, hour and minute of start and end of each Settlement Period.

One complete spare set of tested, calibrated and sealed Meters shall be kept in safe custody of the Company. All such Meters shall be sealed in the presence of the CTU, PTC and the Company, which seal shall remain intact unless it is broken by the Testing Laboratory for testing and calibration.

**Frequency:**

Power Trading Corporation (PTC) may conduct Periodic Performance Test at any time during the Operation Period. PTC issues a written notice to the Company, to conduct one Periodic Performance Test in each Operation Year, comprising any or all of the following:

(i) Project Capacity Test;
(ii) Maximum Project Capacity Test: and
(iii) Unit Characteristics Test on any Unit but limited to:
    (a) Reactive Power capability: and
    (b) Start up time

The Periodic Performance Tests shall be treated as Deemed Generation for the purposes of computing the Monthly Bills. Meter reading of the of the Main Meters and Check Meters installed at the Inter-connection Point shall be taken as at 24:00 hours on each day and the data furnished by the company to the Power Trading Corporation and the purcheser by 12:00 hours on the following day.

i) Total Energy Output from 00:00 hours to 24:00 hours of the relevent day;
ii) The Energy Output during Peak Hours of thr relevent day;
iii) Deemed generation from 00:00 hours to 24:00 hours of the relevent day;
iv) Deemed generation during Peak Hours of thr relevent day;

**Internal Audit:**

EPPL will appoint an energy audit group to take measurements out of the plant activity on a regular basis and also form an operational and management structure in order to monitor emission reductions due to project activity. A particular unit will be responsible for the monitoring and recording of the electricity supplied as per the monitoring plan based on which the audit report will be generated. All the experienced technicians with 5-10 years of experience in operating power generation equipment, will be responsible for this and the monthly monitoring reports will be checked and discussed with the plant manager, who is a qualified engineer with 10-15 years of experience. In case of any irregularity observed, immediate action will be taken. The internal energy audit reports prepared by the audit team will be further submitted to the Management and to the authorised CDM team on regular basis.