See Annex 9 | Economic and Financial Analysis

Document of
The World Bank

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Report No: 38178-IN

PROJECT APPRAISAL DOCUMENT

ON A

PROPOSED LOAN

IN THE AMOUNT OF

US$400 MILLION

TO THE

SATLUJ JAL VIDYUT NIGAM LTD

WITH THE GUARANTEE OF THE REPUBLIC OF INDIA

FOR

RAMPUR HYDROPOWER PROJECT

August 15, 2007

Sustainable Development Department
India Country Management Unit
South Asia Region

CURRENCY EQUIVALENTS

(Exchange Rate Effective: April 2007)

Currency Unit = India Rupees (Rs.)

Rs. 41.5 = US$1

FISCAL YEAR

April 1 – March 31

ABBREVIATIONS AND ACRONYMS

AAD	Advance Against Depreciation	MoU	Memorandum of Understanding
CAG	Comptroller and Auditor General	MTR	Mid Term Review
CEA	Central Electricity Authority	MW	Mega Watt
CERC	Central Electricity Regulatory Commission	NGO	Non-Governmental Organization
CO_2	Carbon Dioxide	NHPC	National Hydroelectric Power Corp.
CWC	Central Water Commission	NJHP	Nathpa Jhakri Hydroelectric Project/ "Nathpa Jhakri"
DPR	Detailed Project Report	NJPC	Nathpa Jhakri Power Corporation
DSCR	Debt Service Coverage Ratio	NO_x	Nitrogen Oxide
EMP	Environment Management Plan	NPV	Net Present Value
ERR	Economic Rate of Return	PAPs	Project Affected Persons
ESIA	Environment & Social Impact Assessment	PCN	Project Concept Note
FIRR	Financial Internal Rate of Return	PDO	Project Development Objective
FM	Financial Management	PIC	Public Information Center
GHG	Green House Gases	PID	Project Information Document
GoHP	Government of Himachal Pradesh	POWERGRID	Power Grid Corporation of India
GoI	Government of India	PPAs	Power Purchase Agreements
GWh	Giga-watt Hour	PSU	Public Sector Undertaking
IAD	Internal Audit Department	R&R	Resettlement & Rehabilitation
IBRD	International Bank for Reconstruction & Development	RAP	Resettlement Action Plan
ICB	International Competitive Bidding	RHEP	Rampur Hydroelectric Project/ "Rampur"
ICR	Implementation Completion and Results Report	RFP	Request For Proposals
IDA	International Development Association	RoE	Return on Equity
IDC	Interest During Construction	SBD	Standard Bidding Documents
IFC	International Finance Corporation	SEB	State Electricity Board
IPCC	Intergovernmental Panel on Climate Change	SJVN	Satluj Jal Vidyut Nigam Limited
IPPs	Independent Power Producers	SO_x	Sulphur Oxide
ISDS	Integrated Safeguard Data Sheet	SPM	Suspended Particulate Matter
Km	kilometer	USD	US Dollar
kWh	kilowatt hour	T&D	Transmission & Distribution
M&E	Monitoring and Evaluation	TA	Technical Assistance
MAT	Minimum Alternative Tax	TEC	Techno Economic Clearance
MIS	Management Information System	TPA	Tripartite Agreements
MoP	Ministry of Power	WACC	Weighted Average Cost of Capital

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INDIA
Rampur Hydropower Project

CONTENTS

INDIA

RAMPUR HYDROPOWER PROJECT

PROJECT APPRAISAL DOCUMENT

SOUTH ASIA

SASDE

Date: August 15, 2007	Team Leader: Sunil Kumar Khosla / Judith K. Plummer
Country Director: Isabel M. Guerrero	Sectors: Renewable energy (50%); Power (50%)
Sector Manager: Salman Zaheer	Themes: Infrastructure services for private sector development (P)
Project ID: P095114	Environmental screening category: Full Assessment
Lending Instrument: Specific Investment Loan	

Project Financing Data

[X] Loan [ ] Credit [ ] Grant [ ] Guarantee [ ] Other:

For Loans/Credits/Others:
Total Bank financing (US$m.): 400.00
Proposed terms: Variable-Spread Loan; maturity of 20 years; 5 years grace period; front-end fee of 1%; commitment charge of ¾ of 1%

Financing Plan (US$m)

Source	Local	Foreign	Total
BORROWER	270.00	0.00	270.00
INTERNATIONAL BANK FOR RECONSTRUCTION AND DEVELOPMENT	0.00	400.00	400.00
Total:	270.00	400.00	670.00

Borrower: Satluj Jal Vidyut Nigam Ltd

Corporate Headquarters: Himfed Building, New Shimla 171009
EPBX: 2670741, 2670064, 2670490, 2670621; Fax: 2670642

Liaison Office: 303 & 501, Bhikaji Cama Bhawan, Bhikaji Cama Place
New Delhi 110066; Phone: 011-41659210

Website: www.sjvn.nic.in

Responsible Agency: Satluj Jal Vidyut Nigam Ltd
India

Estimated disbursements (Bank FY/US$m)

FY	2007	2008	2009	2010	2011	2012	2013	0	0
Annual	0.00	30.00	60.00	90.00	90.00	90.00	40.00	0.00	0.00
Cumulative	0.00	30.00	90.00	180.00	270.00	360.00	400.00	400.00	400.00

Project implementation period: Start: February, 2007 End: September, 2012
Expected effectiveness date: December, 2007
Expected closing date: March, 2013

Does the project depart from the CAS in content or other significant respects? ***Ref. PAD A.3***	[ ]Yes [X] No
Does the project require any exceptions from Bank policies? ***Ref. PAD D.7*** Have these been approved by Bank management? Is approval for any policy exception sought from the Board?	 [ ]Yes [X] No [ ]Yes [ ] No [ ]Yes [X] No
Does the project include any critical risks rated "substantial" or "high"? ***Ref. PAD C.4***	[X]Yes [ ] No
Does the project meet the Regional criteria for readiness for implementation? ***Ref. PAD D.7***	[X]Yes [ ] No

Project development objective ***Ref. PAD B.2, Technical Annex 3***

The development objective of the project is (a) to improve the reliability of India's Northern Electricity Grid through the addition of renewable, low carbon energy from the Rampur hydropower project and (b) to improve the effectiveness of Satluj Jal Vidyut Nigam Limited (SJVN) with respect to the preparation and safe implementation of economically, environmentally, and socially sustainable hydropower projects.

Project description *[one-sentence summary of each component]* ***Ref. PAD B.3.a, Technical Annex 4***

The project will consist of three components:
(a) construction of the 412 MW Rampur run-of-river hydroelectric scheme;
(b) investment support to implement measures for ensuring higher availability of the existing upstream Nathpa Jhakri hydropower project; and
(c) technical assistance for institutional reform and capacity building to assist the borrower, SJVN, in moving towards international good practices in hydropower development and operations, and to improve its standards of project preparation for future projects.

Which safeguard policies are triggered, if any? ***Ref. PAD D.6, Technical Annex 10***

Environmental Assessment (OP/BP 4.01)
Cultural Property (OPN 11.03, being revised as OP 4.11)
Involuntary Resettlement (OP/BP 4.12)
Forests (OP/BP 4.36)
Safety of Dams (OP/BP 4.37)
Projects on International Waterways (OP/BP 7.50)

Significant, non-standard conditions, **if any**, for:
Ref. PAD C.5

Board presentation: None

Loan/credit effectiveness: None

Covenants:

1. Financial, except as the Bank shall otherwise agree, SJVN shall:

i) furnish to the Bank, not later than six months after the end of each fiscal year, certified copies of its audited entity financial statements, audit of the project accounts. Similarly provide copies of the internal audit reports;

ii) not incur any debt, if after the incurrence of such debt, the ratio of debt to equity shall be greater than 4 to 1;

iii) take all necessary steps to maintain its accounts receivable at a level not exceeding an amount equivalent to its billing for energy generation for the preceding three months;

iv) furnish to the Bank, not later than December 31 of each year, its ten-year financial projections, including its investment program and financing plan;

v) furnish to the Bank, every three months, interim un-audited financial reports (IUFRs) in the format agreed with the Bank.

2. Implementation, SJVN shall:

i) report on progress in project implementation with the key performance indicators and including an updated milestone plan for construction of the Rampur hydropower project, with any necessary measures to keep to the commissioning targets, according to the reporting schedule agreed with the Bank;

ii) carry out periodic dam safety reviews and take all actions necessary to ensure the safety of the Nathpa Dam.

3. Social and Environment, SJVN shall:

i) implement the resettlement action plan, sustainable community development program and environmental management plan as agreed with the Bank;

ii) carry out resettlement impact assessment study to assess the changes in the living standards of the affected people before the mid-term review and in the fifth year of implementation. Agree with the Bank, and take action to address any issues raised by the impact assessment studies;

iii) retain a panel of safety experts throughout the project construction period in accordance with terms of reference acceptable to the Bank;

iv) provide all the entitlements available in the resettlement action plan to the PAPs, i.e. compensation for land acquisition, payment of rehabilitation grant and provision of developed plots, which would be allotted to the PAPs, as applicable, before beginning any construction activities on such land required for the project.

4. Mid term review - The mid-term review of the project shall be carried out by March 31, 2010.

5. Completion - SJVN shall prepare, as at the closing date, a project completion report; and a plan for the future operation of the project.

Government of Himachal Pradesh (GoHP) - Project Agreement

GoHP shall:

1. Provide support as needed to facilitate the implementation of the Project, including timely provision of all required consents and approvals for implementing the project; and implement its responsibilities under the environmental management plan, resettlement action plan, catchment area treatment plan and afforestation plan;

2. Cause SJVN to perform in accordance with the provisions of the Loan Agreement and not take any action which would prevent or interfere with such performance.

A. STRATEGIC CONTEXT AND RATIONALE

1. Country and sector issues

1. India's recent economic growth, over 8 percent per annum, and the Government of India's focus on boosting the rural economy, while also improving the investment climate, has placed new demands on the country's power supply system.

2. Under the Constitution, electricity is a "concurrent" subject with Central and state governments being responsible for key aspects of its supply. The Centre, having laid the legal and policy foundations to further strengthen existing organizations and to expand private participation, is better positioned to respond to new demands on the sector than it was five years ago. At the state level, where the electricity market transactions culminate, several states have used national laws and policy to advance the restructuring of their power sectors towards making them more efficient, accountable and demand-responsive. (Refer to Annex 1 for more detail on the sector context)

3. The key challenge is to accelerate the implementation of the National Electricity Policy (NEP) 2005, underpinned by the Electricity Act 2003, which, for the year 2012, has set the goals of: (i) providing electricity access to all households; (ii) eliminating power shortages; (iii) doubling per capita electricity consumption to 1000 kWh per annum; and (iv) achieving the financial turnaround and commercial viability of the sector.

4. In August 2006, the NEP was supplemented by the Integrated Energy Policy, which is intended to address the question of how India can meet the rapidly rising demand for energy and sustain a high economic growth rate. Concerns about energy security and high costs of energy imports drive the proposed measures aimed at reducing non-essential or inefficient energy consumption. However, the remaining challenges are daunting, given the following background:

- Low levels of connectivity, particularly in the rural areas, thereby reducing opportunities for non-farm employment for 59 percent of India's labor force engaged in the agricultural sector;
- High coping costs of industry, with 60 percent of Indian firms relying on captive or back-up generation. Captive generation capacity in the country is estimated at 40,000 MW and the grid-connected capacity is over 132,000 MW;
- Limited grid supply infrastructure, with about 25 percent of capacity in need of rehabilitation; limited capacity for inter-regional trade; under-maintained state distribution systems that are unable to meet demand, resulting in peak and energy shortages; some regional grids operating in a precarious situation with frequent over-drawal by the constituents threatening grid stability and reliability;
- Unfinished agenda of strengthening the sector and utility governance in most states, wherein the symptoms include high system losses which, though concentrated at the distribution level, have a pervasive impact on the sector;
- Need to speed up the sector's financial turnaround. The achievements of some states need to be consolidated and replicated in other states;
- Unpredictable fuel supply and costs, particularly for gas. This issue is becoming a serious barrier to scaling up investments in generation;
- The power sector accounts for about 50 percent of India's carbon emissions, with power generation – based on indigenous coal – expected to continue playing a major role in India's carbon dioxide (CO_2) emissions.

5. The government's policy initiatives have provided an impetus to enhance governance, commercialize services, expand private participation, introduce competition, and better serve the rural poor. Furthermore, the government has underpinned these policy measures with financial incentives to: (i) increase the efficiency, accountability and quality of electricity distribution services, thereby contributing to notable improvements in several states; (ii) improve the reliability of old thermal power plants; (iii) enhance investment in renewable energy; and (iv) expand rural access. The government has also initiated the preparation of seven ultra-mega coal-based plants[1/] (about 4,000 MW each) for competitive tendering.

6. India's efforts at reform in the power sector are beginning to pay off. The sector's financial performance is showing improvement, with virtually all payments to Central public sector units in the power sector being made on time by state-level entities. Availability-based tariffs and tighter performance norms have raised plant load factors. An increasing number of villages have been electrified under the Tenth Five Year Plan as compared with the Eight and Ninth Five Year Plans combined. System losses in some states have been brought down below 20 percent. Generation capacity additions under the Tenth FiveYear Plan are higher than in earlier periods, but have fallen short of the original, albeit ambitious, targets by about 40 percent. Furthermore, first generation reforms -- unbundling, corporatization and independent regulation -- have increased the transparency and quality of data, and public awareness of the sector's performance. Although the levels of commitment vary, state-level authorities are taking the lead in advancing the reform of state utilities and strengthening the regulatory framework.

7. The government intends to more than double the rate of investment in the power sector, working with state-level authorities to support economic growth and provide reliable electricity services to all by 2012. Under the Eleventh Five Year Plan (2007-12), the government expects to facilitate the addition of 60,000-70,000 MW of generation capacity (including 16,000 MW of hydropower), expand inter-state transmission capacity from 10,000 MW to 37,000 MW, assist states to expand and modernize their distribution networks, and improve sector governance and finances. Analysis shows that in the short term, the gap between supply and demand, in physical terms (after considering the impact of price elasticity on demand) will continue to grow, even with a considerable reduction in losses and enhanced efficiency gains.

8. The planned expansion of India's generation capacity will also need to take into account the low carbon option as one of the key elements to address environmental challenges. Despite being recognized internationally as a low-intensity and low per capita producer of CO_2, India produces 1.1 billion tons per annum (tpa) of CO_2 or 4 percent of the world's total. With a growth rate of 8 percent, and a "business-as-usual" scenario (as projected by the Planning Commission), by 2031, India will produce 5.5 billion tpa of CO_2, or 13 percent of the world's total. Under this scenario, India would continue to rely heavily on indigenous coal resources. To achieve a lower carbon development path, it is important that cleaner power generation options, such as sustainable development of hydropower, are scaled up.

2. Rationale for Bank involvement

9. The government envisages that the Bank's re-engagement in the hydropower sector in India, beginning with the Rampur hydropower project, will provide experience of good practice for hydropower development, targeting support at about 10 percent of the 16,000 MW of hydropower capacity it intends to develop over the next five years during the Eleventh Five Year Plan. Specifically, through a partnership with a few developers in specific states, the Bank can help institute suitable international technical and sustainability practices in the Himalayan region, the

[1/] Out of the proposed seven plants, so far one "Mundra" has been awarded.

home of much of India's untapped hydro resources. In parallel, the Bank can also help strengthen the institutional foundation for the government's plans of scaling up development of 100,000-150,000 MW of India's renewable hydropower potential by 2030.

10. The Bank's broader engagement in the power sector seeks to support the government's priorities of improving electricity services, expanding access and optimizing the utilization of indigenous resources, while also helping to put the country on a lower carbon emission path rather than continue under a "business-as-usual" scenario. Discussions and activities initiated by the Bank are underway to support the government's efforts to: (i) reduce technical losses in electricity distribution; (ii) introduce good practices in the rehabilitation and modernization of coal plants; (iii) promote the development of renewable energy for rural areas; and (iv) expand the transmission system. The Bank's main value addition will be in advancing good implementation models, and helping to create an enabling policy and institutional environment for sector development. The Bank will also continue its dialogue with the Government of India (GoI) on issues such as supporting their initiative to enhance private participation in hydropower and supporting the introduction of an economic pricing regime for peak power generation.

3. Higher level objectives to which the project contributes

11. The Bank's proposed support for the Rampur hydropower project is considered to be the first step in a continuing engagement aimed at: (i) providing assistance to the long-term sustainable development of hydropower as a renewable resource in India; (ii) assisting the sector in consolidating recent improvements in sustainable hydropower development and moving towards international good practices; (iii) strengthening the capacity of some of the agencies involved; and (iv) providing support to a low carbon growth strategy.

12. This support will contribute to the development of the power sector in India wherein it is well managed, financially and economically viable, technically sound, and follows good environmental and social practices. It will assist the sector to support growth of the Indian economy rather than acting as a constraint as it does at present. This is in line with the 2004-08 Country Strategy for India.

B. PROJECT DESCRIPTION

1. Lending instrument

13. The project is designed as a specific investment loan (SIL) to finance investments required for the development of the Rampur hydropower project. Satluj Jal Vidyut Nigam Limited (SJVN) has chosen to denominate the loan in US dollars, considering the longer tenure available for such loans. SJVN has decided to opt for the variable spread option for this loan.

2. Project development objective and key indicators

14. The development objective of the project is: (i) to improve the reliability of India's Northern Electricity Grid through the addition of renewable, low carbon energy from the Rampur hydropower project; and (ii) to improve the effectiveness of Satluj Jal Vidyut Nigam Limited (SJVN) with respect to the preparation and safe implementation of economically, environmentally, and socially sustainable hydropower projects.

15. The prime indicator for measuring the improved reliability of India's Northern Electricity Grid will be the proportion of the time over which the grid frequency is maintained within the operating band of India's Electricity Grid Code. The project's capacity is small compared to the size

of the northern grid so its impact will be marginal, but important[2/]. The improvement in effectiveness of SJVN will be measured by the preparation and implementation of training plans and the adoption of good practices in various areas, including safety, financial management, contract management, and communications.

3. Project components

16. The project will consist of three components: (i) construction of the 412 MW Rampur run-of-river hydroelectric scheme (US$365 million); (ii) investment support to implement measures for ensuring higher availability of the existing upstream Nathpa Jhakri hydropower project (US$30 million); and (iii) technical assistance for institutional reform and capacity building to assist the borrower, SJVN, in moving towards international good practices in hydropower development and operations, and improving its standards of project preparation for future projects (US$5 million). (the figures in brackets above indicate estimated share of Bank funding for the components).

17. Annex 4 provides a detailed description for each of the three components, and Annex 5, details the costs. Annex 11 contains a description of the studies and investigations that were undertaken to prepare the project.

4. Lessons learned and reflected in the project design

18. Over the last decade, the Bank has provided support to Central government entities for generation, transmission and renewable investments, and to selected State Electricity Boards (SEBs) for investments associated with sector reform. The International Finance Corporation (IFC) has also been engaged in supporting private participation in generation and transmission. The results of this support have been mixed. While generation and transmission engagements with the Centre have generally yielded satisfactory results, the pace of implementation has depended critically on the institutional and operational strength of the partner entities. The development of close partnerships between the Bank and the entities has been critical in achieving timely results on the ground.

19. State-level engagements have proved more challenging. While some positive results have been achieved, there is now broad agreement that the objectives of the initial project development were ambitious, given the political economy of the sub-sector. Careful attention has to be paid to the difficult transitional issues involved in reform at the distribution level. A review of the state-level reform experience conducted in 2002-03, and discussed extensively with both Central government and state-level partners, has resulted in re-thinking of both key reform steps and the rules for the Bank's engagement in state-level reforms. These rules of engagement are reflected in the 2004-08 Country Strategy. Key lessons for a generation project from these power sector engagements are: (a) focus on the institutional viability and operational practices of the implementing agency is critical for solid and sustainable results on the ground; and (b) state-level problems remain critically relevant to the financial health of Central entities such as SJVN.

20. The Bank has been engaged in hydropower projects in India since the late 1950s, starting with the second Koyna Power Project in 1959. Some of these hydropower engagements were problematic and the Bank's support for a number of potential hydropower projects was cancelled before they were commissioned[3/]. However, the two most recent Bank engagements, Nathpa Jhakri and Koyna IV (both approved in 1989), were completed. Both projects were subject to serious delays and cost overruns, partly due to *force majeure* and currency devaluation, but also due to poor

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2/ The Rampur project is part of the Government's wider power development plans, which taken together, will have a significant impact on the reliability of power in the Northern Grid.

3/ Projects in which the Bank's engagement was cancelled include the Upper Indravati, Upper Krishna, Srinagar (Uttar Pradesh), and Sardar Sarovar (Narmada) projects.

management. However, these projects are now operating at their full capacity and have realized their planned objectives at competitive costs. Other hydropower projects, where the Bank withdrew, also faced similar delays, cost overruns and problems with resettlement.

21. The proposed Rampur hydropower project offers the Bank a good first re-engagement opportunity in India's hydropower sector. The Rampur project is a cascade hydropower project immediately downstream of the 1,500 MW Nathpa Jhakri hydroelectric project (NJHP) which the Bank financed in 1989 and has the same developer, Satluj Jal Vidyut Nigam, (SJVN) with which the Bank engaged on the Nathpa Jhakri project. The developer - SJVN - previously the Nathpa Jhakri Power Corporation (NJPC) is a joint venture between the GoI and Government of Himachal Pradesh (GoHP), established by GoI to develop a range of hydropower projects. SJVN currently has hydropower projects under development in states of Himachal Pradesh and Uttarakhand. SJVN implemented the 1,500 MW NJHP, which is one of the largest hydroelectric stations in South Asia. Cost overruns and time delays notwithstanding, this International Bank for Reconstruction and Development (IBRD) funded project has a good record of safeguards and local area development practices, as well as of following Bank procurement guidelines.

22. The experience gained from the Bank's involvement in India's hydropower projects (including Nathpa Jhakri and Koyna IV) has been incorporated in the design of the Rampur hydropower project. The technical design, layout and cost estimates of the project are a result of careful analysis of several scheme alternatives. A range of sites, capacities, designs and engineering techniques were studied, before the final arrangement was decided upon (see Annexes 4 and 10). These studies resulted in a practical, low-risk, economical design. The feasibility study attempted to anticipate difficult geological conditions, where many of the major cost overruns have occurred in the past. Several of the scheme alternatives that were studied were rejected because of the varied underground conditions, involving high risks of completion delays. Also, SJVN's management and technical staff have taken action to address concerns regarding institutional capacity, particularly those related to the need for timely decision-making and better interaction with the concerned government departments, such as the Department of Forests. Although SJVN has demonstrated improvements in the Rampur project during the preparation phases, the Bank staff will continue to work closely with SJVN on these issues as the proposed project proceeds.

5. Alternatives considered and reasons for rejection

23. ***Sector considerations*:** The efficient and timely construction of the Rampur hydropower project, incorporating good global practices, will enhance the image of hydropower as a clean, predictable and cost-effective alternative to the "business-as-usual" case for building additional coal or oil-fired thermal plants which add to the country's greenhouses gas emissions and also exacerbate its dependence on imported fuels. A coal-fired thermal plant, of equivalent size to the Rampur project would emit about 12,000 tonnes of sulphur oxides, 6,000 tonnes of nitrogen oxides and two million tonnes of carbon dioxide each year. The government plans to apply for carbon finance for this project and preliminary estimates show this could amount to approximately US$8 million a year after project commissioning.

24. ***Site considerations*:** The concept of a cascade power station to utilize the de-silted water exiting the Nathpa Jhakri tailrace was envisaged when the Nathpa Jhakri project was designed; and its construction included the Rampur intake works. More recently several alternative scheme layouts and site locations for the Rampur tunnel and power station were studied (Annexes 4 and 10). As a result of these studies, it was decided that the most practical solution for the Rampur scheme was one which sited the tunnel to the west of the River Sutlej, with the power station on the river's west bank (refer diagram of scheme in Annex 4).

C. IMPLEMENTATION

1. Institutional and implementation arrangements

25. SJVN will be responsible for project implementation, with support in some areas (e.g. catchment area treatment, afforestation, etc.) by the relevant agencies of GoHP. Detailed discussions regarding the implementation and monitoring arrangements have been held with both SJVN and GoHP. GoHP has indicated its readiness to support SJVN fully in its implementation of the project. The project will contribute to the development of Himachal Pradesh, which will receive a royalty of approximately US$12 million per year, at current prices, related to 12 percent of the total electricity Rampur will generate, in return for the use of the state's water resources. In recognition of its 30% equity investment in the project, the state of Himachal Pradesh will also receive an additional allocation of around 109 MW of power and will also receive dividends from the project.

2. Monitoring and evaluation of outcomes/results

26. SJVN will provide to the Bank quarterly progress reports, quarterly information on the progress of key performance indicators, billing and collections, quarterly un-audited financial reports and annual audited financial statements (within six months of the end of each financial year), and such other information as the Bank may reasonably require. SJVN will also carry out a mid-term review and report its findings and conclusions to the Bank, and will review these with the Bank. Annex 3 sets out the key performance indicators for the project. The Bank's implementation support will be through a combination of about three regular visits in each year, supported with short follow-up visits on specific areas in the interim. The Bank team will continue its discussions with GoI and GoHP regarding SJVN's institutional growth and development and government's policies for power sector development.

3. Sustainability

27. The sustainability of investments and technical support is expected to be high, with the likelihood of continuing shortages of power supply in the northern region of India[4/], part of which the Rampur project will aim to meet. Even when such shortages are addressed, the power generated by the Rampur project will be fully dispatched, because of its competitive price and the inherent flexibility offered by a hydropower station to meet fluctuations in demand. SJVN has developed good expertise during the operation of the Nathpa Jhakri project, and has been running the plant profitably for nearly three years. SJVN has the necessary manpower and skills to implement and operate the Rampur project. One of the most significant threats to SJVN's sustainability can be the failure of its state utility customers to pay their bills in full and on time. The securitization mechanism introduced by GoI has done much to resolve this situation and payment discipline has substantially improved. Though SJVN is not covered under the securitization mechanism, it has not so far faced any problems on this account.

4. Critical risks and possible controversial aspects

28. The risks associated with this engagement are high, though mitigated by the project being a run-of-river development with no dam, minimal displacement of people, and where the Bank has previous experience of having worked with the developer and state authorities. The potential gains are substantial in terms of clean renewable power development and improved implementation practices for India. The major risk from non-engagement is that SJVN and India may not be exposed to good practices in sustainable hydropower development. This may hamper the large-scale

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4/ As per 17th Electric Power Survey of Central Electricity Authority (CEA) of India.

development of hydropower as a long-term source of clean, low carbon power and economically valuable peaking capacity and may lead India to an increased dependence on coal fired generation.

Risk	Risk Mitigation Measure	Risk Rating after Mitigation
Institutional risk		
Poor performance of state government agencies in carrying out their responsibilities under the project.	The roles and responsibilities for various activities amongst SJVN, state administration and affected communities are clearly defined. An agreement on timelines and appropriate monitoring systems has been finalized. This risk is partially mitigated as some significant steps on resettlement have already been completed. GoHP is fully aware of these issues and has agreed to sign a support agreement for the project. These issues are also being addressed through the Bank's state-level engagement.	Modest/ Substantial
SJVN's contract management skills were a matter for concern in the NJHP project.	SJVN is aware of these issues and has prepared a contract management action plan with support from an international consultant. The Bank will continue to monitor and support SJVN on this issue during implementation.	Substantial
SJVN is a public utility, with directors appointed by the government. There have been some delays in this process.	GoI is fully supportive of SJVN and recognizes the need for consistent management. The Bank will continue to monitor this with the government	Modest
Technical risks		
Geological and hydrological risks, inherent in any hydro project – leading to time and cost overruns	SJVN has carried out detailed investigations to ensure that these risks are minimized. CEA and Central Water Commission (CWC) engineers and national/international consultants have reviewed these studies. This risk is mitigated, in part, by the fact that experience from the Nathpa Jhakri project, where the geology is similar to the Rampur project has been used for designing the Rampur project. Not withstanding the mitigation measures, the fragile geology of the Himalaya is such that there may still be unforeseen conditions that could affect timely implementation of the project.	High
The operation of the Rampur project would depend upon the performance of the NJHP plant to which it is a cascade development	SJVN has taken several measures to increase the availability of the NJHP plant, such as provision of additional spare parts, enhancing skills to maintain the plant, and working with GoHP on catchment improvement to reduce silt. The project will also fund some additional measures. With these investments and the past experience of operating NJHP for two years the risk is expected to be partially mitigated. Some of these risks have been analysed in the cost-benefit analysis and sensitivity analysis (see Annex 9).	Modest
Delay in building the evacuation transmission line could lead to a loss in generation and sales	The transmission line is a loop in loop out from the existing transmission system and only 10 km in length. Experience dictates that POWERGRID, which will be responsible for the construction and operation of the line, is dependable and will have the transmission line built and commissioned in time to enable testing and commissioning of the Rampur hydropower project to take place to SJVN's schedule. In view of its ongoing engagement with POWERGRID, the Bank will also have continuing opportunities to discuss the status of construction of the line.	Low

Environmental and social ris s		
Delay in implementation of social actions	The resettlement action plan (RAP) and sustainable community development plan (SCDP) have already been designed with the appropriate monitoring and grievance redressal procedures. Implementation actions have commenced. There is a risk of delay in the remaining land acquisition, certification of eligible beneficiaries, and village infrastructure, simply because the processes and consultation can be time consuming. The Bank team will continue to follow up with the state government and SJVN will involve the communities and local leaders in expediting decision-making.	Modest
Inadequate implementation of environmental safeguards actions	The environment management and monitoring plan has already been prepared and is ready for implementation, but there is risk of delay. A capacity building plan has also been prepared. The Bank team is also following up with the state agencies on implementation of key activities such as the catchment area treatment (CAT) plan and compensatory afforestation (CA) through the Bank's direct engagement with the state government.	High
Commercial and financial ris		
Poor creditworthiness of some off-taking state utilities.	This risk has been mitigated to some extent by improvement in payment discipline following the securitization of past dues for the central generating utilities through the Tripartite Agreement. Although at present SJVN is not eligible for securitization, it has so far not experienced any payment problems. SJVN's current receivables are less than one month of billing.	Low/ Modest
Inadequate internal control framework in the finance function.	SJVN has developed an action plan for the improvement of financial management function and corporate governance environment. Implementation of the planned actions has commenced and the Bank team will continue to monitor and support this process.	Substantial
Overall rating		**Substantial/ High**

5. Loan/credit conditions and covenants

29. **Financial, except as the Bank shall** otherwise agree, SJVN shall:

i) furnish to the Bank, not later than six months after the end of each fiscal year, certified copies of its audited entity financial statements, audit of the project accounts. Similarly provide copies of the internal audit reports;

ii) not incur any debt, if after the incurrence of such debt, the ratio of debt to equity shall be greater than 4 to 1;

iii) take all necessary steps to maintain its accounts receivable at a level not exceeding an amount equivalent to its billing for energy generation for the preceding three months;

iv) furnish to the Bank, not later than December 31 of each year, its ten-year financial projections, including its investment program and financing plan;

v) furnish to the Bank, every three months, interim un-audited financial reports (IUFRs) in the format agreed with the Bank.

30. **Implementation**, SJVN shall:

i) report on progress in project implementation with the key performance indicators and including an updated milestone plan for construction of the Rampur hydropower project, with any necessary measures to keep to the commissioning targets, according to the reporting schedule agreed with the Bank;

ii) carry out periodic dam safety reviews and take all actions necessary to ensure the safety of the Nathpa Dam.

31. **Social and Environment**, SJVN shall:

i) implement the resettlement action plan, sustainable community development program and environmental management plan as agreed with the Bank;

ii) carry out resettlement impact assessment study to assess the changes in the living standards of the affected people before the mid-term review and in the fifth year of implementation. Agree with the Bank, and take action to address any issues raised by the impact assessment studies;

iii) retain a panel of safety experts throughout the project construction period in accordance with terms of reference acceptable to the Bank;

iv) provide all the entitlements available in the resettlement action plan to the PAPs, i.e. compensation for land acquisition, payment of rehabilitation grant and provision of developed plots, which would be allotted to the PAPs, as applicable, before beginning any construction activities on such land required for the project.

32. **Mid term review (MTR)** - The MTR of the project shall be carried out by March 31, 2010.

33. **Completion** - SJVN shall prepare as at the closing date: a project completion report; and a plan for the future operation of the project.

GoHP - Project Agreement

34. GoHP shall:

i) Provide support as needed to facilitate the implementation of the project, including timely provision of all required consents and approvals for implementing the project; and implement its responsibilities under the environmental management plan, resettlement action plan, catchment area treatment plan and afforestation plan;

ii) Cause SJVN to perform in accordance with the provisions of the Loan Agreement and not take any action which would prevent or interfere with such performance.

D. APPRAISAL SUMMARY

1. Economic and financial analyses

35. ***Least cost development plan:*** The Rampur hydropower project appears in the National Electricity Plan (NEP) 2006[5/] as one of the hydropower projects targeted for benefits in the Eleventh Five Year Plan (i.e. by the end of 2011-2012). This plan is structured around four main scenarios, based on the demand growth forecasts of the 16th Electric Power Survey (EPS): (i) Base case

[5/] Government of India, Ministry of Power, Central Electricity Authority, *National Electricity Plan, Volume I (Generation)*, January 2006.

(desirable scenario); (ii) Low hydro development; (iii) Limited gas availability; (iv) Low hydro + limited gas availability (feasible scenario). The Rampur project is low cost (both in capital cost and energy cost terms) relative to other candidate hydro plants, and low cost relative to gas based power generation under a range of assumptions. The tariff in the first year is expected to be about Rs. 2.40/kWh (US 5.8 cents), with average tariff over the life of the project expected to be about Rs. 2.14/kWh (US 5.2 cents) and the levellized tariff (assuming a discount factor of 12 percent) expected to be about Rs. 2.25/kwh (US 5.4 cents).

36. ***Economic and financial rate of return:*** The economic rate of return (ERR) (to project completion) is 19.3 percent, with the 12 percent hurdle rate achieved in year 2017 after seven years of operation. The financial internal rate of return (FIRR) for the project is 9.53 percent (pre-tax) (see Annex 9).

37. ***Financial health of the implementing agency:*** The entity started earning revenues in 2004 when the first project, the Nathpa Jhakri, became operational and started commercial production. The current financial performance of SJVN is generally satisfactory. Profitability during 2005-06 measured by return on equity (after tax) stood at 11 percent. This is lower than the regulated return of 14 percent allowed by the Central Electricity Regulatory Commission (CERC), owing to the expansion program being undertaken by SJVN and the fact that returns are only earned once the investments become operational. As a result of the expansion in the capital expenditure program over the next few years with new hydro projects being developed, the return on equity is expected to drop to the 8%-9% range and rise back once the new projects also start earning revenues. Financial projections (see Annex 9) demonstrate that, subject to tariff adjustments in line with CERC's current regulatory framework, SJVN's financial performance would continue to remain satisfactory. The possible financial risks are of poor payment by the off-takers and the possibility of SJVN financially over-extending itself with too many projects in the near future. These risks are slight and have been largely mitigated by SJVN but, nevertheless, financial covenants have been designed to reflect and monitor these risks.

2. Technical

38. The Rampur hydropower project will be located on the River Sutlej, near the town of Rampur in Shimla and Kullu districts of Himachal Pradesh. The scheme will utilize water exiting from the Nathpa Jhakri tailrace and will thus require neither a dam nor any new reservoir capacity or land inundation. No additional de-silting chambers will be required, because the water will already have been de-silted within the Nathpa Jhakri plant. The Rampur project intake (in effect the Nathpa Jhakri tailrace) was built as part of the Nathpa Jhakri project. From the Rampur project intake, a 15 km, 10.5 meter diameter headrace tunnel, will transfer the de-silted water, at the rate of about 384 cubic meters per second to the head of three above-ground, surface-mounted steel penstocks, with diameters of 5.4 meters, which branch to six penstocks measuring 3.8 meters in diameter. The upstream section of the tunnel will cross the river, and will be constructed using a cut-and-cover design. The diameters of the tunnel and penstocks have been chosen following the economic least cost analysis. The Rampur hydropower project will have a gross operating head of 139 meters. The powerhouse (138 m long x 26 m wide x 48 m high) will house six 68.7 MW Francis turbine generators. They will be designed to operate with a net head (gross head less headrace tunnel and penstock friction effects at full water flow) of 119 meters. The project will generate some 1,770 million units (in a 90 percent hydrologically dependable year); and this electricity will be used in the states of the northern region of India.

3. Fiduciary

39. ***Financial management:*** SJVN is in the process of setting up an adequate financial management system and internal control framework for carrying out the functions assigned to it under the project including accounting and reporting for project resources and expenditures. During project preparation, an action plan for strengthening financial management, corporate governance and accountability has been agreed upon, of which some actions have already been initiated (details in Annex 7). Project funds will be disbursed on the basis of interim un-audited financial reports (IUFRs). SJVN's systems are well equipped to generate IUFRs which will report on the full project costs in the agreed formats. To meet the fiduciary requirements, the Bank will receive (i) a project audit report; and (ii) the entity audit report of SJVN within six months of the end of the fiscal year. The project (all components) will be audited by an independent firm of chartered accountants, acceptable to the Bank, under terms of reference that have been agreed. An internal audit of the project will also be undertaken with the objective of ensuring that agreed operational, accounting, payment and procurement procedures are followed in the implementation of the project. Retroactive financing up to an amount of US$80 million will be available under the project, for financing eligible activities procured under agreed guidelines, for Component A in respect of expenditures incurred after January 1, 2007.

40. ***Procurement:*** Procurement for the project will be carried out in accordance with the "World Bank's Guidelines: Procurement under IBRD Loans and IDA Credits" dated May 2004 and "Guidelines: Selection and Employment of Consultants by World Bank Borrowers" dated May 2004. The Bank's Standard Bidding Documents (SBDs) and Standard Requests for Proposals (RFPs) will be used for all procurement of goods, works and consultancy under the project. Procurement activities will be carried out by SJVN which had earlier implemented the Nathpa Jhakri project. SJVN has adequate expertise and staff to handle procurement under this project following the World Bank Guidelines, and has successfully completed the procurement process for the two main civil works contracts, for which contracts were awarded on February 1, 2007. The pre-qualification exercise for the electro-mechanical package was completed in February 2007 and bids have been opened on July 20, 2007. However, SJVN's capacity to manage the contracts needs to be enhanced and strengthened.

41. In the earlier Nathpa Jhakri project, executed by SJVN (then NJPC), there were several disputes during implementation of the contracts, some of which are still under arbitration and have yet to be resolved. In accordance with OP 7.40, a summary of these outstanding contractual disputes is provided in Annex 6. In view of the concerns, which the Bank had on resolution of these disputes, the Bank hired the services of an international consultant to study the problems faced by SJVN in reaching a satisfactory resolution to various disputes/implementation issues. Based on the consultant's report and recommendations, SJVN has drawn up an action plan (see Annex 6), which once implemented, will enhance SJVN's capacity to manage the contracts and accelerate decision-making and record keeping. In addition, the staff from SJVN's contracts and finance departments, who are or will deal with procurement, will be deputed to the Administrative Staff College of India (ASCI), Hyderabad or National Institute of Financial Management (NIFM), Faridabad for training on procurement under World Bank-funded projects. Members of the staff who have already received such training will be deputed for a refresher course.

42. ***Communication and Public Disclosure:*** SJVN and the Bank have recognized the need for early and continuing communication between the implementing authorities and all other stakeholders so that benefits of the project are widely understood and both real and perceived concerns of the stakeholders are addressed. SJVN has developed and commenced implementation of an appropriate communication action plan (details in Annex 16). The plan centers around upholding the highest standards of disclosure and transparency, as benchmarked by the Right to Information (RTI) legislation. It also seeks to establish and maintain effective and credible two-way communication channels with stakeholders in general and the project affected persons (PAPs) in particular. To this end, a Public Information Center (PIC) has been actively working at the project site for more than a year and a half. All relevant information is being made accessible to the affected communities in order to facilitate open and transparent consultations. Information dissemination and public outreach are being stepped up to enhance accountability, build trust and foster credibility among other stakeholders.

4. Social

43. The land acquisition and resettlement impacts in this project are moderate compared to similar projects elsewhere. The magnitude of land acquisition in the project is about 79 hectares, including 30 hectares of private land belonging to 167 landowners consisting of 141 families. In addition, another two non-title holders will be affected. The number of families to be displaced is 28, while 35 landowners will become land-less (i.e. whose land holding will be less than 0.40 hectares).

44. A resettlement action plan (RAP) describing the measures to mitigate adverse impacts, and the institutional arrangements to implement them, is in place and its implementation has begun. SJVN has obtained all permissions from the government for the use of government land (about 49 hectares) for the project activities. All private land required for the construction of major project activities has been acquired (about 14 hectares) and compensation has been paid. The remaining private land is mostly required for the development of township related activities. The land required for the resettlement of displaced families has been identified, and SJVN expects to acquire this soon through direct purchase.

45. The budget for the implementation of the RAP is about Rs. 320 million (about US$7.7 million). The monitoring and evaluation mechanism has been agreed upon. An independent monitoring agency will be used to undertake periodical monitoring in terms of physical and financial progress as well as obtaining feedback from the beneficiaries on the implementation aspects. Improvements in the living standards of the PAPs will be measured through independent impact assessment studies in terms of income, employment asset and housing condition against the baseline values collected during the baseline socio-economic surveys. A grievance redressal committee consisting of members from the state government, local elected representatives, local administration, project authorities and PAPs has been constituted to redress the grievances from the project-affected persons.

46. The project will bring positive social benefits to the local population through the improvement of infrastructure such as roads, creation of employment opportunities in construction activities and township requirements and local area development, and through various proposed community development activities. The project will invest about Rs. 260 million (about US$6.3 million) for local area development through sustainable community development programs over the next five years, for building small infrastructure in the surrounding villages and undertaking major community development initiatives. The small contracts and wage employment under contractors will offer income earning and employment opportunities to the local population. The mobile health

van sponsored by the project is already in operation providing health services to the villages around the project site. SJVN has sponsored 35 students, including four girls, from the project-affected families and the local area, to acquire technical education, and to enhance their suitability for employment. In addition, Rs. 95 million worth of contracts have been awarded to the local people, and Rs. 12 million worth of contracts have been awarded to the project-affected people. All the above activities will have significant positive social impacts on the standards of living of the local population.

47. A social assessment was carried out to ensure that the benefits of the project are distributed equitably to the extent possible and that no segment of the population is adversely affected. The findings of this study, as appropriate, were incorporated in the RAP and sustainable community development plan (SCDP). Seventeen consultations were held with about 200 stakeholders, including local people, elected representatives, affected people, the media, government officials, youth and women's organizations, to elicit their views and suggestions on the project activities. In addition, seven consultations were held with about 140 people as part of the RAP preparation.

48. All documents (the RAP, the SCDP and the Social Assessment) have been available in the Bank's Info-shop since October 2006; and these are also available in the Project Information Center (PIC) and on SJVN's website. A final round of public meetings to disseminate the final versions of these safeguard documents was held at PIC in Bael village on March 30, 2007 and was attended by more than 200 persons.

5. Environment

49. The project area and the project's influence area are characterized by rugged topography with steep hills (altitude varying from 850 m to 2000 m). The hill slopes are steep, generally covered with sparse vegetation, over burden and outwash material. The project area falls under Zone-IV (high damage earthquake zone) as per the seismic zoning map of India (IS: 1893-2002).

50. Most of the human population in the project's influence area is concentrated in the villages along the highway and the connecting district roads. There is no reserve forest and only 12 patches of protected forests exist within the project's influence area (defined as an area 7 km around the project). The protected forests (about 20 km^2 overall) occupy about 8 percent of the project's influence area. The closest of the protected forest patches, the Baruni protected forest is located about 750 m away from the project; all others are more than 2 km away. Of all the protected areas of the state (national parks and wildlife sanctuaries), none is located within the project's influence area, and the closest one, the Rupi-Bhava wildlife sanctuary, is 13 km away from the project. The project acquires 48.9 hectares of degraded forest land (with very little forest or tree cover), and notionally acquires (but does not disturb, as the works are deep underground) another 20.47 hectares of similar degraded forest land above the tunnels. Together these represent only 0.07 percent of the total forest area of Rampur and Anni forest divisions.

51. The baseline data and a comparison with the available data for the state, or the Sutlej basin as a whole, suggest that the environmental impact of the project on the existing landscape, at the basin or even at the district level is insignificant, owing to the location of the project. Impacts at the more immediate level will also be small, if not insignificant.

52. The environmental assessment (EA) examined the following in detail (i) disturbance to the forest cover and biodiversity in the project influence area; (ii) impacts on the potential water use downstream; (iii) induced erosion and landslides in the project area and its vicinity; (iv) impacts from the project's associated facilities; and (v) the construction-related impacts. These were found to have

low impacts and can be fully managed by implementation of the environmental management plan (EMP). Full details are provided in Annex 10.

53. To compensate the loss of acquired forest land, a compensatory afforestation (CA) plan is being implemented, which will result in 139 hectares of non-forest land being converted into forestland. The State Forest Department is implementing the plan at a cost of Rs. 26 million. Additional measures by the project include payment of net present value of forests of about Rs. 40 million (to generate forests of equivalent area elsewhere in the project's influence area), and a CAT plan, costing Rs. 220 million.

54. ***Environmental impact assessment of the project:*** At the time of project identification by the World Bank, an advanced draft of the environmental impact assessment (EIA) was already available. The Bank reviewed this, and six supporting studies were undertaken to complete the investigations. These involved additional detailed field investigation and community consultations over a period of about a year (November 2005 - November 2006) consisting of: (i) Study of the managed river flow in the project stretch of the River Sutlej; (ii) Assessment of the terrestrial biodiversity impacts from the project; (iii) Analyses of induced impacts of the Rampur hydropower project and cumulative impacts of hydropower development in the Sutlej basin in India; (iv) Safety Assurance Plan for the project; (v) an Emergency Preparedness Plan; and (vi) Archeological study. Additionally, the CAT Plan has been prepared by the State Department of Forests. The initial EIA and these background studies have been integrated into a consolidated environmental assessment and environmental management plan (EA/EMP).

55. The project has engaged stakeholders including the project-affected people in discussing different aspects of the project over the last three years. SJVN has organized meetings with the community, village elders and elected leaders of the villages. During the preparation of the environmental and the social assessments, a number of informal but significant meetings were organized. As part of the regulatory clearance process, a formal public hearing was organized. At village Bael, a public information center has been functioning for more than a year and a half where the local community and all other stakeholders have full access and can record their views about the project.

56. The EIA report (based on which regulatory clearance for the project was granted) was disclosed at the formal public hearing, with assistance from the state pollution control board. The final GoI environmental clearance (preceded by forestry clearances, and a no-objection certificate for impacts on cultural properties) was obtained by the project on March 31, 2006. The revised EIA reports had been disclosed in October 2006 in public information centers in Bael village and Jhakri, public libraries in Shimla and Kullu, the SJVN corporate office in Shimla and the Bank's Info Shop. All documents are also available on the Rampur project webpage (accessible through the SJVN website – www.sjvn.nic.in).

6. Safeguard policies

57. ***Applicable safeguard policies and environmental category:*** The project is rated as an "Environment Category A" operation, in accordance with the Bank's environmental screening procedures and triggers six of the ten Bank safeguard policies.

58. The project does not trigger the Bank's safeguard policy on natural habitats (OP/BP 4.04), because the project does not directly or indirectly impact the protected natural habitats (national parks or wildlife sanctuaries – the one closest to the project is 13 km away, and is not accessible from the project site). During the EA, the potential of impact on unprotected habitats in the project influence area were examined in detail, and no such impact was identified.

59. The project does not trigger the Bank's safeguard policy on pest management (OP 4.09), as the project has no direct or indirect linkages to irrigation and agricultural water use, and does not promote use of any chemical or synthetic pesticide.

60. The impact on the tribal population is negligible; only two tribal families will be affected by the project activities. The socio-economic characteristics of the tribals in the project area are similar to those of the non-tribals. They own agricultural land, livestock, and material assets, including televisions, cooking gas appliances, four-wheel vehicles, etc. They do not exhibit any characteristics of indigenous people as described in the Bank's Operational Policy on Indigenous Peoples and this was confirmed by the consultant analysis described under social assessment. The analysis carried out by SJVN indicates that the tribal population is fully integrated into the mainstream economy of the local area. The issue was subject to review by the Indigenous Peoples Coordinator of the World Bank, who concurred with the assessment of the task team's social scientist's consultant. Therefore the project will not trigger the Indigenous Peoples policy (OP 4.20).

61. The project (or its influence area) lies entirely within the Indian state of Himachal Pradesh, and does not trigger the Bank's safeguard policy on Disputed Areas (OP/BP 7.60). The relevance of the Bank's safeguard policies and key measures taken in response are provided in Annex 10.

Safeguard Policies Triggered by the Project	Yes	No
Environmental Assessment (OP/BP 4.01)	[x]	[ ]
Natural Habitats (OP/BP 4.04)	[ ]	[x]
Pest Management (OP 4.09)	[ ]	[x]
Cultural Property (OPN 11.03, being revised as OP 4.11)	[x]	[ ]
Involuntary Resettlement (OP/BP 4.12)	[x]	[ ]
Indigenous Peoples (OP/BP 4.10)	[ ]	[x]
Forests (OP/BP 4.36)	[x]	[ ]
Safety of Dams (OP/BP 4.37)	[x]	[ ]
Projects in Disputed Areas (OP/BP 7.60)*	[ ]	[x]
Projects on International Waterways (OP/BP 7.50)	[x]	[ ]

7. Policy Exceptions and Readiness

62. There is no policy exception sought for this project. The project meets the requirement of standard readiness filters.

* By supporting the proposed project, the Bank does not intend to prejudice the final determination of the parties' claims on the disputed areas.

Annex 1: Country and Sector or Program Background

INDIA: Rampur Hydropower Project

1. This annex focuses on India's growth agenda and the need for electricity to support such growth. It looks at the rationale for increased electricity generation resources and the case for hydropower development. Finally, it considers the advantages and challenges of hydropower development and India's hydropower development program.

2. ***Vision for high economic growth and poverty alleviation:*** India has in recent years been recording an annual rate of economic growth of over 8 percent. The government has announced its intention of encouraging an even higher economic growth rate of 10 percent and achieving its goals of poverty alleviation as quickly as possible. Emphasis on boosting the rural economy and improving the investment climate has placed new demands on the country's infrastructure and specifically on the power supply system.

3. ***High levels of poverty and uneven regional economic expansion***: Many of these problems can be traced to inadequate supply of reliable electricity. In a large proportion of India's rural areas, electricity supply is still non-existent. Such inadequacies lead to inefficient, expensive and uncompetitive industrial and commercial output. Investment Climate Surveys have identified poor quality and inadequate power supply as a major bottleneck to the economic growth in India. Economic development is thus constrained and far too few employment opportunities are being created. The impact is particularly acute in some of the poorer areas of India, for example in the eastern, north-eastern and hilly regions. Recognizing this, the GoI has identified the power sector as key to achieving its goals of high and sustainable economic growth and accelerated poverty alleviation.

4. ***Under India's Constitution, electricity is a "concurrent" subject with central and state governments being responsible for key aspects of supply***: At the central level, GoI has laid out the legal and policy foundations on which to further strengthen existing organizations and to expand private participation. At the state level, several states have used national laws and policy to restructure their power sectors to make them more efficient, accountable and demand-responsive. The key challenge is to accelerate the implementation of the National Electricity Policy (NEP) 2005, underpinned by the Electricity Act, 2003. By the year 2012, the following goals are to be achieved:

- providing electricity access to all households;
- eliminating power shortages and doubling per capita electricity consumption to 1000 kWh per annum; and
- achieving the financial turnaround and commercial viability of the sector.

5. In August 2006, the NEP was supplemented by the Integrated Energy Policy, which is intended to address the process by which India can meet the rapidly rising demand for energy and sustain a high economic growth rate. Concerns about energy security and high costs of energy imports drive the proposed measures that are aimed at reducing non-essential or inefficient energy consumption. However, the remaining challenges are daunting, given the following scenario:

- Low levels of connectivity: Thirty percent of villages and 44 percent of the population remain without access to electricity. The quality of rural services is considerably worse than in urban areas, reducing opportunities for non-farm employment for 59 percent of India's labor force engaged in the agricultural sector;

- High coping costs of industry: Erratic and insufficient power supply is cited as a major bottleneck to industrial growth and new investment. Sixty percent of Indian firms rely on captive or back-up generation (compared to 21 percent in China). Captive generation capacity is estimated to be 40,000 MW;
- Limited supply infrastructure: Installed grid-connected generation capacity (132,000 MW) is less than half of the connected load; 30,000 MW of capacity is in need of rehabilitation. Transmission bottlenecks limit inter-regional trade to 10,000 MW. State distribution systems are under-maintained and unable to meet demand. Reported peak and energy shortages (13.5 percent and 10 percent respectively) are higher than five years ago and understate actual shortages (for example these statistics do not include scheduled load shedding). Some of the regional grids are operating in a precarious situation with frequent over-drawal by the constituents that threaten grid stability/reliability;
- Unfinished agenda of strengthening sector and utility governance in most states: The symptoms include high system losses which, though concentrated at the distribution level, have a pervasive impact on the sector. State-level utilities whose performance is poor are a drain on the resources of the state. They constrain the availability of finances required to add generation and other system capacity for meeting rising demand. This a vicious cycle of poor supply quality causing reduced willingness to pay, that leads to worsening finances and low investments which take the situation back to poor supply quality;
- Need to speed up the sector's financial turnaround: The achievements of some states need to be maintained and replicated in other states;
- Unpredictable fuel supply and costs: This issue is becoming a serious barrier to scaling up generation investments, particularly in the case of gas;
- Power sector accounts for about 50 percent of India's carbon emissions: Power generation – based on indigenous coal - will continue to play a major role in India's carbon dioxide (CO_2) emissions. The lowest CO_2 emitting scenario of the Integrated Energy Policy entails: (i) greater use of nuclear, hydropower and natural gas sources; (ii) demand-side management (including at the utility level); (iii) improvement in the efficiency of coal power plants; (iv) increasing the share of rail goods transport; and (v) marked rise in vehicle fuel economy.

6. ***Government recognizes these challenges and is working towards solutions:*** It has undertaken policy initiatives supported by financial incentives to: (i) increase the efficiency, accountability and quality of electricity distribution services, as evident in several states; (ii) improve the reliability of old thermal power plants; (iii) ehance investment in renewable energy; and (iv) expand rural access. The government has also initiated the preparation of seven ultra-mega coal-based plants (about 4,000 MW each) for competitive tendering.

7. The efforts of the government in the power sector are beginning to pay off. The sector's financial performance is showing signs of improvement, with virtually all payments to central public sector units in the power sector being paid on time by state-level entities. Availability-based tariffs and tighter performance norms have improved plant load factors. System losses in some states have been reduced to below 20 percent. Furthermore, first generation reforms - unbundling, corporatization and independent regulation - have increased transparency and quality of data, and public awareness of the sector's performance. Although the levels of commitment vary, state-level authorities are taking the lead in advancing the reform of state utilities and strengthening the regulatory framework. This improvement in the sector's environment provides an opportunity to the

government, the Bank and the other financers to ensure that future expansion is based on financial and economic sustainability, in tandem with the process of institutional reform.

8. Going forward, the government intends to more than double the rate of investment in the power sector to support economic growth and provide reliable electricity services to all by 2012. Under the Eleventh Five Year Plan (2007-12), it expects to facilitate the addition of 60,000-70,000 MW of generation capacity (including 16,000 MW of hydropower), expand interstate transmission capacity from 10,000 MW to 37,000 MW, assist states to expand and modernize their distribution networks, and improve sector governance and finances. The Bank's analysis shows that in the short term, the gap between supply and demand in physical terms (after considering the impact of price elasticity on demand) will continue to grow, even with a significant pace in loss reduction and enhanced efficiency gains.

9. The planned expansion of India's generating capacity will also need to take into account the low carbon option as one of the key elements to address environmental challenges. Despite being recognized internationally as a low intensity producer per capita of CO_2, India produces 1.1billion tons per annum (tpa) of CO_2 or 4 percent of the world's total. With a growth rate of 8 percent per annum, and a "business-as-usual" scenario (as projected by the government's Planning Commission), by 2031, India will produce 5.5 billion tpa of CO_2, or 13 percent of the world's total. Under this scenario, India continues to rely heavily on indigenous coal resources. To achieve a lower carbon development path, it is important that cleaner power generation activities, such as hydropower are scaled up.

10. ***Need to expand India's hydropower capacity***: Besides the need for adding new generation capacity that takes account of the low carbon option, India also has a techno-economic problem. Therein, the composition of the country's hydro and thermal generating capacity is imbalanced, with hydropower accounting for only about 26 percent of the total. Indeed, the percentage is decreasing as more thermal plants are added to the country's generating capacity. It is inefficient and highly deleterious for thermal plants to start, stop quickly or significantly change their rated output. Yet the grid needs this flexibility in order to adjust fast enough to meet the country's varying hourly electricity demands. Hydropower has this facility as it can be started, stopped and its output changed with greater flexibility, at little or no cost. Thus, to respond economically to fluctuations in consumers' demands, the grid needs a significant proportion of its capacity to be flexible in dispatch. Hydropower provides the answer.

11. ***Need for public sector participation in hydropower development***: There is insufficient private finance available to support the government's hydropower development plans. Traditionally, there has been limited incentive for private sector investment in large hydropower projects in India. In comparison to the development of thermal power generation, hydropower development involves risks and benefit profiles, which act as a disincentive to private sector investors. While the government is making efforts to improve the market conditions, the situation is still not conducive to private sector investment in mid and large hydropower projects. Besides, the complexity of these projects and known risks such as geology and hydrology, the payment risk from state-level electricity entities remains significant. Additionally, the justification for multi-purpose hydro schemes usually involves economic considerations, emanating from flood control and water supply benefits, for which it is difficult to ensure a reliable revenue stream and private sector funding. It will therefore be hard to motivate private sector participation in these schemes. Thus public sector funding will remain the key source of funding for large hydropower projects for some time to come.

12. ***Advantages of hydropower:*** As shown above, hydropower provides valuable support for economic system operations, vis-a-vis coal and nuclear-based generating plants which require inherently long periods (several hours) for start-up, shut-down and changes in supply capacities. Hydropower, on the other hand, besides its flexibility, has additional notable advantages which are described below:

- Last two decades have seen the balance of fuel-mix shift in favor of coal-based plants, mainly due to their short construction cycles, a relatively lower level of complexity required for their planning and construction, and the availability of abundant local coal resources. During this period, hydroelectric development was constrained by a number of complex environmental and social factors. Coal-fired electricity production is likely to continue to be the preferred alternative for years to come. However, due to the high ash content in India's coal deposits, these plants are a major source not only of CO_2 emissions but also of suspended particulate matter in the environment. India is aware of the dangers of greenhouse gases and other emissions, and the need to reduce these, and is thus intent on developing hydroelectric schemes, particularly run-of-the-river ones. Hydroelectricity is a clean and cheap source of flexible power, which can address India's substantial peaking shortfalls, and which can eventually reduce India's dependence on thermal and nuclear generating plants, thereby reducing their adverse environmental impact.
- Natural gas-based generating stations, which are usually in the form of combined cycle plants, are more flexible than coal-fired and nuclear plants. However, though they have lower capital costs, they do not possess the flexibility to respond to the demands of the consumer the way hydropower does. In addition, in comparison to hydropower, they have relatively short lives, higher maintenance costs and are subject to the risk of fuel price increases as oil prices rise.
- Hydropower stations tend to have long productive lives and, when the debt has been repaid, can have very low costs per unit (kWh) generated, that is while the front-end fixed costs are high, the long-term marginal/recurrent costs can be quite low. For example, electricity from Bhakra, which is more than 40 years old, now has operating costs of only about Rs. 0.10 per unit (US 0.2 cents per unit).
- Hydropower projects with storage can be important flood controllers, can support agricultural production through better irrigation, and can provide a source of drinking water, so badly needed by India's dense population.
- The areas where India is rich in hydro-resources are largely among the poorest in the country, and therefore, the backward linkages offer huge possibilities for regional development and poverty alleviation.

13. ***Challenges of hydropower development:*** Hydropower development faces challenges worldwide, and these include problems of project definition, high front-end costs, difficulty in structuring procurement, unusually high risks related to construction, geology and hydrology, financing constraints due to capital intensiveness and long payback periods, regulatory issues such as the pricing of the output, and the need to conform to an overall river basin plan. These challenges are discussed in the "World Bank Discussion Paper No. 420: Financing of Private Hydropower Projects." The paper deals in detail with the challenges that are encountered specifically in India. However, these challenges can (and are) being met in the following scenario:

a) Environmental and social impediments can be overcome through early recognition and up-front planning of appropriate mitigation measures to protect the environment and to ensure that the project-affected people are adequately compensated.

Large dams with substantial impoundments often have significant environmental and socio-economic impacts, and in recent years, developers have tended to shy away from large dam projects because of these issues. However, there has been a recent trend, not least in India, to endeavor to manage the environmental and socio-economic issues associated with hydro developments effectively, in order to realize the very significant developmental benefits that can result from large dam projects. There have been a few projects in India which have shown improvements in their treatment of these issues, even when large-scale resettlement has been involved. However, since R&R is a state subject in India and given the inadequate capacity and experience within some of the state governments to handle these aspects appropriately, this remains a high-risk area and would require maximum attention from the Bank.

b) Advocacy groups, both international and local, often confront developers, and this can result in delays and cost overruns. Opposition from advocacy groups, though constructive in some cases, needs to be appropriately managed through proper studies and plans to mitigate the risks, adequate consultation, and a strong communication process. Robust Environmental and Social Impact Assessments (ESIA) are essential. Good practice ESIAs include: (i) adequate and timely consultation and feedback with stakeholders throughout the process; (ii) upstream identification of critical environmental and socio-economic issues; and (iii) implementation of good management systems and mitigation measures.

c) There is insufficient long tenure finance available for hydropower projects in India. Thus, projects have tended to be financed by comparatively short tenure, high-cost finance (owing to the risks associated with hydropower development). There is also very little private sector finance available for hydropower. Short-term, high-cost financing can lead to high front-end costs for the projects, and high tariffs in the initial years of operation.

d) Projects have historically suffered from repeated cost and time overruns due to inadequate surveys, and disputes with contractors, local people and state agencies. This has added to the cost and the perceived risk of project implementation. However, recent experience is far more positive, and India's National Hydroelectric Power Corporation (NHPC) for instance, is completing major projects on schedule and within the stipulated budget.[6/]

e) Institutional arrangements for project preparation, approval and implementation typically fall short of requirements. The earlier projects were investigated and designed by state irrigation departments or electricity boards; insufficient attention was paid to designs and choices of alternatives. When such projects are handed over to an agency for development and implementation, the agency often has to repeat some of this work, with consequent delays and cost overruns. Project approvals by the various Indian authorities also can take an inordinate amount of time and, even then, there can be insufficient attention paid to the critical aspects of the proposals. Recently, improvements have been evident both in the project review and the project implementation phases; but there is still room for further progress.

f) The geological and hydrological conditions in India are uncertain, especially in the young Himalayan mountain region. This has posed a tremendous challenge to project design and implementation in the past. Recent experience suggests that Indian developers are now much better at understanding and managing these risks.

6/ Chamera II, Indira Sagar, Parbati II were completed, or are being completed within the specified budget.

g) Water is scarce in the country. In some areas, there are conflicting demands on water use (both inter-country and inter-state), which can lead to disputes on the rights and usage of water and allocation of benefits.

14. ***Hydropower in India:*** Hydro project development in India started as multipurpose projects (for example, Bhakra, Hirakud and Srisailam). The eventual focus on hydro electricity mainly as a source of power began because of the growing challenges faced in managing large resettlement issues associated with multipurpose schemes. This led to increased emphasis on run-of-the-river hydro projects with only diurnal storage to meet peak shortages, where resettlement issues were minimal. Hydropower development, which was primarily the responsibility of the states, was elevated to a joint responsibility between the states and government with the creation of the National Hydroelectric Power Corporation (NHPC) in 1976. NHPC is a wholly owned government company with the mandate to build and operate hydropower. Some of the issues faced by India in hydropower development are described below:

- In the decade of the 1980s, there was little progress in hydropower development at both the central and the state level. This was because the capacity to identify, design, develop and implement hydropower projects was poor. Most hydropower schemes were identified by state irrigation departments or electricity boards with inadequate capacity, wherein the investigation or design undertaken was sub-standard. Site selection was often not the most appropriate, and the geological and hydrological conditions were not studied adequately. The resulting proposals were, therefore, difficult to implement. Very often, state governments did not have sufficient finances to build these projects, so they languished for years before being handed over to an implementing agency. In many cases, the implementing agency had to repeat most of the initial work, resulting in overruns and delays.
- Construction management for hydropower projects was highly centralized, leaving little room for quick decision-making. Hence, problems could not be addressed quickly. Concerns about cost control and governance issues led to deferring the smallest decision rather than face the risk of being penalized by the pernicious, central government vigilance processes. This, despite the fact that a small investment could result in huge savings if the project was completed on time. Inadequate procurement and contracting capacity also compounded delays and cost overruns.
- For the large dam projects, which have high submergence levels, the inefficient management of the R&R process further delayed project implementation and caused undue disturbance to the people affected by the project. This was evident in a number of projects, some of them initially supported by the Bank, most notably, the Sardar Sarovar (Narmada) Dam and the Tehri Dam, but also in projects such as the Upper Indravati and Koyna. The importance of environmental management issues was also not sufficiently recognized in the earlier projects. It is imperative that state government agencies pay special attention to resettlement, rehabilitation and environmental management.

15. ***Hydropower development initiatives*:** Hydropower development is now listed as the Prime Minister of India's key initiative along with the development of India's road network. India's hydropower development has made tremendous strides over the last decade. A well-defined and scientific system of site selection is being adopted, which includes: (i) mandatory consultation processes with local populations; (ii) oversight committees of eminent persons to monitor implementation of the environmental and social aspects; and (iii) if necessary, project relocation and realignment to accommodate environmental and local adverse impacts. Furthermore, institutional capacity has been upgraded to better identify, investigate, engineer, design and implement proposed

projects, as a result of well-planned training and technology transfer schemes, and the involvement of international consultants, and use of modern construction techniques. Some of these developments have been catalyzed by the training afforded to CEA/ CWC under the NJPC project, by NHPC's association with Harza and Hydro Quebec and by the experience gained from the implementation of complex projects, such as NJPC, Koyna and Dulhasti with international consultants.

16. ***Process of options analysis and project selection:*** This has also been improved in recent years, and a large number of agencies now provide their inputs. There are also positive developments in terms of CEA's due diligence and site surveys, with a minimum of three viable alternatives to be developed. Project design and investigation has also improved significantly. Designers are gaining from collaboration with leading international companies, and from India's growing domestic experience. Construction practices now boast of being comparable with the best in the world, as witnessed by the recent experience at Nathpa Jhakri of successfully constructing the world's longest power tunnel. In addition, India has experience of completing the construction of a variety of dams, and has excavated and built underground and surface hydroelectric power stations. Procurement practices have become better and projects are being completed on time and within cost. Dam safety is also being given special attention.

17. ***Recent experience:*** This also shows an enhancement of ability and commitment to deal with social and environmental issues. A review of current practices shows that most of the key elements of good practice are in use, and as a result, outcomes have improved. Developers are engaging in community development and environmental enhancement activities. At a strategic level, CEA carries out wider system planning and options analysis, although this is not included in project documentation because local requirements focus only on site-specific issues. Developers have also shown commitment and flexibility in ensuring that adverse impacts on local communities and the environment are minimized. However, there is little systematic documentation of such practices.

18. ***India's hydro-resources and their development:*** The key GoI policy statements that guide hydropower development are the National Policy for Hydropower Development (1998) and the 50,000 MW Hydroelectric Initiative (2003). The latter sets a long- term target for hydroelectric power to meet 40 percent national generation mix (the starting point being 25 percent in 2003). The policy statements describe the policy objectives of hydropower development as: (i) environmental benefits and, in particular, avoidance of pollution and emissions from thermal plants; (ii) benefits for power system operation, especially for meeting peak demand; (iii) energy security - reducing exposure to fuel price and supply risks. The policy statements also propose several policy actions to promote hydropower, including the concept of planning for the development of a "shelf" (portfolio) of hydroelectric projects given: (i) the scale of projected demand increases relative to individual project size; and (ii) the benefits of having a portfolio of projects in terms of diversifying project development and timing risks.

19. ***Ranking of hydropower projects:*** In October 2001, a comprehensive study by the Central Electricity Authority (CEA) ranked 399 candidate hydropower schemes (with an aggregate capacity of est. 106,910 MW) into priority development categories according to the following criteria: (i) rehabilitation and resettlement impacts; (ii) whether projects are in areas subject to international water treaties; (iii) likelihood of delay due to complexities of inter-state co-ordination; (iv) project size; (v) type of scheme, preference being given to projects that do not involve large storage; (vi) height of dam, preference being given to projects with lower dams; (vii) length of tunnel/channel, preference being given to projects with shorter tunnels; (viii) status of upstream and downstream hydroelectric project development, preference given to projects on rivers where there are already other projects; (ix) accessibility of site; and (x) status of project development, preference being given

to projects for which site investigations and feasibility studies are ready. This approach, therefore, screened a large universe of candidate projects using proxy indicators for: (i) environmental impact; (ii) political risk; (iii) construction risk; (iv) project cost; and (v) development lead time. The Rampur hydropower project has been identified by CEA as a project which is high in the development portfolio priority. The following table summarizes the ranking of the basins, as prepared by CEA (where Category A is the highest ranking followed by B and C, with D and E being the least preferred sites in terms of the above factors).

Table 1: Ranking of River Basins

SI. No.	River System	Category A		Category B		Category C		Total	
		Nos.	MW	Nos.	MW	Nos.	MW	Nos.	MW
1	Indus	11	4,088	51	8,811	17	6,080	79	18,979
2	Ganga	20	2,023	54	9,616	1	600	75	12,239
3	Central Indian	3	283	9	1,425	1	186	13	1,894
4	East Flowing	11	1,412	26	6,469	2	88	39	7,969
5	West Flowing	1	35	10	958	14	1,508	25	2,501
6	Brahmaputra	52	7,800	97	42,574	19	12,954	168	63,328
	Total	**98**	**15,641**	**247**	**69,853**	**54**	**21,416**	**399**	**106,910**

20. In addition to the above, there are opportunities for rehabilitation and upgradation or extension of stations. These are not covered under the CEA study. The older hydropower stations tend to be owned by the state electricity utilities. The possibilities for rehabilitation and upgrading need further review but are clearly in line with the Bank's strategy as articulated in the water sector strategy which states: "An important and growing area of World Bank involvement is in increasing the benefits of existing hydraulic infrastructure and in the associated challenge of rehabilitating and maintaining infrastructure stocks through an evolving, long-term approach."

21. ***Preliminary feasibility reports:*** A major activity under the 50,000 MW (2003) initiative was the preparation of Preliminary Feasibility Reports (PFRs) for 162 new hydroelectric projects. CEA was charged with the responsibility of leading this exercise, and it in turn tasked a number of agencies, including SJVN. These PFRs where then further screened according to the criteria of expected tariff and the environmental impacts or international issues. The exercise resulted in a shorter list of 73 projects for the detailed feasibility analysis. The Rampur hydropower project is one of these.

22. Detailed project reports follow a methodology specified by CEA. The main components of this feasibility analysis are: (i) comparison of alternative technical options for exploitation of the hydropower resource; (ii) hydrological analysis; (iii) quantification of power generation potential; (iv) site survey; (v) geological investigation; (vi) construction methodology and equipment design; (v) environmental assessment; and (vi) financial analysis.

23. ***Development Status of Hydropower Projects in the Indus Basin:*** There are nine projects (excluding four small projects of capacity 27-85 MW) in the entire Indus basin ranked higher than the Rampur hydropower project in the CEA's pre-feasibility ranking exercise. Of these, two projects are in the state of Jammu & Kashmir, and are yet to be taken up for construction. The remaining projects are in the Sutlej basin. Two of these projects (Allain Duhangan- 192 MW and Karcham Wangtoo-1000 MW) are under development by private developers. For four other projects (all in the range of 420-600 MW), detailed project reports are being prepared, and for one project (Shongtong Karcham – 780 MW), the preparation is yet to start.

Annex 2: Major Related Projects Financed by the Bank and/or other Agencies
INDIA: Rampur Hydropower Project

World Bank Aided Projects in the Energy Sector

Project Name	Status	Approval Date	IP ratings	DO ratings	Sector Issues
IN: Power System Development Project - III	Supervision	19 Jan 2006	S	S	Improvement of outcome-orientation and institutional development of Powergrid
IN: Power System Development Project - II	Closed	3 May 2001	S	HS	Improvement of grid and power system commercial operations. Independent regulation
IN: Renewable Energy II/ Energy Efficiency	Supervision	27 June 2000	S	S	Development of small hydro resources through private sector investments. Promote Energy Efficiency investments.
IN: UP Power Sector Restructuring	Closed	25 April 2000	S	U	Sector sustainability problems due to high losses. Independent regulation, sector reforms.
IN: Rajasthan Power Sector Restructuring Project	Closed	18 January 2001	MS	MS	Sector sustainability problems due to high losses. Independent regulation, sector reforms.
IN: Nathpa Jhakri Hydro Power Project	Closed	2 March 1989	S	S	Power shortages, strengthen HPSEB operations, strengthen institutional capacity development of hydropower.
IN: Orissa Power Project	Closed	14 May 1996	U	U	Sector sustainability problems due to high losses. Independent regulation, sector reforms
IN: Haryana Power Sector Restructuring Project	Closed	15 January 1998	U	U	Sector sustainability problems due to high losses. Independent regulation, sector reforms.
IN: Andhra Power Sector Restructuring Project	Closed	18 February 1999	S	S	Sector sustainability problems due to high losses. Independent regulation, sector reforms. High untargeted subsidy to agricultural consumers.

Ratings: HS= Highly satisfactory; S=Satisfactory; MS=Moderately Satisfactory; MU=Moderately Unsatisfactory; U=Unsatisfactory; HU=Highly Unsatisfactory; NA=Not Applicable; NR=Not Required

International Finance Corporation Aided Projects in the Energy Sector

Project	Type	Project Board Date	Company	Objective
AD Hydro Power Limited	Loan	31 Oct 2003	Allain Duhangan Power Company Ltd. (ADPCL) will be jointly owned by Rajasthan Spinning & Weaving Mills Ltd., HEG Limited and Malana Power Company Ltd.	To help meet peak and energy shortages through construction of a 192MW run-of-the-river hydroelectric power plant in Himachal Pradesh
Tala Transmission	Loan	31 Jul 2003	A joint venture between Tata Power Company Ltd. and Power Grid Corporation of India Ltd. to establish the Tala Transmission project.	Promotion of the first public private joint transmission project in India; Expansion of inter-regional transmission capacity and evacuation of power from the 1,020 MW Tala Hydroelectric Project in Bhutan.

IHDC (Dodson-Lindblom Hydropower Private Limited)	Loan	25 July 2005	Dodson-Lindblom Hydropower Private Limited (DLHPPL) and Ascent Hydro Projects Limited (Ascent) merged into one company, Indian Hydropower Development Corporation (IHDC)	To develop Mini Hydro Power Plants in India

Asian Development Bank (ADB) Aided Projects in the Energy Sector

Project Name	Type	Approval Date	Executing Agency	Sector Issues
Uttaranchal Power Sector Project	Loan	2005	Uttaranchal Energy & Irrigation Department	Expansion of the northern grid and increase the pace of economic development in less-developed regions in Uttaranchal state
Power Grid Transmission (Sector) Project	Loan	21 December 2004	Power Grid Corporation of India Ltd.	Strengthen India's national transmission grid to improve system reliability, facilitate power transfers and reduce losses
Assam Power Sector Development Program (Project Loan)	Loan	10 December 2003	Assam State Electricity Board	Strengthening of transmission and distribution systems
Assam Power Sector Development Program	Loan	10 December 2003	Government of Assam	Improvement of financial viability of sector, and assistance in development of legal and regulatory framework for sector growth
State Power Reform Project	Loan	12 December 2002	Power Finance Corporation Ltd. (PFC)	Line of credit for power sector financing.
Madhya Pradesh Power SDP (Project Loan)	Loan	6 December 2001	Madhya Pradesh Electricity Board	Facilitate the restructuring of the power sector to improve sector efficiencies.
Madhya Pradesh Power Sector Development Program	Loan	6 December 2001	Government of Madhya Pradesh	Facilitate the restructuring of the power sector to improve sector efficiencies.
Hydropower Development	PPTA	6 May 2004	National Thermal Power Corporation	Strengthening the feasibility studies of two hydropower plants in Uttaranchal State.
Uttaranchal Power Sector Development Program	PPTA	23 August 2004	Energy & Irrigation Dept., Govt. of Uttaranchal	Project preparation for expansion of transmission; small hydropower development; and institutional strengthening.
Assam Power Sector Development Project	PPTA	29 October 2002	Assam State Electricity Board	Facilitate the restructuring of the power sector to improve sector efficiencies.
Energy Efficiency Enhancement	PPTA	21 June 2002	Govt. of India	Study of the feasibility of developing an active market for energy efficiency.
Power Sector Development Program (Kerala)	PPTA	4 October 2001	Govt. of Kerala	Project preparation for improvement of sector performance, and policy and legislative reforms.

Annex 3: Results Framework and Monitoring

INDIA: Rampur Hydropower Project

Results Framework

PDO	Project Outcome Indicators	Use of Project Outcome Information
The development objective of the project is (a) to improve the reliability of India's Northern Electricity Grid through the addition of renewable, low carbon energy from the Rampur hydropower project and (b) to improve the effectiveness of Satluj Jal Vidyut Nigam Limited (SJVN) with respect to the preparation and safe implementation of economically, environmentally and socially sustainable hydropower projects	Improved reliability of India's Northern Electricity Grid: • Increased power supply available for northern region off-takers reducing shortages; • Increased proportion of time for which system frequency in northern grid remains within Indian Electricity Grid Code's operating band; • Reduction in the number of days of outage of NJHP in wet season. Improved effectiveness of SJVN: • Improvement in off-taker satisfaction with respect to SJVN service; • Improvements demonstrated in social development outcomes.	To verify achievement of the PDO(s).
Outputs from each Component	**Output Indicators**	**Use of Output Monitoring**
Component A: Construction of the 412 MW Rampur run-of-river hydroelectric scheme Additional 412 MW of installed capacity completed at Rampur hydropower site on the River Sutlej	Timely and satisfactory progress toward delivery of Component A outputs, as planned, including progress in the following specific items: • Power house construction • Head Race Tunnel construction • EMP implementation • RAP/SCDP implementation	To verify the timely and satisfactory completion of Component A outputs.
Component B: Investment support to implement measures for ensuring higher availability of the existing upstream NJHP NJHP improvements completed, as planned, to reduce turbine blade erosion / cavitations	Timely and satisfactory progress toward delivery of Component B outputs, as planned, including the following specific measures: • NJHP contingency spares • Blanking panels and pumps	To verify the timely and satisfactory completion of Component B outputs.
Component C: Technical assistance for institutional reform and capacity building Action plans completed, as planned	Satisfactory progress toward delivery of Component C outputs, as planned, including specific measures and milestones from the agreed institutional action plans.	To verify the timely and satisfactory completion of Component C outputs.

Arrangements for results monitoring

Outcome Indicators	Data Collection and Reporting					
	Baseline	**MTR**	**ICR**	**Frequency and Reports**	**Data Collection Instruments**	**Responsibility for Data Collection**
Improved reliability of India's Northern Electricity Grid:				Semi-annual project reporting (some outcomes indicators will be available only after the contributing project components are completed)	Reports from SJVN and Bank implement-tation support visits	SJVN
• Increased power supply available for Northern region off-takers reducing shortages (equivalent per annum)	-	-	1770kWh			
• % of time frequency in the Northern Electricity Grid is in the operating band of Indian Electricity Grid Code	72.25%	-	90.3%			
• Significant reduction in the number of days of outage of NJHP in wet season (based on 3 year rolling average);	32	28	24			
Improved effectiveness of SJVN:				Periodic surveys	Periodic surveys	
• Improvement in off-taker satisfaction with respect to SJVN service;	No evidence of an upward trend	Some evidence of an upward trend	Strong evidence of an upward trend			
• Improvements demonstrated in social development surveys						
Output indicators by component						
Component A: Construction of the 412 MW Rampur run-of-river hydroelectric scheme				Quarterly report on implementation progress (all indicators)	Reports from SJVN and Bank implement-tation support visits	SJVN
• Power house (% completion) - Civil	0 %	60%	100 %			
- Electrical	0 %	40%	100 %			
• Head Race Tunnel (% completion)	0 %	30%	100 %			
• EMP implementation						
o Muck disposal as per plan	0%	98%	100%			
o Compensatory afforestation – trees	0%	30%	100%			
o Funds utilization on CAT plan activities (excluding maintenance)	0%	17%	90%			

Outcome Indicators	Data Collection and Reporting					
	Baseline	**MTR**	**ICR**	**Frequency and Reports**	**Data Collection Instruments**	**Responsibility for Data Collection**
• RAP and community development plan implementation o Landowners receiving full entitlements o Real increase in Project Affected Families standard of living (measured by % of Project Affected Families with increased income and or assets) o Amount spent on small infrastructure in project affected villages and local contracts awarded to the PAPs and local villagers	0% 0% 0	90% 30% Rs. 80 million	100% 90% Rs. 200 million	Quarterly report on implementation progress (all indicators)	Reports from SJVN and Bank implement-tation support visits	SJVN
Component B: Investment support to implement measures for ensuring higher availability of the existing upstream NJHP • Blanking panels and dredging pumps installed • Procurement of contingency spares	0% 0%	80 % 50 %	100 % 100%	Quarterly report on implementation progress	Reports from SJVN and Bank visits	SJVN
Component C: Technical Assistance for institutional reform and capacity building – implementation of agreed action plans, including:- • Safety action plan - reduction in reported cases of non-compliance with safety procedures (% of prior year value) • Dam safety reviews carried out to time and follow up actions taken • Financial management action plan - timely and accurate preparation of quarterly accounts • Contract management action plan – variations confirmed through issue of priced variation orders • Environmental capacity - training (person days training) • Other training including organisational effectiveness (person training days)	- 0% 0% 0% 0 0	10% 100% 100% 85% 600 1100	10% 100% 100% 85% 1000 2000	Quarterly/annual report on implementation progress	Reports from SJVN and Bank implement-tation support visits	SJVN

Annex 4: Detailed Project Description

INDIA: Rampur Hydropower Project

1. The Rampur hydropower project will consist of three components as described in the table and further details are provided in the subsequent paras:

Table 1: Break-up of Project Costs and Share of Bank Financing

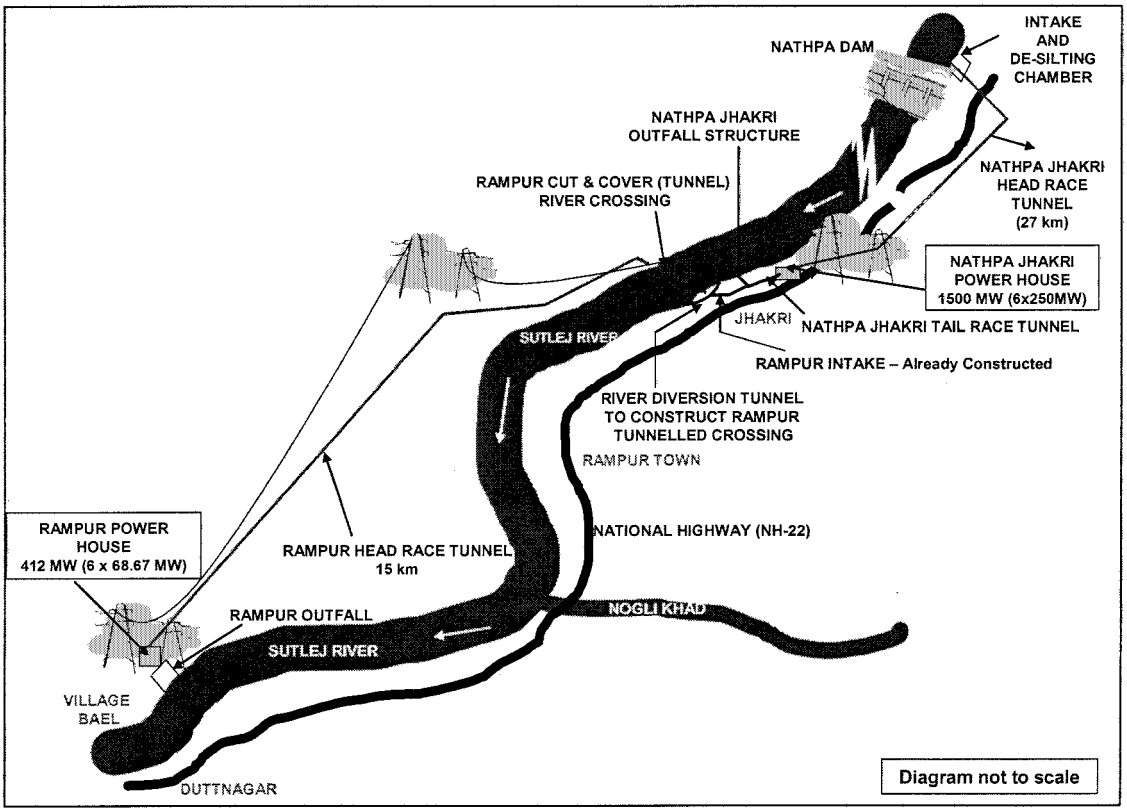
Component	Estimated cost (US$M)	Bank Financing (US$M)
A. Construction of the 412 MW Rampur run-of-river hydroelectric scheme (refer para 2 to 24 below).	615 [7/]	365
B. Investment support to implement measures for ensuring higher availability of the existing upstream Nathpa Jhakri hydropower project (refer para 25 to 28 below).	45	30
C. Technical assistance for institutional reform and capacity building to assist the borrower, SJVN, in moving towards international good practices in hydropower development and operations, and improving its standards of project preparation for future projects (refer para 29 to 32 below).	10	5
Total	**670**	**400**

2. ***Component A - construction of the 412 MW Rampur run-of-river hydroelectric scheme:*** The Rampur hydropower project, which is being developed by Satluj Jal Vidyut Nigam (SJVN), will be situated downstream of the Nathpa Jhakri power project on the River Sutlej in the state of Himachal Pradesh. The scheme will be located about 140 km northeast of Shimla, the state capital, on national highway NH-22. In the project area, the national highway runs parallel to the River Sutlej at a distance of approximately one km. The up-stream 1,500 MW Nathpa Jhakri power project, which was constructed with the help of an IBRD loan, has been in operation for nearly three years. The first of its six 250 MW units was commissioned in October 2003, and its sixth unit in May 2004.

3. The Rampur hydropower project will use the water exiting from the Nathpa Jhakri tailrace; and thus its construction and operation will not require a dam; nor will any new reservoir capacity or additional land inundation be needed. The Rampur hydropower project will be a run-of-river project operated as a cascade station to Nathpa Jhakri. No additional de-silting chambers will be required, because the water will already have been de-silted to the extent practically possible, in the Nathpa Jhakri de-silting chambers situated between the dam at Nathpa and its 27 km long headrace tunnel. The Rampur hydropower project intake, which in effect is the Nathpa Jhakri tailrace, was mainly excavated and built during the construction of the Nathpa Jhakri project. It will act as a breaking cistern in the water conduction between the two stations, which will operate in tandem (refer para 18). Six alternative designs for the scheme were studied (details in Annex 10). Each alternative emanates from the intake structure, which in anticipation of the Rampur hydropower project, was constructed as part of the tailrace works of the Nathpa Jhakri scheme. The studies took into account the geological conditions, which could possibly be met in constructing the various underground routes, for the headrace tunnel, and the resulting risks of delay. The locations and difficulties of siting the powerhouse and penstocks were also factored into the studies. After a careful analysis of the alternatives, the final scheme was chosen and consists of the elements detailed below.

[7/] These estimates include price and physical contingencies and interest during construction.

Figure 1: Illustrative Arrangement for Rampur Hydroelectric Project



4. From the Rampur intake, a 15 km, 10.5 meter diameter headrace tunnel, will transfer the de-silted water, at the rate of about 384 cubic meters per second to the head of three above-ground, surface-mounted steel penstocks, with diameters of 5.4 meters, which branch to six penstocks measuring about 3.8 meters in diameter. The diameters of the tunnel and penstocks were chosen on the basis of an economic least cost analysis. The penstocks will deliver the water to drive the six turbines to be installed in a surface powerhouse on the left bank of the River Sutlej near Bael village. The Rampur project will not extract any water from the river since it takes the water directly from the tailrace of the Nathpa Jhakri scheme. Subsequent to its utilization to drive the turbines in the Rampur project, the water is returned back to the River Sutlej.

5. The Rampur hydropower project will have a gross head of 139 meters. The powerhouse (138 m long x 26 m wide x 48 m high) will house six 68.7 MW Francis turbine generators. These will be designed to operate with a net head (gross head less headrace tunnel and penstock friction effects at full water flow) of 119 meters. The volume of water flowing into the Rampur hydropower project is the same as that for which Nathpa Jhakri was designed and operates. The 412 MW power output of the Rampur project is a direct product of the 139-meter pressure head and this flow of water. The powerhouse structure will also house the six generator transformers, which will step up the 11 kV generation voltage to the 400 kV ground-surface gas insulated switchgear yard, for transmission into the northern electricity grid.

6. The electro-mechanical equipment for the Rampur project has been designed by improving those used for the Nathpa Jhakri equipment. Extra special care has been taken to minimize the effects of silt erosion on the turbine parts (refer paras 22-24).

7. ***Project output***: The Rampur project will have a rated capacity of 412 MW and will be capable of generating some 1,770 million units (in a 90 percent hydrological dependable year). From the derived inflow series for the 41 years (1963-2004) at Nathpa, the year 2001 corresponds to a 90 percent dependable year. The 412 MW (6 x 68.67 MW) of installed capacity has been proposed for the scheme on the basis of water available in such a 90 percent dependable year. The annual energy in a 90 percent dependable year has been estimated to be 1,770 million units with an annual load factor of 49 percent. The load factor for the lean period (October to April), based on the design plant size of 412 MW, will be 33 percent with an output of 687 million units of energy during the lean period.

8. The energy generated by the Rampur project will be used in the states of the northern electrical region of India. The project will also contribute to the development of Himachal Pradesh, which will receive a royalty of 12 percent of the power generated (equivalent to approximately US$12 million, at current prices, each year) in return for the use of its water resources. In addition, in recognition of its investment in the project, the state of Himachal Pradesh will also receive an additional allocation of around 109 MW of power and will also receive dividends from the project. SJVN expects to complete implementation of the scheme in a period of five years.

9. ***Hydrology:*** The River Sutlej originates near Rakas Tal in Tibet and is fed by Lake Mansarovar, which lies at an altitude of 4,550 m. It flows through the states of Himachal Pradesh and Punjab in India and joins the River Indus in Pakistan before draining into the Arabian Sea. The total catchment area upstream of Rampur and Nathpa Jhakri is 51,000 km^2, of which 37,000 km^2 lies in Tibet and the remaining 14,000 km^2 is in India. The snow line in this region is approximately 3,000 m above sea level. The Tibetan plateau lies at an altitude of about 4,570 m with no vegetation. Precipitation occurs mainly in the form of snowfall. The river is heavily silted for much of the year (see – section on sedimentation and silt erosion). Successive deposits of boulders, gravel, clay and mud have formed the plateau. The deposits lie in beds that are nearly horizontal. The River Sutlej has cut a channel several hundred meters deep through the plateau. The channels of most of the tributaries in this region present similar features with deep, narrow vertical-walled canyons. Downstream of the Tibetan plateau to Nathpa, the river is confined by 1,500 m high hills, and generally flows within a 300 m deep un-populated canyon.

10. Between April and June, the river is fed almost exclusively by snowmelt. Rainfall in this section of the river, averaging 780 mm per annum, is mostly concentrated between June and September and is determined by the onset of the southwest monsoon. The peak flows of the river occur during this period, while the lean period occurs between October and April. Hydrological studies of the River Sutlej were previously undertaken in preparation for the construction of the existing Bhakra Dam, which is downstream of Rampur, and for the construction of the existing upstream Nathpa Jhakri project. Water availability studies have been carried out from 1963 onwards by using observed discharges at Rampur town. The discharge data has been related to the Nathpa dam site considering the catchment area and rainfall variability proportions. The discharges observed at Sholding Khad, just downstream of Nathpa, from 1970 to 1986, have been extended using synthetic generation techniques so as to create the discharge series from 1963-2004. An alternative independent study was also

carried out in anticipation of the proposed Rampur hydropower project, confirming the prudence of investing further funds to utilize the flows exiting the Nathpa Jhakri project.

11. ***Design flood***: During the construction of the Nathpa Jhakri project, there were two major flood incidents with adverse consequences in terms of fatalities, damage to works under construction and resultant implementation delays. The greater of these two floods occurred in August 2000. The consequent river flows, as estimated by SJVN, were about 6,500 cubic meters per second. As a result of this experience, SJVN has decided that the permanent and temporary works for the Rampur project should be constructed to anticipate a 10,000-year flood, which is an acceptable international standard. This assumes a flood flow of 7,150 cubic meters per second for the Rampur hydropower project.

12. ***Geology of the locale and lessons learnt in constructing the Nathpa Jhakri project***: As described above, the Rampur hydropower project is designed as a tailrace development of the 1,500 MW Nathpa Jhakri project. The Rampur project's proximity to the Nathpa Jhakri project implies that the geological experiences encountered during the construction of Nathpa Jhakri are of direct relevance for the planned construction of the Rampur project. Both projects are located in the middle reaches of the River Sutlej, which is the principal tributary of the Indus river system. The Nathpa Jhakri and Rampur projects are located in the lesser Himalayas, which are characterized by very rugged topography and lofty steep-sided mountains. The lithology in the area has played a significant role in the development of its surface landforms. The granite and gneisses, with subordinate schist bands, which are exposed in the eastern parts, form high peaks, steep escarpments, and glaciated deep valleys. The terrain in the western part has subdued topography due to the presence of essentially schistose rock. The rock types in the area of the two projects comprise a variety of metamorphic rocks, including gneisses, schistose gneiss, schist and quartzite. Amphibolites as basic intrusive, granite, pegmatite and quartz veins as acidic intrusive have also been encountered. These unfossiliferous rocks belong to Jeori-Wangtu Gnessisic complex of the Precambrian age. How the geologists and construction engineers, employed on the Nathpa Jhakri project, successfully met the difficult challenges, which the geology posed in the excavation and construction of the project are described, in general terms, in the following paragraphs.

13. Owing to the orientation of the joints at the Nathpa dam site, both the banks including the abutments had to be supported using 485 cable anchors, ranging up to 200 tonnes capacity and 47 meters in length. The excavation (900,000 cubic meters of rock) and the construction of the very large de-silting chambers, with their varied lithology, combined with their structural features, was a difficult but successful accomplishment. The chambers were constructed using rock bolts and steel fiber-reinforced shotcrete along with several rows of long cable anchors.

14. Varied geology in the eastern and western part of the 27 km long, 10.5 meter diameter headrace tunnel strongly affected the excavation and lining methodologies employed in its construction. The excavation of the tunnel through high temperature zones, required the use of refrigeration plants to maintain tunnel temperatures, where work crews were able to operate for no more than two hours at a stretch. Tunneling was also successfully performed with rock covers as low as 9 m and as high as 1,400 m. Two stretches of the tunnel, totaling one km in length, were steel-lined. A drainage reinforcement, excavation and support sequence (DRESS) was used to cross weak rock zones consisting of shear zones and fractured and sheared rock. A special drilling rig for driving fore-poles up to 12 meters in

length was used to excavate a very difficult 360 meter reach of the of tunnel, which was under extremely high stress and seepage. The DRESS methodology involved the pre-drainage of ground ahead of the tunnel rock-face with long drainage holes, the installation of the 12 meter fore-poles to create an umbrella arch, the over-excavation of the tunnel to diameters as large as 13.5 meters, to accommodate the installation of heavy duty ribs and other rock supports.

15. The lining of the surge shaft (300 meters deep by 25 meters diameter) was carried out using slip forms using a continuous concreting technique.

16. The excavation of the three inclined pressure shafts (underground penstocks) was carried out by the upward excavation of a pilot shaft using raise-climbers, followed by the removal of the slashed rock by gravity downwards through the pilot shaft. The three penstocks were steel-lined for their total length of about 2,000 meters.

17. Because of the favorable geological conditions at the powerhouse location, it was possible to construct the machine hall cavern and the penstock valve-house with the support of only rock bolts, wire-mesh and shotcrete. However, the nearby transformer hall, in more difficult geological conditions, had to be supported with steel ribs. Also, because of the difficult surface terrain, the hillside rock slopes of the tailrace tunnel outfall channel were supported with the use of 550 cable anchors, of 110 tonnes capacity and 25 meters in length.

18. ***Tandem operation of the Nathpa Jhakri and Rampur hydropower projects*:** The Rampur hydropower project intake, which in effect, is the Nathpa Jhakri tailrace, was mainly excavated and built during the construction of the Nathpa Jhakri project. It will act as a breaking cistern in the conduction of water through the Nathpa Jhakri tailrace tunnel and the Rampur headrace tunnel. The cistern's current volume is limited in size, but will be expanded during the construction of the Rampur project by permanently connecting it to the temporary river diversion tunnel, and other purpose-built tunnels. This will ensure that with appropriately designed modern control systems for the two power stations, their operation in tandem will be practical, through the use of ultrasonic water flow measuring devices. These systems will facilitate series control of the two stations and, if necessary, appropriate emergency tripping of Rampur units, if any Nathpa Jhakri unit trip. The control system for Nathpa Jhakri will be retrofitted while that for the Rampur project will be a component of its electro-mechanical equipment package.

19. ***Seismicity*:** The project area lies in the highly seismic zone IV of the seismic zoning map of India, incorporated in the Indian Standard and is a High Damage Risk Zone. It has been rocked by a number of major recent earthquakes. According to the Indian Meteorological Department, during the last 100 years, as many as 29 earthquake shocks of magnitude more than 5 have taken place with their epicenters within a radial distance of 200 km. Of these, epicenters of 8 shocks lay within a distance of 50-100 km and for 21 shocks within a distance of 100-200 km from the project area. No epicenter of magnitude more than 5 lay within 50 km of the project area.

20. Of the seismic events during the last 100 years, those that caused major damage are: Kangra earthquake (1905), Kullu earthquake (1908), Chamba earthquakes (1945, 1947) and Kinnaur earthquake (1975). Fourteen events of magnitude 6 or more were located at a distance of 200 km while those with a magnitude more than 5 were within a distance of 100 km from the project area.

21. As far as the project area is concerned, no epicenter of magnitude more than 5 lies within a distance of 50 km. It is relevant to point out that the Rampur hydropower project area falls with in isoseismaes VI and VII of the Kangra earthquake (1905) and the Chamba earthquake, and between isoseismaes V and VI of the Kinnaur earthquake. The Kinnaur earthquake (January 1975), about 120 km from the Rampur project has been attributed to the activity of the Kaurik fault (Hukku et al 1975). The detailed project report (DPR) addresses seismic performance by calculating stresses induced in key components of the project under seismic loading. Consideration is also taken of permanent deformations induced by seismic loading.

22. ***Sedimentation and silt erosion*:** The natural regime of the River Sutlej is to carry a considerable volume of sediments particularly during the high-flow season. Sediment and erosion control measures upstream of Nathpa Jhakri, by soil management and afforestation, can offer very limited possibilities of reducing the sedimentation load, because of (i) the natural physiography and soil morphology of the region; and (ii) impracticalability of introducing vegetation at the high altitudes around the upper reaches of the river, from where much of the silt originates. Recognizing that the river silt loads will be high for the life of the project, the design of Nathpa Jhakri; (i) provided for gates in the dam to facilitate the periodic flushing of the fore-bay pond in its intake area; (ii) specified turbines materials to minimize equipment wear and tear and down-time for maintenance; and (iii) included, at the head of the power tunnel, wide underground de-silting chambers, where the water flow reduces, and heavy sediments above 0.15 - 0.2 mm in diameter settle into troughs. The resulting slurry is returned to the river.

23. Extensive research and dimensional analysis modeling supported the inclusion of these measures in the project design. However, silt erosion of the turbine runners (impellors) and the associated equipment has been more deleterious than was expected when the Nathpa Jhakri project was planned. Runner repairs have been more frequent than planned in the first year of operations at Nathpa Jhakri. This was mainly because the silt load content of hard quartz has been higher than was expected, when the river content was analyzed and the project designed in the 1980s. The runner repairs involve adding replacement metal to the runner blades and other worn out parts by specialized welding techniques, which is an expensive and lengthy exercise, especially as each turbine is not available for generating power for lengthy periods, to enable the work to be performed on it. However, over the last two years, SJVN has considerably reduced outage time and increased generation output by using modern ceramic coating for some components and very hard tungsten carbide layering for other components. Model studies incorporating modifications to Nathpa Jhakri's intake design, to avoid all possible ingress of water with high silt contents, are also being undertaken, and the results emanating from these model studies will be included under Component B as measures to support improving the availability of Nathpa Jhakri project (see para 25).

24. The design of the Rampur project and the runners and other related equipment has taken into account the considerable experience gained at the Nathpa Jhakri project. The amount of silt damage is directly related to the pressure head on the equipment, and the velocity of impact. In the case of the Nathpa Jhakri project, the pressure head is about 428 meters, and the speed of the units is 300 rpm, while the head at the Rampur hydropower project is 119 meters and the speed is 214 rpm. Thus the siltation damage at Rampur will be much less than that inflicted on the Nathpa Jhakri equipment.

25. ***Component B - implementing measures for ensuring higher availability of the existing up-stream Nathpa Jhakri hydropower project:*** As described above, the existing Nathpa Jhakri project has been affected by higher than expected silt levels in the River Sutlej, resulting in the shutdown of the plant for longer periods than was envisaged at the design stage. GoI has nominated several experts on a committee to assist SJVN in finalizing a strategy for minimizing the impacts of the abrasive silt on the NJHP turbines and also for reducing the number of days of outage by taking measures to reduce silt inflow to the river. Alarmed by a long outage in 2005 (more than two months due to high silt inflows- the worst outage so far), the water resource management agencies have also been studying whether this severe impact was solely due to one event, that is, the formation of a temporary glacial lake in the River Sutlej's main tributary in Tibet and the sudden bursting of its dam, causing floods and erosion of the river banks and roads nearby. SJVN has already begun: (i) creating repair facilities for underwater parts at the plant; (ii) ordering more runners; (iii) hard-coating repaired parts; and (iv) ceasing generation and thus stopping the plant at lower levels of silt concentrations than was originally planned. SJVN is flushing the reservoir more frequently, which is ensuring that the problem has less impact on the dry season generation, and will not escalate over the years ahead. With the measures already taken, the plant shutdown during FY2007 was only 32 days. SJVN is continuing to investigate the steps required to improve availability and is acting on advice from international experts who have worked on Bank-financed projects in silt-laden conditions. Recent model testing has indicated that silt ingress can be reduced by as much as 20 percent by blanking off the lower portion of the intake trash racks. SJVN has begun to install steel blanking plates to achieve this result. SJVN is also intent on looking at schemes in China and elsewhere that have similar problems.

26. For the Rampur project, a sensitivity check carried out for its economic analysis indicates that the plant can remain shut for 160 days, before its economic internal rate of return (EIRR) falls below the hurdle rate. This robust result provides the reason for assigning a modest risk rating associated with silt management.

27. The investment support under this component will comprise: (i) procurement of spares, including hard-coated upper and lower labyrinth seal rings, and hard-coated cheek plates for the turbines; (ii) the provision of the blanking plates at the intake; (iii) heavy duty dredging pumps to keep the intake free of silt build-up; and (iv) if currently ongoing model tests justify it, a tunnel to divert silt laden water away from the area of the intake works to downstream of the dam.

28. The model studies and other investigations may indicate the need for further support measures. Investments for these will be selected on the basis of technical optimization. Investments will be eligible for financing under the loan, based on project descriptions submitted by SJVN, which establish to the satisfaction of the Bank that the investment for which the Bank approval is sought meets the following eligibility criteria: (i) it is technically and operationally justified and has been formulated after taking into account other alternative investments; (ii) it is economically and financially justified; (iii) the appropriate authorities of the GoI have provided all required clearances and approvals for implementing the investment, including environment and forest clearances prior to initiation of construction of those elements where such clearances are required; (iv) it has adequate financing, procurement and implementation plans; (v) it complies with SJVN's environmental policy and to that end SJVN has carried out an EIA and prepared an environmental mitigation plan, and where applicable, a R&R plan or other development plan for adversely

affected people, all in a manner satisfactory to the Bank; (vi) it shall be for activities in line with the project development objectives; and (vii) such additional criteria as may be specified by the Bank for each investment.

29. ***Component C - technical assistance for institutional reform and capacity building to assist the borrower, SJVN, in moving towards international good practices in hydropower development and operations, and improving its standards of project preparation for future projects:*** SJVN has improved its institutional capacity since implementing the Nathpa Jhakri project; but there is room to strengthen the organization further. One of the specific reasons cited by GoI when it sought the Bank's involvement in the Rampur hydropower project was for the Bank to assist in the process of institutional strengthening of SJVN, and to enable it to develop future hydropower projects in an economic, environmentally and socially sustainable manner.

30. The Bank has engaged a variety of experts to support SJVN in its preparation of the Rampur project. This expertise was used in areas where SJVN needs institutional strengthening to help it move towards international practices, that is, financial accountability and corporate governance; contract management; safety and health assurance; economic appraisal; silt management; engineering; social and environment safeguards; and communications and public relations.

31. The technical assistance component of the project is designed to demonstrate good practice in these areas and support SJVN's development as its portfolio of projects increases. Most specifically assistance will be required through studies, training and technical support in the areas of: (i) planning and management of environment and social issues; (ii) contract management skills; (iii) safety and health aspects; and (iv) financial accountability and corporate governance. A portion of the technical assistance component has been kept sufficiently flexible, so that advice can be provided on issues and problems that may arise during implementation.

32. The detailed capacity building plan, prepared by SJVN, is on file and is summarised in the indicative table below. The plan will be financed from the TA component and from SJVN's own funds.

Table 2: Training Plan from FY 2007-08 to FY 2011-12

Department/ Area	Budget (Rs. in million)					Total
	2007-08	2008-09	2009-10	2010-11	2011-12	
Design	26	30	35	41	48	181
General Management	8	9	12	15	18	62
Procurement – Civil and Electrical	10	10	10	10	10	50
Corporate Planning	5	5	5	5	5	25
Finance, Commercial, R&R & Monitoring	3	4	5	6	7	24
Human Resources, QA&I, Site Quality, Geology & Safety	8	8	9	13	13	51
Environment	7	8	6	6	2	29
Total	**67**	74	**82**	**95**	**103**	**421**

Annex 5: Project Costs

INDIA: Rampur Hydropower Project

Project Cost By Component and/or Activity	Local US$ million	Foreign US$ million	Total US$ million
Capital investments– Rampur	312	112	424
Investment support - NJHP	18	27	45
Technical Assistance for Institutional Reform and Capacity Building	4	6	10
Total Baseline Cost	334	145	479
Physical Contingencies	30	13	43
Price Contingencies	52	23	75
Total Project Costs	416	180	596
Interest during construction		74	74
Front-end Fee			-
Total Financing Required	416	254	670

Annex 6: Implementation Arrangements

INDIA: Rampur Hydropower Project

Corporate Governance

1. Reviews of similar sectors in India have identified procurement and contract management as key areas where there can be improvement in corporate governance. In the case of the Rampur project, the selection of contractors and award of contracts is being carried out following World Bank procurement guidelines under international competitive bidding procedures (two of the three major contracts are already awarded). SJVN has already achieved a degree of transparency in its own procurement (for example, contracts awarded are posted on the website). Thus the key area of risk identified was the ongoing management of large contracts, particularly since delay in resolution of contract claims and variations was an issue of concern on a previous Bank-financed project with the same agency – see box.

Contract management issues on Nathpa Jhakri Hydroelectric Project

SJVN was the project implementing agency for the earlier Bank funded NJHP, and the Bank recognizes that there are currently a number of outstanding contractual disputes between SJVN and the various contractors employed by SJVN at that time. The parties to the disputes submitted their cases to Dispute Review Boards (DRBs), set up for each contract, and recommendations to resolve these disputes were made by the DRBs. Of the decisions made by the DRBs, 79% have been implemented by SJVN and the remainder were largely referred to arbitration or court for a further ruling. Currently, the outstanding claims being sought by the contractors, which are still to be decided by DRBs, stand at about US$ 48 million, of which 90% relates to one contract where the DRB was not functioning due to delay in appointment of DRB members. To date, the DRBs have recommended an average settlement value of less than 18 per cent of the amount claimed by the Contractors.

In accordance with OP 7.40, the Bank expects a prompt and equitable settlement of the disputes. Out of a total of 141 claims submitted to DRBs for resolution, the DRBs have made recommendations on 124 disputes. Out of these 124 recommendations, 35 (28%) have been decided in favour of SJVN and 89 (72%) have been decided in favor of Contractors. SJVN have implemented 69 of the decisions made in favour of the contractors and 20 are with arbitration or the court. There are a further 4 claims that have already been submitted to the Additional DRBs, set up to specifically to resolve the extension of time claims. These Additional DRBs have given their decision (awarding some US$48 million, 16% of the amount claimed by contractors). This was not accepted by SJVN, as different principals had been applied in the separate cases, and the contractors have referred the issues to arbitration.

To facilitate a timely resolution of the disputes relating to the NJHP, the Bank will assist through the normal processes of project implementation support and will continue to press upon the parties the desirability of a swift settlement. SJVN should take whatever steps are available to them, within the Indian legal system, to bring to a conclusion the ongoing arbitrations and litigations regarding these disputes and implement any judgements expeditiously. Further, SJVN has worked with experts, including an international contracts management expert, to develop an action plan to improve its contract management and compliance systems, including its audit, risk management and corporate governance frameworks, for the efficient implementation of the Rampur Project.

2. Since the commissioning of the Nathpa Jhakri project, SJVN has been working towards improving its own institutional capacity. Action has been taken on such issues as clarity in delegation of powers. An international contract management specialist was engaged to review the NJHP experience and to advise SJVN on ways to improve its management of contracts. Based on this report, SJVN has created a matrix of contract management actions to address the weaknesses in the management of NJHP contracts and has incorporated the results of this matrix into its revised contract management procedures. The actions agreed upon include the formation of claims review committees and the maintenance and disclosure of a register of claims and the time taken to resolve disputes. The action plan for contracts management is now being implemented through the contract management procedures, and will be supported where necessary by the capacity building component of the project.

3. The recently enacted Right to Information Act (RTI) (October 2005) will raise the benchmark of disclosure and transparency for all Indian public organizations. SJVN is making good progress on compliance with disclosures required under RTI. This Act mandates the publication of a wide variety of corporate information including organizational procedures, financial performance, budgets and disbursements, in addition to the right for citizens to demand any additional information that is available. Under the RTI, it is also necessary to provide training to the general public on how to access and use the information, a process that is likely to increase transparency. SJVN now plans to carry out an independent review of its level of compliance with the RTI and address any gaps identified to bring itself into full compliance, and also to develop a disclosure policy. SJVN is organizing awareness programs/ workshops for its staff as well as PAPs of the project on the RTI Act.

4. In addition to the contract management action plan noted above, further action plans have been developed to address areas where the company requires some institutional strengthening to achieve a good practice standard of corporate governance and corporate social responsibility. These are indicated below.

5. ***Financial management plan***, which sets out the steps necessary to bring SJVN's financial management to a level of good practice. This can support good governance during the rapid future growth of the company. The action plan addresses areas where SJVN needs to take quick actions to improve financial accountability such as strengthening the internal audit function, developing capabilities for quarterly financial reporting and the development of standardized systems and manuals for financial reporting (see Annex 7).

6. ***Operations and maintenance plan***, which contains rules and procedures for reliable and safe operation of the dam and associated structures, including an instrumentation plan and other procedures for its satisfactory monitoring.

7. ***Safety assurance plan***, which details the safety procedures for the organisation both for construction and operation of the plant. This would also be used by the contractors.

8. ***Emergency preparedness plan*** which provides the criteria for identification and classification of emergency situations (large floods, earthquakes, abnormal instrument readings, etc.) and also includes rules for notification to the competent authorities for appropriate response to different emergency levels.

9. ***Environmental management plan and training plan,*** which sets out all the required environmental actions for the project, as well as the necessary training and institutional development (see Annex 10).

10. ***Communications action plan***, which sets out steps for SJVN to improve its communications and outreach activities, by ensuring transparency, through appropriate disclosure norms; establishing and maintaining an effective and credible two-way channel of communication with project-affected persons (PAPs); and enhancing public awareness of SJVN as a socially and environmentally-responsible developer of sustainable hydropower (see Annex 16).

11. These plans form the basis of the institutional reform and capacity building component (see Annex 4).

12. ***Internal implementation plan,*** which is used by SJVN in project planning and monitoring (applicable for the Rampur and Nathpa Jhakri hydropower projects)

13. SJVN, as the implementing agency, has put in place arrangements for the procurement and implementation of the Rampur hydropower project. The implementation arrangements proposed have been designed using the practices already developed within the organization during the implementation of the previous NJHP. This includes institutional oversight provided by the Ministry of Power (MoP) and the Ministry of Finance (MoF), which are the two key ministries involved in formulating policy for the power sector. The Central Electricity Authority (CEA) is responsible, *inter alia,* for sector planning and techno-economic project oversight and the Central Electricity Regulatory Commission (CERC) is responsible for tariff formulation and notification as well as sectoral regulation. Both these agencies will follow their usual procedures with respect to project investments.

14. The physical implementation of the Rampur hydropower project will be performed by the civil works contractors (who are responsible for the execution of the two civil works packages) and the electro-mechanical contractor. SJVN has appointed a general manager, to supervise the contractors. This post is one level below that of the Executive Director on the SJVN's board. The general manager has full responsibility for the timely execution of the project and is assisted at the site by Engineers in-charge (EIC), whose function is to oversee the implementation of the two civil works and one electro-mechanical supply and installation package.

15. The tendering and awarding of the main contracts, following the international competitive bidding procedures, has been dealt with by the corporate contract department and the infrastructure works (major roads, bridges, construction power etc.) are tendered and awarded from the project office. Contract packages were designed with due consideration for simplifying project management, by optimizing the number of packages involved. In the case of the Rampur hydropower project, there are three packages as mentioned above. The project monitoring activity is being carried out at:

- Corporate Level: Corporate Monitoring and Coordination Department, reports to the Chairman and Managing Director (CMD) or in absence to the Director in-charge at that time. This department monitors the progress and execution of all projects;

- Project Level: Project Planning and Monitoring Department, reporting to the Head of Project, monitors the project execution.

16. The procurement has been and will continue to be performed in accordance with the Bank's procurement guidelines. SJVN has developed an in-house Project Monitoring and Management System (PMMS), using PERT/CPM technique, for review of the project implementation at different levels. The system calls for increasing levels of detail through the hierarchy of functions of engineering, contracts, and site with corresponding levels of monitoring and control, resulting in the management summary report to the top management. The management summary report highlights the project completion forecast and actions being taken on an exceptional basis in critical areas, which need to be brought to the attention of the top management. For effective project planning and review, a three-tier level of planning and review, as described below, is being used in SJVN.

17. Firstly, planning is carried out by the Corporate Monitoring and Coordination Department. This includes an overall project schedule for the project and forms the basis for all subsequent planning and monitoring of the activities. Broadly, the project schedule covers all the activities up to the preparation of the detailed project report (DPR), award of civil and electro-mechanical packages, and provides indicative estimates for implementation of contracts and commissioning of projects.

18. Secondly, the project planning is broken down into packages and the milestones and dates are worked out and finalized with the respective contractors and vendors before the award of the contract. These milestones are then fed into the project schedule. (The contractor is required to prepare and share the detailed PERT chart on PRIMAVERA within 30 days after the award of the work).

19. Thirdly, the next level of planning deals with elaborate and detailed schedules and weekly and monthly rolling plans, which are prepared for activities involved for each major activity in the contract schedules. These rolling plans are prepared by the contractor and agreed with the Engineers in-charge at the site. These plans form the basis for the Engineers in-charge and the contractor to monitor the quantified progress of work and agree on the actions, which need to be taken to ensure correct progress.

20. As a result of this planning system, monitoring of project execution takes place at three levels:

- Engineers in-charge level : Weekly review of progress of monthly or weekly program with the contractor and the project's Planning and Monitoring Department;
- Head of Project level : Fortnightly review of progress of against the contract milestones and plan with all Engineers in-charges and monthly review of progress with all Engineers in-charges, all Heads of Departments of the project and corporate design/ contract/ finance/ personnel and administration/ monitoring/ planning departments;
- Corporate level : Monthly review of progress for each contract by the management based on reports generated by the Corporate Monitoring Department, and quarterly review of progress at a meeting chaired by the Chairman and Managing Director along with all the functional directors and heads of project and heads of department at the corporate office.

21. The monitoring mechanism envisages preparation of separate reports for review and follow-up at different levels. The key reports being prepared include:

- Daily progress of major critical works
- Critical points and exception report based on the project review meetings
- Monthly milestone report
- Monthly/ quarterly/ annual progress report

22. The Project Monitoring and Management System requires that a project review meeting (PRM) be held every month. This review meeting is chaired by the General Manager, with representatives of all functions at the project and corporate level, that is, contracts, engineering, field, personnel, finance, corporate monitoring group, etc. The participants discuss progress, project interface problems and project completion trends, etc.

23. From the discussions held during the project review meeting, a critical points statement and an exception report is generated for the Chairman and Managing Director and Directors, highlighting extremely critical areas requiring immediate attention and assistance. These discussions help in identifying the critical actions required and in seeking decisions for speedy project implementation. From these reports details will be extracted for project progress reports to the World Bank, every quarter, or more often if required.

Annex 7: Financial Management and Disbursement Arrangements

INDIA: Rampur Hydropower Project

1. ***Summary of Financial Management (FM) Assessment.*** Satluj Jal Vidyut Nigam Ltd. (SJVN), formerly known as Nathpa Jhakri Power Corporation Ltd, was incorporated in 1988 as a private limited company under the Indian Companies Act, 1956 to implement and operate the Nathpa Jhakri project (financed by IBRD). *SJVN has a financial management system which is considered adequate, to account for and report on the project resources and expenditures accurately.* An action plan for enhancing Financial Accountability and Corporate Governance of SJVN has been agreed as a part of the preparation of this project (refer Table 4 later in the Annex). Actions have been initiated on some of the critical issues and the balance will be implemented during the implementation of the project.

2. ***Financial Management Strengths, Weaknesses and Mitigating Arrangements.*** The project has the following strengths in the area of financial management: (i) a budgeting, accounting and reporting system has been operational for the entity for the past few years, which will be used for accounting and generating the required financial reports under the project; (ii) SJVN had received an IBRD loan (via GoI) for the Nathpa Jhakri project and thus has experience of the Bank's FM policies and procedures. Its FM performance under the previous loan was satisfactory and there are no pending issues.

3. The Bank team conducted a high level review of financial management, corporate governance and accountability arrangements of SJVN[8/] which has indicated that SJVN has institutionalized certain cardinal *principles*, in consonance with other public sector undertakings in India, in areas like accounting, auditing, internal control, budgeting and reporting which have laid the foundation for a basic financial accountability and corporate governance framework in the organization. However there is a need to further improve financial accountability and corporate governance arrangements of the organization to be in line with the future rapid growth plan of the company. This review identified a few areas[9/] where SJVN needs to take quick actions to improve financial accountability. An action plan for strengthening Financial Accountability and Corporate Governance has been prepared by SJVN to further develop FM capabilities in these areas, of which several actions have been initiated during preparation of the project such as formation and constitution of an audit committee, conversion to a public limited company, strengthening internal audit function and developing capabilities for in-year financial reporting. The FM risk for this project is rated at Substantial (detailed risk table in project files). After successful implementation of the agreed action plan items it is considered that the risk rating would be modest.

4. ***Arrangements for oversight and accountability.*** SJVN will be responsible for the FM arrangements of the project. The company was incorporated as a joint venture between the GoI and the GoHP. SJVN is registered as a Private Limited Company[10/] under the Companies Act, 1956. By virtue of being a private limited company, certain exemptions

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8/ A note on "Financial accountability and Corporate Governance arrangements" prepared by the Bank is available in the project files.

9/ Most importantly there is a need to strengthen further the internal audit framework and there is a need to develop finance manuals.

10/ Under the Indian Companies Act, 1956, a public limited company requires a minimum of 7 shareholders. SJVN currently has only 2 shareholders – Government of Himachal Pradesh and Government of India.

apply to SJVN as compared to a public limited company[11/] under the Companies Act, 1956. SJVN is managed by a Board of Directors (Board) comprising a full-time Chairman & Managing Director (CMD) and four full-time functional Directors – Director (Finance), Director (Personnel), Director (Civil) and Director (Electrical) plus six Government directors (four nominated by GoI and two nominated by GoHP). In addition, there is a Management Committee comprising CMD, full-time Directors and Heads of Departments. For improvements in the financial accountability and corporate governance, the recent appointment of the Director Finance (a post which was vacant for over a year) was crucial so that important initiatives and their implementation receive the necessary impetus. The implementation arrangements for the project, which is institutionalized at different levels of hierarchies of the organization, are discussed in detail at Annex 6. SJVN shall provide the fiduciary assurance to IBRD over proper and efficient use of Loan proceeds. The mainstream FM systems of SJVN, housed as a part of their general accounting and financial systems will be used to generate the financial and other progress reports under the project.

5. ***Funds Flow:*** The IBRD funds from this loan, unlike the earlier loan, will be directly borrowed by SJVN, with a guarantee from GoI. Under the project, SJVN will open a new bank account (to be designated special account) in a Commercial Bank to receive the initial advance under the loan. Foreign currency payments to suppliers/ vendors could be released directly from this Bank account. SJVN would have the flexibility of converting USD into Rs. (INR) at periodic intervals for meeting rupee payments over the next month and in this case, the expenditures will be reported to the Bank using the actual rate of currency conversion. Alternatively SJVN could also seek direct reimbursements from IBRD. The Rampur project will be financed by SJVN either by transferring requisite funds to the site office or by making direct payments.

6. ***Budgetary control:*** SJVN prepares an annual capital budget and an operations and maintenance (O&M) budget on the basis of work plans that are agreed with each of the departmental heads and the management. Expenditure commitments are general based on approved budgets. The budgets are revised during mid year review. Collections are handled by the Expediting Office at Delhi and by the Corporate Office in Shimla for Himachal Pradesh State Electricity Board (HPSEB) collections. To exercise effective cost control, there is need for improvement in the budgetary framework. SJVN also intends to start preparing rolling cash forecasts every three months with effect from current financial year (covering cash flow for the year to date and three months forecast). Budgeted profit and loss account and balance sheet are currently not being prepared; these will be included in future for better monitoring of operational results. SJVN is in the process of preparing a manual to formalize its budgetary control procedures covering policies, procedures, time frames, and formats with detailed instructions (agreed as a part of the action plan during preparation). Periodic reporting formats will be included indicating budget versus actual, variances, analysis of variance and plan for corrective action.

7. ***Financial Accounting & Reporting:*** Finance teams are located in Delhi (Expediting Office), New Shimla (Corporate Office), and at each project office. The Delhi and Shimla offices and on-going Projects operate as separate accounting units which maintain accounts on Oracle based accounting software. All accounting units prepare monthly Trial Balances and annual Profit & Loss Account and Balance Sheet. Thereafter, the audited Profit & Loss

[11/] Peers like POWERGRID, NTPC and NHPC in the power sector are incorporated as public limited company under the Companies Act, 1956.

Account and Balance Sheets are consolidated by the Corporate Office Finance Department. SJVN uses a uniform chart of accounts at all the accounting units. The account heads[12] are suitably grouped to generate financial statements and schedules in the required formats. Financial transactions are approved in accordance with the formal Delegation of Powers (latest revision May 2005).

8. ***Finance Manual:*** SJVN has issued circulars from time to time containing guidelines for accounting, internal control and financial reporting activities. Currently important components exist in separate documents such as key accounting policies, accounting circulars, and chart of accounts. SJVN intends to bring these together in an accounting manual and address any gaps. This will serve as guideline for carrying out day-to-day financial management activities, bring about uniformity and consistency in practices across SJVN and form the basis for audits and improvements. The manual will cover accounting activities relevant such as sales, procurement, inventories, fixed assets, capital work-in-progress and depreciation, payroll and other expenses, cash and bank, funds, share capital, investments, deposits, loans and advances, periodical and annual closing and preparation of financial statements. It has been agreed that Finance manual will be prepared by the end of the current financial year.

9. ***Financial Reporting:*** SJVN prepares the following periodic financial reports (a) monthly statement of cash expenditure compared with budgets; and (b) monthly O&M expenditure report compared with budgets. These reports are distributed to CMD, Directors and Department Heads. During project execution, daily, fortnightly and monthly reports are prepared on physical progress and monthly project review/ progress meetings are held between Project heads and Corporate Planning & Monitoring Department. Quarterly extracts are submitted to the Board. This system will also apply for Rampur project implementation. The reporting framework for the project will include a quarterly un-audited financial report (on a cash basis) prepared by SJVN, in an agreed format which would give details on the project expenditure incurred till date along with projections of funds utilization in the next 2 quarters. These reports will be prepared from information generated from SJVN's FM and MIS systems. These then would be consolidated and a single report will be prepared for submission to the Project management and IBRD. The annual project financial statements, which would be similar to the format of the quarterly financial reports, would also be submitted under the project. SJVN recognizes that there is scope for improving financial reporting to management[13/] in light of the organizations growing requirements and the need to formalize a reporting system covering SJVN's entire operations to provide information needed for effective monitoring and control.

10. ***Accounting Policies and Procedures:*** The financial statements (Balance sheet and the profit and loss account) of SJVN are governed by the Indian Companies Act which requires preparation of annual financial statements on full accrual principles applying accounting standards issued by the Institute of Chartered Accountants of India (ICAI). Significant accounting policies are disclosed in the annual report. The day-to-day accounting is on a cash basis and liabilities are accrued/ provided for at the time of generating annual financial statements. As a part of their action plan, SJVN has started enhanced in-year

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12/ However, there are over 1400 heads providing scope for review and rationalization

13/ Including for example quarterly financial statements, budget variance and analysis reports covering periodic operating results, treasury management, working capital management, project management, and cost analysis reports.

financial reporting by preparing full financial statements applying full closing procedures for nine months ended December 31, 2006 for presentation to Board. Following this achievement, SJVN will prepare accounts on a half yearly basis with effect from current financial year. SJVN has well defined accounting policies and procedures (in line with the requirements under the National Standards of Accounting[14/] in India) in place for revenue recognition, construction accounting and treatment of expenditure under construction, fixed assets, grants-in-aid, booking of expenditures and valuation of inventories and investments.

11. ***Depreciation:*** SJVN, being a power sector entity, is required to follow the Electricity Act, 2003 which has an overriding effect in case of any inconsistency with the Companies Act, 1956. Although Electricity Act (2003) has repealed the earlier Electricity (Supply) Act, 1948, no guidance has been issued for computation of depreciation which was available under the earlier Act (section 43 A and 75 of the Electricity Supply Act, 1948) which has caused some confusion in the power sector with different central power sector companies engaged in the same business and using similar type of assets, applying varied rates of depreciation. SJVN has conservatively applied the rates as given in Schedule XIV of the Indian Companies Act, 1956 which are higher[15/] than those notified by the Central Electricity Regulatory Commission (CERC) calculated on the basis of 'estimated useful economic life' of the asset. The tariff reimbursable to SJVN is calculated on the basis of CERC notified rates. This sectoral issue is in the process of being resolved and CERC needs to issue necessary instructions in this regard from an accounting perspective.

12. ***Costing system*:** SJVN is subject to cost audit since 2004-05 as required under the Companies Act, 1956 and a costing manual has been recently prepared by SJVN. SJVN is considering integrating cost accounting with the accounting system, over medium term, for better monitoring and control of costs.

13. ***Billing and tariff:*** Billing for energy supplied to beneficiaries is based on a two-part tariff[16/] introduced with effect from 2004-05 by Central Electricity Regulatory Commission (CERC). The energy tariff is notified by CERC based on a tariff petition submitted by the company. Due to the lack of finalization of the final project cost of NJHP, the company's petitions and CERC's orders are provisional subject to later corrections. The major elements in tariff calculation are – return on equity (14%), interest on term loan and working capital, O&M expenditure (1.5% of capital cost) and depreciation. Based on energy dispatch data from Nathpa Jhakri and after applying CERC formulae for two-part tariff, monthly bills are raised by SJVN and dispatched to the beneficiaries by 10th of each month. The Commercial and Finance Departments maintain details of billing and collections by beneficiary. Currently debtors represent less than one months billing.

14. ***Project costs:*** All project costs and expenditures, including those related to the TA component will be paid for and recorded in the books of SJVN in accordance with its accounting policies and procedures. Under this project, the Bank will finance three large contracts (two contracts for civil works and one for electro-mechanical equipment) for

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14/ As per the India - ROSC (A&A) dated December 2004, the Indian Accounting standards are modeled on International Financial Reporting Standards (IFRS) and except for some small revisions (required for customization to local circumstances and legal requirements) are largely in consonance.

15/ As a result of this, the depreciation charged for 2004/05 is higher than it would be if calculated using the CERC notified rates, by Rs 1380 million.

16/ Prior to the issuance of the order, a single part provisional tariff of Rs.2.35/ kwh based on power purchase agreements between SJVN and the beneficiaries was allowed by CERC for billing.

Rampur Hydro project; a few smaller contracts for Rampur and NJHP; and a few consultancy contracts for technical assistance. Hence the number of transactions under the IBRD financed project is expected to be few, but these will be large and bulky transactions. All contractual payments for Rampur project will be made after due verification of the bills in accordance with the procedures laid down in the circulars issued by the company. The Rampur project would have a separate balance sheet, which will help in distinguishing costs financed by the proposed IBRD loan.

15. ***Contract management***: NJHP faced severe challenges during execution and there are several disputes relating to major civil works contracts, and extension of time which are yet to be resolved. In order to be proactive and prudent and not repeat the issues that arose during the implementation of NJHP, an in-depth review of NJHP contract implementation has been carried out by a Contracts Specialist (Bank consultant) as a part of the preparation of this project. Actions taken on the basis of recommendation of the report (see Annex 6) will strengthen SJVN's overall contracting, execution, monitoring and reporting procedures.

Staffing – Finance function

16. The project's financial arrangements would be handled by the finance staff working at corporate headquarters, and the site office along with their regular finance work. The Finance Department is headed by Director Finance at Corporate Office who is assisted by a group of officers including a General Manager, Assistant General Managers, Deputy General Managers, and Senior Managers. The site finance department will be headed by a person not below the rank of Manager. All these executives are professional accountants. The corporate finance division coordinates with external funding agencies. They would be responsible for meeting the information requirements of the external agencies and providing the reports in the agreed formats to the World Bank. The current strength of Finance Departments and vacancies across the organization is as follows:

Table 1: Finance Department – Current Strength and Vacancies

Location	Sanctioned	Existing	Remarks
Corporate Center[17/]	38	24	9 executives – 8 with post-graduate qualifications and one from State Accounts Service.
NJHP	20	20	There are 12 executives – 11 with post-graduate qualifications and one from State Accounts Service.
RHEP	8	6	There are 3 executives and 1 executive trainee. All have post-graduate qualifications
Others	21	9	
Total	**87**	**59**	

17. Staff previously on deputation from the GoHP has been largely absorbed by the company, reducing the gap between sanctioned and existing strength. However there are apparent skills mismatches at the supervisor and lower levels in relation to the growing needs of the organization, which needs to be addressed. In view of this, there is a need for SJVN to recruit staff with requisite skills immediately in accordance with the agreed time-bound action plan. A staffing strategy has been prepared by SJVN that envisages recruiting

[17/] Finance Department in Expediting Office in Delhi is headed by a Senior Manager who is an ICWA.

urgently needed staff and carrying out manpower and skills assessment study for the finance function with the objectives of matching existing manpower and skills with the requirements. The finance and accounts staff as planned at RHEP is considered adequate for accounting and reporting on the IBRD project.

FM and other Information Systems

18. Accounting is carried out at Corporate Office and Project units using Oracle based custom designed software. The software contains several useful features, is windows based and has a separate fixed assets accounting module. A materials management system is currently in use in NJHP and all the accounting units are using a payroll package. The accounting package has been in use for the past two years, but has a few software bugs that need rectification to allow more effective usage. The finance and accounts department is in the process of hiring a full time and dedicated IT professional to customize the software and bring it to full readiness for the 2007-08 accounts. After the required modifications to the existing package SJVN proposes to develop budgeting and costing modules and integrate them with financial accounting with suitable reporting features. With its planned growth and distributed operations over difficult and wide terrain it may be useful for SJVN to develop a medium term plan for integrating its business units and departments with the assistance of an Enterprise Resource Planning (ERP) system. SJVN is in the process of developing a strategy paper for ERP implementation after due consultation with management. SJVN has also implemented an Integrated Project Management and Control System for review of the projects under progress to ensure development and implementation of projects in a timely and effective manner.

Internal control and Corporate Governance

19. The delegation of powers establishes the internal control environment within the company. This also aids in segregation of duties within the organization. Contracts are issued by the Project Contracts Departments and copies of these contracts are made available to the Engineers-in-Charge of the works as well as the Finance department. The Engineer-in-Charge is responsible for getting the work executed under their supervision, and on the receipt of bills from the executing agencies, they forward them to finance department after due verification with reference to the existing contract. The bill(s) as received from different engineers-in-charge are scrutinized in the finance department with reference to the contract provisions as well as such administrative approvals, as may be applicable to the transaction. After the payment is released, the original documents are kept in safe custody of the banking section of the finance department whereas the physical custody of the assets created by the working agencies is under the control of the concerned Engineers-in-Charge. SJVN's internal control framework needs to improve in line with the size and scale of operations of the company. Although some processes to improve corporate governance and financial accountability have been initiated, further actions are underway (as detailed in the action plan for improvement of Financial Management).

20. The department of public enterprises (DPE), Government of India has issued a code of corporate governance for Central Public Sector Undertakings (CPSUs) in June 2007 for all CPSUs that are not listed in the stock exchange[18/]. In the following table, the key

[18/] The aim is to institutionalize good corporate governance practices that are broadly in conformity with SEBI guidelines (clause 49 of the Listing Agreement), in CPSUs as ultimately, these CPSUs would approach the financial markets for its requirements.

components of the draft model code of corporate governance and the present status in SJVN is presented.

Table 2: Status of Draft Model Code on Corporate Governance in SJVN

Draft model code	Present SJVN status
Board of directors shall have an optimum combination of functional, nominee and independent directors with not less than fifty percent of the board of directors consisting of independent directors.	SJVN board comprises a full time chairman, four full time functional directors and six Government nominated directors – four nominated by the Central Government and two nominated by the Government of Himachal Pradesh. There are no independent directors in SJVN's Board.
The DPE[19/] has recommended that the number of government directors on the board of directors of an enterprise should not exceed one-sixth of the actual strength of the board and in no case the number should exceed two.	The number of government directors on the board of directors of SJVN is six.
Qualified and independent audit committee shall be set up with minimum three directors as members. Two- thirds of the members of audit committee shall be independent directors. All members of audit committee shall be financially literate and at least one member shall have accounting or related financial management expertise. The chairman of the audit committee shall be an independent director.	SJVN has last year set up audit committee, as a part of implementing Financial Management action plan for improvement. Although, as it is a private limited company, it is exempted from relevant section of the Act (Section 292 A) and also that under the present framework, there are no independent directors.
The company shall lay down procedures to inform board members about the risk assessment and minimization procedures. These procedures shall be periodically reviewed to ensure that executive management controls risks through means of a properly defined framework. Disclosure on risks and concerns should from part of Director's report.	The functional plan (a part of the 10 year corporate plan) for engineering, procurement and construction, contains a risk management strategy with focus on risk coverage instruments. However, this could be expanded to cover risk assessment and minimization strategies for SJVN as a whole.

21. ***Actions initiated for improving corporate governance:*** SJVN is planning to convert from a 'Private Limited Company' into a 'Public Limited Company'[20/], change its name and suitably amend its Memorandum and Articles of Association. In-principle approval has already been taken from the Board and approval has been sought from GoHP and GoI. The process is finally expected to be completed by December 2007. On the subject of independent directors[21/], SJVN has forwarded names of 12 qualified professionals along with their bio-data to the Ministry of Power in response to a GoI directive on the subject. An independent audit committee has been set up in November 2006 with full scope as required under the companies Act[22/] which includes fixing the remuneration the statutory audit, coordinating their work and providing management responses to the audit observations, overseeing the internal audit framework and work plan, discussing and making recommendations on any matter relating to financial management.

19/ DPE OM No. 18(6)/91-GM dated 16 March 1992 annexed to the draft model code of corporate governance. This is an existing circular for implementation by CPSUs and its implementation is not necessarily linked with the model code.

20/ It is presently a private limited company with two signatories to the memorandum of association – the Central Government and the Government of Himachal Pradesh.

21/ DPE's note on corporate governance requires non-official directors to be drawn from technocrats, management experts and consultants, and professional managers in industry and trade with a high degree of proven ability.

22/ This has been setup without independent directors at present, as they are yet to be appointed by GoI.

Internal audit (IA)

22. The internal audit department operates from HQ in Shimla. During construction of NJHP, there was IA presence at site. Similarly RHEP will also house a local internal audit unit. The internal audit department comprises a Senior Manager and two professionals. Another two professionals are expected to be recruited by December 2007. The department currently carries ex post audit of all kinds of transactions and is also responsible for coordinating, following up and finalizing Comptroller and Auditor General (C&AG) audit observations. The main focus of internal audit has largely been transactional and not on systemic issues and their deficiencies. Also the IA reports have not adequately presented the audit findings according to their priority to the organization. There is no internal audit manual and the objectives and strategies were not documented. In addition, there was no formal process of resolution of audit observations and monitoring of compliance.

23. ***Actions proposed for strengthening:*** SJVN understands the need to strengthen the IA function in tune with organizational requirements, lay down standard operating guidelines, improve reporting and follow-up and create an independent audit environment. An internal audit strategy focusing on risks and management orientation has been prepared. Independence of the function has been enhanced by SJVN by revising the reporting mechanism of internal audit department to the CMD, recently. An assessment of the required staff strength and training required will be undertaken keeping in mind, growth plans of SJVN[23/]. An internal audit manual is in the process of being developed, setting out the objectives, scope and coverage of audit, the detailed methodology of review, and the required reporting and follow up. This will also detail the policy in respect of hiring external experts and consultants, management orientation for addressing systemic deficiencies for improving organizations performance. The internal audit department would also audit the IBRD financed project (under agreed terms of reference) and its reports would be available to the IBRD, on request.

External Audit

24. Under Section 619 of the Companies Act, 1956, the C&AG appoints SJVN's statutory auditor. The auditor is selected by C&AG for a period of four years, from a data-base of pre-qualified audit firms, which is maintained by the Office of C&AG for auditing the corporatised public sector undertakings (PSUs). In addition, the C&AG also conducts a supplementary/test audit. Previous entity audits have included a number of audit observations, which have not always received adequate management attention. As a part of the action plan, SJVN has initiated remedial actions, which will address these old outstanding observations and will make the audit process smoother. This is evident in the audit report for 2005-06 that contains fewer audit observations, and further improvement is expected for the 2006-07 accounts. SJVN has made an informed decision[24/] to submit a separate project audit report along with financial statements. It is proposed that the project (including all components) will be audited by an independent firm of chartered accountants (which may

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[23/] Internal audit would normally cover the entire organization's activities and thus skills requirements will be varied. It is advisable that IA focus on quality, develop expertise to effectively manage internal audits such that it adds value to the organization and avail the services of experts/ consultants to fill the skills gap.

[24/] The World Bank presented the options available to SJVN to submit entity audit with adequate disclosures in lieu of the project audit. After discussions, SJVN has finally chosen to submit a separate audit report for the project along with the entity audit report.

include the statutory auditors appointed on the advice of C&AG), acceptable to the Bank, under agreed terms of reference. The annual audit report would be accompanied by a project financial statement, which would separately identify each component under the project, its progress and the funding sources for each of the components. Thus the following audit reports will be monitored in Audit Reports Compliance System (ARCS):

Table 3: Audit Reports Monitoring

Agency	Audit Report	Audited by	Due Date
SJVN	Annual Entity audit report as required under the Companies Act	Statutory Auditors appointed by C&AG	30th September
SJVN	Project audit including audit of special account	An independent firm of Chartered Accountants (which may include the statutory auditors)	30th September

25. ***Resettlement & Rehabilitation (R&R) component:*** Although the IBRD loan will not finance R&R costs associated with the project, (for which the budget is Rs. 374.64 million) the expenditure will be an integral part of the project costs on which reports will be submitted to the Bank. A resettlement action plan has been prepared which has been reviewed from a financial accountability perspective to ensure clear flow of funds with adequate internal control and accountability. R&R activities under the project would not affect large numbers of families (see Annex 10). The funds flow under the R&R component will be directly handled by SJVN or its authorized representative and no NGOs or consultants will handle financial flows. The financial reports will include a separate line item describing the physical and financial progress under the R&R component. These expenses will be audited as a part of the mainstream audit of SJVN and the internal audit department will provide a specific focus on R&R activities.

26. ***Land compensation*:** After the announcement of the award, SJVN will deposit the compensation amount in the account of the Land Acquisition Collector (an officer of GoHP cadre) for disbursing the same to the eligible land owners / title holders.

27. ***Resettlement Grant:*** The list of eligible families will be duly certified by the Deputy Commissioner of GoHP before disbursement.

28. ***Allotment of plot/constructed independent house*:** After receipt of the list of eligible houseless families duly certified from the Deputy Commissioner concerned, those eligible houseless families that have opted for this option will be provided plots/ constructed houses with basic amenities in the presence of Sub-Divisional Magistrate or his representative.

29. ***Other Assistance*:** Cash assistance would be provided by way of cheques to the displaced families who opt for cash assistance as per their choice.

30. ***Shifting Allowance & other allowances:*** A one time shifting allowance for transition will be given to displaced families, at least 15 days in advance, by way of a cheque. Rental allowance will be paid by the project authority to displaced families by transferring the amount in their bank account by the 7th of every month. All the above payments will be made by way of account payee cheques and disbursed in the presence of Sub-Divisional Magistrate or his representative.

Disbursement Arrangements

31. Disbursements would be made on the basis of the quarterly IUFRs[25]. Supporting documentation, including completion reports, certificates and other documentation, will be retained by SJVN and made available to the Bank during project supervision. They would also be audited as a part of annual project financial statements audit. IBRD project funds will flow to SJVN, with a guarantee from GoI.

32. ***Retroactive Financing***: Retroactive financing up to an amount of US$80 million will be available under the project, for financing eligible activities procured under agreed guidelines, for Component A in respect of expenditures incurred after January 1, 2007.

33. ***Designated Account***: An account (denominated in USD) will be established in a commercial bank in to which the Bank's advances for an amount up to the next six months requirements, as forecast by SJVN, will be paid.

Impact of Procurement arrangements

34. Procurement function for the entire project will be mainly performed at corporate headquarters by the Contracts department and will require close liaison with the finance department.

Table 4: Implementation status of Action plan for strengthening financial accountability and corporate governance

Area	Status
Resolve audit queries in time leading to a substantial reduction in audit observations	Substantial progress made on this account, as evident in 2005/6 accounts - needs to be continued going forward.
Convert into a public limited Company to enhance corporate governance	Approval taken in August 2006 from Board. Approval sought from GoHP/ GoI-expected in next couple of months. Formalities expected to be completed by December, 2007
Set up independent audit committee to improve corporate governance	Fully functioning audit committee set up in November 2006, with scope as required under the Companies Act. Two meetings have taken place. Quarterly meetings need to be continued with full discussion on internal audit, statutory audit, risks, and manuals etc.
Improve the internal audit arrangements in line with the requirements and size of the company; to provide a right focus of management orientation to the audit function.	SJVN has finalized the overall strategy of the IA function with objectives, scope, ToRs, staffing strategy and multi-disciplinary approach. IA department now reports to CMD to remove conflict of interest. A Chartered Accountant firm has been hired for developing a comprehensive and detailed internal audit manual is in the process of preparation. A separate report for internal audit for Rampur project will be made available to IBRD.
Introduce rolling cash forecasts for managing funds. Budgetary and financial reporting will need to be enhanced.	A format for rolling cash forecast has been prepared. Budgetary reporting system is being revised and rolling monthly cash forecasts (for succeeding) three months will be introduced from the current financial year.

[25] SJVN would have the flexibility of furnishing reports earlier (say on a monthly basis) to seek early replenishments wherein they could also provide forecasts for a shorter period than six months.

Area	Status
Develop in-year financial reporting & MIS in line with the requirements of the organisation	SJVN has prepared financial statements for the nine month period (December 31, 2006). Going forward six monthly financial statements and other MIS reports with variance analysis will be prepared with effect from the current financial year.
Develop manuals for a more formalized and systems oriented finance and corporate governance environment.	SJVN is in the process of developing the following manuals in 2007-08. (a) Budgeting (b) Costing (c) Financial accounting, reporting, internal controls
Enhance the accounting software by resolving problems faced	SJVN to hire an IT professional versed with Oracle and UNIX to upgrade and maintain the current software for effective usage in 2007-08 accounts
Complete the required staffing for Finance and Accounts function	SJVN is in the process of recruiting young finance professionals and 4 professionals are expected to join shortly. A staffing & training strategy is currently under preparation along with an action plan for filling up the gap
Induct independent directors to enhance the level of corporate governance	SJVN has provided a list of names for the post of Independent directors, as directed by MoP, GoI. These are currently under evaluation. SJVN to follow up

Annex 8: Procurement Arrangements

INDIA: Rampur Hydropower Project

A. General

1. Procurement for the proposed project will be carried out in accordance with the World Bank's Guidelines: Procurement under IBRD Loans and IDA Credits" dated May 2004; and "Guidelines: Selection and Employment of Consultants by World Bank Borrowers" dated May 2004, and the provisions stipulated in the Legal Agreement. The general description of various items under different expenditure category is described below. For each contract to be financed by the Loan, the different procurement methods or consultant selection methods, the need for prequalification, estimated costs, prior review requirements, and time frame for the contracts to be procured in the first eighteen months, have been agreed between SJVN and the Bank project team and are indicated in the Procurement Plan. The Procurement Plan will be updated at least annually or as required to reflect the actual project implementation needs and improvements in institutional capacity. Bank's Standard Bidding Document (SBD) and Standard Request for Proposal (RFP), as agreed with the Bank, will be used for all procurement of goods, works and consultancy under the project.

2. **Procurement of Works**: The procurement for the works contracts for component A (the Rampur scheme) has been completed by SJVN by having awarded the contracts for the two packages, (1) for construction of civil works for Head Race Tunnel (HRT) Sta. 50.61m to Sta 12,900m including cut and cover section, river diversion works, adits, and vehicular gates etc.; and (2) construction of civil works for HRT Sta. 12,900m to 15,088m, surge shaft, pressure shaft, valve house, Power House complex, Tail Race Tunnel (TRT), adits and Hydro-Mechanical works in February 2007. The contract value for the first package is Rs. 3824 million plus US$9.1 million and that for second package is Rs. 3643 million plus JPY 359 million plus EURO 0.51 million respectively. The pre-qualification for both these works was completed as per the Bank standard Pre-Qualification (PQ) document. The bids were subsequently invited from the pre-qualified applicants, duly cleared by the Bank. The evaluation of bids for both these packages was carried out by SJVN and the Bank issued its no objection for award of contract for both these packages. The expenditure incurred against these contracts, incurred after January 1, 2007 and subject to a maximum of US$80 million in total will eligible to be retroactively funded. The works to be procured for Component B-measures to improve the availability of the existing up-stream Nathpa Jhakri Project will be procured following ICB procedures of the Bank and using the Bank's SBD as a base. For works under this component estimated to cost up to US$10 million per contract, NCB procedures may be followed.

3. **Procurement of Goods:** The procurement of goods under the project for component A (the Rampur scheme) will be completed by procurement through one package, i.e. Procurement of Electro-Mechanical Works in Power House and Switchyard of 412 MW (6x68.7 MW). The estimated cost of the package is US$168 million. SJVN carried out a pre-qualification exercise for this procurement based on the standard PQ document of the Bank and duly cleared by the Bank. SJVN provided its evaluation of the applicants for prequalification, and the Bank provided its no objection to the recommended list in January 2007. SJVN has already issued the bidding documents, prepared based on the Bank's SBD for "Supply and Installation of Plant and Equipment", to the pre-qualified bidders and bids have been opened on July 20, 2007. The spares under component B would be procured

through International Competitive Bidding, using the Bank's SBD for "Procurement of Goods" or in case of OEM supplies, through direct contracting with prior agreement of the Bank. Other goods for component, being small in value, will be procured following NCB and Shopping procedures in accordance with the Guidelines.

4. **Other Procurement Procedures:**

a) **National Competitive Bidding:** Goods estimated to cost less than US$ 300,000 equivalent per contract and Works estimated to cost less than US$ 10,000,000 may be procured under contracts awarded on the basis of National Competitive Bidding and the following provisions:

i) Only the model bidding documents for NCB agreed with the GoI Task Force (and as amended for time to time), shall be used for bidding;

ii) Invitations to bid shall be advertised in at least one widely circulated national daily newspaper, at least 30 days prior to the deadline for the submission of bids;

iii) No special preference will be accorded to any bidder either for price or for other terms and conditions when competing with foreign bidders, state-owned enterprises, small-scale enterprises or enterprises from any given State;

iv) Except with the prior concurrence of the Bank, there shall be no negotiation of price with the bidders, even with the lowest evaluated bidder;

v) Extension of bid validity shall not be allowed without the prior concurrence of the Bank (i) for the first request for extension if it is longer than four weeks; and (ii) for all subsequent requests for extension irrespective of the period (such concurrence will be considered by Bank only in cases of Force Majeure and circumstances beyond the control of the Purchaser/Employer);

vi) Re-bidding shall not be carried out without the prior concurrence of the Bank. The system of rejecting bids outside a pre-determined margin or "bracket" of prices shall not be used in the project;

vii) Rate contracts entered into by Directorate General of Supplies and Disposals, will not be acceptable as a substitute for NCB procedures. Such contracts will be acceptable however for any procurement under National Shopping procedures;

viii) Two or three envelope system will not be used.

b) **Shopping:** Goods and works estimated to cost US$ 50,000 or less may be procured following shopping procedures in accordance with paragraph 3.5 of the procurement guidelines.

c) **Direct Contracting:** Goods and works which meet the requirements set forth in paragraph 3.6 of the Procurement Guidelines may be procured on the basis of Direct Contracting in accordance with provisions of paragraph 3.6 and 3.7 of the Procurement Guidelines.

5. **Selection of Consultants:** Short lists of consultants for services estimated to cost less than US$ 500,000 equivalent per contract may be composed entirely of national consultants in accordance with the provisions of paragraph 2.7 of the Consultant Guidelines. The Bank's Standard RFP Document will be used as a base for all procurement of Consultancy services to be procured under the Project.

6. **Particular Methods of Procurement of Consultant Services**

a) Quality- and Cost-based Selection: Consultant Services may be procured under contracts awarded on the basis of Quality- and Cost-based Selection in accordance with the provisions of Section II of the Consultant Guidelines.

b) Other procedures

Quality-based Selection

Services under the Project which meet the requirements set forth in paragraph 3.2 of the Consultant Guidelines may be procured under contracts awarded on the basis of Quality-Based Selection in accordance with the provisions of paragraphs 3.1 through 3.4 of the Consultant Guidelines.

Selection Based on Consultants' Qualifications

Services under the Project estimated to cost less than US$ 100,000 equivalent per contract may be procured under contracts awarded in accordance with the provisions of paragraphs 3.1, 3.7 and 3.8 of the Consultant Guidelines.

Single Source Selection

Services for tasks in circumstances which meet the requirements of paragraph 3.10 of the Consultant Guidelines for Single Source Selection, with the Bank's prior agreement, may be procured in accordance with the provisions of paragraphs 3.9 through 3.13 of the Consultant Guidelines.

Individual Consultants

Services for assignments that meet the requirements set forth in the first sentence of paragraph 5.1 of the Consultant Guidelines may be procured under contracts awarded to individual consultants in accordance with the provisions of paragraphs 5.2 through 5.3 of the Consultant Guidelines. Under the circumstances described in paragraph 5.4 of the Consultant Guidelines, such contracts may be awarded to individual consultants on a sole source basis.

B. Assessment of the agency's capacity to implement procurement

7. Procurement activities will be carried out by Satluj Jal Vidyut Nigam (SJVN), who had earlier implemented the Nathpa- Jhakri Project in the then name of NJPC.

8. An assessment of the capacity of SJVN to implement procurement actions for the project has been carried out by the Bank during preparation of the project. The procurement by SJVN is carried out by the two Contracts Departments - (i) for procurement of civil and hydro-mechanical works and (ii) procurement of electro-mechanical equipments. The contracts department for procurement of civil works is headed by a Deputy. General Manager who is supported by six engineers, of which five have undergone procurement training in ASCI, Hyderabad and other engineers also have experience under World Bank procurement. The contracts department for procurement of electro-mechanical equipment is headed by a General Manager and is supported by nine Engineers. Five of these Engineers will be directly involved in the procurement activities related to this project and one of them is of the rank of Deputy General Manager.

9. Both these contract departments have separate Directors i.e., Director, Civil and Director, Electrical.

10. The Technical Specifications for the equipments and works to be procured are prepared in-house by SJVN. However, for this project SJVN has utilized the services of Central Electricity Authority (CEA) to review the specification for electro-mechanical equipment. In addition SJVN has also hired the services of an international consultant to review technical specification for the electro-mechanical equipment package.

11. The finance department also participates in procurement activities by reviewing the evaluation reports and providing financial concurrence to various procurement related activities.

12. As per the existing Delegation of Powers, the Chairman and the Managing Director has powers to approve contracts up to Rs. 200 million. The contracts between Rs. 200 million to Rs. 500 million are approved by a sub-committee of the Board of Directors. Contracts of estimated value above Rs. 500 million are decided and approved by the Board of Directors.

13. Though, SJVN has adequate capacity to deal with procurement pertaining to this project, their capacity to manage the contracts needs to be enhanced and strengthened. In the earlier project (Nathpa Jhakri) executed by SJVN as NJPC, there have been several disputes during implementation of the contracts and some of them are still under arbitration and are to be resolved. In view of the serious concerns which the Bank had on resolution of these disputes, the Bank had hired the services of an international consultant to study the problems faced by SJVN in reaching a satisfactory resolution to various disputes/ implementation issues. The consultant has given his recommendations so that these problems could be addressed by SJVN for future contracts. Based on this report and the subsequent discussions with SJVN, an action plan has been agreed to enhance SJVN's capacity on contract management (refer Annex 6 for further details). In addition, the staff from contracts and finance departments dealing with procurement, who have not undergone procurement training, will be deputed to ASCI, Hyderabad or NIFM, Faridabad for training on procurement under World Bank funded projects. The staff who have already received such trainings will also be deputed for a refresher course.

14. The overall project risk for procurement is Average.

C. Procurement Plan

15. SJVN, at appraisal, developed a detailed Procurement Plan for procurement to be carried out under the Project for the first eighteen months. This plan has been agreed between SJVN and the Project team, and is available at New Delhi office of the Bank. It will also be available in the Project's database and in the Bank's external website. The Procurement Plan will be updated in agreement with the Project team annually or as required to reflect the actual project implementation needs and improvements in institutional capacity.

D. Frequency of Procurement Supervision

16. In addition to the prior review to be carried out from Bank offices, the capacity assessment of the Implementing Agency indicates the requirement of two supervision missions including visits to the field to carry out post review of procurement actions.

Attachment 1

Details of the Procurement Arrangement for Works/Goods under Rampur Hydro Electric Project

Sl. No.	Contract Description of Works/Goods	Estimated Cost (Rs. in Million)	Estimated Cost in equiv. US$ Million 1US$=Rs 41.5	Method of procurement ICB/NCB	P-Q	Domestic Preference (Yes/No)	Review by Bank (Prior / Post)	Expected Bid Opening date	Comments
1.	Construction of Civil Works for HRT Sta. 50.61 m to Sta. 12,900 m including cut and cover section, river diversion works, adits, vehicular gates etc.	4838.9	116.6	ICB	Yes	Yes	Prior	06-09-2006	Award already issued
2.	Construction of civil works for HRT Sta. 12,900 m to Sta. 15,088 m, Surge Shaft, Pressure Shaft, Valve House, Power House Complex, TRT, Adits and Hydro-mechanical works.	4381.7	105.6	ICB	Yes	Yes	Prior	06-09-06	Award already issued.
3.	Procurement of Electro Mechanical works in Power House and Switchyard of 412 (6 x 68.67) MW	7000	168.7	ICB	Yes	No	Prior	07-20-07	Bids have been opened.
4	Upper Labyrinth (Rotary & Stationary)	201.6	4.86	ICB	No	Yes	Prior	05-15-2008	
5	Lower Labyrinth (Rotary & Stationary)	252	6.07	ICB	No	Yes	Prior	07-15-2008	
6	MIV Spares, Surge Shaft, Seal Rings etc.	87	2.1	ICB	No	Yes	Prior	09-15-2008	
7	Cheek Plate (Upper and Lower)	180	4.33	ICB	No	Yes	Prior	11-15-2008	

Except as the Bank shall otherwise determined by notice to SJVN, the following contracts of goods and works shall be subject to prior review by the Bank: (a) each contract for goods or works procured following ICB procedures, first contract for goods or works procured following NCB procedures irrespective of value of the contract, each contract of works estimated to cost equivalent of US$ 5,000,000 or above, each contract of goods or works , estimated to cost US$ 10,000 and procured following Direct contracting procedures. All other contracts of goods and works shall be subject to post review.

2. Consulting Services.

(a) Consultancy services estimated to cost US$ 200,000 and above per contract and single source selection of consultants (firms) for assignments estimated to cost US$ 50,000 and above will be subject to prior review by the Bank. In addition, the record of justification referred to in paragraph 5 of Appendix 1 to the Consultant Guidelines for each contract for the employment of individual consultants estimated to cost the equivalent of US$ 50,000 or more shall be subject to prior review by the Bank. All other consultancy contracts shall be subject to the post review

(b) ***Short lists composed entirely of national consultants:*** Short lists of consultants for services estimated to cost less than US$ 500,000 equivalent per contract may be composed entirely of national consultants in accordance with the provisions of paragraph 2.7 of the Consultant Guidelines.

Annex 9: Economic and Financial Analysis

INDIA: Rampur Hydropower Project

A. Economic Analysis

Scope of Analysis

1. The objective of the analysis is to determine the economic feasibility of the proposed Rampur Hydroelectric Project (RHEP). The analysis has the following components:

i) Identification of separable components

ii) Comparison of Alternatives and Verification of Least Cost:

iii) Identification and Valuation of Economic Costs and Benefits.

iv) Calculation of NPV and ERR.

v) Sensitivity Analysis

vi) Analysis of the Distribution of external benefits and costs

vii) Analysis of project risks

Sources of Data

2. The main sources of data for the analysis are: RHEP Detailed Project Report; Annual and Monthly Grid Reports of the Northern Regional Load Dispatch Centre; Central Electricity Authority, National Electricity Generation Plan 2006; Central Electricity Authority, Thermal Power Generation Performance Review 2005; Government of India, 16th and 17th Electric Power Survey; and data provided by SJVN.

Currency and Prices

3. The analysis is conducted in Indian Rupees (Rs.) in real prices (2006 price level). Results are also shown in US$. The analysis employs the standard base discount rate, conversion factors, exchange rates, and inflation projections for appraisal of World Bank projects in India[26/].

Overview of Project

4. RHEP is a 412 MW hydroelectric power project on the Sutlej River in Himachal Pradesh. The design energy generation (based on 90 percent dependable hydrological year) is 1770 GWh[27/]. RHEP is a run-of-river project which will operate in tandem with the NJHP immediately upstream. The energy output of RHEP is therefore determined by the seasonal hydrology of the Sutlej and the operation of NJHP. The project will supply energy to India's Northern Region Grid, which currently faces energy and capacity deficits at most times of year and day, and for which the generation mix is predominantly coal-fired plant (this is described in more detail in the following section). The estimated capital cost of RHEP, excluding contingencies and IDC, is Rs. 17,850 million.

[26/] World Bank Memorandum dated 14 November 2005.

[27/] As per final approval given by GoI's Cabinet Committee on Economic Affairs (January 2007).

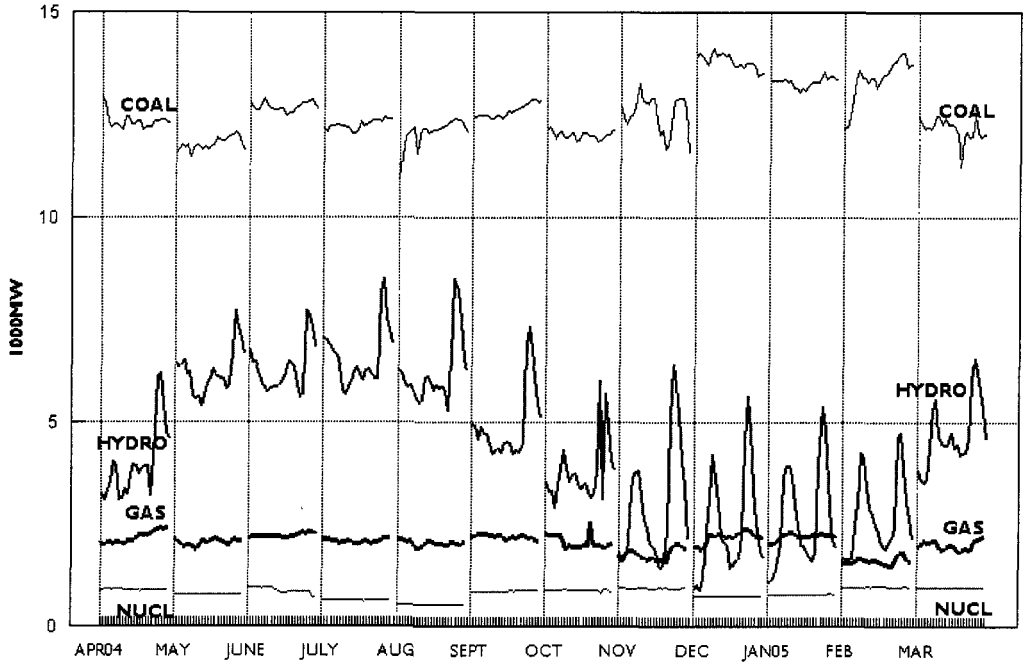
Description of Northern Region Power System

5. Between 1995 and 2005 the energy requirement of the Northern Region grew at 5.2% p.a. (NRLDC, 2006), while energy generation grew at 4.87% p.a. CEA projects that in 2012 the Northern Region will have peak demand of 48,137 MW and an energy requirement of 294,841 GWh.

6. The target for generation capacity additions for the 10th Plan was 41,110 MW, of which only around 21,100 MW has been achieved by the end of plan period (2006-2007 was the last year in the 10th Plan). Thus India faces continuing problems in meeting the demand for electricity, especially the Northern Region, which according to the National Electricity Plan (NEP) is experiencing the greatest shortages of all (21.8% of peak MW, and 14.5% of energy in 2006-07).

7. The present situation in the Northern region is one of chronic capacity shortage. Figure 1 shows the daily hour-by-hourly dispatch by generation type for the peak day in each month in 2004-2005.

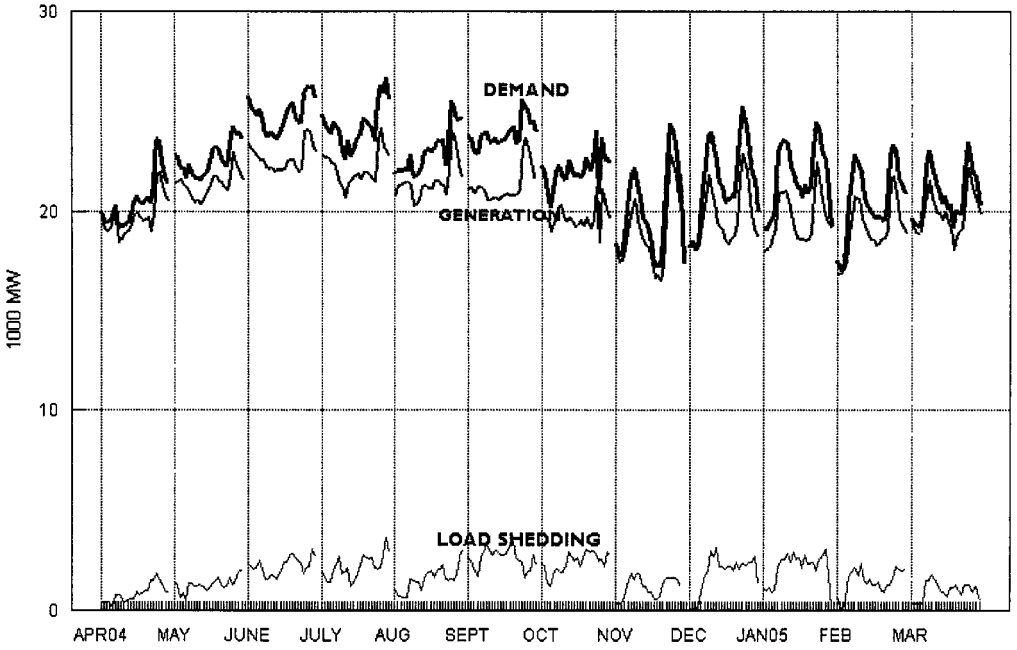
Figure 1: Northern region hourly dispatch for peak load day of each month 2004-2005



Source: Northern Regional Load Dispatch Centre, Annual Report 2004-2005

8. Figure 2 shows the corresponding supply-demand balance, and the extent of load shedding as estimated by the dispatch centre. The system is short of capacity throughout the day in all months. In November-March the demand has two very distinct peaks in the morning and evening hours, whereas in the summer months there is less of a distinct morning peak. The sharp morning and evening peaks are met by hydro. Gas-fired power plants operate throughout the day.

Figure 2: Northern region hourly load shedding, peak day of each month 2004-2005



9. It can be observed that the highest demand occurs between June and September. Power shortages are also greater during this period. However, because of hydrological conditions, this is also period at which the availability of the region's hydroelectric plant is greatest. Moreover because Rampur will be operated in tandem with NJHP which has diurnal storage capacity it can also be available to meet peak daily demand throughout the year.

Verification of Least Cost:

10. Rampur appears in the 2006 National Electricity Plan (NEP)[28/] as one of the hydro projects targeted for benefits in the 11th Plan (i.e. by end of 2011-2012). This plan is structured around four main scenarios based on the demand growth forecasts of the 16th Electric Power Survey (EPS): (i) Base case (desirable scenario); (ii) Low Hydro Development; (iii) Limited Gas Availability; (iv) Low Hydro + Limited Gas availability (feasible scenario).

[28/] Government of India, Ministry of Power, Central Electricity Authority, *National Electricity Plan, Volume I (Generation)*, January 2006.

11. Rampur appears in all four of these scenarios[29/]. While the base-case scenario is deemed the most desirable based on energy security, generation mix diversity and cost considerations, the NEP recognizes the difficulties of implementing hydro projects (particularly in the Northeastern Region), and the high level of uncertainty surrounding the quantity of available gas supply and its costs, hence the "feasible scenario" of limited gas and limited hydro. Table 1 shows the capacity additions by type in the four NEP scenarios.

Table 1: Generation mix (of additions) in the NEP scenarios

	Base Case ("desirable scenario")	Low Hydro development	Limited Gas availability	Low hydro +limited gas availability ("feasible scenario")
Hydro	21,000	17,000	21,000	17,000
Thermal	43,300	47,900	43,600	48,300
Coal	27,200	31,800	33,000	37,700
Lignite	1,900	1,900	2,100	2,100
Gas/LNG	14,200	14,200	8,500	8,500
Nuclear	3,200	3,200	3,200	3,200
Total	**67,500**	**68,100**	**67,800**	**68,500**

Source: NEP, *op.cit.*, Table 11.16

12. The baseline load forecast anticipates the need for an all-India capacity addition of 67,500 MW during the 5-years of the 11th Plan, of which 21,000MW are expected to come from hydro. The breakdown of projects by readiness status is shown in Table 2: Rampur is one of 9 hydro projects included in category D[30/]. Rampur is one of 5 hydro projects in this category that are present in all four scenarios.

Table 2: Hydro capacity additions in the 11th Plan

	Base Case ("desirable scenario")	Low Hydro	Limited Gas availability	Low Hydro + Limited Gas ("feasible scenario")
A. Projects Under Construction (1)	7722	7722	7722	7722
B. Schemes awaiting Investment decision/Work Award	1479	1379	1479	1379
C. Works held-up/Yet to start	2596	2596	2596	2596
D. Projects for which concurrence by CEA/ State to be accorded	3516	1556	3516	1556
E. DPR Ready/ To be revised	1679	1679	1679	1679
F. Projects for which DPRs are under preparation	4048	1940	4048	1940
TOTAL	**21040**	**16872**	**21040**	**16872**

Source: NEP, *op.cit.*, Appendix 11.1, Sheet 4/13.

(1) includes projects slipped from the 10th Plan.

29/ As well as in three further scenarios that explore the implications of higher electricity demand growth rates in generation requirement of 7%, 8% and 9%.

30/ Rampur was a 'category D' project at the tine the NEP was prepared. Subsequently it received CEA techno-economic clearance (meaning it would now be a category B project).

CEA's Planning Models

13. CEA uses two main planning models, EGEAS and ISPLAN. EGEAS is a well-known optimal generation capacity expansion planning model that provides the optimal expansion plan under given loss-of-load probability (LOLP) and load forecast requirements. This model evaluates the optimal generation mix over time based on a portfolio of generic candidate projects, which are then presented to ISPLAN for detailed analysis based on the portfolio of actual candidate projects. Individual hydro projects not expressly considered in the EGEAS runs, but are represented as a daily-peaking hydro project type.

14. ISPLAN is a spatial linear programming (transshipment) model developed expressly for CEA to provide an integrated view of power plant siting, transmission requirements, and fuel transport, particularly for coal that is subject to significant railroad and coastal trans-shipment capacity constraints[31/]. The national version of the model used for the NEP consists of 95 spatial nodes that represent the major load centres, coal producing areas, the major nodes in the high voltage transmission system, and import ports. ISPLAN attempts to meet the EGEAS optimal generation mix targets based on the projects as are likely to be available, and uses generic balancing projects to cover the generation requirement. In the 11th Plan this gap is filled (in part) by the seven so-called ultra-mega coal fired projects. The model is driven by a set of load forecasts based on the 16th EPS, and a generation plant data base that contains all of the candidate projects available to each planning period: for the 11th Plan simulations the database contains 498 projects that are at various stages of planning, CEA clearance, and construction. Thus Rampur is one of the projects expressly modeled in ISPLAN.

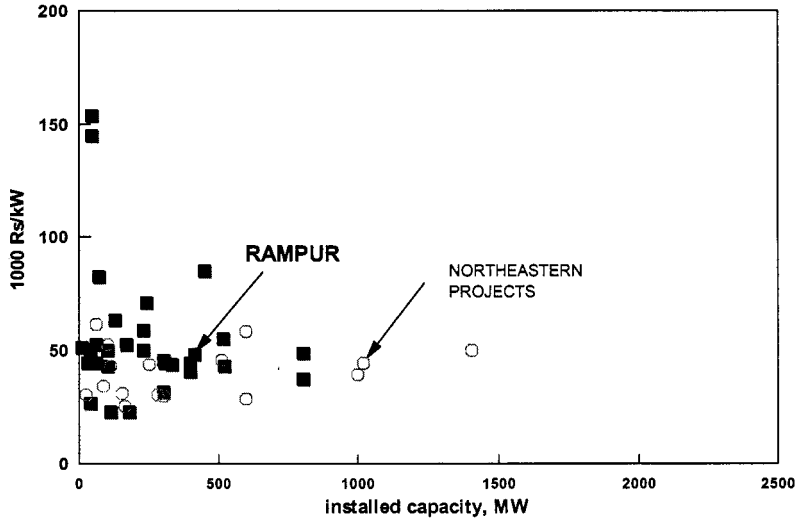
Comparison of Rampur with other hydro projects

15. Rampur is one of 109 hydro projects in the ISPLAN CEA. CEA's approved capital cost (in its techno-economic clearance of December 2005) is Rs.19,840 million (including IDC), equivalent to Rs. 48,160/kW (US$ 1,048/kW). This cost is close to the Rs. 45,000/kW used by CEA as its "normative" capital cost for hydro-projects where firm capital costs are not yet available. Indeed, of the 109 hydro projects in the ISPLAN database, 63 fall into this normative cost category.

16. Figure 3 shows the capital cost of the hydro projects in the ISPLAN database, excluding the normatively costed projects. The largest group of hydro projects, with lower unit costs than Rampur is in the North-east region of India, where there is little load. However the costs of the major investments in HVDC would need to be added to these projects to make for a fair comparison. Implementation of both the major HVDC transmission corridor from the Northeast, and completion of a sufficient number of Northeastern hydro projects to make the HVDC economic, presents major challenges, and few expect this to be undertaken during the 11th Plan.

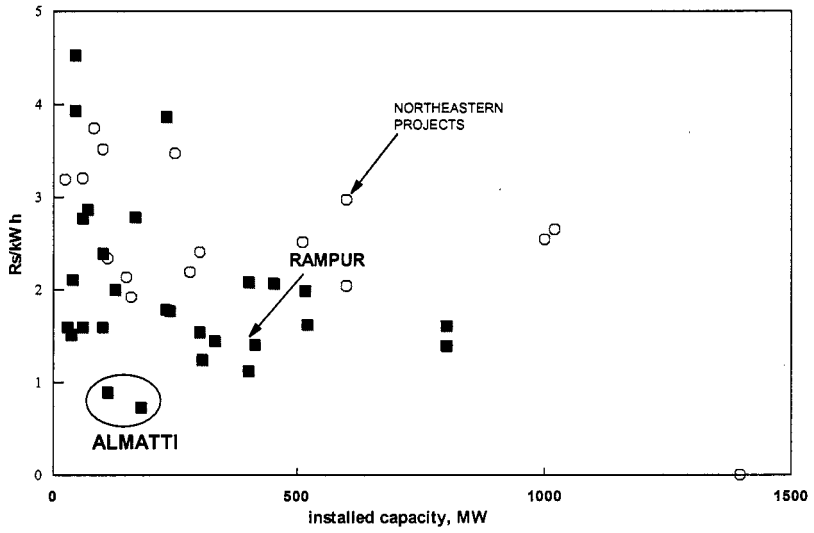
[31/] The national version of the model used for the NEP consists of 95 spatial nodes that represent the major load centres, coal producing areas, the major nodes in the high voltage transmission system, and import ports. The links represent railroad and coastal shipment corridors and transmission lines.

Figure 3: Capital costs v. installed capacity[32/]



17. The better comparison is in terms of energy cost, given the wide range of capacity factors among hydro projects. When capital costs are annualised at 12% over 25 years, and again removing all projects for which there are no firm capital costs, as well as the Northeastern hydro projects, Rampur has one of the lowest *economic* cost per kWh of all except the Almatti projects (which are purely the addition of a powerhouse at the foot of the existing Upper Krishna irrigation dam), refer Figure 4.

Figure 4: Normative energy costs of hydro projects in CEA database



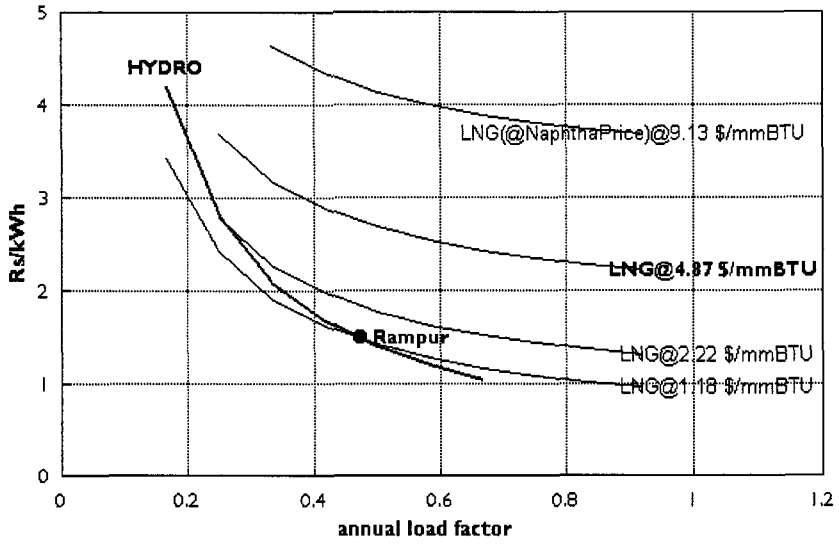
18. Rampur would appear in the least cost plan even were the need for additional hydro projects in the 11th Plan drastically cut as a result of increased Demand Side Management (DSM), reduced consumption consequent to pricing reforms, and reduction in T&D losses.

32/ The only hydro projects that have generally lower unit capital costs are power-house only projects at existing irrigation dams (many of which are in Southern India, such as Jurala and Almatti, with capital costs around Rs.25,000/kW), or power-house expansions (that involve minimal civil works). The two outliers with costs of Rs.150,000/kW are in Jammu & Kashmir.

Comparison of Rampur with gas-fired power plants

19. The previous section showed that, under current demand and supply conditions, gas-fired power plant operates throughout the year and throughout the day. Given the projected demand and generation capacity additions, gas and naphtha fired plant is likely to continue to be the marginal generation plant. Figure 5 shows the costs of generation from gas and naphtha fueled combined cycle combustion turbines (CCCT) at various gas prices, and compares these to the costs of generation at Rampur (and with a generic hydro project based on CEA's normative costs). Even at the present (administered) HBJ pipeline price, Rampur has a significant economic cost advantage, and at the present *economic* price (US$4.87/mmBTU), Rampur is almost half the cost.

Figure 5: Screening curves



20. As shown in Table 3, for a gas CCCT to have equivalent cost to Rampur (Rs. 1.40/kWh) requires an LNG price of US$ 1.06/mmBTU (column [4] of Table 3), which is clearly implausible as a long-term price benchmark. We may therefore be confident that even if LNG remained at its present price of US$ 4.87/mmBTU, corresponding to crude oil at US$24/bbl, Rampur generates very large economic benefits (of US$438 million).(Row[29]).

Table 3: Economic cost comparisons

			Hydro Normative	Rampur: DPR	gas CCCT	gas CCCT	gas CCCT	gas CCCT	gas CCCT	coal
			[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
[0]	**fuel costs**		Hydro normative	Hydro Rampur	current LNG	LNG	GAS (current HBJ)	(@Naphtha Price)	Naphtha	coal
[1]	ex-terminal	$/mmBTU			4.87	1.06	2.22	9.13	9.13	
[2]		[$/mmKCal]			19.3	4.2	8.8	36.2		
[3]	exchange rate (1)	[Rs/$US]			45.5	45.5	45.5	45.5	45.5	45.5
[4]		[Rs/mmKCal]			879	190	400	1648		
[5]		[Rs/1000CM]			8793	1905	4000	16476		
[6]	transportation	[Rs/1000CM]								
[7]	delivered price	[Rs/1000CM]			8793	1905	4000	16476		
[8]	Naphtha@border price	[Rs/tonne]							17300	1935
[9]	calorific value (2)	[KCal/CM][kg]			10000	10000	10000	10000	10500	4150
[10]	burner tip price	[$/mmBTU]			4.87	1.06	2.22	9.13	9.13	
[11]		[Rs/mmKCal]			879	190	400	1648	1648	430
[12]	heat rate (3)	[KCal/kWh]			1900	1900	1900	1900	2000	2460
[13]	fuel cost	[Rs/kWh]			1.67	0.36	0.76	3.13	3.30	1.06
[14]	non-fuel variable O&M	[Rs/kWh]								
[15]	***total variable cost[net]***	[Rs/kWh]			1.67	0.36	0.76	3.13	3.30	1.06
[16]	**Fixed costs**									
[17]	capital cost	[Rs/KW]	45000	45625	27000	27000	27000	27000	27000	40000
[18]	discount rate (4)	[ ]	12%	12%	12%	12%	12%	12%	12%	12%
[19]	economic life	[years]	30	30	20	20	20	20	20	25
[20]	annualised	[Rs/kW/year]	5586	5664	3615	3615	3615	3615	3615	5100
[21]	fixed operating costs	[%cap.cost]	1.1%	1.1%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%
[22]		[Rs/kW/year]	489	496	810	810	810	810	810	1200
[23]	***total fixed costs***	[Rs/kW/year]	6075	6160	4425	4425	4425	4425	4425	6300
[24]	total cost at Rampur LF, gross	[Rs/kWh]	1.36	1.38	2.66	1.36	1.75	4.12	4.29	2.47
[25]	auxilary consumption	[ ]	0.01	0.01	0.03	0.03	0.03	0.03	0.03	0.08
[26]	total cost at Rampur LF, net	[Rs/kWh]	1.38	1.40	2.75	1.40	1.81	4.25	4.42	2.67
[27]	annual benefit	[RsCrores]			248	0	75	524	555	234
[28]	NPV	[RsCrores]			1995	0	607	4219	4470	1886
[29]		[$USmillion]			438	0	133	927	982	414

Sources: 1 World Bank, Memorandum of Nov.2005, New Delhi

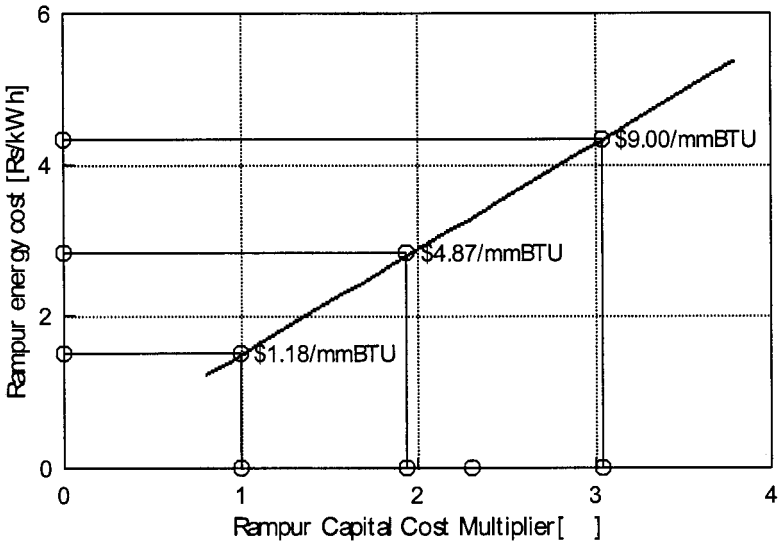
2 CEA

3 CEA normative values (as used in the NEP)

4. World Bank, Memorandum of Nov.2005, New Delhi

21. Another way of demonstrating the robustness of the Rampur investment decision is to ask by how much could the capital costs of Rampur increase before its energy costs were equal to those of a gas-fired plant. Figure 6 shows the energy cost as a function of capital cost escalation. To be equal to the present border price of LNG (US$ 4.87mmBTU), capital costs could *double*; and at US$ 9.00/mmBTU, capital costs could *triple*. As noted below in the risk assessment, short of some catastrophic act of God, it is hard to see how capital costs could double.

Figure 6: Capital cost escalation switching values



22. In summary, Rampur appears in all the generation scenarios in the CEA National Electricity Plan. This conclusion is confirmed by the foregoing analysis which confirms that Rampur is low cost (both in capital cost and energy cost terms) relative to other candidate hydro plants, and low cost relative to gas based power generation under a range of assumptions.

Identification of separable components

23. The main components of the proposed investment are civil works, electrical and mechanical equipment, transmission line, environmental impact mitigation, and social investments. These components are not separable and are therefore considered as a single investment for the purposes of the economic analysis.

Identification and Valuation of Economic Costs

Capital Costs

24. The capital cost of the project in financial terms, excluding contingencies and interest during construction, is Rs. 17,850 million. The economic cost is calculated by adjusting this value for taxes and duties, sunk development costs. The economic project cost after these adjustments is Rs. 14,238 million.

25. The investment in power transmission capacity to evacuate RHEP is not included in the DPR. . While this investment will be financed and implemented by Power Grid Corporation of India, it is nonetheless and inseparable component of the project and therefore included in the capital cost for the purposes of appraisal. The economic capital cost of the transmission line is Rs. 1,955 million.

Operating and Maintenance Costs

26. The DPR estimates the financial operating and maintenance costs at 1.5% of project capex. After the usual adjustments the economic cost of operation and maintenance is Rs.203.8 million per annum.

Incremental Transmission and Distribution Costs

27. Incremental capital, operating and maintenance costs for electricity distribution networks costs are not included in the analysis, because energy from the RHEP either (i) reduces load shedding (ii) displaces more costly generation. At the times when energy from RHEP serves to reduce load-shedding, distribution network losses are included in the calculation of the quantity of energy delivered to end-users.

Identification and Valuation of Economic Benefits

28. The principal benefit of the project is the electric energy generated. The economic value of Rampur to the national power system can be gauged by what would replace if it were *not* built: the economic benefits are equal to its *avoided costs*. In a small power system the second best hydro project would normally be advanced were the best project not built. But in a system as large as India, that requires many power projects each year, the second best project would in any event also get built. Thus if Rampur were selected as the best of n hydro projects, then if Rampur were not built then the $n+1^{th}$ hydro project would be advanced.

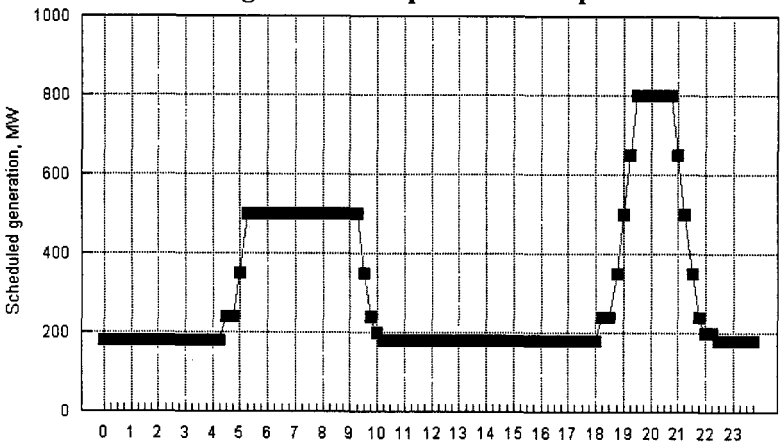
29. In fact, the Northern Region of India faces continued peaking power shortages over the next decade. At the margin, if peaking power shortages can be valued at the cost of unserved energy, which CEA takes as Rs. 6/kWh, any hydro project with costs of less than Rs.150,000/kW would therefore be cheaper (which explains why almost all of the hydro projects in the ISPLAN database are selected). In other words, there is no $n+1^{th}$ hydro project that could be advanced were Rampur not available, and therefore the alternative to Rampur would in fact be oil or gas-fired peaking units. Indeed, this is how ISPLAN balances the generation portfolio to meet the gap between identified candidate projects and demand by selecting from a slate of generic projects (gas and naphtha-fired peaking units at load centres, and the seven notional coal-mega-projects).[33/]

30. To assess the economic value of Rampur therefore requires more careful examination of its probable dispatch, which is constrained by the limited storage capacity of the Nathpa Jhakri reservoir (3,032 TCM): this provides Nathpa Jhakri with only 2.2 hours of storage at the design discharge of 383.9 cumecs (1,367 TCM). Rampur depends upon its input flows from the discharges of Nathpa Jhakri, and is not therefore independently dispatched. Figure 7 shows the Nathpa Jhakri dispatch plan (at 15 minute intervals on 23 March 2006, when 800MW were available). Rampur would therefore exhibit the same lean season[34/] dispatch pattern, with highest output during the morning and evening peak hours. However, during much of the wet season, dispatch is 24 hours/day.

[33/] Coastal projects in Gujarat, Maharashtra, Karnakata and AP, and mine-mouth projects in Chatisgarh (Korba), MP (Singrauli) and Orissa (Ib Valley). These are expected to be about 4,000MW each, of which only one 800MW unit at each of the Gujarat, MP, Maharashtra and Karnataka sites are assumed to be commissioned before the end of the 11th Plan.

[34/] The DPR defines "lean season" as 1 October –31 March.

Figure 7: Nathpa Jhakri Dispatch

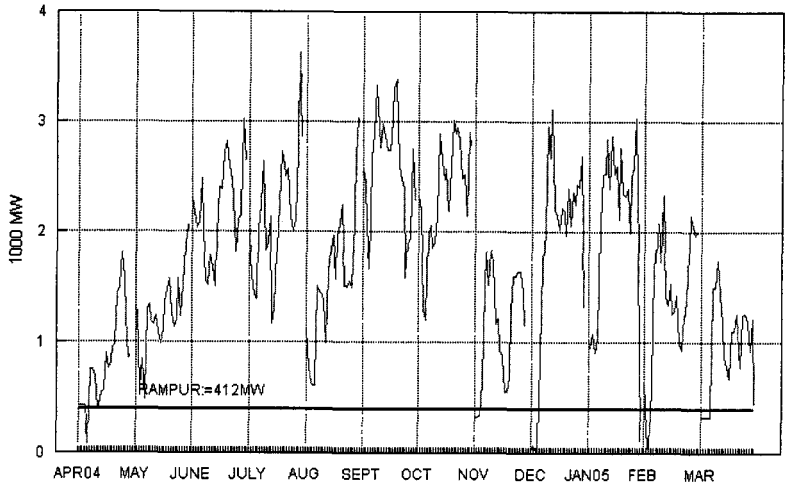


31. During each hour of dispatch, Rampur would displace the marginal project in the merit order, which may be different according to the time of day and season, and which may be different according to the extent of system-wide shortages.

32. Under present and foreseeable conditions during the entire day gas-fired projects are the operated at the margin and Rampur, were it in operation today, and were load shedding no longer necessary, would displace the most expensive of the gas plants *even during the wet months*. (refer to Figure 1).[35/]

33. Figure 8 shows the corresponding estimate of load shedding compared to Rampur's peak output: in only 6 of the 288 hours in this compilation would Rampur eliminate load shedding. Therefore, one likely scenario is that Rampur service to reduce load shedding at all the times of day and year at which it operates. Under this scenario the economic value of energy from Rampur corresponds to the economic value of un-served demand, for which one could use the relevant availability-based tariff of Rs. 5.70/kWh[36] as the proxy (CEA uses Rs.6/kWh as the value of un-served energy in its planning models).

Figure 8: Load shedding



35/ The scheduled maintenance of coal plants during the wet season when hydro output is at its highest is also clearly evident, so the maximum contribution of coal generation is during the lean months of December - February.

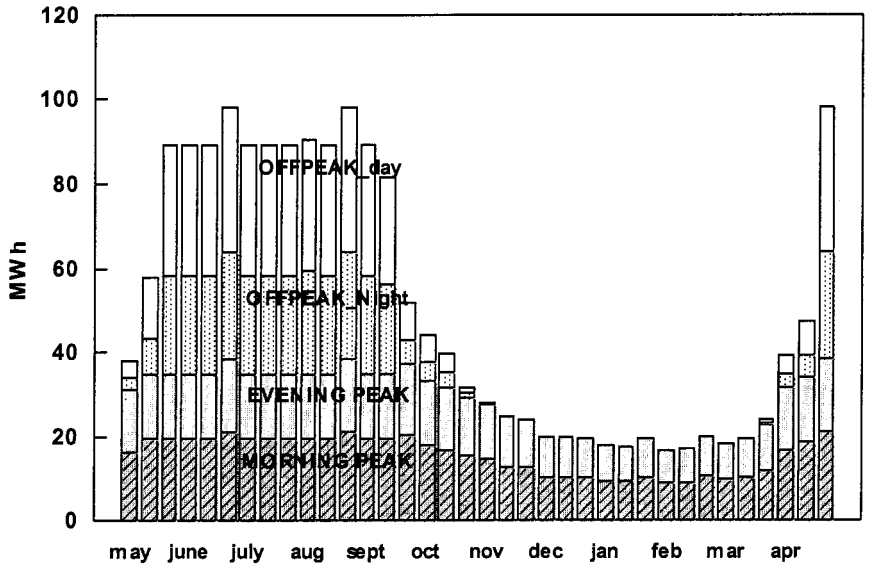
36/ This has been recently revised to Rs. 7.45/kWh

34. While it is highly probable that Rampur would displace gas throughout the day were the present capacity shortages to persist into the next decade, it could be argued that successful implementation of the 11th Plan would bring about a situation in which occasional shortages were limited only to the peaks, rather than throughout the day as at present. As such, it is conceivable that off-peak hydro generation in the wet season will result in backing down of thermal stations, in which case the economic benefit of Rampur during such times would be limited to the avoided *variable* costs of thermal power plants only. In the first instance, the (highest cost) marginal plant would be gas fired (as described above). Though it seems an unlikely scenario the economic benefits of Rampur will also be calculated for a scenario where it displaces coal-fired power plant during off-peak periods.

35. The economic benefits of Rampur are therefore a function of quantity of energy delivered by RHEP and the time of year and time of day at which it is supplied[37/]. The analysis therefore considers a variety of alternative assumptions about the costs of the marginal plant that would operate in the absence of Rampur.

36. If we apply the optimal operating rule to the NJ reservoir operation, then the mix of energy in each block: off-peak night, morning peak, off-peak day, and evening peak is as shown in Figure 9 for the 50% dependable year. The total annual generation (based on a 15 cumec minimum discharge, and 95% availability), is 1,835 GWh.

Figure 9: Energy production by 10-day period and load curve block, 50% dependable year



37. The percentage of energy in the four main blocks of the load curve is shown in Table 4. 56% of the energy is generated during the peak hours. Although the Nathpa Jhakri reservoir is small, it is of sufficient size to store several hours of inflows in the lean season,

37/ This also has a bearing on the economic impact of sediment control mitigation measures, because plant closures during the wet season (when most of the sediment problems occur) would have a different value to outages at other times of year.

permitting daily peaking operation: as shown in Figure 9, from mid-November to early April the entire available output of Rampur can be dispatched during peak hours.

Table 4: Energy by load curve block

		Lean season, October-April	Wet season, May-September	Total
morning peak	GWh	267	293	559
evening peak	GWh	236	236	472
off-peak day	GWh	43	300	343
off-peak night	GWh	60	400	461
Total	**GWh**	**606**	**1229**	**1835**
morning peak	[ ]	44%	24%	30%
evening peak	[ ]	39%	19%	26%
off-peak day	[ ]	7%	24%	19%
off-peak night	[ ]	10%	33%	25%

38. Given the most likely scenario, that Rampur will displace gas generation, it follows that the assumption about gas prices will be a key determinant of the ERR result. In this regard it should be noted that the financial cost of fossil fuels in India are below economic costs for a variety of reasons, including: (i) administrative determination of prices by the Government and public sector fuel suppliers (ii) import protections (iii) subsidies and taxes (iv) underdevelopment of infrastructure for the import of fossil fuels. A key analytical task is therefore to determine the correct shadow prices for fossil fuels. As fossil fuels are internationally traded commodities the shadow price is determined with reference to observations of international prices and transport costs.

Table 5: Gas price assumptions

		NPP, January 2006 (1)	CEA 2004 (2)
	Kcal/m^3	Rs/1000m^3	
LNG	9,800	8,000	
Gas (HBJ)	9,500	4,400	3,800
Gas (Reliance)	9,500	5,760	
Gas (Northeast)	9,500	3,000	

Source: (1) NPP, Table 11.8

(2) CEA, (In fact the report uses 4,000 Rs/1000m^3 but for a calorific value of 10,000 Kcal/m^3 rather than 9,500 as used in the NPP).

39. Table 5 shows some reported prices of gas supply in Northern India. In all cases these prices arte far below the border price that must be the basis for the *economic* analysis. It should also be noted that the supply of gas at the price shown in table 5 is limited. For the

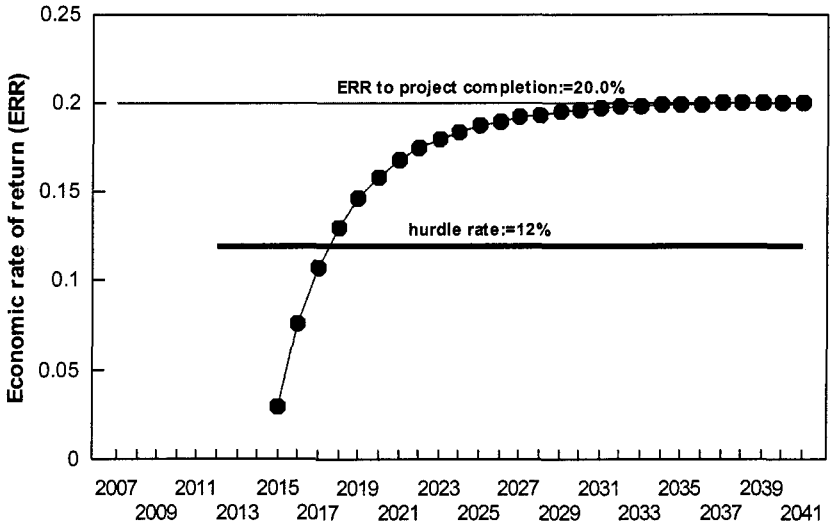
purpose of this analysis is therefore assumed that the economic price of gas to the Northern region is set by the Gujarat border price of LNG imported from the middle east plus transport cost to the Delhi load centre[38/].

40. It should be noted that the approach of valuing project benefits based on avoided energy costs, could underestimate the economic benefits because it does not capture the incremental value of consumer surplus where energy from RHEP reduces rationing.

Base Case Project Net Present Value (NPV) Economic Rate of Return (ERR)

41. The ERR (to project completion) is 20.0%, with the 12% hurdle rate achieved in year 2017 after 7 years of operation (Figure 10).

Figure 10: ERR



42. Table 6 shows estimates of ERR based on various assumptions about shortages in the system at various times of day.

38/ The supply original agreement with Qatar's Rasgas was based on price a linkage with crudeoil (similar to the long-term LNG export contracts with Japan based on the so-called Japanese Crude Cocktail), but as crude prices have soared, the contract was renegotiated to a crudeoil price band of US$ 16-24/bbl, resulting in a present LNG price in Gujarat of US$ 4.87/mmBTU (Rs. 8,777/TCM). However this arrangement will last only until 2008, at which point the linkage to crudeoil price would be restored. Current spot market prices are substantially higher. Press reports in early May 2006 suggested that the Gas Authority of India (GAIL) will import three LNG spot cargoes from Algeria in 2006 at prices between US$ 8-9/mmBTU (at $1=45.2 Rs); and a Press report of 18 May 2006 reported a GAIL spot purchase from Sonatrach of Algeria at an ex-shipment price of US$ 9.28mm/BTU.

Table 6: Estimates of ERR as a function of dispatch conditions

	ERR						
	Original estimate July 2006	**Revised estimate (1770 GWh + Rs. 20,150 million)**	Lean peak	Lean off-peak	Wet Peak	Wet off-peak	
			Rs/kWh	Rs/kWh	Rs/kWh	Rs/kWh	
	[1]	[2]	[4]	[5]	[6]	[7]	[8]
1. Present situation, curtailments 24h/day	**34.1%**	**33.2%**	5.70	5.70	5.70	5.70	ABT maximum tariff
2. Shortages during peak only, gas plant @$6.60/mmBTU (probable price)	**30.3%**	**29.5%**	5.70	3.60	5.70	3.60	
3. Gas marginal plant throughout $4.87/mmBTU (present LNG price)	**20.1%**	**19.5%**	2.75	2.75	2.75	2.75	Illustrated in Table 6
4. Gas marginal plant throughout $6.50/mmBTU (probable price)	**24.7%**	**24.0%**	3.60	3.60	3.60	3.60	
5. Gas marginal during peaks, coal during off-peak (coal fuel costs only, no capacity credit)	**18.6%**	**18.0%**	3.60	1.06	3.60	1.06	Gas @ $6.50mm/BTU Coal at Rs 1935/ton

Note: Subsequent to the preparation of the detailed economic report for this project, the design energy estimates were marginally decreased in the final GoI investment approval to 1770 GWh (compared with 1835 GWh used in the above analysis – under optimal operation of Nathpa Jhakri reservoir for the 50% dependable year and allowing for a 15% minimum discharge and 95% availability) and costs were marginally increased to Rs 20,150 million (from the Rs 20,060 million used above – this included Rs. 17,850 million towards cost of Rampur project as approved by Public Investment Board and balance towards cost of constructing transmission line). This has the effect of reducing the "present situation" ERR from 34.1% to 33.2% and the ERRs for the other scenarios are similarly marginally reduced. This does not materially impact the remainder of the analysis.

Environmental Benefits

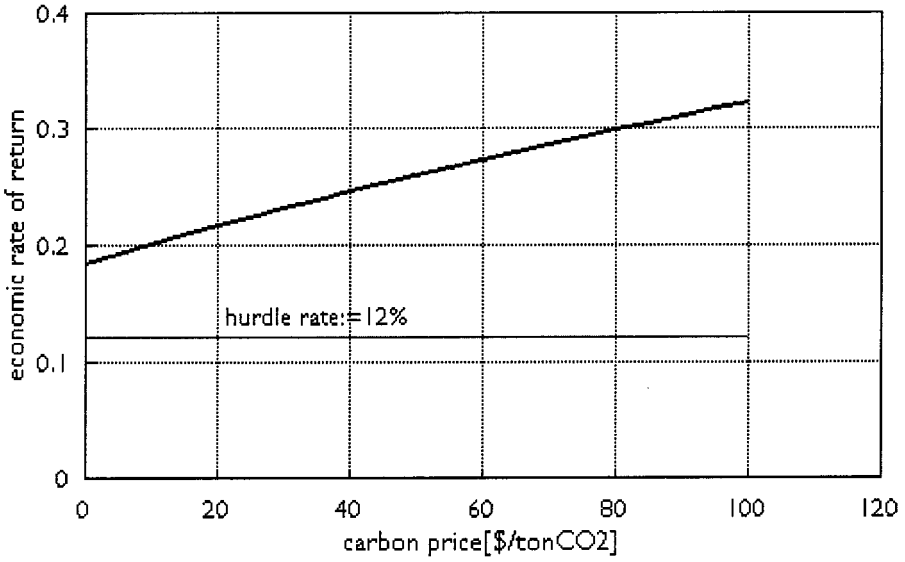
43. The calculation of avoid carbon is straight forward given the fuels that are assumed to be replaced. For the baseline carbon price we use US$5/ton CO_2, which is typical of current carbon finance deals. This raises the ERR in the example shown in Table 6 from 20.1% to 20.6%, a modest 0.5% increase, for in this case the displaced fuel is natural gas. For case 5 in Table 6, in which coal is the presumed off-peak energy off-peak that is displaced, the ERR increases somewhat more from 18.6% to 19.4% (an increase of 0.8%).[39/]

[39/] The IPCC uses 0.762 $KgCO_2$/kWh as a representative value for CO_2 emissions from a pulverized coal project. Since the type of coal project in the Northern Region that would be backed down were Rampur hydro to displace coal would be the least efficient projects, emissions from these plants would be significantly higher, and in the range of 1 to 1.2 Kg/kWh. Our calculations therefore use 1 Kg/kWh for coal, and 0.367Kg/kWh for gas (the IPCC reference value). In the case of gas projects, most CCCTs in the Northern Region have been built recently, and have very good efficiencies: therefore the IPCC reference value is appropriate.

44. The present carbon finance price of avoided carbon may be seen as a lower bound, and some studies argue for very much greater values for external costs based on the estimated costs of avoidance: the 2003 EU study argues for €19/ton CO_2.

45. The sensitivity of returns on the carbon price assumption is shown in Figure 11. At €19/ton CO_2, (US$25/ton CO_2), the ERR increases to 22.5% (compared to 18.6% for zero carbon price).

Figure 11: Sensitivity of economic returns to the carbon price assumption



46. The avoided environmental damage costs of thermal generation as they may apply to India – most of which are related to the health costs of air emissions (SO_2, NOx and PM-10) - have been reviewed recently by Markandya.[40/] Table 7 shows his presentation of the external costs of electricity generation based on the European Extern-E studies, and recent estimates in China.

Table 7: External costs of electricity generation on the EU and China

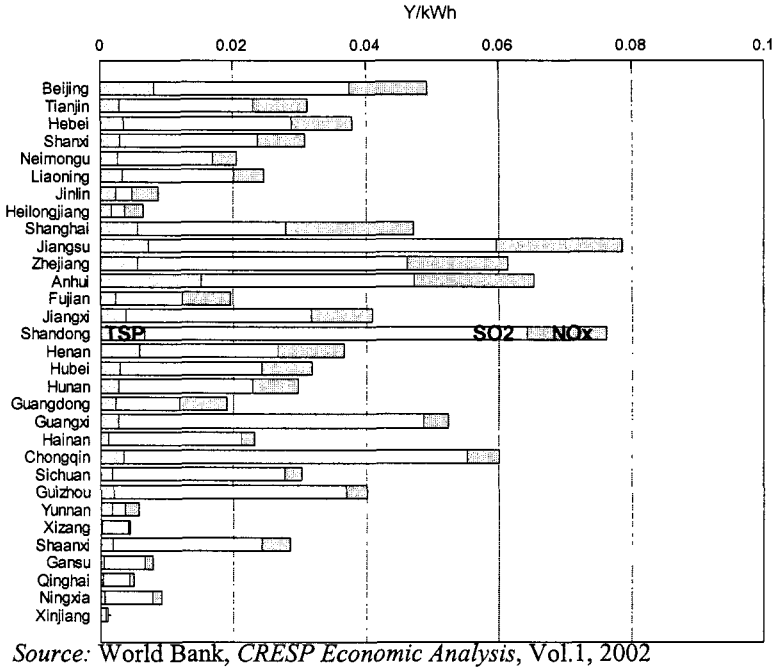
US cents/kWh 2005 prices	Coal & Lignite			Gas			Hydro		
	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max
EU	0.7	9.1	14.7	0.4	2.3	3.0	0.0	0.7	1.3
China	1.0	5.9	18.1	0.4	0.4	0.4	Na	na	na

Source: Markandya, *op.cit.*, Table 2, based on EU Extern-E and Eliasson & Lee (2003) for China .

[40/] A. Markandya, *Power System Planning in India: Incorporating Environmental Externality Costs and Benefits*, Draft Report, July 2006.

47. The estimates of the Extern-E studies lie at the high end of the range of damage cost estimates, as is the study chosen by Markandya for China. Damage cost estimates for utility generation projects in China, as derived for the World Bank supported China renewable energy Scale-up programme (CRESP) show a *maximum* value of around 1 UScent/kWh (in the provinces of Shandong and Jiangsu), as shown in Figure 12.

Figure 12: Damage cost estimates for coal-fired projects in China



Source: World Bank, *CRESP Economic Analysis*, Vol.1, 2002

48. To be sure, the damage costs from older coal-fired plants, particularly combined heat and power projects in the older industrial cities, with typically quite low stacks and located in densely populated areas, would have higher damage costs than more modern coal-fired projects now routinely fitted with FGD systems. But these older urban plants would not be representative of the type of coal-fired project in India that would be backed-down to make way for energy from Rampur – which are generally located away from the big cities (like Panipat in Haryana and Kota and Suratgarh in Rajasthan).

49. It seems clear that damage costs are subject to significant uncertainties, a subject to which we return in the risk assessment below. For the baseline estimate, however, we take the minimum values shown in Markandya's table, i.e. 0.7 US cents/kWh for coal, and 0.4 US cents/kWh for gas combined cycle combustion turbines. Assuming case 4 for the valuation of avoided costs (with Rampur displacing gas CCCTs throughout the year, at a gas price of US$6.50/mmBTU), and using the baseline values of hydrology trend and days lost for sediment control, the ERR increases from 22.2%[41/] to 23.0% when local air externalities are taken into account (in this example the carbon price is set at zero). Were one to use the *mean* values of Table 7, then the ERR increases to 29.9%.

[41/] Without the adjustments for sediment control and hydrology trend, the ERR is 24.7%, as shown in Table 7. The decrease to 22.2% reflects the effect of these risk factors.

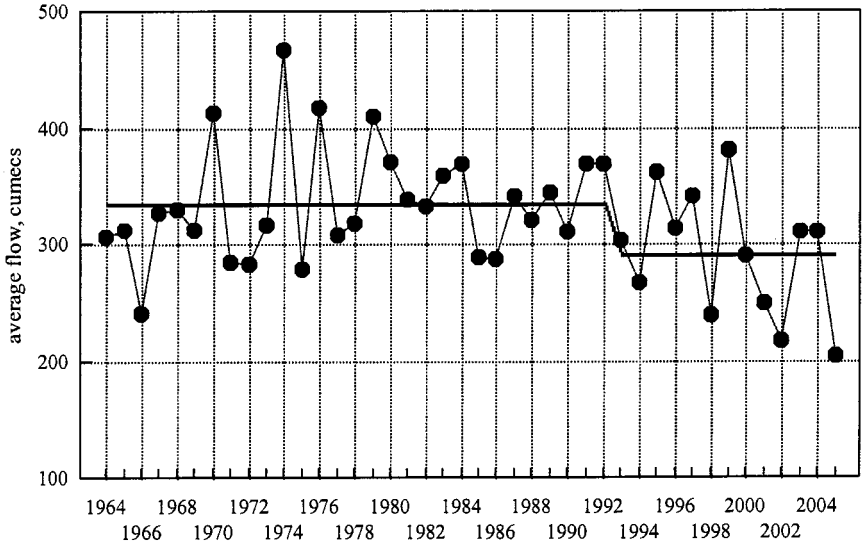
Risk Assessment and Sensitivity Analysis

50. The most significant risks to project NPV are (a) construction risk (c) siltation risk i.e. forced outages (e) hydrology.

Hydrology

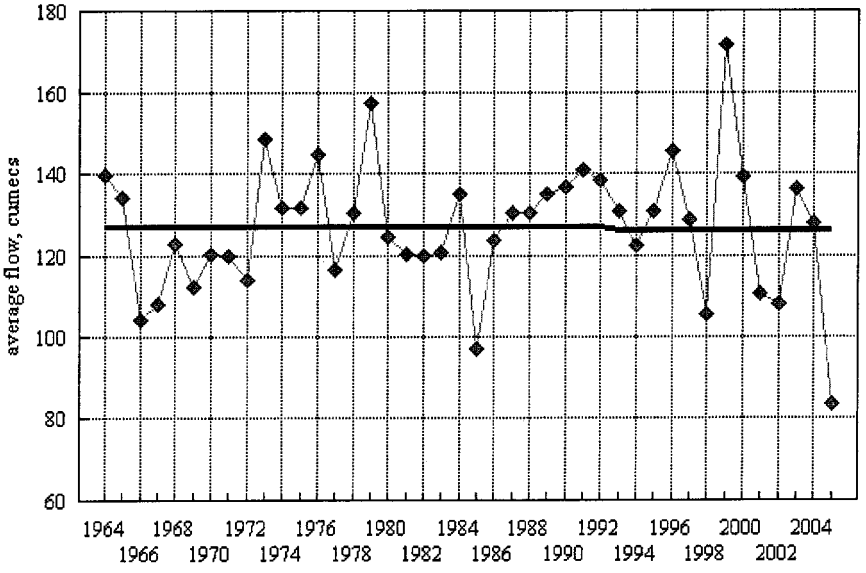
51. Over the past 20 years, the stream flows exhibit a statistically significant decreasing trend over time, as shown in Figure 13.

Figure 13: Hydrology trends: total average flows at Nathpa Jhakri site



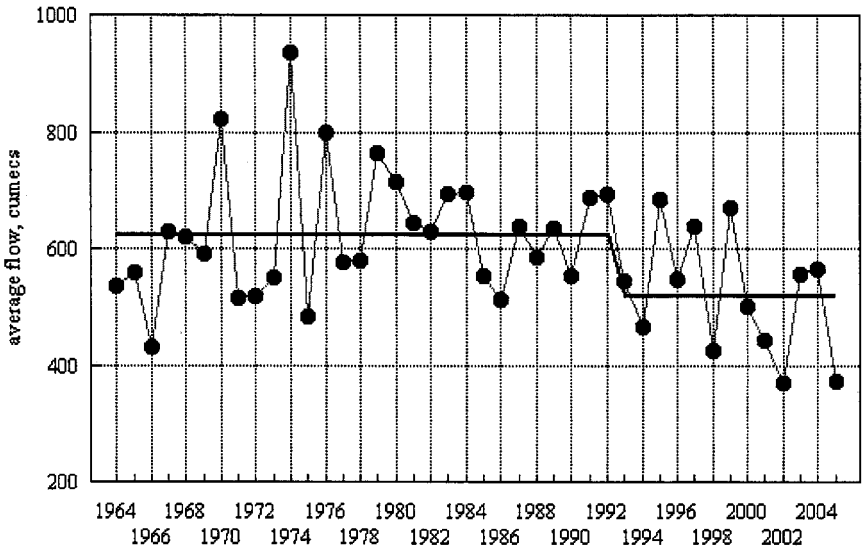
52. The annual average flow of the 22 years 1964-1992 is 335 cumecs; the annual average since then computes to 291 cumecs. However when the total flows are decomposed into lean and wet season flows, a somewhat different picture emerges. Figure 14 shows the lean season average flows which appear to have become more volatile (coefficient of variation increased 60% from 0.1 in 1964-1992 to 0.16 in 1993-2004), while the average has declined only marginally from127 to 126 cumecs over the same period.

Figure 14: Lean season average flows at Nathpa Jhakri



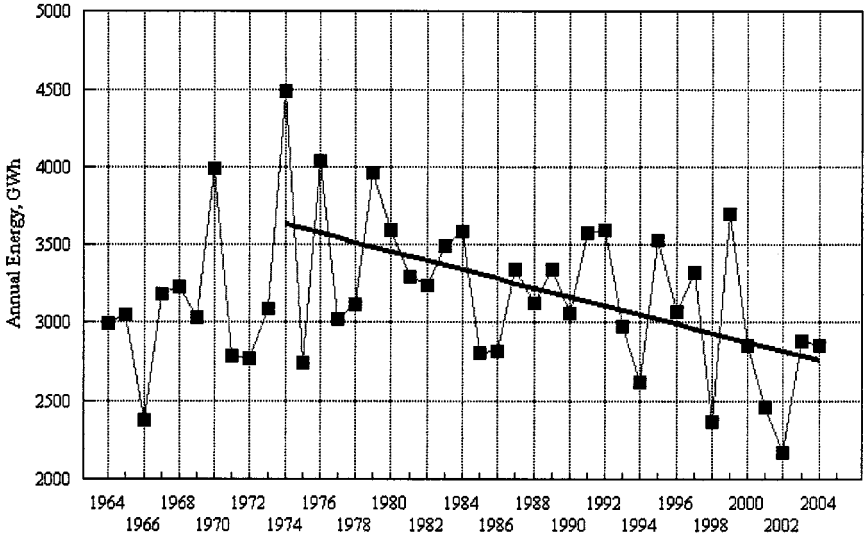
53. In other words, the decline has occurred in the *wet* season flows, as shown in Figure 15: the average 1964-1992 flow of 626 cumecs is followed by an average for the 1993-2005 period of only 526 cumecs.

Figure 15: Wet season average flows at Nathpa Jhakri



54. However, what matters is not so much the total inflows, much of which is spilled anyway during the wet season, but the corresponding energy generation. Figure 16 shows the total annual energy generation, based on the DPR data that extends just to April 2004, and which is based on "energy potential". The trend shown since the mid 1970s is unmistakable, and statistically significant.[42/]

Figure 16: Total annual energy

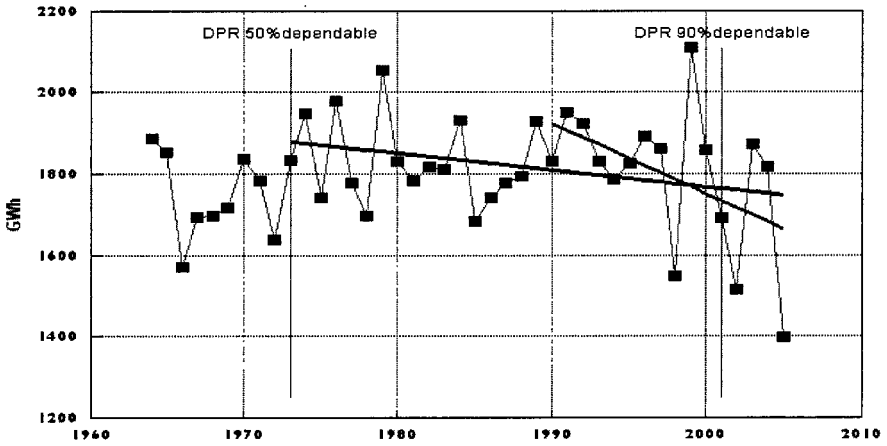


Source: Rampur DPR

[42/] The least squares fit shown in the figure has an R^2 of 0.28.

55. As an independent check on the DPR calculations we have run our project simulation model for the entire set of years from 1964 to 2005, based on a reservoir operating rule that maximizes peak-hour generation. The result is shown in Figure 17.

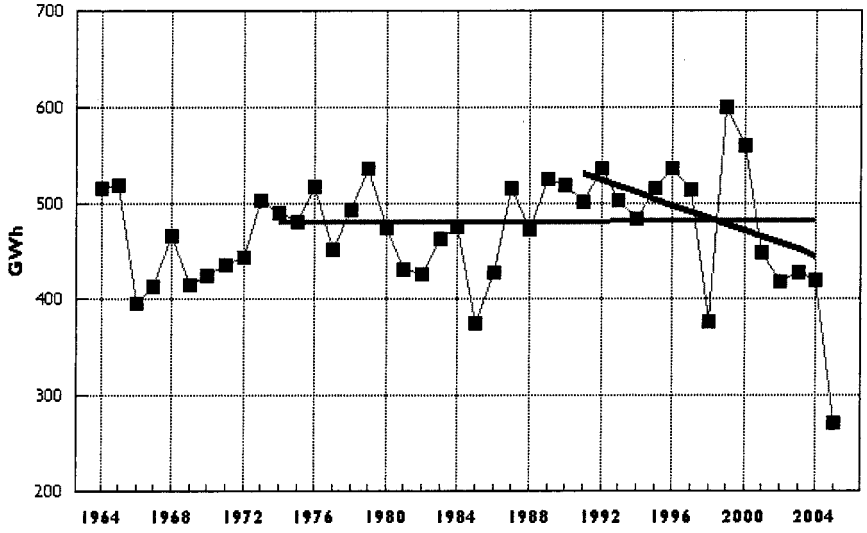
Figure 17: Annual generation, peaking operation



Source: model estimates

56. The downward trend in total energy depends upon the time period selected. If one starts in 1973, the trend-line has a lesser slope than if one starts in 1990, but both are statistically significant. If one takes the view that in a normal system (without curtailments), the most valuable energy is lean season peak energy, does this exhibit a similar trend? Figure 18 shows that this is indeed the case: while the longer time series shows no statistically significant trend, the shorter series shows a statistically significant downward trend.

Figure 18: Lean season peaking energy (morning + evening peaks)



57. Therefore for the risk assessment of economic returns we take as one of the variables the trend value of peaking energy. The corresponding trend variables for the wet season peaking energy, and off-peak energy, are as follows:

Table 8: Hydrology risk assessment: trend variables (GWh/year)

	Lean season Peaking [Figure 18]	Total lean season [Annex II]	Wet season Peaking [Annex II]	Wet season [Annex II]	Total energy [Figure 16]
1974-2004	0	-1.4	-0.04	**-3**	**-4.4**
1990-2004	**-6.4**	**-9.1**	-1.2	**-10**	**-20**

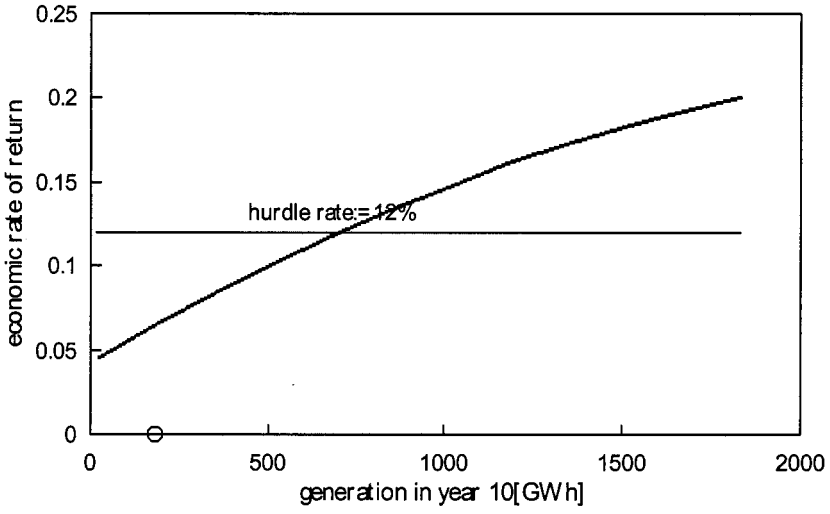
Boldface = statistically significant at the 95% confidence level

58. For the corresponding probability distributions we assume that the trend variable is distributed with mean at the mid-point of the ranges shown in Table 8; truncated at zero at the low end (i.e. in the interest of conservative assumptions, we assign zero probability to *increasing* trends); and adjusted such that the probability of a downward trend greater than – 6.4 GWh/year is 10%.

59. The trend line in Figure 16 indicates that in the 20 years from 1980 to 2000, the potential average annual energy generation has fallen from 3,500 GWh to 2,800 GWh, an annual decline of around 1.25%. If this trend were applied to the design energy estimate (1,835 GWh for peaking operation), the energy generation in year 20 falls to around 1,400 GWh, but the baseline ERR decreases from 20.1% (as shown in Table 6) only to 19.1% - a reflection of the relative unimportance to economic returns of generation beyond the 10th year or so (at the discount rate of 12%).

60. Figure 19 shows the sensitivity of returns to the magnitude of this long-term downward trend (assuming the worst case that this is indeed a downward trend and that the trend would not reverse itself. For the hurdle rate to be reached would need generation in year 10 to fall to about 700 GWh, or an annual decline of 6.5%, or five times greater than what has been observed.

Figure 19: Sensitivity of economic returns to hydrology trends

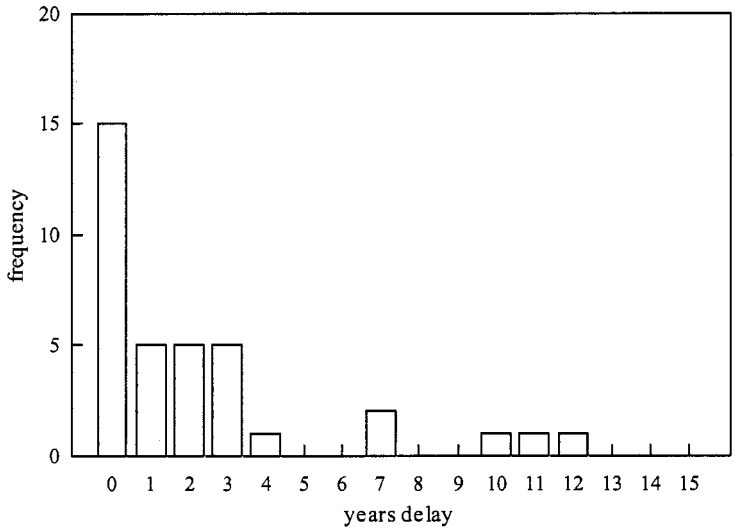


61. Such a decline in-stream flows would be unprecedented, even under the most pessimistic assessments of the impact of climate change. It may be concluded that even under a worst case scenario of a long-term decline in inflows, the Rampur economic returns are robust.[43/]

Construction Risk

62. Hydro projects in India have a generally mixed record of timely completion within the cost estimates as sanctioned in CEA techno-economic clearance, and it seems prudent to assess the risk of delay and cost escalation in the economic analysis.[44/] Figure 20 show the frequency distribution of commissioning delays for a set of 38 hydro projects at various stages of completion (CEA data). 15 are progressing to schedule, and a further 15 are expected to have commissioning dates between 1-3 years after the expected date at the time CEA clearance was given. 8 will be more seriously delayed.

Figure 20: Frequency distribution of delays

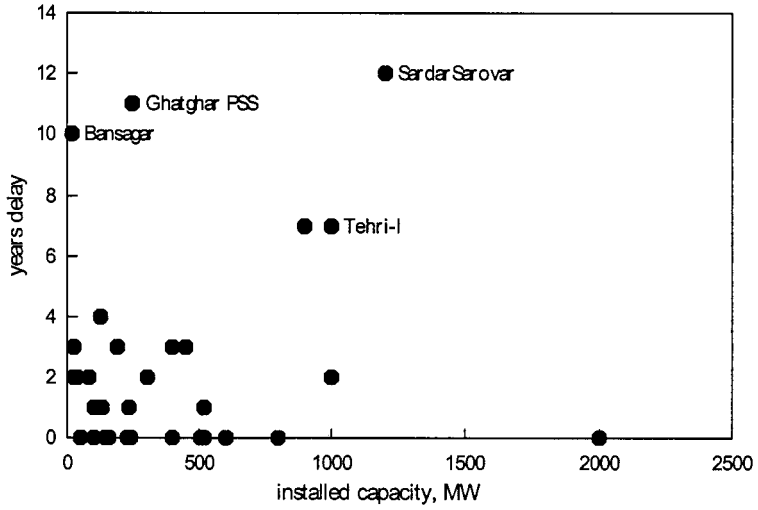


63. There is little relationship between extent of delays and project size, as shown in Figure 21. The majority of projects of 200-400MW in size have suffered only modest delays.

[43/] If indeed the cause is long-term climate change, then similar trends in the hydrology of other Himalayan rivers would be observed, so all hydro projects feeding into the Northern Region would be similarly affected. This would aggravate peaking power shortages in the system as a whole, making greater the economic value of Rampur's energy, which would offset Rampur's lower production.

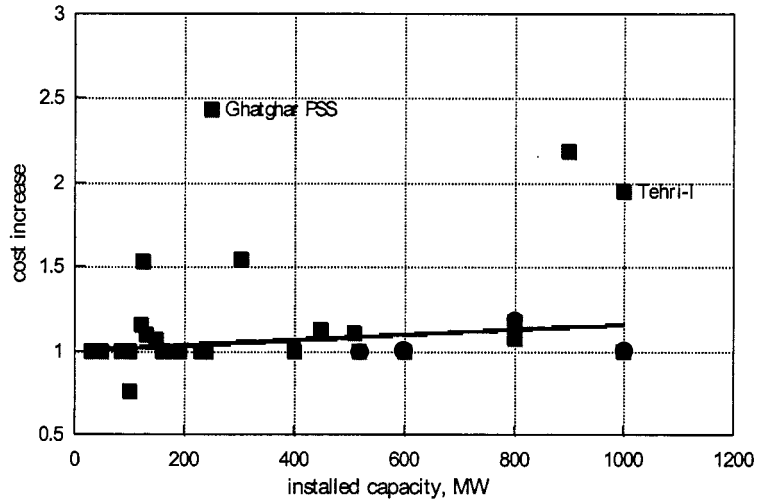
[44/] This is by no means a problem limited to India. A World Bank analysis of cost overruns and schedule slippages in 71 hydro projects in all regions of the world showed an average cost overrun of 27% and schedule slippage of 28%, and with very high variation (standard deviation of cost overruns was 38%). The sample included no Hydro projects in India (though it did include 11 thermal projects (R. Bacon, J Besant-Jones and J. Heidarian, *Estimating Construction Costs and Schedules: Experience with Power Generation Projects in Developing Countries*, World Bank Technical Paper 325, August 1996.

Figure 21: Delay v. project size



64. If we exclude the outliers with more than 200% cost increase, one finds a statistically significant relationship between cost escalation and project size, as shown in Figure 22. Based on this relationship one might expect a cost escalation for Rampur of around 7.5%.

Figure 22: Unadjusted cost escalation v. project size

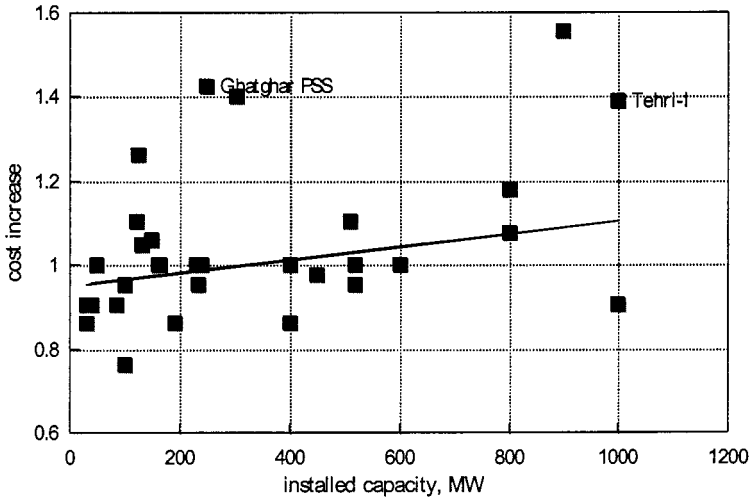


65. The cost increases shown in Figure 22 are unadjusted for inflation. That is to say they simply compare the estimates of completed cost at time of CEA sanction – (which may be taken to be at price levels roughly in the year prior to CEA clearance), and the presently expected cost (which may be taken to be at current 2006 price levels). In other words, part of the cost increase of a delayed project is due simply to inflation. If one brings past costs to 2006 price levels (by escalating the cost estimate in the year of sanction), the adjusted cost factors show a lesser average increase.

66. The result of this adjustment is shown in Figure 23. It leads to the apparently anomalous result that 13 of the 38 projects have experienced cost *decreases*. Suppose a project cleared in 2000 is estimated to be completed in 2006, and have a completed cost, including IDC, of Rs. 45,000/kW. Now if this project is completed in 2008 with a two year delay, but at a completed cost that is no higher than the original cost, i.e. still at

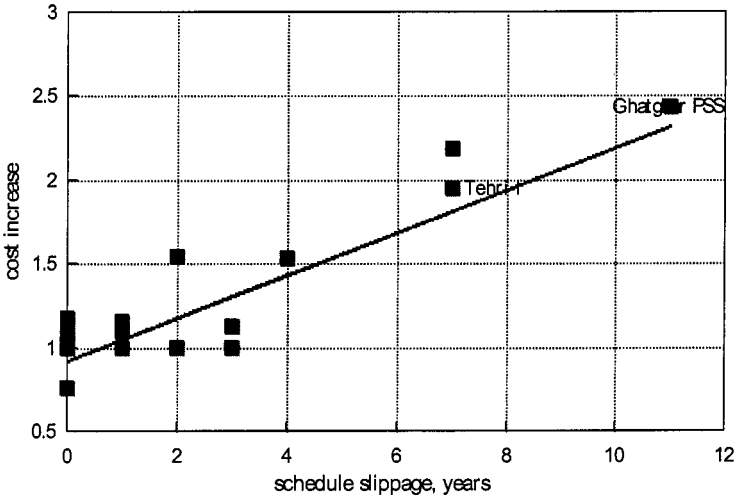
Rs.45,000/kW, then in real terms that completed cost (in 2008) is indeed lower than had it been completed in 2006.

Figure 23: Adjusted cost increases v. project size



67. However, since none of these 38 projects has actually been completed, and since cost increases are indeed strongly related to the length of delays (see Figure 24), for the economic analysis risk assessment we model construction risk as the (discrete) probability distribution for schedule delays shown in Figure 20, and then assess the corresponding cost increase as per the regression line shown in Figure 24.

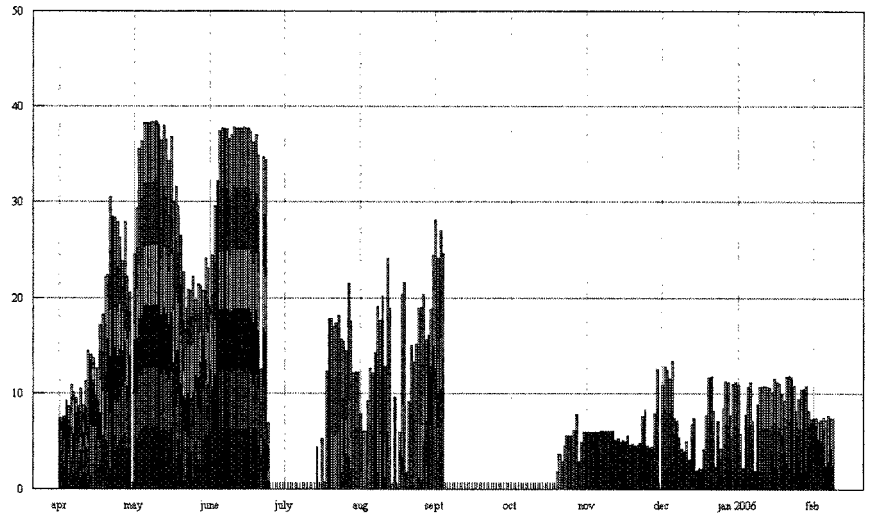
Figure 24: Cost Increase v. schedule slippage



Siltation Risk

68. Siltation risk has two dimensions. The first is plant shut-down due to turbine damage, of the type experienced at NJ since commissioning: as shown in Figure 25, this has resulted in extended periods of complete plant shut-down. Problems at NJ are of major concern to Rampur, since Rampur flows are entirely dependant upon NJ turbine flows.

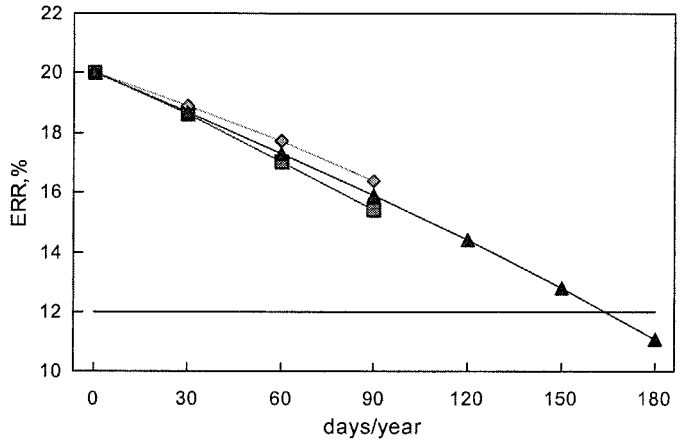
Figure 25: Unit-wise dispatch at NJ, April 2005 to Feb 2006



69. The relationship between the economic returns and such plant shut-downs is shown in Figure 26, which shows ERR v. days lost. The ERR is remarkably robust to plant shut-down days, a consequence of the high baseline returns. The diminution of returns for shut-downs during the wet season are slightly greater than during the lean season, but the switching value (at which the returns fall to exactly the 12% hurdle rate) is about 160 days/year.

70. For the risk assessment of economic returns we take the flushing plan as fixed (i.e. 12 hours/week in the months indicated), and add to the plant shut-down days a minimum of 11 days (CEA value) and a maximum of 23 days (SJVN) to account for days in which the silt concentration exceeds 4000 ppm: absent information to the contrary we assume a uniform distribution over this range.

Figure 26: Impact of plant shut-down days on ERR



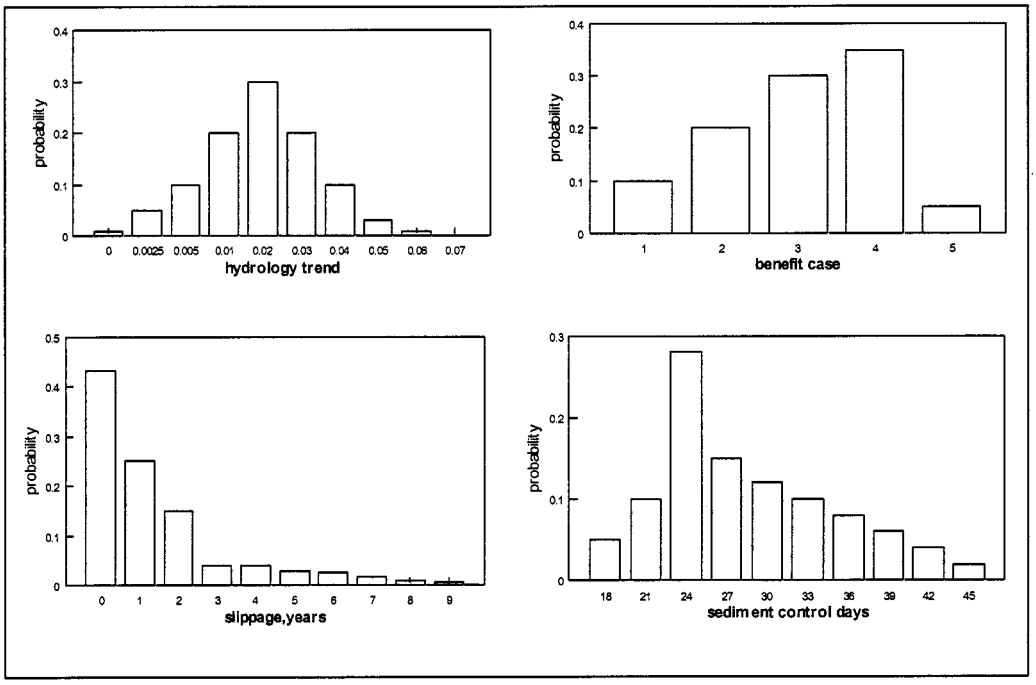
	0	30	60	90	120	150	180
Wet	20%	18.6	17	15.4			
Lean	20%	18.9	17.7	16.4			
wet+dry	20%	18.7	17.3	15.9	14.4	12.8	11.1

Overall Risk Assessment

71. Figure 27 shows the probability distributions for the four main uncertainties in the economic analysis:

- The long term hydrology trend (as discussed above)
- Construction slippages and the associated cost overruns (as discussed above)
- The number of days Nathpa Jhakri must be shut down for sediment control reasons (as discussed above)
- The system conditions and gas price that govern the valuation of benefits.

Figure 27: Probability distribution assumptions

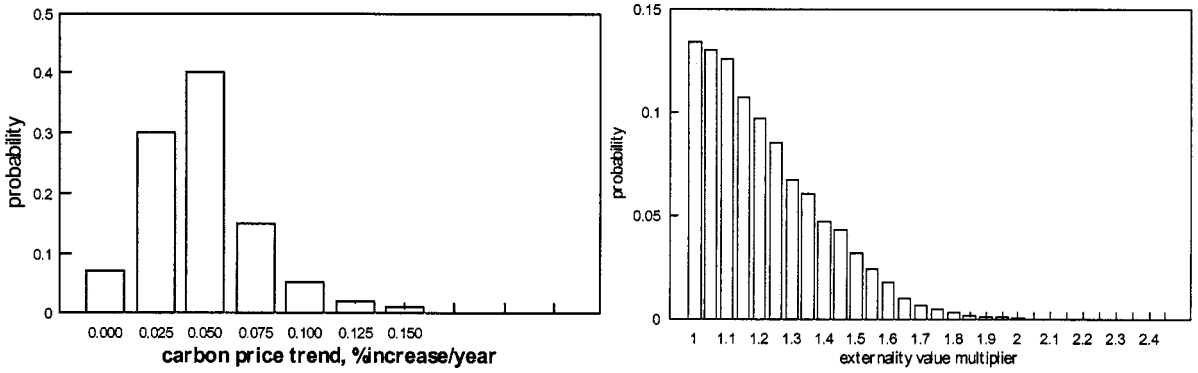


72. For the benefits estimation, we use one of the five system conditions and gas prices shown in Table 6 that range from Rs. 5.70/kWh if present conditions of peaking power shortages persist into the 12th Plan (case 1, presumed to occur with a 10% probability, to the worst case (worst from the standpoint of benefit valuation), in which the benefit during off-peak hours is limited to the avoided (variable) cost of coal generation estimated at Rs. 1.06/kWh (case 5, presumed to occur with 5% probability). We view as the most probable case 4 (presumed to occur with 25%, probability), under which Rampur displaces gas generation during the entire year at a price of US$6.50/mmBTU (corresponding to the present price of imported LNG): this is surely a conservative assumption given the probable further growth of the international LNG market.

73. The probability distributions for the environmental benefits are shown in Figure 28. For the carbon price, we assume US$5/ton$CO_2$ as the present-day (carbon finance deal) value, and then escalate at an annual rate as indicated by Figure 28: it is assumed that the most probable escalation rate is 5%/year, at which rate a carbon price of US$ 27.50/ton (at present price levels) is reached in the last year of the Rampur's assumed life (30 years).

74. The uncertainly in local environmental benefit is modeled as a multiplier of the baseline value (e.g., 0.7 US cents/kWh for coal, as discussed above); this multiplier has a minimum value of 1, and a maximum value of 2 (as a truncated normal distribution).

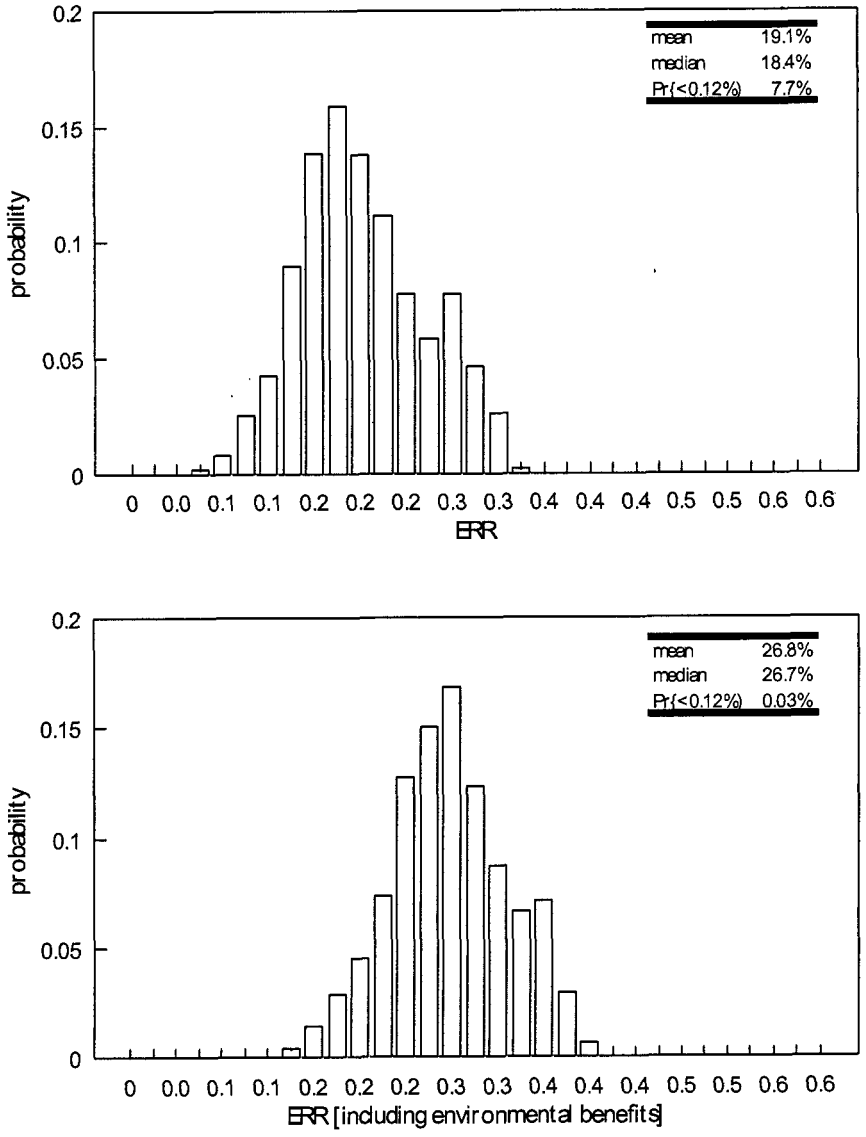
Figure 28: Probability distributions for environmental benefits



75. The results of the Monte Carlo simulation are shown in Figure 29. Without consideration of environmental benefits, the probability of the hurdle rate not being achieved is estimated at 7.7% (the area under the curve to the left of 12% ERR). The expected value of economic returns is 19.1%.

76. When environmental benefits are included (both global and local), the probability distribution shifts to the right, with a new mean ERR of 26.8%, and a probability of not meeting the hurdle rate of less than 0.1%.

Figure 29: probability distribution of economic returns



77. One may conclude that Rampur is a project with robust economic returns under a wide range of input assumptions. The probability that returns are less than the hurdle rate is very small.

B. Financial analysis - Project

Project costs

78. The total estimated project cost for the project, including contingencies and interest during construction, is expected to be about US$615 million. For the purposes of financial analysis, the project cost includes only those costs incurred directly by SJVN. Therefore, the costs associated with the construction of transmission line and associated facilities for evacuation of power from the project are excluded.

Electricity Sales

79. As per the MoU signed between SJVN and Government of Himachal Pradesh (GoHP) for the implementation of Rampur project, 12 percent of energy generated from project (after excluding auxiliary consumption and transformation loss) will be given free of cost to Host State (i.e. GoHP) towards royalties for usage of state's water resources. Further, 30 percent or share of GoHP equity in the actual paid-up capital of SJVN (whichever is lower) will determine the share of remaining 88 percent of generated power at bus-bar to be allocated to GoHP. For the remaining unallocated power, SJVN will enter into Power Purchase Agreements (PPAs) with the interested states.

80. Construction period for the project is five years with commercial operation expected to start from April 2012 onwards. Electricity generation is projected to be at the design energy levels. Energy generated in a year up to the design energy levels is known as Primary Energy and any energy generated in a year in excess of the design energy is known as secondary energy. The tariff for the primary energy generated is on two-part tariff basis comprising of recovery of annual capacity charge[45/] and primary energy charge[46/].

81. Electricity sales have been arrived at after providing for 12 percent free energy to GoHP towards royalties for usage of state's water resources. Only sales made during the commercial operating period are included in the financial analysis. Therefore, any sales made during the project commissioning period prior to full commercial operations are not included. Further, it is assumed that no secondary energy is being generated by the project. Needless to say, if the project were generating and selling secondary energy to beneficiary states, additional revenues would be generated.

45/ Annual capacity charge is calculated as difference of Annual fixed charge and Primary energy charge. Annual fixed charge consist of – interest on loan capital; depreciation, including advance against depreciation; return on equity; operation and maintenance expenses; and interest on working capital.

46/ Primary energy charge is calculated after adjusting for free power delivered to the host state multiplied by the primary energy rate. Rate of primary energy generated is equal to the lowest variable charges of the central sector thermal power generating station in the concerned (northern) region. Secondary energy tariff is equal to the primary energy rate.

Electricity Tariffs

82. Electricity tariffs are fixed by Central Electricity Regulatory Commission (CERC) based on terms and conditions of tariff issued from time to time and are valid for a specific period. The latest tariff regulations for fixing tariffs issued by CERC are applicable from April 1, 2004 for a period of five years. Though the project will start generating after this period in 2012, the same norms have been used in calculating expected tariff for the power generated by the project - the key features are as follows:

- Debt-Equity ratio of 70:30;
- Interest on debt as per actual costs incurred based on six-months LIBOR plus a spread; working capital and short-term loans interest rate at 12.50 percent p.a.; and interest on cash balances at 6 percent p.a.;
- Return on Equity at 14 percent p.a. with any equity in excess of 30 percent being provided returns at a level equal to average cost of debt;
- Auxiliary energy consumption at 0.7 percent; and transformation losses at 0.5 percent;
- Initial operations and maintenance expenses at 1.5 percent of the project cost , escalated at 4 percent p.a.;
- Depreciation on straight line basis (as per rates prescribed by CERC), up to 90 percent of project cost (excluding land) during loan repayment period and after loan repayment, the remaining depreciable value is uniformly spread over the balance useful economic life of the project;
- Advance against depreciation (AAD) (to support loan repayment) equal to loan repayment amount subject to a ceiling of $1/10^{th}$ of loan amount minus depreciation subject to AAD being restricted to the extent of difference between cumulative repayment and cumulative depreciation up to that year;
- Working capital requirement calculated from operations and maintenance expenses for one month, maintenance spares (initially at 1 percent of the project cost, escalated at 6 percent p.a.) and receivables for two months;
- Design energy for Rampur project at 1770 Million Units;

Other key assumptions used include:

- Exchange rates and inflation as per World Bank's Office Memorandum dated June 29, 2007;
- Physical contingencies at 10%.

83. The tariff in the first year is expected to be about Rs. 2.40/kWh (5.8 US cents), with average tariff over the life of the project expected to be about Rs. 2.14/kWh (5.2 US cents) and the levellized tariff (assuming a discount factor of 12 percent) expected to be about Rs. 2.25/kWh (5.4 US cents).

Debt service coverage ratio

84. The financial analysis shows that reasonable debt service cover ratios are achieved by the project. In the base case scenario, the minimum debt service coverage ratio (DSCR) is 1.08 in the first year of operation (2013) and the average DSCR is 1.64.

Project rates of return

85. Financial analysis of the project has been undertaken to assess the financial viability of the proposed project from the perspective of SJVN, and also of the shareholders (i.e. GoI and GoHP). For the operating entity (SJVN), viability has been assessed on the basis of the project financial internal rate of return (FIRR). Financial viability to shareholders is measured on the basis of the FIRR of equity invested (share) in the project.

86. In the prevalent regulatory regime, an annual return on equity of 14 percent is provided by the regulator during the years when the project is operational. However, the cost of debt is a pass through in tariff. As a result, the financial performance of the project, or that of SJVN, remains unaffected by the cost of debt. Accordingly, IRR for the project and equity has been used as the index for financial appraisal.

87. The FIRR for the project is 9.53 percent (pre-tax) and the FIRR of equity invested (or Return on equity) is 12.04 percent, assuming discount rate of 12 percent.

88. In addition to the dividends from the project, the shareholders will also receive other revenue from the project. GoI will receive income taxes and dividend distribution tax from the project. GoHP will receive 12 percent of the energy generated (at bus-bar) free, as a royalty for usage of water resources. This energy can be sold by GoHP either within the state or outside the state to other energy deficit states.

89. SJVN has also intends to apply for selling the carbon credits available from the clean energy generated by the project under the Kyoto protocol and earn carbon revenues.

Table 9: Rampur Hydropower Project - Cash Flows and FIRR

(Rs. in millions)

Financial Year	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
Project FIRR														
Capital Expenditure	917	3606	5795	5363	4908	1960	0	0	0	0	0	0	0	0
Revenue	0	0	0	0	0	0	3676	3662	3647	3633	3618	3604	3589	3575
O&M Expenditure	0	0	0	0	0	0	386	402	418	435	452	470	489	509
Working Capital Increase	0	0	0	0	0	0	887	12	13	14	15	16	18	19
Cashflows before tax	-917	-3606	-5795	-5363	-4908	-1960	2402	3247	3216	3184	3151	3117	3083	3047
Project FIRR (Pre-tax)	9.53%													
Return on Equity														
Equity Increase	917	431	1739	1609	1473	588	0	0	0	0	0	0	0	0
Revenue	0	0	0	0	0	0	3676	3662	3647	3633	3618	3604	3589	3575
O&M Expenditure	0	0	0	0	0	0	386	402	418	435	452	470	489	509
Working Capital Increase	0	0	0	0	0	0	887	12	13	14	15	16	18	19
Net Interest Paid	0	0	0	0	0	0	1123	1073	1021	969	916	862	807	750
Debt Repayment	0	0	0	0	0	0	1104	1115	1125	1136	1147	1157	1168	1179
Net Cashflows	-917	-431	-1739	-1609	-1473	-588	174	1060	1069	1079	1088	1098	1108	1118
Equity FIRR (RoE)	12.04%													

Table 10: Rampur Hydropower Project – Summary Financial Projections

(Figures in Rs. in Millions)

Financial Year Ending March 31 of Year	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
INCOME STATEMENT ITEMS														
Revenue	0	0	0	0	0	0	3676	3662	3647	3633	3618	3604	3589	3575
Operating Income Before Interest & Finance Charges	0	0	0	0	0	0	2074	2045	2014	1983	1951	1919	1885	1851
Net Profit	0	0	0	0	0	0	782	843	917	977	1030	1080	1129	1176
FUNDS STATEMENT ITEMS														
Internal Cash Generation	0	0	0	0	0	0	3289	3265	3270	3289	3290	3283	3271	3257
Equity Contributions	917	504	1873	1809	1736	884	0	0	0	0	0	0	0	0
Borrowings	0	3342	4370	4220	4050	2062	0	0	0	0	0	0	0	0
Total Sources	917	3846	6243	6029	5786	2945	3289	3265	3270	3289	3290	3283	3271	3257
Capital Expenditure	917	3846	6243	6029	5786	2945	0	0	0	0	0	0	0	0
Debt Service	0	0	0	0	0	0	2228	2188	2147	2105	2063	2019	1975	1930
Dividend (including tax)	0	0	0	0	0	0	0	61	435	718	809	886	955	1016
Provision for Tax	0	0	0	0	0	0	0	1	5	10	14	17	19	22
Increase (Decrease) in Working Capital	0	0	0	0	0	0	887	12	13	14	15	16	18	19
Increase/Decrease in Cash	0	0	0	0	0	0	174	1003	670	441	390	344	305	271
Total Application	917	3846	6243	6029	5786	2945	3289	3265	3270	3289	3290	3283	3271	3257

Financial Year Ending March 31 of Year	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
BALANCE SHEET ITEMS														
Net Fixed Assets in Operation	0	0	0	0	0	0	24551	23336	22121	20906	19691	18475	17260	16045
WIP	917	4763	11006	17035	22821	25766	0	0	0	0	0	0	0	0
Working Capital	0	0	0	0	0	0	887	900	913	927	943	959	977	996
Forex Loss	0	0	47	155	276	429	429	429	429	429	429	429	429	429
Current asset	0	0	0	0	0	0	268	1310	2034	2512	2930	3299	3627	3918
Less Current Liabilities	0	0	0	0	0	0	150	531	823	921	1005	1079	1146	1208
Total Assets	917	4763	11052	17190	23097	26195	25985	25444	24673	23852	22987	22083	21147	20180
Debt	0	3342	7759	12088	16259	18474	17543	16593	15624	14635	13626	12596	11547	10476
Equity	917	1421	3294	5102	6838	7722	7722	7722	7722	7722	7722	7722	7722	7722
Retained Earnings	0	0	0	0	0	0	721	1129	1328	1496	1639	1765	1878	1982
Total Equity & Liability	917	4763	11052	17190	23097	26195	25985	25444	24673	23852	22987	22083	21147	20180
FINANCIAL RATIOS														
Net Income as % of Revenue	0%	0%	0%	0%	0%	0%	21%	23%	25%	27%	28%	30%	31%	33%
Return on Equity	0%	0%	0%	0%	0%	0%	9%	10%	10%	11%	11%	11%	12%	12%
Debt Service Coverage	0	0	0	0	0	0.00	1.08	1.49	1.51	1.55	1.58	1.61	1.64	1.67
Debt:Equity Ratio	0.00	2.35	2.36	2.37	2.38	2.39	2.27	2.15	2.02	1.90	1.76	1.63	1.50	1.36

Sensitivity and Scenario Analysis

90. A sensitivity analysis was also carried out to understand the impact of cost escalations, implementation delays and changes in regulated rate of return on equity (RoE) on financial internal rate of return (FIRR), debt service coverage ratio (DSCR) and tariffs. A summary of the scenario analysis is given in Table 11. The project is affected adversely in the case of a reduction in regulated rate of return on equity and implementation delays. In the worst case scenario, wherein an implementation delay of 2 years and cost escalation by 20 percent are coincident, the FIRR for project is estimated to be 8.28 percent and for equity 9.31 percent.

Table 11: Sensitivity Analysis

No.	Scenario	Project	Equity	Minimum	Tariff (Rs. /kWh)	
		FIRR (%)	FIRR (%)	DSCR	1st year	Levellized
1	Base Case	9.53%	12.04%	1.08 (2013)[47/]	2.40	2.25
2	Cost escalation by 20%	9.53%	12.04%	1.08 (2013)	2.88	2.70
3	Delay of 2-year in commissioning	8.28%	9.31%	1.01 (2015)	2.48	2.33
4	Reduced regulated Return on Equity (12%)	8.99%	10.87%	1.02 (2013)	2. 30	2.15
5	Increased regulated Return on Equity (16%)	10.05%	13.17%	1.14 (2013)	2.50	2.36
6	Delay of 2 years and cost escalation by 20%	8.28%	9.31%	1.01 (2015)	2.97	2.80

C. Financial Analysis – Entity

91. SJVN started earning revenues only in 2004 when the first project, NJHP, became operational and started commercial production. The proposed Rampur project is the second project being implemented by SJVN. The current financial performance of SJVN is generally satisfactory. FY2005 was the first full year of project operation with SJVN earning revenue of Rs. 10,983 million and a Net Income of Rs. 2,984 million. Profitability during FY2006 measured by return on equity (after Tax) stood at 11 percent. This is lower than the regulated return (presently, the CERC allows a regulated return on equity of 14 percent) in view of the expansion program being undertaken by SJVN and the fact that a returns are only earned once the investments become operational. The DSCR (0.78) came down significantly during FY2006 as the revenues were impacted because of plant shutdown caused by unfavorable operating conditions (high silt in the river) and a plant failure (flooding of power house). However the company didn't default on its commitments. The plant availability for the purposes of calculation of tariff has now been amended such that the stoppages due to high silt levels would not have such a significant impact on revenues in future years. Owing to the expansion in the capital expenditure program over the next few years with new hydro projects being developed, the return on equity is expected to drop to 8%-9% range during the period FY2010-FY2012 and rise back once the new projects also start earning revenues. The return on equity is likely to remain at these levels. The financial projections (summary tables at the end of the Annex) show the satisfactory debt-equity and DSCR levels being achieved by the entity. The forecasted minimum DSCR is 1.59 in FY2008 while the debt: equity ratio remains below 1. This demonstrates that, subject to tariff adjustments in line with CERC's

[47/] Year of minimum DSCR.

current regulatory framework, SJVN's financial performance would continue to remain satisfactory.

92. SJVN's main financial risk is the risk of non-payment by off-taking state utilities. Though SJVN has not faced any payment problems so far, as their project portfolio expands in future this risk may increase. Presently, SJVN is not covered by the securitization scheme under which outstanding dues from the state utilities were securitized through tripartite agreements (TPAs) between GoI, State Governments and Reserve Bank of India [48/], however it is considering to approach GoI for its inclusion in the scheme.

Key Assumptions for Financial Projections

93. The financial projects have been prepared by consolidating the projections of projects in operation (i.e. Nathpa Jhakri), project under construction (i.e. Rampur) and the three new projects under development in the state of Uttarakhand. The cost information on the new projects is from the available Pre-feasibility reports from Central Electricity Authority (CEA). The implementation schedule has been assumed as per the latest plans of SJVN. The other key assumptions on which the financial projections are based are given below:

- Operating Revenues taken from audited accounts till FY2006, and for subsequent years calculated based on present commissioning schedule of projects and their likely tariff based on the cost estimates provided in the pre-feasibility reports;
- Capacity index is assumed to be at normative levels throughout plant life – i.e. at 85 percent in first year and 90 percent subsequently in case of run-of-river power stations; and at 80 percent in first year and 85 percent subsequently in case of storage type and run-of-river power stations with pondage. At normative capacity index levels, full capacity charges are recoverable but there is no incentive available. In case of capacity index being more than normative levels, the project will earn additional revenue in the form of incentive;
- Operation and maintenance expenses are projected to escalate as per the present CERC tariff norms/ regulations;
- Return on Equity taken at 14 percent, in accordance with the prevailing Tariff Regulations;
- A dividend of 30 percent of profit after tax is considered subject to sufficient cash and profit (including retained earnings) being available;
- Minimum Alternative Tax (MAT) rate is considered at 11.33 percent, Corporate income tax at 33.99 percent and Dividend distribution tax at 16.995 percent;

[48/] Under the TPAs, 15 year (including a five year moratorium) tax free bonds carrying interest of 8.5 percent were issued by Reserve Bank of India for all outstanding dues from the state utilities as of September 30, 2001. To ensure the payment of current monthly bills by states, the agreement provides incentives for prompt payment and in case of defaults, the generators can initially regulate the power supplied to the defaulter and subsequently have recourse to payment by RBI from central appropriation of the concerned state.

- Tax holiday of 10 years for each new project has been considered. During tax holiday period, MAT is payable;

- For future hydropower projects, where loans are not contracted, the financing norms adopted are – Debt-Equity of 70:30;

- Exchange rates and inflation as per World Bank's Office Memorandum dated June 29, 2007.

Table 12: Summary Financial Projections for Satluj Jal Vidyut Nigam Limited

(Figures in Rs. Millions)

Financial Year Ending March 31 of Year	2004 (A)	2005 (A)	2006 (A)	2007 (P)	2008 (P)	2009 (P)	2010 (P)	2011 (P)	2012 (P)	2013 (P)	2014 (P)	2015 (P)	2016 (P)	2017 (P)	2018 (P)	2019 (P)	2020 (P)
INCOME STATEMENT ITEMS																	
Revenue	2169	10983	13715	14653	14348	14002	13001	12425	12275	21313	20311	19806	19639	19529	19425	19326	19233
Operating Income Before Interest & Finance Charges	386	6668	8322	9064	8625	8086	7014	6363	6136	11719	10600	9975	9682	9442	9202	8963	8723
Net Profit	-931	2984	4982	6633	6768	6758	6112	5777	5799	8036	7824	7822	8013	8225	8433	8639	8846
FUNDS STATEMENT ITEMS																	
Internal Cash Generation	2050	10485	12350	13200	12794	12608	11664	11121	10964	19142	18030	17477	17339	17318	17339	17356	17375
Equity Contributions	40455	633	0	917	705	4664	3515	3509	2782	0	0	0	0	0	0	0	0
Borrowings	41697	579	0	1831	6355	10884	8202	8188	6491	0	0	0	0	0	0	0	0
Total Sources	84202	11697	12350	15949	19853	28156	23381	22818	20236	19142	18030	17477	17339	17318	17339	17356	17375
Capital Expenditure	77302	2636	1117	2325	7060	15548	11717	11698	9272	0	0	0	0	0	0	0	0
Debt Service	4957	6042	8578	8322	7951	7032	5386	4736	4508	10427	9304	8140	6075	5824	5573	5322	5072
Dividend (including tax)	0	0	1619	1828	2487	3608	4677	5630	6215	6463	6324	6705	7121	7365	7564	7721	7860
Provision for Tax	0	0	254	454	19	45	60	72	80	83	83	-283	-339	-281	-203	-121	-38
Increase (Decrease) in Working Capital	1117	417	4076	-2290	-13	-2	-105	-32	41	2139	-58	29	91	107	116	124	134
Increase/Decrease in Cash	826	2602	-3294	5310	2349	1924	1647	716	120	30	2377	2886	4392	4302	4289	4311	4347
Total Application	84202	11697	12350	15949	19853	28156	23381	22818	20236	19142	18030	17477	17339	17318	17339	17356	17375

Financial Year Ending March 31 of Year	2004 (A)	2005 (A)	2006 (A)	2007 (P)	2008 (P)	2009 (P)	2010 (P)	2011 (P)	2012 (P)	2013 (P)	2014 (P)	2015 (P)	2016 (P)	2017 (P)	2018 (P)	2019 (P)	2020 (P)
BALANCE SHEET ITEMS																	
Net Fixed Assets in Operation	75638	74523	71838	70231	73289	84712	92304	99877	105024	98330	91636	84942	78248	71553	64859	58165	51471
Working Capital	1117	1535	5611	3321	3308	3307	3202	3169	3210	5349	5291	5321	5412	5519	5635	5759	5893
Forex Loss	0	0	0	0	0	47	155	276	429	429	429	429	429	429	429	429	429
Current asset	892	4271	871	6338	8916	10954	12624	13366	13511	13885	17660	20705	25319	29886	34436	39008	43619
Less Current Liabilities	0	2490	2818	3234	4380	5449	6330	6879	7129	7334	8673	9032	9338	9619	9860	10087	10318
Total Assets	77647	77839	75503	76655	81133	93571	101955	109809	115045	110659	106342	102364	100069	97769	95499	93275	91094
Debt	38123	36317	30827	26917	27530	33221	37608	42391	45509	39411	33975	29296	26354	23392	20409	17406	14383
Equity	40455	41088	41088	42005	42710	47375	50890	54399	57181	57181	57181	57181	57181	57181	57181	57181	57181
Retained Earnings	-931	434	3588	7733	10893	12975	13457	13019	12355	14067	15186	15887	16534	17196	17909	18688	19531
Total Equity & Liability	77647	77839	75503	76655	81133	93571	101955	109809	115045	110659	106342	102364	100069	97769	95499	93275	91094
FINANCIAL RATIOS																	
Net Income as % of Revenue	-43%	27%	36%	45%	47%	48%	47%	46%	47%	38%	39%	39%	41%	42%	43%	45%	46%
Return on Equity	-2%	7%	11%	13%	13%	11%	9%	9%	8%	11%	11%	11%	11%	11%	11%	11%	12%
Debt Service Coverage	1.17	1.42	0.78	1.83	1.59	1.73	2.08	2.21	2.25	1.55	1.86	2.08	2.74	2.80	2.87	2.94	3.02
Debt:Equity Ratio	0.94	0.88	0.75	0.64	0.64	0.70	0.74	0.78	0.80	0.69	0.59	0.51	0.46	0.41	0.36	0.30	0.25

Note: A=Audited; P=Projection

Annex 10: Safeguard Policy Issues

INDIA: Rampur Hydropower Project

A. Social Safeguards

1. ***OP: 4.12 Involuntary Resettlement***: Among the two social safeguard policies, this project triggers only OP: 4.12 "Involuntary resettlement". The land acquisition and resettlement impacts in this project are small compared to similar hydropower projects. The total land required for the project is about 79 hectares including 30 hectares of private land belonging to 141 families comprising 167 landowners. Out of these, 35 families are likely to become landless (less then 0.40 hectares of remaining land holding) and 28 families will be physically displaced. There is no impact on non-title holders except for two tenants. The magnitude of land acquisition and its associated impacts are summarized below:

Table 1: Land Acquisition

No.	Impacts	Numbers	Remarks
1	Government land	49 hectares	All government land in HP is classified as government forest land
2	Private land	30 hectares	14 hectares for civil works and the remaining 16 hectares for township
3	No. of land owners affected	167	
4	No. of families affected	143	Including 2 non title holders (tenants)
5	No. of displaced families	28*	Of these, land holdings of 14 families will also become uneconomical holding size (below 0.40 hectare)
6	No. of landowners whose land holding will become uneconomical holding size (below 0.40 hectare)	35*	

* These are mutually inclusive with figures in Sl. 4.

2. Resettlement entitlements are spelt out as part of the Memorandum of Understanding (MoU) between GoHP and SJVN. The entitlements include several improvements over those used for the Nathpa Jhakri financed by the Bank. The key improvement includes: top-up money for loss of land; options for resettlement of displaced families (cash or cash with developed plot or constructed house); and provision for award of small contracts to PAPs. The MoU also incorporates several provisions for taking up community development works including operation of a mobile health unit. A copy of the entitlements and assistance (in English and Hindi languages) has been circulated widely among the potential project-affected people.

3. There are a few gaps in the entitlements and assistance contained in the MoU when compared with the Bank's operational policy on involuntary resettlement. The key gaps includes: (i) non-inclusion of non-title holders as PAPs; (ii) lack of clarity in mitigation of impacts due to ancillary activities such as transmission lines, access roads, dump sites, etc.; (iii) cut off date for eligibility of benefits as on the date of survey or land acquisition notification; (iv) developmental approach for income restoration or improvements; (v) valuation of loss of structures based on scheduled rates and excluding the depreciated amounts; and (vi) disclosure procedures. These gaps were taken into account while finalizing the resettlement action plan (RAP) to bring the entitlements and assistance consistent with the Bank's provisions outlined in the Bank's OP 4:12 on involuntary resettlement. The RAP contains the provisions for assistance to non-title holders. It also takes into account the

impacts related to land acquisition for ancillary services, dumping sites, etc. The compensation rates for private land were assessed by a special committee based on various parameters, such as recent sale transactions, the recent court order on enhanced compensation in nearby projects and land rates paid for some private hydropower projects so as to pay the compensation at replacement cost. A third party assessment was undertaken by approved valuers for payment of compensation to the structures, based on recent scheduled rates of GoHP. The first notification under the land acquisition act for landowners and the date of baseline survey for non- title holders will constitute the cut-off date. The draft documents are disclosed in the Public Information Center and web site of SJVN and were also disclosed in the Bank's Info Shop. The final documents will replace the draft documents.

4. During implementation of the earlier 1,500 MW Nathpa-Jhakri hydropower project, SJVN already has successfully implemented a range of good social practices, such as: (i) uninterrupted operation of mobile health van for more than five years in the affected villages; (ii) offer of employment to nearly 60 PAPs in the project; (iii) construction of a resettlement colony and market complex for PAPs; (iv) support to income generation activities for about 50 families; and (v) infrastructural developmental works worth approximately Rs. 25 million in the affected villages.

5. ***OP: 4.20 Indigenous Peoples*:** This project will not trigger the policy on Indigenous Peoples. The impact on scheduled tribes is negligible in this project. Only two tribal families will be affected. The proportion of tribal families living in the project area is about 3 percent compared to 4 percent in Himachal Pradesh and 8 percent in India. The socio-economic characteristics of the tribal people in the project area reveal that they own agricultural land, livestock and also material assets such as televisions, cooking gas, etc., that is, similar to non-tribal people. A social assessment was carried out by a team of independent consultants and social scientists employed by SJVN. The findings showed that the tribal families from the Negi and Gujjar tribes migrated to the project area approximately 50 years ago. Based on the screening of the representative sample of tribal families against the five criteria listed in the World Bank's OD 4.20, "Indigenous Peoples," (which covers scheduled tribes), (para 5), the social assessment team concluded that the families do not possess three of the five characteristics (close attachment to ancestral territories; self-identification as members of distinct cultural groups; and presence of customary social and political institutions). The World Bank social scientist on the Task Team, who has been visiting the project site from time to time since 1998, concurs with the findings and conclusions of the social assessment team that the families do not meet the criteria of the Indigenous Peoples as listed in OD 4.20. This issue was subject to review by the Indigenous Peoples Coordinator of the World Bank who concurred with this decision. Therefore, the project will not trigger the Indigenous Peoples Policy (OD 4.20).

6. ***Implementation Arrangements for Resettlement Action Plan*:** A RAP describing the process for payment of compensation and resettlement assistance, institutional arrangements, grievance procedures, time table for monitoring and evaluation arrangements and budget provisions has been prepared. It contains outcome of the baseline socio-economic survey and consultations and the baseline valuers for key performance and impact indicators which will be used for measuring the outcomes of resettlement implementation. A transition plan for resettlement of the physically displaced families is in place and the livelihood support activities for those affected people who are losing economically are also highlighted. A separate Sustainable community Development Program (SCDP), has been prepared describing the proposed infrastructural facilities in the project area for next five years with an estimated cost of about Rs. 260 million (US$6.3 million). The RAP and SCDP have been disclosed locally in the PICs on September 29, 2006 and the executive summary of the reports have been placed on the SJVN website. Disclosure of the documents was also announced

through local newspapers. The documents were also disclosed in the Bank's Info shop on October 19, 2006.

7. A baseline socio-economic survey has been completed among the PAPs. The key demographic and socio- economic information collected in the survey includes demographic profile, income and occupation, land holding and cropping patterns, ownership of livestock and household assets, health situation, etc. that will serve as a basis for comparing the living standards in the post-resettlement period. The key baseline socio-economic characteristics that are proposed to be used during the impact evaluation of the resettlement are summarized below:

Table 2: Baseline Characteristics of Project-Affected Families

No	Indicator	Value	Remarks
Economic	Average annual income (Rs)	1,20,648	
	Proportion of families living below poverty line* (%)	2.76	
	Proportion of families having outstanding debt (%)	29.0	Average Rs. 81,000
	Proportion of workers in service or business (%)	13.0	
Housing	Proportion of families living in *pucca* houses** (%)	35.0	
	Average size of the house (sq.ft)	578	
	Proportion of families having separate kitchen (%)	79.0	
	Proportion of families having separate toilet (%)	68	
Ownership of Land and assets	Average land holding size (ha)	10.35	
	Proportion of households having refrigerators (%)	46	
	Housing having LPG connection (%)	82	
	Average livestock/household (in number)	2.12	

*Based on per capita monthly income of Rs. 289

** A house constructed by using cement, brick and steel

8. ***Social Assessment***: A social assessment was carried out to elicit the views of the various stakeholders about the activities of the project. Seventeen consultations were held with various stakeholders such as local villagers, elected representatives of affected people, government officials, women and youth organizations, media persons, etc. In all, 207 persons participated in these meetings. The key issues discussed included employment opportunities, health and education facilities, and concerns about drying water sources, impact of tunnel construction, mobile health facilities, monitoring project implementation of community development activities, etc. The proposed measures for these concerns are incorporated in the RAP and the SCDP.

9. ***Resettlement of Displaced Families***: Out of the 28 displaced families, 25 will be affected due to civil works and the remaining three by the construction of the township. The project has identified alternative land in consultation with the affected people in two locations. All the families becoming houseless have given an option for receiving the developed plot and cash assistance for construction. The project authorities have informed the Bank team that the SJVN Board has approved the purchase of land for the resettlement site directly from the landowners on a willing-seller and willing-buyer basis. The landowners have already executed an agreement to sell the land to the project. It is expected that this land will be purchased very soon and the land development

may taken another 3-4 months before the developed plot is handed over to the PAPs. These displaced families will be given a transitional allowance of Rs. 2000 per month towards rental allowance for 18 months during which time the PAPs are expected to complete the construction of their new houses. The infrastructural facilities such as internal roads, street lighting, drainage facilities, development of open spaces and other common amenities, etc. will be completed by the project authorities during this transition period.

10. ***Livelihood Support Programs*:** The RAP contains various measures for supporting the livelihoods of the PAPs. These include support for income generation activities, award of small local contracts, hiring of vehicles from the PAPs on lease basis, employment in the project for the landless and houseless people subject to their suitability and availability of vacancies. In addition, the children of the PAPs will also be sponsored for acquiring technical skills through industrial training institutions. The support for various agricultural and veterinary services will further be provided to the project-affected and local people to modernize their agricultural and veterinary practices.

11. ***Institutional Arrangements for Implementation of the RAP*:** A separate R&R department has been functioning since September, 2006 both at the corporate and at project office with key staff in place. At the corporate office, the Additional General Manager (Personnel and Administration) heads the R&R department and reports to the Director (Personnel), assisted by a Senior Manager and Deputy R&R Officer. At the project site, the Deputy General Manger (R&R) and Deputy Resettlement Officers are the key staff involved with the implementation, supported by other land acquisition and resettlement staff as well as civil engineers. The R&R department works under the overall supervision of the General Manager. Some of the staff were associated with the implementation of the Nathpa Jhakri hydropower project and have gained valuable experience and exposure to the aspects of social safeguards. This will be helpful for smoother implementation of the RAP in this project. Thus, the current institutional arrangements are adequate to handle the land acquisition and resettlement implementation in this project.

12. The monitoring and evaluation procedures and grievance redressal mechanisms have been agreed upon and a time frame has been set for initiating these activities. An external monitoring agency will be appointed to carry out concurrent monitoring of R&R implementation which will done on a quarterly basis during the first year and bi-annually thereafter. The external impact evaluation will be carried out prior to the mid-term review to assess the changes in the living standards of PAPs. All PAPs who have received full entitlements one year prior to the commencement of the study will be covered. A final impact assessment will be carried out in the fifth year of project implementation. The remedial measures arising from these studies will be implemented as needed. The grievance redressal committee consisting of representatives from the state government, local administration, project authorities, elected local panchayat representatives and the PAPs has been constituted. This committee will redress the appeals received from the PAPs related to receipt of their entitlements and other assistance proposed in the RAP.

13. ***Consultations*:** As part of RAP preparation, seven formal consultations were held in which 142 persons participated. The discussions covered the impact of land acquisition and proposed resettlement measures, options for resettlement, site selection, opportunities for employment, etc. In addition, several informal consultations were held on a regular basis. A PIC is in operation in the project area at Bael since December, 2005, where all relevant documents are available for the local people. The PIC is managed by a full-time officer.

14. ***Sustainable Community Development Program*:** A stand alone SCDP has been prepared describing the proposed small infrastructure facilities to be developed in the project area for the next five years at an estimated cost of Rs. 256.8 million (US$6.2 million). This program includes: (i) implementation of basic infrastructural facilities in the affected villages; (ii) operation of mobile health van; (iii) award of scholarships to the wards of affected people and local people; (iv) sponsoring children to industrial training institutions for acquiring technical skills; and (v) support services to agricultural and horticultural activities. In addition, SJVN is providing financial support to the state government for undertaking development works such as construction of a bus station at Rampur, construction of senior secondary school, and widening of the road from Wazir Bowri to Bael village.

15. ***Implementation Progress till date*:** Implementation of the RAP and Community Development Program has commenced and the progress related to RAP is summarized below:

a) The project has obtained the clearance of the Ministry of Environment and Forest (MoE&F) for the use of all government forest land for project activities;

b) All the private land (approximately 14 hectares) required for civil works has been acquired and compensation has been paid; and

c) The land required for the resettlement of displaced families has been identified in consultation with PAPs and the agreement to sell has been obtained from the landowners. This land is being acquired directly through a willing-seller and a wiling-buyer basis shortly.

16. Implementation of the community development action program has also commenced. The key activities completed so far include:

a) Commencement of mobile health van since January 2005 (so far about 10,000 people have availed of its services);

b) The first batch of 35 students, including 4 girls, from the project area have been sponsored for the industrial training course in the areas of electrical, motor mechanics, computers, fitters, refrigerators, etc.;

c) So far about Rs. 6.5 million has been spent out of Rs. 25 million earmarked towards first year budget of small infrastructure development in the affected villages. The development include improvements to foot bridges, access roads, street lighting and play ground, etc.;

d) Assistance of Rs. 0.26 million has been extended to 49 schools in the project area for the plantations in their compounds;

e) Support to the state government for the construction of a bus station at Rampur, construction of senior secondary school; and widening of road from Wazir Bowri to Bael village. Approximately Rs. 70 million has been provided so far for these works;

f) Award of petty contracts worth Rs. 95 million to the local people and another Rs. 12 million to the project-affected people; and

g) 15 vehicles hired from the local people on lease basis which will provide assured monthly income.

B. ENVIRONMENTAL MANAGEMENT

Environmental Impact Assessment, Management Plans and Monitoring Arrangements

I. Overview

Project Location

17. The Rampur hydropower project is located on the River Sutlej, near the town of Rampur in the Shimla and Kullu districts of Himachal Pradesh. The project area is enclosed by latitudes 77°35'N and 77°43'; and longitudes 31°23'E and 31°30'E. The project is designed to divert water from the tailrace pool of the Nathpa Jhakri power project (located near village Jhakri on the east bank of the River Sutlej) through a 15 km head race tunnel to a surface power station (located near Bael village on the west bank of the River Sutlej). Various sites of the project will be approached by project roads connected to National Highway-22A on the east bank of the river. This is a run-of-river project and will lie between two run-of-river projects: the upstream and operating 1,500 MW Nathpa Jhakri project (which has a small dam for diurnal storage) and the proposed Luhri project downstream..

18. The River Sutlej rises in the Tibetan Plateau (near Rakastal – Lake Mansarovar at an elevation of approximately 4570 m above mean sea level). It flows for about 1,450 km (320 km in China, 758 km in India, and 370 km in Pakistan) before it meets the River Chenab and subsequently the River Indus. The catchment area of the River Sutlej at Rampur is approximately 50,800 km^2 (49,800 km^2 at Nathpa Dam), of which about 30 percent falls in India and the remaining in China. The catchment, particularly in China, receive little rainfall and precipitation is mostly in the form of snow. A small percentage of the project catchment receives precipitation due to the south-west monsoon (June-September).

Environmental Context and Project Location

19. The project area and the project's influence area are located in the lower Himalayas, and is characterized by rugged topography with steep hills (altitude varying from 850m to 2000m). The area experiences subtropical to sub-Himalayan climate and is sparsely vegetated. The immediate vicinity of the project supports patches of dense forests, but has a long history of deforestation. The hill slopes are steep, and are generally covered with sparse vegetation, over burden and outwash material. Most of the human population in the project's influence area is concentrated in the villages along the highway and the connecting district roads.

20. Although forestry is the major land use in the hill state of Himachal Pradesh (with 37,033 km^2 or approximately 66 percent of the state area under legally defined forests), there has been a long history of forest degradation. As a result, only about 8976 km^2 area of the state currently is classified as "dense" forest, and the remaining is a mix of "open" forests, meadows, grasslands and barren scree slopes. Most of the good quality forests remain in the relatively remote and inaccessible areas, whereas the forest cover near the traditional settlements, major towns and near major transportation routes are relatively poor. The patches of good quality forests close to the major transportation routes, such as highways are result of government initiatives for protection of forests since 1980.

21. As part of the government plans and programs for managing forests, biodiversity and wildlife, vast tracts of forest land is currently being protected in the state. Of these, 1896 km^2 (5.1 percent of state area) are reserved forests, and 11,378 km^2 (31 percent of state area) are demarcated protected forests. These areas support 3295 plant species (7 percent of the total plant wealth of India). Similarly, for conservation of biodiversity and wildlife, an area of 7000km^2 (12.7 percent of the state area) are under the protected area network, which include two national parks (1440 km^2) and 32 wildlife sanctuaries (5562 km^2). This protected area network supports 5721 recorded wildlife species (7.4 percent of the total animal wealth of India).

22. Owing to historical reasons combined with the natural setting, areas around the Rampur project have relatively poor forest cover or biodiversity. The project is located by the side of a major transportation route (National Highway 22A), and in the midst of a number of traditional settlements including the major town of Rampur. The steep rocky slopes by the deep gorges of the River Sutlej and its tributaries do not support good forests. There is no reserve forest and only 12 patches of protected forests within the project's influence area (defined as an area 7 km around the project). The protected forests (about 20 km^2) overall occupy about 8 percent of the project's influence area. The closest of the protected forest patches, the Baruni Protected Forest is located about 750 m away from the project; all others are more than 2-3 km away. Of all the protected areas of the state (national parks and wildlife sanctuaries) none is located within the project's influence area, and the closest one – the Rupi-Bhava Wildlife Sanctuary – is located 13 km away from the project.

23. The project area falls under Zone-IV (high damage earthquake zone) as per the seismic zoning map of India (IS:1893-2002), with epicenters of 29 recorded earthquakes of magnitude greater than 5 in the Richter scale, within 200km of the project, but none within 50km of the project site. The Detailed Project Report (DPR) prepared for the project addresses seismic performance by calculating stresses induced in key components of the project under seismic loading. The considerations are also made on permanent deformations induced by seismic loading.

Impact Assessment Process

24. The Rampur hydropower project is classified as a Category A operation under the World Bank environmental screening procedures specified in operational policy 4.01. The project triggers six of the ten World Bank safeguard policies[49/] and required comprehensive environmental assessments. The project also required a comprehensive EIA stipulated by GoI as well as GoHP. An initial environmental impact assessment was prepared by *WAPCOS Ltd. (India)* along with the detailed project report. The baseline surveys covered the period from June 2003 to September 2004. Subsequently, six supporting studies by independent consultants were undertaken to enhance the analysis, which involved additional detailed field investigation and community consultations over a period of about a year (November 2005 – November 2006). Further, the Himachal State Forest Department prepared the catchment area treatment plan, and an emergency preparedness plan was prepared in-house. The initial EIA, background studies and plans have been integrated into a consolidated environmental assessment and environmental management plan (EA/EMP) by *DHI (India) Water & Environment Pvt. Ltd.*

[49/] These six World Bank Safeguard Policies are those on - Environmental Assessment (OP/BP 4.01), Forests (OP/BP 4.36), Cultural Property (OPN 11.03), Involuntary Resettlement (OP/BP 4.12), Safety of Dams (OP/BP 4.37), and Projects on International Waterways (OP/BP 7.50).

Policy and Regulatory Framework

25. From the point of view of environmental impact assessment, the project is subject to a variety of national and state laws, and rules and regulations. Among these, the prominent are the following:

a) The Forest Act 1927; the Forest (Conservation) Act 1980; the Wildlife (Protection) Act 1972; National Wildlife Action Plan 1983, revised 2002; National Conservation Strategy 1992; National Forest Policy, 1988;

b) The Environment (Protection) Act 1986; the Environmental Impact Assessment Notification, 1994

c) Government of Himachal Pradesh Order on Minimum Flow of Rivers, 2005.

26. According to the prevailing procedures, the project required (i) forestry clearances; and (ii) environmental clearances. Forestry clearances were required to acquire forest land (although none of the area acquired was defined either as reserved forests or as demarcated protected forests) and clear felled approximately 1000 trees on such land. These were obtained through a process of joint verification of land and trees by the forest department of GoHP.

27. The project has obtained the three-stage environmental clearance from the Ministry of Environment and Forests, GoI (MoE&F). The final environmental clearance to the project was granted on March 31, 2006. This was preceded by the Stage I and the Stage II clearances from MoE&F; the forest and environmental clearances by GoHP; and a no-objection certificate from the Himachal Pradesh State Pollution Control Board, based on formal public hearing of the project.

28. The project does not require any regulatory clearance under the GoI Ancient Sites and Remains Act, as it does not impact, directly or indirectly any known or notified cultural heritage resource. The State Department of Culture had also provided no-objection to the project on the basis that no cultural property is impacted by the project.

Key Safeguard Documents

29. A detailed description of the project's baseline environmental conditions; probable adverse social and environmental impacts; and detailed environmental and social management plans including institutional responsibilities, implementation schedules, budget, and arrangements for monitoring and evaluation, are provided in the following documents (i) the Environmental Assessment and Management Plan (EA/EMP) *consolidated and prepared by DHI-India Pvt. Ltd.*; (ii) Baseline socio-economic survey of project-affected people by Himachal Pradesh University; (iii) Resettlement Action Plan (RAP) *prepared by Consulting Engineering Services India Ltd.* (CES); (iv) Social Impact Assessment (SA) *prepared by FQA Management Services Pvt. Ltd.*; and (v) Sustainable Community Development Program (SCDP) prepared by SJVN in assistance with CES.

30. The EA/EMP is supplemented by the following supporting documents: (i) Study of the Managed River Flow in the project stretch of the River Sutlej *prepared by DHI-India Pvt. Ltd.*; (ii) Assessment of the Terrestrial Biodiversity Impacts from the project *prepared by Consulting Engineering Services India Ltd.*; (iii) Analyses of Induced Impacts of the Rampur Hydropower Project and Cumulative Impacts of Hydropower Development in the Sutlej Basin in India *prepared by DHI-India Pvt. Ltd.*; (iv) Safety Assurance Plan for the project *prepared by National Safety Council of India*; (v) Catchment Area Treatment Plan for the project *prepared by the Himachal State*

Forest Department; and (vi) Archeological Study Report. The project has also prepared an Emergency Preparedness Plan (EPP), the summary recommendations of which are incorporated in the EMP.

Public Consultation and Disclosure

31. The project has engaged stakeholders including the project-affected people to discuss different aspects of the project over the last three years. SJVN has organized community meetings, meetings with village elders and elected leaders of the villages. During the preparation of EA and social assessments, a number of informal but significant meetings were organized. As part of the regulatory clearance process, a formal public hearing was organized. At Bael village, a public information centre (PIC) was set up in December 2005, where the local community and any other stakeholders have full access, and this PIC has been helpful for the local public in recording their views about the project. Additionally, SJVN has sponsored and participated in traditional village fairs, special events such as the Republic Day celebrations, and sports events in all the villages in the project area.

32. As part of social assessment, 17 consultations were held with various stakeholders such as local villagers, elected representatives of the affected people, government officials, women and youth organizations, media persons, etc. A total of 207 persons participated in these meetings. The key issues discussed included employment opportunities, health and education facilities, concerns about drying water sources, impact of tunnel construction, mobile health facilities, and monitoring project implementation of community development activities, etc. The proposed measures for the above concerns are incorporated in the RAP and the SCDP. Similarly, as part of RAP, seven consultations were held in which 142 persons participated and discussed the impact of land acquisition and proposed resettlement measures, options for resettlement, site selection, opportunities for employment, etc.

33. The EIA report (based on which regulatory clearance for the project was granted) was disclosed before the formal public hearing, with assistance from the state pollution control board. The revised EA/EMP, SA, RAP (including its translation of the Executive Summary in the local language - Hindi) and SCDP reports have been disclosed, in October 2006 in PICs in Bael village and Jhakri, public libraries in Shimla and Kullu, and in the SJVN corporate office in Shimla. All the documents are also available online in the Rampur hydropower project webpage (accessible through the SJVN website – www.sjvn.nic.in). The availability of these documents was also announced in the local newspapers (both English and Hindi newspapers) in October 2006. The current (January 2007) version of the Executive Summary of the EA has also been locally disclosed.

34. A complete set of these safeguard documents can also be found in the Bank's Info Shop in Washington DC and the Bank's Public Information Center in New Delhi, where these have been available since October 2006. A final round to publicly disseminate the final versions of these safeguard documents was held at PIC in Bael village on March 30, 2007 and was attended was more than 200 persons.

II. Analysis of Alternatives

Identification of the Rampur Hydropower Project

35. The key GoI policy statements that guide hydropower development are the National Policy for Hydropower Development (1998) and the 50,000 MW Hydroelectric Initiative (2003). The latter sets a long-term target for hydroelectric power to meet 40 percent national generation mix, and medium term target as 28.63 percent of generation mix by end of the Tenth Five Year Plan (the starting point being 25 percent in 2003). The policy statements describe the policy objectives of hydropower development as: (i) environmental benefits, in particular avoidance of pollution and emissions from thermal plants; (ii) benefits for power system operation, especially for meeting peak demand; and (iii) energy security - reducing exposure to fuel price and supply risks. The policy statements also propose several policy actions to promote hydropower.

36. A key feature of these policy statements is the concept of planning for the development of a "shelf" (portfolio) of hydroelectric projects. India had adopted a portfolio approach to project development given: (i) the scale of projected demand increases relative to individual project size; and (ii) the benefits of having a portfolio of projects in terms of diversifying project development and timing risks.

Initial Ranking

37. In October 2001, the Central Electricity Authority (CEA) produced a study which ranked 399 candidate hydropower schemes (with an aggregate capacity of 106,910 MW) into three categories (A,B & C) according to the following criteria: (i) R&R impacts; (ii) whether the projects are in areas subject to international water treaties; (iii) likelihood of delay due to complexities of inter-state co-ordination; (iv) project size; (v) type of scheme, preference being given to projects that do not involve large storage; (vi) height of dam, preference being given to projects with lower dams; (vii) length of tunnel/ channel, preference being given to projects with shorter tunnels; (vii) status of upstream and downstream hydroelectric project development, preference being given to projects on rivers where there are already other projects; (ix) accessibility of site; and (x) status of project development, preference being given to projects for which site investigations and feasibility studies are ready. This approach, therefore, screened a large number of candidate projects using proxy indicators for: (i) environmental impact; (ii) political risk; (iii) construction risk; (iv) project cost; and (v) development lead time. The Rampur hydropower project is a CEA category A project, high in the development portfolio.

Analysis and Prioritization

38. A major activity under the "50,000 MW" (2003) initiative was preparation of "Preliminary Feasibility Reports" (PFRs) for 162 new hydroelectric projects. CEA was entrusted with the responsibility of leading this exercise, and it in turn tasked a number of agencies to prepare these reports following a standard guideline. PFRs include a conceptual project design, preliminary project and equipment layouts, environmental and geological studies, planning for power evacuation, cost estimates and financial appraisal. The 162 PFRs where then screened according to the following criteria: (i) projected levellized tariff below Rs. 2.50/ kWh – 78 met this criterion; and (ii) excluding projects with major environmental impacts or international issues – five were excluded on this basis. Therefore, 73 projects were selected for detailed feasibility analysis, that is, preparation of "detailed project reports" -- Rampur hydropower project is one of these. Each of these projects is being

followed up by GoI. The Rampur hydropower project falls within the top ten projects (excluding the small projects 27-85 MW) in the Indus basin and as such is high on the government priorities.

39. The detailed project report follows a methodology specified by CEA. The main components of this feasibility analysis are: (i) comparison of alternative technical options for exploitation of the hydropower resource; (ii) hydrological analysis; (iii) quantification of power generation potential; (iv) site survey; (v) geological investigation; (vi) construction methodology and equipment design; (v) environmental assessment; and (vi) financial analysis.

The "No Project" Alternative

40. The Rampur hydropower project ranks high in the hydropower development program in India. Currently, India faces severe power shortages (10 percent average, and 13.5 percent during peak hours), which translate into a substantial loss to the economy. India will require an additional 100,000 MW of generating capacity by 2012, even with a significant pace of loss reduction and enhanced efficiency gains, to continue with its current growth trajectory and to provide universal access to electricity. If India continues to rely heavily on indigenous coal resources and supplies and consumes energy under a "business as usual" scenario, it might produce 13 percent of the world's total CO_2 emissions by 2031, up from the current share of 4 percent of global CO_2 emissions. For a "lower carbon" development path, it would be important that cleaner power generation activities, such as hydropower are scaled-up; and a substantial portion of the new and additional generation capacity should come from hydropower.

41. A "no-project" scenario will ensure that the resulting increased demand-supply gap for electricity will be filled up by development of additional coal fired power stations (the fuel of choice given India's abundant coal reserves) during off-peak time and small diesel or coal fired plants during peak time. These would result in significant net increase in GHG emissions (12,000 tonnes of SO_x, 6,000 tonnes of NO_x, and about 2 million tonnes of CO_2).

42. Owing to the finite nature and limited number of feasible of hydropower projects, it is unlikely that a gap created by not developing the Rampur project can be filled up by developing another hydropower project which is currently low in CEA's ranking and feasibility studies. Even if any such project replaces Rampur, the environmental and social impacts of that project will be higher than the Rampur project (as the CEA studies include consideration of environmental and social footprints).

43. Hydropower is a major resource in Himachal Pradesh and is important for the state's economic progress and revenue accrual. Back of the envelope calculations indicate that the state is expected to earn annually about US$245 million of revenue as royalty from hydropower projects in 2013, which is more than 17 percent of the state's current level of own tax & non-tax revenue receipts and more than double the state's current level of own non-tax revenues. A "no-project" scenario would mean an annual revenue loss of US$18.25 million for the state (which is equivalent to 1.25 percent of the state's current revenue receipts, or about 16 percent of current non-tax revenue receipt). It is unlikely that a coal fired plant (that would come up as a response to the "no project" scenario) will be established in Himachal Pradesh, being away both from the coal mines and the centers of power demand. The "no-project" scenario therefore will also mean a forgone power production worth more than US$100 million annually in 2013 and thereafter, which is equivalent to 1.9 percent of the current state gross domestic product.

44. The "no project" alternative is therefore not a desirable option.

Design Alternatives for the Project

45. Six alternative layouts were formulated and analyzed for the Rampur hydropower project. As the intake structure for the project had already been built along with the outfall structure of the 1,500 MW (6 x 250 MW) Nathpa Jhakri project – this intake aspect is a constant in all the six alternative layouts.

46. *Alternative I*: This involved a short tunnel on the left bank followed by an inverted siphon aqueduct and further transfer tunnel on the left bank. The surface powerhouse would be located on the right bank of the River Sutlej near the Bael village to use a gross head of 138.7 m with an installed capacity of 412 MW. For this alternative, no de-silting arrangement or storage reservoir was envisaged since only silt-free and regulated flows from the tailrace of the Jhakri powerhouse were proposed to be used for power generation. During construction, this alternative would have encountered problems of handling a large diameter steel-lined inverted siphon aqueduct and problem of accumulation of silt at the bend or depression points of the inverted siphon during operation. Further, the siphon would have to be long due to (i) the need to achieve workable gradients; and (ii) the requirement of clearance of its ends from river banks.

47. *Alternative II*: This was a modification of Alternative I. The difference was that the river crossing was proposed by means of a 43.2m long cut and cover reinforced cement concrete conduit in place of the deep siphon aqueduct proposed in Alternative-I. In addition, construction of upstream and downstream coffer dams and a concrete lined horseshoe-shaped diversion tunnel were also involved.

48. *Alternative III*: This was similar to Alternative-II except that the powerhouse would be located near Behna village at the confluence of Behna Khad with the River Sutlej about 20 km downstream of outfall of Alternative-II to gain an additional head of 80.22 m. The unfavourable rock conditions for the powerhouse were found to add complexity to this alternative which already required a very long (even longer than NJHP) head race tunnel.

49. *Alternative IV*: In this alternative, the powerhouse was envisaged on the left bank of the River Sutlej. It involved a 11 km long head race tunnel on the left bank of the river from Jhakri to Nogli. A long tailrace tunnel of around 8.2km would also be required for releasing water back to the river. In this alternative, the HRT would encounter overburden or inadequate rock cover in the initial stretch. The powerhouse caverns would have to be set deep inside the hill and reinforced. The tailrace would also pass through unfavorable rock classifications; and an additional surge shaft in the downstream water conductor would be required, since it is so long. The only suitable site for an adit would be too close to the populated Rampur town, and this was considered unlikely to be permitted.

50. *Alternative V*: This comprised all the features of Alternative-II and also involved picking up additional water from the River Sutlej at a point downstream of its inter section with Kajo Khad by constructing a diversion dam. It was thus proposed to utilize additional water volume of about 150 cumec through a second parallel HRT. An underground de-silting chamber and an additional tail race tunnel would also be required. This alternative would utilize a gross head of 138.7 m with an installed capacity of 574 MW and a design discharge of 533.88 cumec. The geo-technical features of this proposal were similar to those for the Alternative II. The difference lay in the introduction of a

diversion dam across the River Sutlej, an additional HRT diameter coupled with a de-silting chamber for picking up the additional 150 cumec of water during the monsoon months.

51. *Alternative VI*: This contemplated the construction of a pickup gravity dam with a dam toe powerhouse near the Bael village so as to utilize the entire releases of the Jhakri powerhouse besides the additional water generated from the intermediate catchment area. The height of the dam was to be approximately 140 m so as to fully utilize the available head between Jhakri power house and Bael village. The length of the dam at the top would exceed 600m at this location. Besides, a large portion of Rampur township, Brau, Nogli and other villages would have to be displaced. A wide stretch of arable land would be submerged. Three main bridges, the National Highway between Khaneri and Nirsu on the left bank and the Rampur bypass road on the right bank as also the link roads on the two banks would have been affected. In addition, the 2.5 MW Nogli power station and some of the transmission towers of SJVN would also be submerged.

Identification of the Most Favourable Alternative

52. Based on the preliminary studies of geological features, environmental and sociological aspects, project components and operational parameters discussed above, Alternative I, IV and VI were not considered for further examination. Power potential studies and selection of the optimum proposal with respect to the Alternatives II, III and V were taken up. The parameters for such investigation included water availability, water levels in intake pool, tail water level of powerhouse, water conductor losses, rated head, power generation and installed capacity, and investment cost. From all perspectives, Alternative II is technically feasible, optimum from social and environmental impact points of view, and economically the most attractive (see Table 3).

Table 3: Summary Analysis of Alternative Project Designs

Alternative	Reason for Rejection	Energy Generation (MU)	Tariff (Rs/kWh)		Investment Cost (Rs. million)
			Levelized	First Year	
I	Geological uncertainties	Note: Considerations include suitability of available construction material, huge and insurmountable silt load issues.			
II	-	2021.98	1.75	1.94	21459.50
III	-	3329.3	1.97	2.18	39696.40
IV	Geological features, social issues	Note: Considerations include inadequate rock cover, excavation in fragile material, huge seepage problem; adit at Rampur town.			
V	-	2366.54	2.81	3.11	40326.60
VI	Social and environmental impacts	Note: This includes storage and consequent high levels of loss of forests and private properties. Additionally, the town of Rampur and other human settlements would need to be displaced.			

III. Summary of Environmental Impacts and Mitigation Measures

Impacts on Forests, Natural Habitats and Wildlife

53. Baseline studies were conducted for the project's influence area (PIA – 7 km area around the project), the project's immediate influence area (PIIA – 1.5 km area around the project), and the directly affected areas (DAA – which includes all 86.5 hectares of land being acquired for the surface level works of the project, of which 48.9 hectares is forestland).

54. The baseline data and a comparison with the available data for the state, or the Sutlej basin as a whole suggests that the project's influence area is relatively poor in terms of forest cover, plant wealth, wildlife and biodiversity. The projects immediate influence area and the directly affected area has the minimum possible forest types in hilly areas -- sub-tropical euphorbia scrub and dodonea scrub, which are sparsely distributed along the foothills and hill slopes. Only four species of wildlife were reported from the project's influence area of which the Himalayan black bear is reported only during summer while musk & barking deer showed altitudinal migration during winter. The common leopard is reported to follow cattle, goat, sheep herds commonly surrounding the villages in forest areas. No endangered, rare or protected species is found from the project's immediate influenced area or the directly affected area.

Table 4: Comparative Status of Forests and Natural Resources in the Project Area

Parameter		Himachal Pradesh	Sutlej Basin	Project's Influence Area	Project's Immediate Influence Area	Project's Directly Affected Area
Forests	Type	9	8	4	2	2
	Sub-Groups	36	9	10	2	2
Flora (total trees, shrubs, climbers, grasses, ferns, epiphytes, etc).		3256	NA	119	77	63
Flora: Diversity Index		-	-	-	1.17 – 1.41	0.27 – 1.3
Protected Areas	National Park	2	1	0	0	0
	Wildlife Sanctuary	32	8	0	0	0
Existence of Endangered/ Threatened/ Rare Fauna (number of species).		11	11	1 (Common Leopard) Altitudinal Migration – 3 more species	0	0
Other Wild Fauna		5710	NA	58	None (only domestic animals)	

55. The impact of the project on the existing landscape, at the basin or even a district level is truly insignificant, owing to the environmental setting of the projects. Impacts at the more immediate level will also be small, if not insignificant. The project acquires 48.9 hectares of degraded forest land (with very little forest or tree cover), and notionally acquires (but does not disturb – as the works are deep underground) another 20.47 hectares of similar degraded forest land over the tunnels. Together these represent 0.07 percent of the total forest area of Rampur and Anni forest divisions (which together have 90,596 hectares of legally defined forests).

56. There are total 12 protected forest under the study area of which six forest fall in the Rampur division and the remaining six in the outer Seraj division of Kullu district. The details of the protected forest are given in Table 5. None of these are directly impacted by the project.

Table 5: List of Protected Forests within the Project's Influence Area

Within Rampur Forest Division	Distance (km)	Anni Forest Division	Distance (km)
Bahli Protected Forest	2.5	Marha Kod Protected Forest	5.25
Banavali Protected Forest	3.0	Khaira Kod Protected Forest	4.0
Baruni Protected Forest	0.75	Ramgarh Kondi Protected Forest	3.5
Daran Protected Forest	5.5	Sanpatu Protected Forest	4.5
Gaura Protected Forest	3.5	Shikarwah Protected Forest	3.75
Sanathali Protected Forest	2.5	Tandi Thera Protected Forest	3.0

57. For each of the land parcels affected by the project, the diversity is very low. The highest value of diversity index recorded is 1.28 for the powerhouse and approach road area. For all other sites, the diversity index is even lower, indicating that the area is not rich in floral wealth and represents poor diversity (see Table 6).

Table 6: Diversity Index of Project Affected Area

Site	Diversity Index (H)	
	Trees & Shrubs	Grasses & Herbs
Cut and Cover Head Race Tunnel	0.27	0.39
Dumping Area (near Kazo Adit)	0.90	0.58
Dumping Area (near Kunni Adit)	0.97	0.73
Kazo Adit	0.27	0.27
Kazo Job Facility	0.48	0.79
Kazo Approach Road	0.51	0.66
Kuni Adit	0.28	0.29
Goshai Adit	0.34	0.29
Dumping Area (Nirmand Bridge)	0.83	0.46
Averi Dumping Area	0.59	0.16
Surge Shaft Area (Approach road)	0.78	0.28
Powerhouse Area (approach road, tailrace and job facilities)	1.28	0.75
Quarry Road, Crusher and Job Facilities	0.97	0.76

58. The project will clear fell 1075 trees, of which 996 are (exotic) eucalyptus trees, which were planted earlier by the forest department. The other 79 trees to be felled (*Dalbergia sissoo, Melia azadirach, Grewia oppositifolia, Toona ciliate, Pinus roxburghii, Morus alba, Acacia leucophloea, Salix sp, Ficus palmate*) are commonly distributed throughout the project's immediate influence and influence area. No endangered, rare, threatened or endemic tree or shrub would be lost due to felling in the project area. Owing to their common distribution, the loss of these trees and shrubs will not significantly affect the existing biodiversity status of either the project influence area, the Sutlej Basin in general, or Himachal Pradesh in totality. It will also not affect the structure composition of existing forest types, forest cover, or distribution characteristics of flora.

59. To compensate for the loss of the forestland that is acquired, a compensatory afforestation (CA) plan will be implemented by the State Forest Department. The CA will be carried out on 139 hectares as per the Forests (Conservation) Act 1980 in Arsu and Nichar ranges of Ani forest division. The impact of the project will be more than sufficiently compensated for by such afforestation. In fact development of 139 hectares of forested area instead of the 48.9 hectares of degraded forest land

will be an environmental enhancement in the area. Additional measures by the project includes payment of net present value of forests of about US$10 million (to generate forests of equivalent area elsewhere in the project's influence area), and a catchment area treatment plan, costing US$5.3 million.

60. The indirect impacts of project activities on flora are expected to be mostly limited to the project's immediate influence area. Indirect impacts will be due to various construction activities such as: (i) generation of dust due to earthwork, excavation, transportation of construction materials (sand, aggregate, cement etc), quarry, crusher and blasting operations; (ii) air pollution due to movement of construction vehicles, equipments and machinery; (iii) influx of laborers; and (iv) pollution generated through provision of labor camps established temporarily at construction sites etc. These impacts will be short term and limited to the construction period only. Long-term exposure of dust may affect some vegetation and lead to various morphological effects such as chlorosis, necrosis, discoloration and ultimately reduction in primary productivity. While this is important for the vast number of orchards in the project area, the project will take sufficient measures to control dust during the construction period. Blasting will be controlled, so as not to create great noise, although noise impacts on wildlife would not be significant owing to the lack of wildlife in the area.

61. The EMP also includes measures related to: (i) prevention of disturbance to forests and wildlife by construction labourers; (ii) procedures for disposal and management of muck and debris; and (iii) redevelopment of muck disposal sites (see below). Dumping areas are either devoid of vegetation or show a few weedy shrubs. Limited adverse impact on flora is expected as these shrubs are widely distributed in the project immediate influence area as well as project influence area.. To mitigate this loss of shrubs, an approved muck disposal plan should be strictly implemented. Although virtually no vegetation was recorded at the proposed quarry site, in order to avoid impacts due to quarry operations on the surrounding quarry site, adequate dust suppression measures need to be implemented. After completion of the quarry operation, the area will be redeveloped.

In-stream Flow Impacts and Water Quality Issues

62. The Rampur hydropower project will in effect be operated as a cascade station to the Nathpa Jhakri run of the river hydropower project. The only change in the river flow will occur between the intake works at Jhakri (where the Nathpa Jhakri tailrace water is currently re-entering the River Sutlej), and the tailrace outlet at Bael village. At Jhakri, the current flow of the river is constituted by (i) the water from Nathpa Jhakri tailrace, and (ii) the combined flow of all tributaries joining the River Sutlej between the Nathpa dam and Jhakri (except a stream called Shoulding, where six cumec of water is diverted to augment the Nathpa Jhakri lean season peaking power generation). The project uses all the water coming from the Nathpa Jhakri tailrace, but does not use any of the water coming through the tributaries.

63. The GoHP requires all projects to provide an in-stream flow of a minimum of 15 percent of the lean season flow, immediately downstream of any dam or diversion structure. The minimum lean season flow available at Nathpa dam is 47.4 cumec. Thus a minimum lean season flow of about 7 cumec would be required to meet the spirit of GoHP regulatory guidelines.

64. The maximum discharge of the River Sutlej goes up to 10000-12000 cumecs and the minimum discharge remains in the range of 70-80 cumecs. The absolute minimum 10-day flow at the Nathpa dam is 47.4 cumec (see Table 7).

Table 7: Minimum Flow at Various Locations from Khab to Suni (cumecs)

Site	Monthly Minimum		10 Daily Minimum		Absolute Minimum	
	90 percentile	60 percentile	90 percentile	60 percentile	Monthly	10 Daily
Khab	64	46	59	44	17	8
Nathpa	116	91	106	93	59	48
Rampur	104	92	102	89	69	65
Luhri	108	98	104	90	70	56
Suni	110	99	106	96	72	71

65. The flow data for tributaries meeting the River Sutlej between Nathpa and Jhakri stretch has been compiled using data measured by IIT Roorkee on a 10 daily basis for the months of October, November, December 2005 and January, February, March and April 2006. Further, the principal tributaries between Jhakri up to Bael village have been identified and mapped during February-March, 2006 at 10-day intervals. From all the tributaries alone (without any release from the dam except seepage), the combined minimum lean season flow at Jhakri is about 8.2 cumec. Between Jhakri and the town of Rampur, 11 other small streams (Kajo, Tunan, Kunni, Kasholi, Barauni, Pashada, Jakho, and Racholi) join the River Sutlej, with a combined lean season flow of 1.3 cumec. Further, between Rampur and Bael village tailrace outfall, two more streams (Badgai and Nogli) join with a combined lean season flow of 3.63 cumec. Therefore the minimum lean season flow available at Rampur town is 9.5 cumec, and just upstream of the tailrace outlet at Bael village it is about 13 cumec.

66. Detailed studies carried out to examine the issues of water pollution, and flushing required to take care of the pollution and sewage load in the stretch between the intake and outlet works of the project suggest that the available minimum lean season flow would be sufficient. There is no direct consumptive use of water (for drinking, irrigation and other household purposes) from the River Sutlej since it flows in such a deep gorge in this area. The natural springs and "chashme" are the key sources of water supply for people living in the area for their own consumption, livestock use and irrigation purposes. In most of the villages except those situated on high hills, the state department of water supply (department of public health) has provided piped water supply for domestic purposes. The existing plans to augment water supply also do not include use of any water from the River Sutlej. Irrigation in the area is rain fed or the very limited demand for water for agriculture practice (only about 10 percent of the land area is under agriculture) is being met by khuls (canals). Therefore, the reduced flow in the river due to the proposed project will not hamper the water supply schemes in the area.

67. Owing to geographical reasons, and the very high silt load coming down from snow melts in China and cold desert areas of the Spiti Valley, the aquatic life in the river is poor. Tremendous hazards are caused by the variable velocities of water, ice formation during winter, occurrence of periodic floods due to cloud burst and continuous rolling of the bottom material consisting of boulders, stones, gravels etc. The incidence of high flood causes dislodging of benthic organisms, but even so turbulent River Sutlej has provided micro-habitats for a few micro-organisms to get suitably adapted to the environment.

68. In order to document the type of fish available in the river, 20 days of monitoring was carried out during the month of March 2006. No fish were reported in the River Sutlej in the project area during the surveys of 1998, 2004 and 2006. However, fish were monitored in the side streams particularly Nogli Khad, Sumej Khad and Kajo Khad, near their confluences with River Sutlej. These side streams have less flow instability, favorable temperature and less turbidity than the main River Sutlej. The sole fish species monitored was trout (*Schizothorax spp, Schizothoraichthys spp.*) and it was caught downstream of the confluence of Nogli Khad with the main river. This is a small sized, migratory fish variety locally known as "asla". Market surveys (in four markets where fish is available in the project area - Tapri, Bhabanagar, Rampur and Bael) and consultation with the community and experts suggest that the main River Sutlej has very little fish population in the stretch between Jhakri and Bael. Only one person was found to be involved in fishing activity and that too on one of the side streams. For commercial purposes, fish is mainly brought from downstream areas like Bilaspur. Upstream, a few sites such as Sangla are being developed by the state fisheries department for sport fishing. Mahseer is a migratory fish, and was historically reported to be present in the River Sutlej. However, for approximately 50 years now its migration has been affected by the construction of the Bhakra dam on the River Sutlej. Even without the Bhakra dam, its availability in the project area is a remote possibility due to the low water temperature.

69. Rampur, which is the only town in the project area, has a sewerage scheme. The sewerage treatment plants have been damaged by floods and are only partially operational; however repairs are being undertaken. In the mean time most of the population of the town is served by septic tanks. Other than Rampur, no other town puts effluents into the river. In the Jhakri township, established under the Nathpa Jhakri project, the households are connected to the sewage pipeline network, which is finally connected to eight septic tanks. Most of the villages have a provision of soak pits (some up to 20-30ft deep) for collection of human excreta. Liquid effluent leaches into the ground and solid effluent is converted into manure after mixing with soil. There are no polluting industries. SJVN has proposed to fund establishing of a sewerage treatment plant, as part of the EMP, in order to treat the sewage flowing into the River Sutlej from the Jagatkhan and Brow villages located opposite Rampur town, to further improve the water quality.

70. As per the primary water quality criteria laid down by the Central Pollution Control Board, the Himachal Pradesh State Pollution Control Board has categorized the River Sutlej under 'A' category of water quality with respect to pH, DO and BOD in general. The critical parameter observed in the past in some stretches of the river is total coliform in which case the river comes down to 'C' category. The level of dissolved oxygen (DO) in the project stretch varies from 8 to 8.5 (mg/l) between Jhakri and Bael. The high DO levels in the river indicate high water quality in the study stretch. This may be because of higher water flow in the river and low environmental temperature. The pH value of 8.1 and 7.88 at Bael and Jhakri respectively indicates that the river water is slightly alkaline in nature. The level of biochemical oxygen demand (BOD) in the river is around 1.0 mg/l at all places except downstream of Rampur town, where the value observed was 1.2 mg/l. The BOD and COD values are very low, which indicates the absence of organic pollution loading. This is mainly due to low population density, low agro-chemical dosing and the absence of industries in the area. Water quality in terms of pathogenic bacteria appears to be good except immediately downstream of Rampur town, where faecal coliform was observed as 4 MPN/100ml and the value of total coliform was observed as 14. Otherwise none of the samples (Jhakri outfall, Rampur u/s, Bael) showed the presence of faecal contamination. Iron and zinc were found <.05 at the Jhakri outfall and at Bael. However, the value of mercury was observed to be on the higher side, touching 7.11 ppb at the Jhakri outfall, due perhaps to the mechanical processing taking place in the Jhakri powerhouse. However, all these values are much below the standard water quality norms.

Nevertheless, the fluorides level was of the order of 1 mg/l which just meets the permissible limit for drinking purposes (note: there is no supply of drinking water from the River Sutlej).

71. In the past, no major epidemic has been reported in the area. Thus, even without lots of sewage treatment facilities in the area, the pollution loading (organic and bacteriological) is well within the carrying capacity of the water available for dilution in the River Sutlej and its tributaries. The findings of the village-level surveys, data collected from the health department and government hospital, Rampur do not indicate the prevalence of water borne diseases in the area. However, during the summer (April-July) about 50 cases on an average have been recorded related to gastroenteritis, diarrhea and dysentery from the project area.

72. In light of the above, the parameters on which the medium and long term adequacy of the river flow will depend include: (i) desired dilution to the sewage; (ii) limited functions as aquatic habitation; and (iii) favourable flow condition for flushing of sediments. Adequate flow in the river, especially during the lean season, becomes essential to provide the desired dilution to the sewage, which is disposed off into the river with or without treatment. It is important to maintain the river ecology aesthetically as well as for the sustenance of its natural functions, that is, aquatic habitation etc. Several different scenarios of demand for water due to an increase in population in the project area and an increase in sewage load have been simulated for different flow releases varying from one cumec to 10 cumec as well as zero release. The studies suggest that the available minimum lean flow would be adequate for the needs of the water quality impacts in the Jhakri-Bael stretch. However, for maintaining water quality in the Nathpa Jhakri stretch, a release of 5 cumec from the dam would be necessary. The project will, in fact, release more water from the dam (7 cumec), as per the regulatory requirement of GoHP, which, according to the studies should be more than sufficient for water quality and aquatic life. All residual impacts due to managed river flow will be monitored by SJVN as part of the project's overall adaptive monitoring program, and all relevant actions including augmentation of lean season managed flow will be taken up if warranted by such monitoring.

Construction-Related Impacts

73. The management of construction-related impacts will be the responsibility of SJVN (through its contractors, as and where relevant, and as described in the EMP). The plans for managing the construction site impacts include: (i) plans and guidelines for managing and restoring the muck disposal sites (including advance protection measures for the sites, before muck is actually disposed in these sites); (ii) management and reinstatement of the quarries; (iii) management of effluent discharge; (iv) management of safety and health issues (including a plan to deal with HIV/AIDS risks); and (v) a chance find procedures for the conservation of cultural properties. These measures are described in detail in the EMP, and in the supporting environmental documents. Supervision and monitoring will be essential for ensuring full implementation of the detailed plans. These arrangements have been described as part of the EMP.

74. *Control of Pollution from Labour Camps during the Construction Phase:* The total population due to congregation of work force and their families during construction phase is expected to increase the local population significantly. This is likely to affect the existing infrastructure as well. The aggregation of a large labour population and technical staff during the construction phase is likely to put significant stress as a result of discharge of sewage, solid wastes and other pollutants. Thus, the EMP has identified a number of measures to maintain the facilities in labour camps, sanitation and sewage treatment facilities, solid waste management, and provision of a community kitchen.

75. *Environmental Management in Road Construction*: In hilly terrain, road construction often generates significant quantities of wastes (muck) due to stripping of rocks to make way for roads. The stripped muck is generally cleared by dumping the material along the slopes. This dumped material finally flows down to the valleys and ultimately finds its way in to the river. The EMP includes the following measures: (i) collection and dumping of stripped material in the designated muck disposal areas; (ii) protection against erosion; and (iii) bio-engineering measures to protect the road slopes.

76. *Muck Disposal*: For managing the 3 million m^3 of muck to be generated by the project, a muck disposal plan has been prepared. The plan includes, over and above reuse of part of the muck as construction material for the project, site protection and rehabilitation measures which include civil works, vegetative measures, fencing and planting. As three of the four dumping areas are located closed to the River Sutlej, there are chances of rolling down of muck and loose material leading to blockage in river flow or contamination of water due to silting. To avoid this, retaining walls of 2–7 m height are to be developed along the banks of the river at all muck disposal areas.

77. The EMP includes measures to control air pollution and noise pollution. All crushers will have cyclone and particulate filters. Workers will be provided with effective personal protective gear such as masks, ear muffs, or ear plugs. Equipment and machinery will be maintained regularly to keep the noise generation at the designed level. Silencers and mufflers of the individual machinery will be regularly checked. The sewage generated from various labor camps will be treated in septic tanks before disposal by discharging into the river. The septic tanks shall be located so as not to pollute the drinking water sources.

Transmission, Township, and Workers' Camps

78. The project will not construct any new power transmission lines. Power would be evacuated through a short loop-in loop-out arrangement by connecting it to the existing high voltage transmission line at Duttanagar. The existing transmission line was built following the environmental and social standards of POWERGRID, which is recognized to be among the best in India. Similarly, the project will not construct any new township, and instead uses the existing facilities at the Jhakri township constructed by the Nathpa Jhakri project. The small project facility at Bael village and the camp sites for the contractors had been included in the assessments of impacts related to land acquisition and resettlement, biodiversity and forest, etc.

Safety of Workers and Communities

79. Given the typical context of Himalayan geology, and the substantial underground construction works, the project involves serious potential safety risks for the workers. SJVN has adopted, as part of its overall environment policy, a health, safety and environment directive – which includes the commitment to provide a safe place to work for its employees; it acknowledges that SJVN has the ultimate responsibility for compliance with all requirements of applicable safety rules and regulations. To implement this directive for the Rampur project, a site safety assurance plan has been prepared. This plan will install systems so that safe procedures are followed in the construction of the project (documented in the safety manual of the project).

80. The safety manual for the project describes a systems approach using an established standard similar to the well-known ISO 9001 standard and specifies the applicable safety policies and rules. It

also specifies the use of personal protective equipment for all workers. It also stipulates the standards and methods that have to be adhered to during the various stages of construction of the project – such as: (i) in cutting and welding operations, excavation and trenching, tunnel excavations and drill operations; (ii) in using explosives, cranes, ladders scaffolds and stairways; and (iii) in working around high voltage and in other electrical safety contexts, etc.

81. In the site safety assurance plan, a program approach to safety has been used, in which specific documentation and practices have been developed for the Rampur project. This project specific plan describes the responsibilities for safety assurance, including the organizational set-up to effectively monitor and manage compliance with SJVN's corporate safety directives. It spells out the methods and schedule for: hazard identification, employee orientation, subcontractor orientation and training,, accident investigation and reporting, contractor/ SJVN interface, safety documentation and record keeping and a safety incentive program. The plan also includes provisions for securing occupational health by ensuring hazard communication, hearing conservation and protection, respiratory protection, and prevention of infectious diseases. The plan details out the requirements for emergency response including worker refuge stations, evacuation of work area or jobsite, tunnel rescue team, and securing the accident scenes.

Impacts on Physical Cultural Resources

82. The project area does not have known archaeological or historical sites or remains. This has been confirmed by a field-based archaeological study of the project area. There is only a small possibility of impact on cultural properties (such as community religious properties, sacred groves, and chance finds). The EMP includes procedures to identify such properties, and mitigate and manage impacts in case such properties are affected.

Other Induced Impacts and Cumulative Effects

83. The induced impacts of the project could be increasing urbanization of the area around the project, particularly Rampur town, that could result in demand for water, effect on water quality due to increased sewage load, greater demand for timber rights from the forests, possible drying up of small water sources, and perceived damage to built properties. GoHP is constructing sewage treatment facilities at Rampur. The State Forest Department has already exhausted the stock to cater to future demand for traditional timber rights (for which new settlers also become eligible), and will not entertain demands from new settlers in the area. GoHP's hydropower policy commits that in the event of increased future demand for drinking water, all water allocation could be reviewed to ensure the primacy of drinking water supply. The project has committed that any water source that dries up during construction or operation of the project, the project will provide compensation, either by supplying water directly or by developing and protecting alternative sources. For this, the project, jointly with the villagers, has collected baseline data (on flow, location, use) including videographs of all the water sources in the villages in the vicinity. These water sources will be monitored as part of the adaptive monitoring program for the project. In addition, the project is also providing for augmentation of water supply to the villages as part of the SCDP. On the perceived damage to built properties – although it is unlikely that the underground works hundreds of meters below the surface could lead to such damages – the project has agreed to develop a baseline jointly with the villagers (complete with photographs and video), which will serve as a basis for compensation in the event of damages. Progress on this baseline is uneven, given the varied willingness of individuals to document their properties.

84. One of the major positive cumulative effects of hydropower development in the Sutlej basin is the creation of additional employment, especially for the local communities. In addition, part of the revenue from the projects, and the Rampur hydropower project in particular, will go to the state and can be used to provide better access to social amenities. The possible negative cumulative effects are influx of population to the project area, threats to biodiversity, deterioration of water quality, increased pollution levels in the Sutlej basin, and increased HIV/AIDS risks. Most of these possible effects had been described in the preceding paragraphs. In order to address the HIV/AIDS issues, the project will partner with the state-level initiatives under the National HIV/AIDS program, and will have close cooperation with the state AIDS control society. The project will implement through its contractors a program for awareness, diagnosis and referral as is the spirit of the National HIV/AIDS control program. Climate change, extreme weather patterns and increasing flash floods could also pose a set of risks to the project. These risks have been analyzed. The Rampur project uses water which is available through the Nathpa Jhakri tailrace, and is therefore protected from the impacts of flash floods or increasing and decreasing water flows unless the Nathpa Jhakri project is also impacted. Further, the economic and the financial sensitivity analyses suggest that viability of the project is not affected by the worst-case scenarios for climate change and possible extreme events.

Dam Safety

85. The Rampur hydropower project will not construct any dam, but will use tailrace water diverted by the dam earlier constructed by the Nathpa Jhakri power project. The Nathpa Jhakri dam was constructed following the Bank's policy on safety of dams (as the project was funded by the World Bank). During the construction of the Nathpa Jhakri project, a panel of experts was in place to advise SJVN on all aspects of construction of the dam and the underground works. In the case of Rampur project, therefore, the aspects related to safety of the dam needed to be only re-confirmed. Accordingly, SJVN engaged the Dam Safety Organization, Nashik to examine the dam and related works with respect to stability and maintenance of the structures. The safety of the dam was confirmed and this review will now be regularly followed up.

Operations Manual and Emergency Preparedness

86. An Operations and Maintenance (O&M) Manual has been drafted, which incorporates elements pertaining to civil works and addresses the issues of instrumentation, rock anchors in the rock slope upstream on the dam, tunnel de-watering and filling procedures, and gate operation in case of floods. The O&M manual will integrate the relevant elements of the emergency preparedness plan (EPP), which covers emergency identification, evaluation, and classification, where each emergency situation is analyzed in terms of identification (observations, monitoring, instrument readings), evaluation (comparison with reference values, descriptions, etc.), and classification (what measures to take). The EPP covers potential emergency situations such as excessive uplift pressures on the dam-concrete foundation contact, slope instability upstream of the dam (rock slope with anchors), emergency evacuation of the powerhouse (flooding, fires, etc.), and underground waterways incidents (partial or total tunnel collapse).

Riparian Issues

87. The River Sutlej is a tributary of the River Indus and is an international river, flowing through China, India and Pakistan. This run-of the river Rampur hydropower project is located in between two existing dams. The upstream dam at Nathpa, about 50 km upstream of the project, has a

small storage (an inundation of about 22 hectares, all within the river gorge, mainly for producing peaking power for the 1,500 MW Nathpa Jhakri project). The downstream Bhakra dam and the storage of Govindsagar were completed in the 1960s, and constitute a major multi-purpose project in northern India. The Bhakra Dam has a gross storage of 9,621 million m^3, and is about 200 km downstream of the Rampur project. Thus, there is no significant impact of the project related to water flow and availability on either the upstream or downstream riparian countries. The water quality impacts of the project are assessed to be minor even at the immediate project area, and would be truly negligible downstream of Bhakra. In addition, the River Sutlej is one of the three eastern rivers defined by the Indus Treaty (between India and Pakistan), and is earmarked for sole (consumptive) use by India.

88. According to the World Bank Policy on International Waterways, both the upstream and downstream riparian countries, China and Pakistan were notified and provided with relevant project details. No objection to the project was raised by either of the riparian countries.

Catchment Area Treatment Plan and other Environmental Enhancements

89. The River Sutlej flows in narrow deep channels with steep hills rising on either side in the project area. The hills are very steep with poor or no vegetation cover. As a result, the rate of soil erosion is high. Different forms of erosion such as sheet erosion, gully erosion, riverbank erosion are quite prevalent throughout the project affected/ immediate influence and project influence area. The common anthropogenic factors leading to erosion are overgrazing, collection of trees for fuel, fodder, timber and unscientific farming practices. The project activities accelerating soil erosion will be quite significant during construction phase and include excavation work, tunneling and blasting, construction of temporary and permanent road in project area to move vehicle, machinery, equipment and the workforce.

90. The induced impacts of the project are largely confined to the project's influence area, and relate to the dependency of local people on the forests. These impacts include various anthropogenic activities affecting the forest such as traditional timber rights, new migrant laborers, associated development, and induced commercial development.

91. The Forest Department, GoHP has formulated a catchment area treatment (CAT) plan for the Rampur hydropower project in order to address these catchment-wise issues. The objective of this plan is to ensure that the sediment load does not increase due to construction and operation of the project. The CAT plan also addresses the need to protect the watersheds in the region and, as per the directives of the GoHP. It covers measures regarding area treatment, soil conservation, and improvement of degraded forest areas within the project catchment. The plan will be implemented over a 10-year period at a cost of Rs.220 million.

92. The CAT plan will cover the following types of degraded area - degraded forest, degraded pasture and barren land, erosion prone area, treatment of active land slides, treatment of drains. In the open forest areas, the CAT plan will support replenishment afforestation, assisted natural regeneration, and development of NTFPs. As part of pasture improvement, it will provide for subsidiary silvicultural operation, treatment of erosion prone area, stabilization of active landslides, roadside erosion control, avenue plantation and landscaping. It will also support village infrastructure development, such as village ponds and tanks, soil and water conservation structures, repair of springs, baunes, water sources, strengthening of village paths and roads, treatment of private lands, distribution of seedlings, etc.

93. The project will support the GoHP program for development of fisheries in the state. GoHP has proposed to implement supplementary stocking program for snow trout (*Schizothorax richardsonii*), an endemic species. The stocking will be done annually by the fisheries department. To achieve this, facilities to produce seed of trout need to be developed at suitable sites, for which the project will contribute Rs.10 million, to be utilized for developing hatcheries. Similarly, the project will contribute Rs. 6.25 million to support the GoHP programs for conservation of wildlife.

Table 8: Budget for Implementation of Environmental Management Plan

Items Proposed in EMP		Implementation Responsibility	Budget (Rs. in Million)
Compensatory Afforestation including Payment of Net Present Value of Forests		HP State Forest Department (SFD)	66.03
Wildlife Conservation			6.25
Catchment Area Treatment Plan		SFD and SJVN	219.90
Muck Disposal Plan, including Restoration of the Disposal Areas		SJVN	23.66
Restoration and Landscaping of Sites Directly Affected by the Project		SJVN	2.50
Fisheries Development Activities		HP State Fisheries Department	10.00
Control of Pollution from Labour Camp during Construction	Sanitation Facilities	SJVN	21.86
	Solid Waste Management	SJVN	11.11
	Construction of Settling Tanks	SJVN	2.00
Sewage Treatment Facilities: Jagatkhana and Brow towns		SJVN	10.00
Pilot Works on Muck Dumping & Active Landslide Sites		SJVN	5.00
Public Awareness Program		SJVN	0.50
Development of Environmental Laboratory and Monitoring Instruments– for Rampur Project		SJVN	1.95
Environmental Monitoring during Project Construction and Operation		HP State Pollution Control Board	7.50
Independent Environmental Monitoring for Regulatory Compliance and Reporting		SJVN	10.00
Environmental Monitoring Equipment, Tools and MIS Software (Corporate & Project)	Environmental Monitoring	SJVN	5.50
	Silt Analysis	SJVN	3.00
	Emergency Communication and Information Systems	SJVN	3.50
	1:15,000 Topographic Maps	SJVN	2.50
Emergency Preparedness Plan: VSAT for Communication		SJVN	5.00
Adoption of Environment Management Systems (ISO-14000 & OSHAS-18000) – Rampur Project		SJVN	2.00
Panel of Safety Experts		SJVN	6.60
Implementation of Environmental Training Program (Corporate & Project)	On-Site Training	SJVN	17.20
	Off-Site Training in India	SJVN	5.60
	Overseas Training & Exposure Visits (Environment & Sediment Control)	SJVN	6.00
Total			**455.16**

IV. Implementation Arrangements

Institutional Framework

94. The primary responsibility to implement the EMP is of the SJVN, however, a number of EMP activities, such as the compensatory afforestation, the CAT plan, the fisheries and the wildlife conservation support activities will be implemented by the state government agencies.

95. In view of the extensive hydropower development planned in Himachal Pradesh and the limited capacity of the Forest Department of GoHP to implement the compensatory afforestation and catchment area treatment plan in the Sutlej basin, the Forest Department and the hydropower development agencies (particularly SJVN) will share the implementation responsibility. The overall principle of such division of responsibility would be to make best use of the comparative advantages for implementation (which suggests that all mechanical, i.e. non-plantation works will be implemented directly by the hydropower agencies). The cost norms will be as per the Forest Department norms, and overall monitoring will be done by the Upper Satluj Watershed Society (a part of the Forest Department). For the Nathpa-Jhakri and the Rampur projects, SJVN will discuss on the actual division of works with the Conservator of Forests (CF), Rampur Circle. The forest department will also modify the catchment area treatment plans, so as to treat the priority areas (such as current landslides) first. To this end SJVN and the CF, Rampur circle will review and agree on the modified CAT plan. Additionally, as per the recent discussion between the SJVN and the GoHP, an integrated CAT plan will be prepared for the entire Sutlej basin, based on satellite imageries and remote sensed data. SJVN will prepare this plan.

96. As per the recently notified power policy of the state, GoHP will constitute a multi-disciplinary committee under the chairmanship of Chief Minister for monitoring the issues arising during the implementation of the hydropower projects -- employment related monitoring, relief and rehabilitation, review of progress of LADC schemes, implementation of CAT plan, compensatory afforestation, environmental management plan, and restoration of facilities which get damaged because of the implementation of the project. The committee will also have participation of state Power Minister (Vice Chairman), Minister/Member of Legislative Assembly of the area where Projects are being executed, representatives of the hydropower company, representatives from various concerned state government departments, Chairman/Managing Director of the concerned Power Utility and Chairman, Local Area Development Committee (LADC). The committee will also review the recommendations (and implementation thereof) of the Forum of Hydroelectric Power Producers. The committee will draw up the methodology to regulate the payments to be made by the Company to the various departments of the government in connection with the implementation of the project.

97. The World Bank is also supporting GoHP through a technical assistance, financed by Public Private Infrastructure Advisory Facility or PPIAF, in preparing river basin development optimization strategies for the Sutlej basin. The ongoing study would demonstrate the methodology for optimization of hydro-development in the Sutlej basin with the goal of facilitating coordinated and sustainable development by private and public sector developers, with due regard for the environmental and social impact of river-basin-wide development. The optimization study will cover environmental and social implications of multi-project development, including but not limited to: (i) implications for water resource management, (ii) catchment area treatment plans, (iii) potential cumulative impact on natural forests and other protected areas; (iv) social impacts arising from multiple projects; and (v) communication and public outreach issues.

Adaptive Management of Environmental Issues

98. SJVN has adopted a corporate environmental mission statement and environmental policies. The SJVN mission statement ("...developing and supplying to the nation, state and local communities, and efficient, economic, environmentally sustainable, and socially responsible hydropower") stresses the need to develop adequate long-term capacity to mange environmental issues in all its projects. The environment policy specifically requires SJVN to develop and maintain adaptive environmental management mechanisms and adequate risk management systems. To this end, SJVN has prepared an adaptive environmental management plan for its corporate operations. This would help manage environmental issues in the Rampur project.

Continuous Stakeholder Consultation

99. The Rampur hydropower project will continue to engage the local communities and stakeholders, through periodic public consultation and meetings, special events such as cultural programs, and will take local communities view into account at all stages of the project's construction and operation. A community communication plan has also been prepared, and will be implemented by SJVN. The PIC will also continue to function throughout the project construction and operation period for continued public disclosure, and for recording public comments and suggestions. A committee consisting of representatives from the state government, elected representatives, PAPs and the project implementing agency has been constituted to serve as a grievance redressal committee to deal with the grievances of the project-affected people.

Institutional Capacity Building

100. SJVN has already taken a number of steps to augment the capacity of the environmental cell. For medium term capacity building, a capacity building plan has been prepared. It includes the development plan for staffing of the environmental cell, and procurement of monitoring equipments. Additionally, a detailed training plan has been prepared that includes training of the staff of the environmental and social cell, training of contractors' staff, as well as training of the corporate and project level managerial staff on environmental management.

Annex 11: Project Preparation and Supervision

INDIA: Rampur Hydropower Project

	Planned	Actual
PCN review	08/30/2005	08/30/2005
Initial PID to PIC	09/19/2005	10/12/2005
Initial ISDS to PIC	09/19/2005	10/12/2005
Appraisal	09/04/2006	02/19/2007
Negotiations	11/20/2006	7/23/2007
Board/RVP approval	02/20/2007	09/13/2007
Planned date of effectiveness	12/31/2007	
Planned date of mid-term review	03/31/2010	
Planned closing date	03/31/2013	

1. The key institution responsible for preparation of the project is Satluj Jal Vidyut Nigam Ltd. (SJVN). The Responsible agency is the Ministry of Power (MoP), Government of India.

2. During the project preparation phase, the Bank team took note of the deficiencies that occurred in the preparation of the Nathpa Jhakri project, and the findings of a QAG review which concluded that the loan proposal and approval had been undertaken too early. In the case of the Rampur project, the Bank team has a detailed knowledge of the project through frequent interactions with SJVN. Indeed, several of the team members were also on the Bank team for the implementation of the Nathpa Jhakri project. Site investigations by SJVN have been exhaustive, and have led into the preparation of the feasibility study and report, namely the detailed project report (DPR) which was prepared by SJVN's consultants, WAPCOS. The Bank team had several opportunities to review the drafts of the DPR. WAPCOS responded adequately to the comments and suggestions made by the Bank and its consultants, based on their reviews, site visits and on-site discussions. These comments are available in substantial Bank documentation on file in the form of letters and aide memoires agreed with and acted upon by SJVN and WAPCOS in finalizing the DPR. SJVN's project preparation also took into account the advice contained in specific studies and reports , for example, by the consultants, Halcrow International. Its report (May 2005) contained advice on risk management during construction, especially regarding special measures, which should be taken for tunnel construction in adverse conditions. SJVN have also employed an expert to review the electromechanical specifications and carried out modeling studies on the Rampur design and interaction with Nathpa Jhakri. Consultants have been, and will continue to be, engaged by the Bank or SJVN, now and through project implementation, to advise on methods to reduce the impacts of silt on plant and equipment; to advise on contract management and disputes resolutions; and other implementation issues which may arise. The project is now being presented to the Board in an advanced state in that the two major civil works contracts have been awarded, and bids for the other main contract, for the supply and installation of the plant and equipment have been opened.

3. Bank staff and consultants who worked on the project included:

Name	Title	Unit
Sunil Kumar Khosla	Co-team Leader / Sr. Energy Specialist	SASDE
Judith K. Plummer	Co-team Leader/ Sr. Financial Analyst	SASDE
Alessandro Palmieri	Lead Dam Specialist	ESDQC
I.U.B. Reddy	Sr. Social Development Specialist	SASDS
Tapas Paul	Sr. Environmental Specialist	SASDN
Manmohan Singh Bajaj	Sr. Procurement Specialist	SARPS
Sushil Bahl	Sr. Procurement Specialist	SARPS
Manoj Jain	Sr. Financial Management Specialist	SARFM
Sumir Lal	Sr. External Affairs Officer	SAREX
Sudip Mozumder	Sr. Communication Officer	SAREX
Rohit Mittal	Financial Analyst	SASDE
Joseph Daniel Wright	Economist	SASDE
Boonsri Prasertwaree Kim	Program Assistant	SASDO
Deepali Uppal	Program Assistant	SASDO
Ritu Sharma	Program Assistant	SASDO
Anthony E. Sparkes	Consultant	SASDE
Ashok Malik	Consultant	SAREX
Ramola Bhuyan	Consultant	SARFM
Sona Thakur	Consultant	SAREX
Peter S. Copplestone	Consultant	SASDE
Naseer A Rana	Adviser	SARSQ

4. Bank funds expended to date on project preparation:

- Bank resources: US$465,455
- Trust funds:
  DFID TF055160 US$75,515

Total US$540,970

5. Estimated Approval and Supervision costs:

- Remaining costs to approval: US$ 50,000
- Estimated annual implementation support cost: **US$150,000**

Annex 12: Documents in the Project File

INDIA: Rampur Hydropower Project

1. Letter from Department of Economic Affairs, GoI requesting possible assistance for the Rampur HEP (January 20, 2005)
2. Project Concept Note (PCN)
3. Project Information Document
4. Integrated Safeguards Data Sheet (ISDS)
5. Minutes of the PCN Review Meeting held on August 30, 2005
6. Quality Enhancement Review (QER) Report (April 2006) and Minutes (June 2006)
7. Detailed Project Report (May 2005) prepared by WAPCOS and its subsequent revision(s)
8. Rampur Hydroelectric Project: Review of Detailed Project Report (December 2004) - Geotechnical by Halcrow Group Limited (May 2005)
9. CEA's concurrence (Techno-Economic Clearance) for Rampur project (December 16, 2005)
10. Report on Tandem Operation and Plant Control by Halcrow (December 2005)
11. Baseline Demographic Socio-Economic Survey of Rampur Hydroelectric Project, Himachal Pradesh University, Shimla (2005)
12. Report on "Contract Management : Rampur & Nathpa Jhakri" by Peter S. Copplestone (October 2006)
13. Final Report on "Communications Needs Assessment of SJVN and RHEP" (October 2006)
14. Report on Economic Analysis by Peter Meier (June 2006)
15. Report of Safety Inspection – Nathpa Dam in NJHP (November 2006)
16. Note on " Financial accountability and corporate governance arrangements" (October 2006)
17. Note on Credit Assessment of SJVN, December 2006
18. Report of the SJVN Committee regarding running of Nathpa Jhakri power station in high silt conditions (November 2005)
19. Agreement between GoHP and SJVN for the execution of Rampur Hydroelectric Project (October 20, 2004)
20. Report on "Nathpa Jhakri – Sediment Inflow and erosion to turbines" by Daniel J. Gunaratnam (January, 2006)
21. National Electricity Plan, CEA (January 2006)
22. Operations and Maintenance Manual of NJHP (March 2007)

23. Executive Summary: Environmental Assessment for Rampur Hydropower Project, DHI (India) Water & Environment Pvt. Ltd. (January 2007)

24. Resettlement Action Plan (RAP) by Consulting Engineering Services India Ltd

25. Social Impact Assessment (SA) by FQA Management Services Pvt. Ltd.

26. Sustainable Community Development Program (SCDP) by SJVN in assistance with Consulting Engineering Services India Ltd

27. Study of the Managed River Flow in the project stretch of the river Sutlej by DHI (India) Water & Environment Pvt. Ltd.

28. Assessment of the Terrestrial Biodiversity Impacts from the project by Consulting Engineering Services India Ltd.

29. Analyses of Induced Impacts of the Rampur Hydropower Project & Cumulative Impacts of Hydropower Development in the Sutlej Basin in India by DHI (India) Water & Environment Pvt. Ltd.

30. Safety Assurance Plan for the Rampur project by National Safety Council of India

31. Catchment Area Treatment Plan for the Rampur project by the Himachal State Forest Department

Annex 13: Statement of Loans and Credits

INDIA: Rampur Hydropower Project

Project ID	FY	Purpose	Original Amount in US$ Millions				Cancel.	Undisb.	Difference between expected and actual disbursements	
			IBRD	IDA	SF	GEF			Orig.	Frm. Rev'd
P071160	2007	Karnataka Health Systems	0.00	141.83	0.00	0.00	0.00	146.25	3.67	0.00
P075060	2007	RCH II	0.00	360.00	0.00	0.00	0.00	371.31	30.00	0.00
P075174	2007	India AP DPL III	150.00	75.00	0.00	0.00	0.00	75.70	-151.17	0.00
P078538	2007	Third National HIV/AIDS Control Project	0.00	250.00	0.00	0.00	0.00	255.61	0.00	0.00
P078539	2007	TB II	0.00	170.00	0.00	0.00	0.00	147.98	-21.23	0.00
P083187	2007	Uttaranchal RWSS	0.00	120.00	0.00	0.00	0.00	125.38	6.32	0.00
P090585	2007	Punjab State Roads Project	250.00	0.00	0.00	0.00	0.00	229.11	-16.59	0.00
P090592	2007	Punjab Rural Water Supply & Sanitation	0.00	154.00	0.00	0.00	0.00	152.79	22.59	0.00
P090764	2007	Bihar Rural Livelihoods Project	0.00	63.00	0.00	0.00	0.00	62.74	0.00	0.00
P090768	2007	TN IAM WARM	335.00	150.00	0.00	0.00	0.00	478.72	-8.00	0.00
P096019	2007	HP State Roads Project	220.00	0.00	0.00	0.00	0.00	220.00	0.00	0.00
P097036	2007	Orissa Socio-Econ Dev Loan II	150.00	75.00	0.00	0.00	0.00	75.54	-150.65	0.00
P099047	2007	Vocational Training India	0.00	280.00	0.00	0.00	0.00	280.53	0.00	0.00
P100789	2007	AP Community Tank Management Project	94.50	94.50	0.00	0.00	0.00	189.98	0.00	0.00
P102768	2007	Stren India's Rural Credit Coops	300.00	300.00	0.00	0.00	0.00	598.26	0.00	0.00
P093720	2006	Mid-Himalayan (HP) Watersheds	0.00	60.00	0.00	0.00	0.00	54.35	5.43	0.00
P092735	2006	NAIP	0.00	200.00	0.00	0.00	0.00	188.16	-9.56	0.00
P091453	2006	VSBK Cluster Project	0.00	0.00	0.00	0.00	0.00	2.84	0.00	0.00
P090163	2006	FALG Brick Project	0.00	0.00	0.00	0.00	0.00	4.40	0.00	0.00
P086414	2006	Power System Development Project III	400.00	0.00	0.00	0.00	0.00	272.64	-127.36	0.00
P083780	2006	TN Urban III	300.00	0.00	0.00	0.00	0.00	262.16	47.91	0.00
P079708	2006	TN Empwr & Pov Reduction	0.00	120.00	0.00	0.00	0.00	111.51	-2.55	0.00
P079675	2006	Karn Municipal Reform	216.00	0.00	0.00	0.00	0.00	195.04	4.04	0.00
P078832	2006	Karnataka Panchayats Strengthening Proj	0.00	120.00	0.00	0.00	0.00	98.73	-25.71	0.00
P094513	2005	India Tsunami ERC	0.00	465.00	0.00	0.00	0.00	406.89	273.26	0.00
P077977	2005	Rural Roads Project	99.50	300.00	0.00	0.00	0.00	204.06	0.47	0.00
P077856	2005	Lucknow-Muzaffarpur National Highway	620.00	0.00	0.00	0.00	0.00	437.84	-32.16	0.00
P084632	2005	Hydrology II	104.98	0.00	0.00	0.00	0.00	93.08	42.77	0.01
P084790	2005	MAHAR WSIP	325.00	0.00	0.00	0.00	0.00	292.42	19.42	0.00
P084792	2005	Assam Agric Competitiveness	0.00	154.00	0.00	0.00	0.00	141.33	48.81	0.00
P075058	2005	TN HEALTH SYSTEMS	0.00	110.83	0.00	0.00	20.06	79.09	26.85	28.86
P086518	2005	IN SME Financing & Development	120.00	0.00	0.00	0.00	0.00	5.00	5.00	0.00
P073651	2005	DISEASE SURVEILLANCE	0.00	68.00	0.00	0.00	0.00	60.97	28.83	0.00

P073370	2005	Madhya Pradesh Water Sector Restructurin	394.02	0.00	0.00	0.00	0.00	359.68	93.23	0.00
P073776	2004	ALLAHABAD BYPASS	240.00	0.00	0.00	0.00	0.00	109.56	85.56	0.00
P073369	2004	MAHAR RWSS	0.00	181.00	0.00	0.00	0.00	50.39	-19.85	0.00
P050655	2004	RAJASTHAN HEALTH SYSTEMS DEVELOPMENT	0.00	89.00	0.00	0.00	0.00	65.60	43.47	0.00
P082510	2004	Karnataka UWS Improvement Project	39.50	0.00	0.00	0.00	0.00	16.48	12.18	0.00
P078550	2004	Uttar Wtrshed	0.00	69.62	0.00	0.00	0.00	58.65	-0.66	0.00
P067606	2003	UP ROADS	488.00	0.00	0.00	0.00	0.00	268.26	201.00	0.00
P071272	2003	AP RURAL POV REDUCTION	0.00	150.03	0.00	0.00	0.00	85.17	-2.36	0.00
P072123	2003	Tech/Engg Quality Improvement Project	0.00	250.00	0.00	0.00	40.11	68.32	12.57	-63.45
P073094	2003	AP Comm Forest Mgmt	0.00	108.00	0.00	0.00	0.00	40.81	0.52	0.00
P050649	2003	TN ROADS	348.00	0.00	0.00	0.00	0.00	227.67	107.87	0.00
P076467	2003	Chatt DRPP	0.00	112.56	0.00	0.00	20.06	75.22	60.33	0.00
P075056	2003	Food & Drugs Capacity Building Project	0.00	54.03	0.00	0.00	0.00	35.85	23.05	0.00
P050668	2002	MUMBAI URBAN TRANSPORT PROJECT	463.00	79.00	0.00	0.00	0.00	357.22	257.72	0.00
P069889	2002	MIZORAM ROADS	0.00	60.00	0.00	0.00	0.00	40.32	8.65	0.00
P071033	2002	KARN Tank Mgmt	0.00	98.90	0.00	0.00	25.07	52.93	53.98	5.96
P074018	2002	Gujarat Emergency Earthquake Reconstruct	0.00	442.80	0.00	0.00	115.24	97.57	135.90	-35.17
P040610	2002	RAJ WSRP	0.00	140.00	0.00	0.00	15.04	71.34	44.14	0.00
P050647	2002	UP WSRP	0.00	149.20	0.00	0.00	40.11	96.82	110.82	0.00
P050653	2002	KARNATAKA RWSS II	0.00	151.60	0.00	0.00	15.04	58.04	46.95	0.00
P072539	2002	KERALA STATE TRANSPORT	255.00	0.00	0.00	0.00	0.00	112.51	66.51	0.00
P010566	2001	Gujarat Highways	381.00	0.00	0.00	0.00	101.00	13.15	114.15	13.15
P070421	2001	Karnataka Highways	360.00	0.00	0.00	0.00	0.00	9.77	9.77	0.00
P055454	2001	KERALA RWSS	0.00	65.50	0.00	0.00	12.27	7.41	10.84	-1.98
P067216	2001	KAR WSHD DEVELOPMENT	0.00	100.40	0.00	0.00	20.06	40.30	43.07	27.45
P071244	2001	Grand Trunk Road Improvement Project	589.00	0.00	0.00	0.00	12.53	149.62	162.15	0.00
P055455	2001	Rajasthan DPEP II	0.00	74.40	0.00	0.00	0.00	20.07	9.28	0.00
P059242	2001	MP DPIP	0.00	110.10	0.00	0.00	20.06	4.65	11.31	-6.03
P009972	2000	Natl Highways III	516.00	0.00	0.00	0.00	25.16	89.67	114.83	114.83
P010505	2000	RAJASTHAN DPIP	0.00	100.48	0.00	0.00	0.00	19.41	9.21	9.23
P059501	2000	TA for Econ Reform Project	0.00	45.00	0.00	0.00	12.03	14.06	21.59	10.94
P049770	2000	REN EGY II	80.00	50.00	0.00	0.00	26.00	17.37	41.29	-4.02
P050657	2000	UP Health Systems Development Project	0.00	110.00	0.00	0.00	30.09	30.51	49.50	12.72
P050646	1999	UP Sodic Lands II	0.00	194.10	0.00	0.00	0.00	0.60	-3.16	-5.30
		Total:	7,838.50	6,816.88	0.00	0.00	549.93	9,085.41	1,955.80	107.20

INDIA
STATEMENT OF IFC's
Held and Disbursed Portfolio
In Millions of US Dollars

		Committed				Disbursed			
		IFC				IFC			
FY Approval	Company	Loan	Equity	Quasi	Partic.	Loan	Equity	Quasi	Partic.
2005	ADPCL	39.50	7.00	0.00	0.00	0.00	0.00	0.00	0.00
2006	AHEL	0.00	5.08	0.00	0.00	0.00	5.08	0.00	0.00
2005	AP Paper Mills	35.00	5.00	0.00	0.00	25.00	5.00	0.00	0.00
2005	APIDC Biotech	0.00	4.00	0.00	0.00	0.00	2.01	0.00	0.00
2002	ATL	13.81	0.00	0.00	9.36	13.81	0.00	0.00	9.36
2003	ATL	1.00	0.00	0.00	0.00	0.68	0.00	0.00	0.00
2005	ATL	9.39	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2006	Atul Ltd	16.77	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2003	BHF	10.30	0.00	10.30	0.00	10.30	0.00	10.30	0.00
2004	BILT	0.00	0.00	15.00	0.00	0.00	0.00	15.00	0.00
2001	BTVL	0.43	3.98	0.00	0.00	0.43	3.98	0.00	0.00
2003	Balrampur	10.52	0.00	0.00	0.00	10.52	0.00	0.00	0.00
2001	Basix Ltd.	0.00	0.98	0.00	0.00	0.00	0.98	0.00	0.00
2005	Bharat Biotech	0.00	0.00	4.50	0.00	0.00	0.00	3.30	0.00
1984	Bihar Sponge	5.70	0.00	0.00	0.00	5.70	0.00	0.00	0.00
2003	CCIL	1.50	0.00	0.00	0.00	0.59	0.00	0.00	0.00
2006	CCIL	7.00	2.00	0.00	12.40	7.00	2.00	0.00	12.40
1990	CESC	4.61	0.00	0.00	0.00	4.61	0.00	0.00	0.00
1992	CESC	6.55	0.00	0.00	14.59	6.55	0.00	0.00	14.59
2004	CGL	14.38	0.00	0.00	0.00	7.38	0.00	0.00	0.00
2004	CMScomputers	0.00	10.00	2.50	0.00	0.00	0.00	0.00	0.00
2002	COSMO	2.50	0.00	0.00	0.00	2.50	0.00	0.00	0.00
2005	COSMO	0.00	3.73	0.00	0.00	0.00	3.73	0.00	0.00
2006	Chennai Water	24.78	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2003	DQEL	0.00	1.50	1.50	0.00	0.00	1.50	1.50	0.00
2005	DSCL	30.00	0.00	0.00	0.00	30.00	0.00	0.00	0.00
2006	DSCL	15.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2005	Dabur	0.00	14.09	0.00	0.00	0.00	14.09	0.00	0.00
2003	Dewan	8.68	0.00	0.00	0.00	8.68	0.00	0.00	0.00
2006	Federal Bank	0.00	28.06	0.00	0.00	0.00	23.99	0.00	0.00
2001	GTF Fact	0.00	1.20	0.00	0.00	0.00	1.20	0.00	0.00
2006	GTF Fact	0.00	0.00	0.99	0.00	0.00	0.00	0.99	0.00
1994	GVK	0.00	4.83	0.00	0.00	0.00	4.83	0.00	0.00
2003	HDFC	100.00	0.00	0.00	100.00	100.00	0.00	0.00	100.00
1998	IAAF	0.00	0.47	0.00	0.00	0.00	0.30	0.00	0.00
2006	IAL	0.00	9.79	0.00	0.00	0.00	7.70	0.00	0.00
1998	IDFC	0.00	10.82	0.00	0.00	0.00	10.82	0.00	0.00

2005	IDFC	50.00	0.00	0.00	100.00	50.00	0.00	0.00	100.00
	IHDC	6.94	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2006	IHDC	7.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2006	Indecomm	0.00	2.57	0.00	0.00	0.00	2.57	0.00	0.00
1996	India Direct Fnd	0.00	1.10	0.00	0.00	0.00	0.66	0.00	0.00
2001	Indian Seamless	6.00	0.00	0.00	0.00	6.00	0.00	0.00	0.00
2006	JK Paper	15.00	7.62	0.00	0.00	0.00	7.38	0.00	0.00
2005	K Mahindra INDIA	22.00	0.00	0.00	0.00	22.00	0.00	0.00	0.00
2005	KPIT	11.00	2.50	0.00	0.00	8.00	2.50	0.00	0.00
2003	L&T	50.00	0.00	0.00	0.00	50.00	0.00	0.00	0.00
2006	LGB	14.21	4.82	0.00	0.00	0.00	4.82	0.00	0.00
2006	Lok Fund	0.00	2.00	0.00	0.00	0.00	0.00	0.00	0.00
2002	MMFSL	7.89	0.00	7.51	0.00	7.89	0.00	7.51	0.00
2003	MSSL	0.00	2.29	0.00	0.00	0.00	2.20	0.00	0.00
2001	MahInfra	0.00	10.00	0.00	0.00	0.00	0.79	0.00	0.00
	Montalvo	0.00	3.00	0.00	0.00	0.00	1.08	0.00	0.00
1996	Moser Baer	0.00	0.82	0.00	0.00	0.00	0.82	0.00	0.00
1999	Moser Baer	0.00	8.74	0.00	0.00	0.00	8.74	0.00	0.00
2000	Moser Baer	12.75	10.54	0.00	0.00	12.75	10.54	0.00	0.00
	Nevis	0.00	4.00	0.00	0.00	0.00	4.00	0.00	0.00
2003	NewPath	0.00	9.31	0.00	0.00	0.00	8.31	0.00	0.00
2004	NewPath	0.00	2.79	0.00	0.00	0.00	2.49	0.00	0.00
2003	Niko Resources	24.44	0.00	0.00	0.00	24.44	0.00	0.00	0.00
2001	Orchid	0.00	0.73	0.00	0.00	0.00	0.73	0.00	0.00
1997	Owens Corning	5.92	0.00	0.00	0.00	5.92	0.00	0.00	0.00
2006	PSL Limited	15.00	4.74	0.00	0.00	0.00	4.54	0.00	0.00
2004	Powerlinks	72.98	0.00	0.00	0.00	64.16	0.00	0.00	0.00
2004	RAK India	20.00	0.00	0.00	0.00	20.00	0.00	0.00	0.00
1995	Rain Calcining	0.00	2.29	0.00	0.00	0.00	2.29	0.00	0.00
2004	Rain Calcining	10.00	0.00	0.00	0.00	10.00	0.00	0.00	0.00
2005	Ramky	3.74	10.28	0.00	0.00	0.00	0.00	0.00	0.00
2005	Ruchi Soya	0.00	9.27	0.00	0.00	0.00	6.77	0.00	0.00
2001	SBI	50.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1997	SREI	3.21	0.00	0.00	0.00	3.21	0.00	0.00	0.00
2000	SREI	6.50	0.00	0.00	0.00	6.50	0.00	0.00	0.00
1995	Sara Fund	0.00	3.43	0.00	0.00	0.00	3.43	0.00	0.00
2004	SeaLion	4.40	0.00	0.00	0.00	4.40	0.00	0.00	0.00
2001	Spryance	0.00	1.86	0.00	0.00	0.00	1.86	0.00	0.00
2003	Spryance	0.00	0.93	0.00	0.00	0.00	0.93	0.00	0.00
2004	Sundaram Finance	42.93	0.00	0.00	0.00	42.93	0.00	0.00	0.00
2000	Sundaram Home	0.00	2.18	0.00	0.00	0.00	2.18	0.00	0.00
2002	Sundaram Home	6.71	0.00	0.00	0.00	6.71	0.00	0.00	0.00
1998	TCW/ICICI	0.00	0.80	0.00	0.00	0.00	0.80	0.00	0.00
2005	TISCO	100.00	0.00	0.00	300.00	0.00	0.00	0.00	0.00
2004	UPL	15.45	0.00	0.00	0.00	15.45	0.00	0.00	0.00
1996	United Riceland	5.63	0.00	0.00	0.00	5.63	0.00	0.00	0.00
2005	United Riceland	8.50	0.00	0.00	0.00	5.00	0.00	0.00	0.00

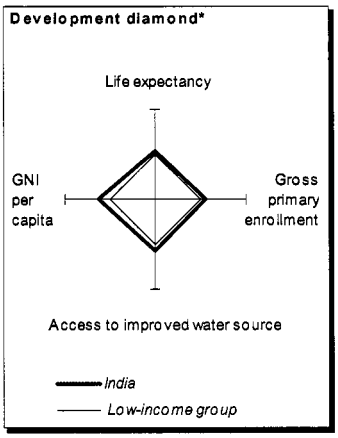
2002	Usha Martin	0.00	0.72	0.00	0.00	0.00	0.72	0.00	0.00
2001	Vysya Bank	0.00	3.66	0.00	0.00	0.00	3.66	0.00	0.00
2005	Vysya Bank	0.00	3.51	0.00	0.00	0.00	3.51	0.00	0.00
1997	WIV	0.00	0.37	0.00	0.00	0.00	0.37	0.00	0.00
1997	Walden-Mgt India	0.00	0.01	0.00	0.00	0.00	0.01	0.00	0.00
2006	iLabs Fund II	0.00	20.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total portfolio:	956.52	249.41	42.30	536.35	604.74	175.91	38.60	236.35

		Approvals Pending Commitment			
FY Approval	Company	Loan	Equity	Quasi	Partic.
2004	CGL	0.01	0.00	0.00	0.00
2000	APCL	0.01	0.00	0.00	0.00
2006	Atul Ltd	0.00	0.01	0.00	0.00
2001	Vysya Bank	0.00	0.00	0.00	0.00
2006	Federal Bank	0.01	0.00	0.00	0.00
2001	GI Wind Farms	0.01	0.00	0.00	0.00
2004	Ocean Sparkle	0.00	0.00	0.00	0.00
2005	Allain Duhangan	0.00	0.00	0.00	0.00
	Total pending commitment:	0.04	0.01	0.00	0.00

Annex 14: Country at a Glance

INDIA: Rampur Hydropower Project

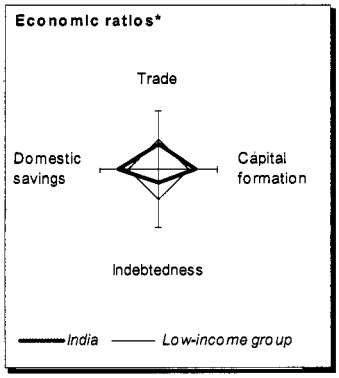
POVERTY and SOCIAL	India	South Asia	Low-income
2005			
Population, mid-year *(millions)*	1,094.6	1,470	2,353
GNI per capita *(Atlas method, US$)*	730	684	580
GNI *(Atlas method, US$ billions)*	804.2	1,005	1,364
Average annual growth, 1999-05			
Population *(%)*	1.5	1.7	1.9
Labor force *(%)*	1.9	2.1	2.3
Most recent estimate (latest year available, 1999-05)			
Poverty *(% of population below national poverty line)*	29	..	..
Urban population *(% of total population)*	29	29	31
Life expectancy at birth *(years)*	63	63	59
Infant mortality *(per 1,000 live births)*	62	66	80
Child malnutrition *(% of children under 5)*	47	45	39
Access to an improved water source *(% of population)*	86	84	75
Literacy *(% of population age 15+)*	61	60	62
Gross primary enrollment *(% of school-age population)*	116	110	104
Male	120	116	110
Female	112	105	99



KEY ECONOMIC RATIOS and LONG-TERM TRENDS

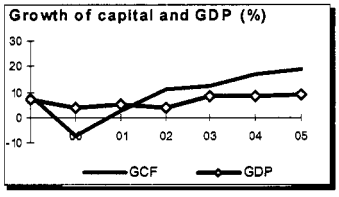
	1985	1995	2004	2005
GDP *(US$ billions)*	227.2	355.2	695.9	805.7
Gross capital formation/GDP	23.7	26.5	31.0	33.4
Exports of goods and services/GDP	5.4	11.0	18.2	20.3
Gross domestic savings/GDP	19.5	25.1	31.1	32.4
Gross national savings/GDP	19.9	26.4	33.3	34.7
Current account balance/GDP	-2.3	-1.8	-0.7	-1.3
Interest payments/GDP	0.9	1.4	0.5	0.8
Total debt/GDP	18.0	26.6	17.9	15.3
Total debt service/exports	23.0	27.8	12.7	12.6
Present value of debt/GDP	..	..	15.8	13.7
Present value of debt/exports	..	..	72.7	57.3

	1985-95	1995-05	2004	2005	2005-09
(average annual growth)					
GDP	5.5	6.0	8.3	9.2	8.3
GDP per capita	3.4	4.3	6.8	7.7	7.0
Exports of goods and services	10.9	13.5	28.1	22.0	13.6

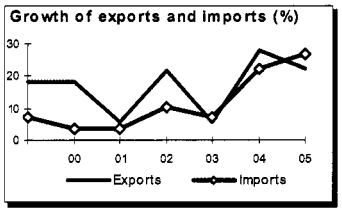


STRUCTURE of the ECONOMY

	1985	1995	2004	2005
(% of GDP)				
Agriculture	33.7	28.2	18.8	18.3
Industry	26.4	28.1	27.5	27.3
Manufacturing	16.4	18.1	15.9	15.7
Services	39.9	43.6	53.7	54.4
Household final consumption expenditure	67.4	63.8	59.9	58.3
General gov't final consumption expenditure	11.4	10.8	11.0	11.3
Imports of goods and services	7.8	12.2	20.0	23.3



	1985-95	1995-05	2004	2005
(average annual growth)				
Agriculture	3.5	2.1	0.0	6.0
Industry	6.5	5.8	9.6	9.4
Manufacturing	6.7	5.4	8.7	9.1
Services	6.7	8.2	9.6	9.9
Household final consumption expenditure	5.7	5.2	3.8	5.7
General gov't final consumption expenditure	4.2	5.5	5.4	9.8
Gross capital formation	5.4	6.3	16.7	18.8
Imports of goods and services	9.9	10.0	22.3	27.1

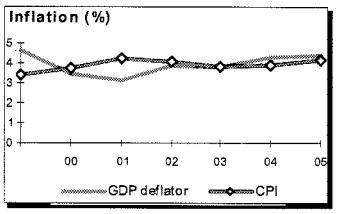


Note: 2005 data are preliminary estimates. Group data are to 2004. 2005 indicates 2005-06 (Apr 1 to Mar 31).

* The diamonds show four key indicators in the country (in bold) compared with its income-group average. If data are missing, the diamond will be incomplete.

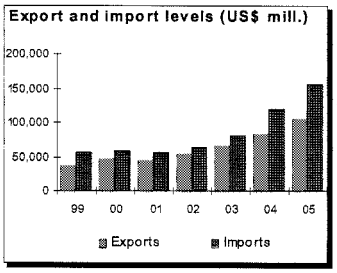
PRICES and GOVERNMENT FINANCE

	1985	1995	2004	2005
Domestic prices				
(% change)				
Consumer prices	4.9	10.0	3.9	4.2
Implicit GDP deflator	7.2	9.0	4.4	4.4
Government finance				
(% of GDP, includes current grants)				
Current revenue	19.2	17.9	19.1	19.7
Current budget balance	-1.7	-3.1	-3.7	-3.5
Overall surplus/deficit	-8.8	-6.7	-7.2	-7.4



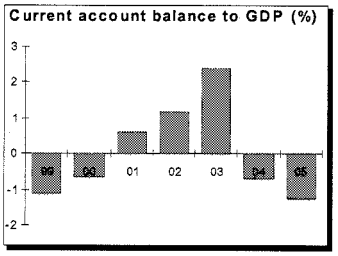
TRADE

	1985	1995	2004	2005
(US$ millions)				
Total exports (fob)	9,461	32,311	82,150	104,780
Tea	334	1,011	1,440	1,436
Iron	544	1,175	5,079	6,189
Manufactures	5,580	23,747	60,731	71,816
Total imports (cif)	17,294	43,670	118,779	156,334
Food	1,310	970	3,105	2,681
Fuel and energy	4,261	7,526	29,844	43,963
Capital goods	3,338	10,330	25,135	31,677
Export price index *(2000=100)*	100	106	115	124
Import price index *(2000=100)*	135	102	111	126
Terms of trade *(2000=100)*	74	103	103	98



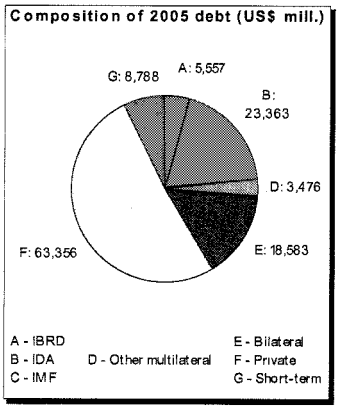
BALANCE of PAYMENTS

	1985	1995	2004	2005
(US$ millions)				
Exports of goods and services	12,777	39,657	128,181	165,390
Imports of goods and services	19,418	51,213	150,611	194,679
Resource balance	-6,641	-11,556	-22,430	-29,289
Net income	-776	-3,205	-2,669	-5,027
Net current transfers	2,207	8,506	20,253	24,095
Current account balance	-5,210	-6,255	-4,846	-10,221
Financing items (net)	4,639	3,319	31,618	24,874
Changes in net reserves	571	2,936	-26,772	-14,653
Memo:				
Reserves including gold *(US$ millions)*	6,520	21,687	140,076	150,866
Conversion rate *(DEC, local/US$)*	12.2	33.4	44.9	44.3



EXTERNAL DEBT and RESOURCE FLOWS

	1985	1995	2004	2005
(US$ millions)				
Total debt outstanding and disbursed	40,951	94,464	124,376	123,123
IBRD	2,396	9,849	4,865	5,557
IDA	9,750	17,499	23,662	23,363
Total debt service	3,531	13,566	19,250	24,335
IBRD	313	1,713	300	417
IDA	124	357	773	809
Composition of net resource flows				
Official grants	450	565	872	1,060
Official creditors	1,421	-1,048	996	1,421
Private creditors	2,273	1,254	4,693	379
Foreign direct investment (net inflows)	106	2,144	5,474	6,598
Portfolio equity (net inflows)	0	1,591	8,835	11,968
World Bank program				
Commitments	2,882	1,427	2,111	1,592
Disbursements	1,375	1,318	1,843	2,130
Principal repayments	157	1,170	784	843
Net flows	1,218	149	1,059	1,288
Interest payments	280	901	289	384
Net transfers	938	-752	770	904



Annex 15: Communications and Public Disclosure

INDIA: Rampur Hydropower Project

1. Experience has shown that development projects in general, infrastructure projects in particular, and hydropower projects perhaps most of all require early and continuous communication between the implementing authorities and all other stakeholders. In this way the benefits of the project are widely understood and both real and perceived concerns of stakeholders are taken into account. This in turn contributes to better design and sequencing of the project, larger stakeholder support for it, and smoother implementation. SJVN and the Bank have taken cognizance of this factor, and have worked together to put in place an appropriate strategy.

2. As detailed under para 28 of main text, the risks associated with this engagement are high, but the potential gains are also substantial in terms of power development and improved implementation practices for India. The risks of not engaging, too, are large and include inadequate development of hydropower as a long term source of clean energy.

3. The approach towards communication therefore has been to prepare a strategy that will:

- Ensure complete transparency around the Rampur hydropower project and help SJVN uphold the highest standards of transparency and disclosure as benchmarked by the Right to Information (RTI) Act;
- Establish and maintain an effective and credible two-way channel of communication with stakeholders in general and project-affected persons (PAPs) in particular, throughout the implementation of RHEP;
- Help ensure smooth and timely project implementation by anticipating and addressing the concerns and misapprehensions of local communities and other civil society organizations that may impact the project.

4. Accordingly, SJVN has agreed on the importance of proactive, professionally managed communication and transparency through all stages of the project both at the site and at the corporate level. Effort will be made to ensure that the communication activities are not piecemeal but are integrated with the project process so that: (i) they meet the assessed information needs of different stakeholders at any given time; (ii) project SJVN's work on the ground and its position on various issues; (iii) help it meet desired standards of transparency and disclosure; (iv) equip it to meet all contingencies, and (v) enable it to gain skills in this area that would stand it in good stead in future, especially in the wake of growing competition in the sector.

5. A communications need assessment study for SJVN was conducted by a consultant, based on which an action plan has been prepared. The plan is aimed at addressing key issues highlighted by the needs assessment study including:

- Ensuring transparency by following appropriate disclosure norms;
- Establishing and maintaining an effective and credible two-way channel of communication with PAPs;
- Enhancing public awareness of SJVN as a socially and environmentally responsible developer of sustainable hydropower.

6. At present, SJVN maintains a Public Information Center at the proposed project site in Bael village; has steady, informal relations with local communities; is upgrading its website; has designated an information officer as required under the RTI legislation; and engages with the local Himachal Pradesh media. Also, given the challenges thrown up by the communications needs assessment, SJVN has set up its own internal nodal communications cell which can guide and oversee the implementation of communication activities detailed in the following plan:

Area of action	Actions required for implementation	Status
Disclosure	Ensure full compliance with Right to Information (RTI) Act norms.	Information officers and appellate authority as mandated by the RTI legislation have been appointed; an RTI corner has been created on the SJVN website containing details mandated for disclosure under Section 4(1)(b). SJVN is also formulating a disclosure framework in order to put into place systems and processes for continued disclosure under RTI, both for suo moto as well as on-demand disclosure. SJVN has also engaged an appropriately qualified independent consultant (as suggested by the Central Information Commission) to identify any gaps in its current RTI disclosure. This consultant has also undertaken specialized RTI training modules for SJVN staff as well as for project-affected communities.
	Maintain full and complete documentation and disclosure on rehabilitation and resettlement (R&R) issues – eg. (i) lists of PAPs; (ii) RAP; (iii) entitlement criteria etc; (iv) R&R status updates. These should all be available in the PIC at the site as well as on the website.	These documents, as and when available, are being disclosed in the PIC at Bael village and also on the SJVN website.
	At all times maintain transparency of procurement and financial management processes and decisions through effective disclosure.	Efforts to increase transparency around these are ongoing and are covered in the Annexes 7 and 8.
	Document the process followed and the details of public consultations (on R&R, environment impact etc) and their outcomes and disclose these in the PIC as well as on the website. This documentation should include details such as date, venue, participants, issues discussed, decisions and next steps. Photographic records should also be maintained.	Ongoing; details are maintained in the PIC at Bael village.

Area of action	Actions required for implementation	Status
Communication with PAPs and other stakeholders	Regular and transparent consultations on key issues affecting PAPs.	Ongoing
	Strengthen the existing PIC set-up by furnishing full details of R&R package (refer above), etc.	Ongoing
	Robust grievance redressal mechanism to be identified and details communicated to PAPs through personal interaction, PIC, handbills and the website.	PAPs have been notified about the establishment of the grievance redressal committee and details will continue to be communicated through diverse media on an ongoing basis.
	Make relevant technical issues (e.g. dam safety, construction safety and emergency measures) accessible to stakeholders through easily comprehensible handouts as well as direct interaction.	Initiated – will be taken further by the nodal communications cell.
Enhancing SJVN's public profile	Revamp the website to include: ▪ Frequently Asked Questions (FAQs) ▪ Interactive section on feedback, queries and grievances ▪ Details of grievance redressal mechanism ▪ R&R details (refer above) ▪ Major reports and studies including EIA, RAP, etc. ▪ Monthly updates on project developments and achievements ▪ Human interest stories from the ground (including benefits of Nathpa Jhakri).	Completed in substantial part in-house, but SJVN is experiencing a skill-gap on this and will need external technical and creative help to make its website truly comprehensive and user-friendly. Hence, a professional web consultant is being retained to take this forward.
	Regular and intensive media outreach: ▪ Regular stream of project updates to local media ▪ Site visits for media at appropriate intervals ▪ Workshops and roundtable discussions aimed at sensitizing the media to relevant issues.	Ongoing.

MAP SECTION

INDIA

RAMPUR HYDROPOWER PROJECT
NATHPA JHAKRI HYDROPOWER PROJECT

HIMACHAL PRADESH

RAMPUR HYDROELECTRIC PROJECT SITE

NATHPA JHAKRI HYDROELECTRIC PROJECT SITE

DAMS

RIVERS

SELECTED TOWNS

STATE CAPITAL

DISTRICT BOUNDARIES

STATE BOUNDARIES

INTERNATIONAL BOUNDARIES

Zaskar River

Chenab River

CHAMBA

LAHUL AND SPITI

Pong Reservoir

KANGRA

Beas Dam

Beas River

Parvati River

Beas River

KULLU

Sainj Khad

Spiti River

HAMIRPUR

MANDI

UNA

Soan River

Bhakra Dam

BILASPUR

RAMPUR HYDROPOWER PROJECT

Sutlej River

RAMPUR

NATHPA JHAKRI HYDROPOWER PROJECT

Wangtu

Nichar

Kilba

Sutlej River

KINNAUR

Baspa River

SHIMLA

SHIMLA

Sutlej River

SOLAN

SIRMAUR

N

0 10 20 30 Kilometers

0 10 20 30 Miles

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APRIL 2006

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